Identification of nursing-sensitive indicators for nursing quality monitoring and reporting in an Australian context

Xiaoquan Xu

A thesis submitted in fulfilment of the requirements for the degree of

Doctor of Philosophy

College of Health and Biomedicine

Victoria University

Melbourne, Australia

February 2015

ABSTRACT

Nursing-sensitive indicators (NSIs) are numerical measures that quantify the effectiveness of nursing care, cost efficiency and organization performance. They have been used extensively to monitor and report the quality of nursing care. However, in Australia the NSIs used for nursing quality monitoring and reporting are incomplete and inconsistent, and there is no national minimum data set of NSIs. Therefore, it is timely to develop a set of agreed NSIs against which health care services can be effectively monitored, reported on and improved in Australia.

Based upon the Donabedian structure–process–outcome (SPO) Model, the present two-phase study was designed to explore the NSIs agreed by the nurses as measures for nursing quality monitoring and reporting and the NSIs used commonly in current clinical practice at a Melbourne metropolitan public health service. Phase One was a concept analysis of NSIs which was used to inform the development of a survey instrument. Phase Two involved an online survey to explore nurses' agreed NSIs and the NSIs commonly used in current clinical practice (N=245).

The findings provide a set of most agreed-upon NSIs as integral measures for nursing quality monitoring and reporting, which included seven structure NSIs, two process NSIs and eight outcome NSIs. This set of NSIs is consistent with the sets of NSIs collected in international nursing quality measurement databases (e.g., National Database of Nursing Quality Indicators and the California Nursing Outcomes Coalition). The findings also indicate that the structure and process NSIs were more agreed-upon than outcome NSIs by nurses as measures for nursing quality monitoring and reporting. In addition, it was found that the use of NSIs in current clinical practice was infrequent and inconsistent.

The present study contributes to the body of knowledge about NSIs. The findings of present study may inform the development of NSIs in Australia.

DECLARATION

I, Xiaoquan Xu, declare that the PhD thesis entitled 'Identification of nursing-sensitive indicators for nursing quality monitoring and reporting in an Australian context' is no more than 100,000 words in length including quotes and exclusive of tables, figures, appendices, bibliography, references and footnotes. This thesis contains no material that has been submitted previously, in whole or in part, for the award of any other academic degree or diploma. Except where otherwise indicated, this thesis is my own work.

Signature Date: 10/03/2015

ACKNOWLEDGEMENT

I would like to express my sincere gratitude to all those who have contributed to the production of this thesis. The thesis would not have been possible without their guidance, support and encouragement.

I extend special appreciation to my Principal Supervisor, Professor Terence McCann, for providing me with invaluable guidance, assistance and support. I also give deep appreciation to my Associate Supervisor, Professor Mary Carolan-Olah, for her great advice, support, and encouragement during my PhD study. It would have been extremely difficult for me to complete the thesis if they had not been my supervisors.

My sincere thanks are given to Dr Neil Diamond, who offered me constructive assistance on statistical issues. I wish to acknowledge the comments provided by my former supervisors Associate Professor Liza Heslop and Dr Sai Lu on my PhD study.

I am very grateful to the College of Health and Biomedicine, Victoria University, for offering and funding me with various workshops, seminars and conferences to strengthen my research skills and improve the quality of my thesis. I wish to thank the staff from the Department of Academic Support and Development and Graduate Research Office, who assisted me in improving my writing skills.

I am indebted greatly to the nurses who dedicated their time to participate in the survey.

My heartfelt gratitude goes to my family and friends for their unconditional support, encouragement, sacrifices and trust during such a hard and long PhD journey. Their love, inspiration, assistance, and empathy are the foundation of the completion of this thesis.

ABBREVIATIONS

ANA	American Nurses Association
AUKUH	Association of UK University Hospitals
B-NMDS	Belgium Nursing Minimum Data Set
CalNOC	California Nursing Outcomes Coalition
C-HOBIC	Canadian Health Outcomes for Better Information and Care
EN	Enrolled Nurse
HOBIC	Health Outcomes for Better Information and Care
ICU	Intensive Care Unit
LPN	Licensed Practice Nurse
LVN	Licensed Vocational Nurse
MeSH	Medical Subject Headings
MilNOD	Military Nursing Outcomes Database
NHPPD	Nursing Hours per Patient Day
NDNQI	National Database of Nursing Quality Indicators
NNQR (C)	National Nursing Quality Report–Canada
NPE	Nursing Practice Environment
NQF	National Quality Forum
NSIs	Nursing-sensitive Indicators
NSIQ	Nursing-sensitive Indicators Questionnaire
NWI	Nursing Work Index
NWI-R	Revised Nursing Work Index
PES-NWI	Practice Environment Scale of Nursing Work Index
PHEQIs	Perceived Hospital Environment Quality Indicators
PICC	Peripherally Inserted Central Catheter
RN	Registered Nurse
SPO	Structure–Process–Outcomes
UAP	Unlicensed Assistive Personnel
VANOD	Veterans' Affairs Nursing Outcomes Database

JOURNAL ARTICLE AND CONFERENCE PRESENTATION

1. Xu, X., Lu, S., Burton, T., & Heslop, L. (2011). Limitations of hospital ward quality monitoring reporting in Australia: a discussion paper. *Electronic Journal of Health Informatics, 6*(3), e21.

2. "Nurses' perceptions of nursing-sensitive indicators: an Australian online survey" at International Conference on Nursing & Emergency Medicine (Nursing-2013), 2-4 December 2013, Las Vegas, USA.

3. "Nurses' perceptions of nursing-sensitive indicators: an Australian online survey" at Victoria University, College of Health and Biomedicine, Postgraduate Student Research Conference, 28 November, 2013, Melbourne, Australia.

4. "Concept analysis of NSIs" at 4th Australia-China Joint Symposium on Science, Technology and Education, 16-19 December, 2012, Perth, Australia.

5. "Limitations of hospital ward quality monitoring reporting" at 5th Annual Conference of Victorian Association of Chinese PhD Students and Scholars, 12, November, 2011, Melbourne, Australia.

TABLE OF CONTENTS

ABSTRACT 2

DECLARATION 3

ACKNOWLEDGEMENT 4

ABBREVIATIONS 5

JOURNAL ARTICLE AND CONFERENCE PRESENTATION 6

TABLE OF CONTENTS 7

LIST OF TABLES 15

LIST OF FIGURES 16

CHAPTER ONE 17

INTRODUCTION 17

1.1 Introduction 17

1.2 Background 17

1.3 Research questions 19

1.4 Aims of the study 19

1.5 Justification for the study 19

1.6 Research design and conceptual framework 20

1.7 Definitions of terms 20

1.8 Structure of the thesis 21

1.9 Summary 22

CHAPTER TWO 23

LITERATURE REVIEW 23

2.1 Introduction 23

2.2 Quality of nursing care 23
2.2.1 Definition of the quality of nursing care 23
2.2.2 Key factors influencing the quality of nursing care 25
2.2.2.1 NPE 26
2.2.2.2 Nurse training and competencies 33
2.2.2.3 Physical plant 34
2.2.2.4 Nursing organization 35
2.3 Limitations of current nursing quality monitoring and reporting processes in Australia 38
2.3.1 Inadequate development of NSIs 38
2.3.2 Lack of standardization in nursing quality monitoring and reporting processes 40
2.3.3 Absence of nursing data in health databases 40
2.3.4 Lack of input from clinically-based nurses 40
2.4 Quality indicators and NSIs 41
2.4.1 Definitions of quality indicators 41
2.4.2 Key characteristics of an ideal quality indicator 43
2.4.3 Types of indicators 43
2.4.3.1 Sentinel indicators versus aggregated-data indicators 43
2.4.3.2 Indicators related to structure, process and outcome dimensions of care 44
2.4.4 Quality indicators used in current nursing quality monitoring and reporting processes 44
2.4.4.1 Structure indicators 44
2.4.4.2 Process indicators 45
2.4.4.3 Outcome indicators 46
2.4.5 The development of NSIs and related initiatives 48

2.4.5.1 NDNQI 53
2.4.5.2 CalNOC 54
2.4.5.3 MilNOD 55
2.4.5.4 VANOD 55
2.4.5.5 NQF-15 55
2.4.4.6 Health outcomes for better information and care (HOBIC) 56
2.4.5.7 Canadian health outcomes for better information and care (C-HOBIC) . 56
2.4.5.8 National nursing quality report-Canada (NNQR (C)) 56
2.4.5.9 B-NMDS 57
2.4.5.10 Nursing quality Programs in the United Kingdom 57
2.5 Summary 58

CHAPTER THREE 59
METHODOLOGY 59
3.1 Introduction 59
3.2 Conceptual framework for the study 59
3.3 Two-phase study design 61
3.4 Rationale for choosing a two-phase study 63
3.5 Rigor of the study 64
3.6 Chapters relating to the research methods in the thesis 64
3.7 Summary 64

CHAPTER FOUR 66
PHASE ONE: CONCEPT ANALYSIS OF NURSING-SENSITIVE INDICATORS 66
4.1 Introduction 66
4.2 Background 66

4.2.1 Conceptualization of concept 66
4.2.2 Nature of concept analysis 67
4.2.3 The need for concept analysis in nursing 68
4.2.4 Application of the results of concept analysis 68
4.2.5 Methods for concept analysis 68
4.2.5.1 Walker and Avant method 69
4.2.5.2 Rodger's evolutionary method 70
4.2.5.3 Pragmatic utility method 71
4.3 Rationale for choosing the modified Walker and Avant method 71
4.3.1 Use of an electronic search of scientific literature as the main search strategy 72
4.3.2 Use of the Holzemer Outcome Model as the theoretical context 72
4.3.3 Identification of the real cases as borderline cases 74
4.4 Determining the aims of the concept analysis of NSIs 74
4.5 Identifying data sources using the concept of NSIs 74
4.5.1 Step one: identify the initial data sources 75
4.5.2 Step two: identify the final data sources 76
4.6 Identifying surrogate terms or related terms for NSIs 77
4.7 Determining core attributes and empirical referents of NSIs 77
4.8 Identifying cases, antecedents and consequences of NSIs 78
4.9 Using the concept analysis of NSIs to develop the survey instrument 78
4.10 Summary 79

CHAPTER FIVE 80
RESULTS OF PHASE ONE: CONCEPT ANALYSIS OF NURSING-SENSITIVE INDICATORS 80
5.1 Introduction 80

5.2 Surrogate terms or related terms 80
5.3 Definitions 81
5.4 Core attributes 82
5.4.1 Structure NSIs 82
5.4.2 Process NSIs 97
5.4.3 Outcome NSIs 98
5.5 Borderline cases 99
5.6 Antecedents 99
5.6.1 Contextual antecedents 99
5.6.2 Ability antecedents 100
5.7 Consequences 101
5.8 Empirical referents 103
5.9 Proposed definitions of NSIs 103
5.10 Pattern of usage of NSIs 104
5.11 Summary 104

CHAPTER SIX 105
PHASE TWO: NURSING-SENSITIVE INDICATORS SURVEY 105
6.1 Introduction 105
6.2 Instrument 105
6.2.1 Phase 1: Construction of NSIQ 105
6.2.2 Phase 2: Assessment of the validity of NSIQ 110
6.2.3 Phase 3: Pilot testing and improving the clarity and feasibility of NSIQ 113
6.2.4 Phase 4: Assessing reliability of NSIQ 113
6.3 Setting 114
6.4 Respondents 114
6.5 Administration of the survey 115

6.6 Data collection....115
6.6.1 Data collection procedure....115
6.6.2 Strategies for increasing response rate....116
6.7 Data analysis....116
6.7.1 Data transformation....117
6.7.2 Grouping NSI data into three dimensions....117
6.7.3 Missing data....117
6.7.4 Statistical tests....119
6.8 Ethical considerations....120
6.8.1 Informed consent....120
6.8.2 Privacy, confidentiality and anonymity....120
6.8.3 Minimizing the risk of harm....120
6.8.4 Data storage, access and disposal....121
6.9 Summary....121

CHAPTER SEVEN....122
RESULTS OF PHASE TWO: NURSING-SENSITIVE INDICATORS SURVEY....122
7.1 Introduction....122
7.2 Demographic profile of respondents....122
7.3 Raking procedure....122
7.4 NSIs nurses agreed on as measures for nursing quality monitoring and reporting....125
7.4.1 Levels of agreement for total 40 NSIs....125
7.4.2 Ten most and least agreed-upon NSIs....125
7.4.3 Most agreed-upon structure, process and outcome NSIs....129
7.4.3.1 Structure dimension....129
7.4.3.2 Process dimension....130

7.4.3.3 Outcome dimension 130
7.4.4 Construct of NSIs 131
7.5 NSIs used commonly in current clinical practice 134
7.6 Summary 136

CHAPTER EIGHT 137
DISCUSSION AND CONCLUSION 137
8.1. Introduction 137
8.2 NSIs nurses agreed on as measures for nursing quality monitoring and reporting 137
8.2.1 Levels of agreement for total 40 NSIs 137
8.2.2 Ten most and least agreed-upon NSIs 138
8.2.3 Most agreed-upon structure–process–outcome NSIs 139
8.2.4 Constructs of NSIs 144
8.3 NSIs used commonly in current clinical practice 145
8.4 Overall discussion of findings 146
8.5 Implications of the study 147
8.5.1 Policy and administration 148
8.5.2 Research 150
8.5.3 Clinical practice 151
8.5.4 Nursing education 152
8.6 Limitations of the study 152
8.7 Strengths of the study 153
8.8 Concluding statement 154

REFERENCES 156
APPENDICES 188

Appendix 1 Nursing-sensitive indicators questionnaire 189
Appendix 2 Invitation email 203
Appendix 3 Poster 205
Appendix 4 Information for participants 206
Appendix 5 Consent form 210
Appendix 6 Reminder email 212
Appendix 7 Ethics approval from Victoria University 214
Appendix 8 Ethics approval from Western Health 216

LIST OF TABLES

Table 2.1 Definitions of NPE..... 26

Table 2.2 Summary of the instruments used to measure NPE..... 28

Table 2.3 Overview of NSIs and its related initiatives..... 49

Table 4.1 Matrix of Holzemer Outcome Model 73

Table 5.1 Definitions of nursing-sensitive indicators used in the data sources..... 81

Table 5.2 Category, frequency and citation of NSIs used in the data sources within Holzemer Outcome Model 84

Table 6.1 Summary of 40 NSIs items in the NSIQ.....107

Table 6.2 Modifications to the NSIQ recommended by the expert panel 110

Table 6.3 Correlations of three factors determined by oblique rotation.....113

Table 6.4 Cronbach's alpha reliability coefficients of NSIQ 114

Table 7.1 Demographic characteristics of the respondents 123

Table 7.2 Comparisons of the proportion of five auxiliary variables between the sample and population 124

Table 7.3 Levels of agreement for 40 NSIs as measures for nursing quality monitoring and reporting…… 126

Table 7.4 Three factors extracted by exploratory factor analysis .....…132

Table 7.5 NSIs used commonly in current clinical practice 135

Table 8.1 A set of most agreed-upon structure-process-outcome NSIs 140

LIST OF FIGURES

Figure 3.1 Donabedian's Structure-Process-Outcome Model..... 60

Figure 3.2 An illustration of the two-phase study..... 62

Figure 4.1 Procedure for identifying the data sources using the concept of NSIs..... 75

Figure 5.1 Concept analysis of NSIs..... 83

Figure 6.1 Scree plot for NSI items.....112

Figure 7.1 Descending sequence of agreement percentages for 14 structure NSIs 129

Figure 7.2 Descending sequence of agreement percentages for 4 process NSIs.....130

Figure 7.3 Descending sequence of agreement percentages for 22 outcome NSIs 131

CHAPTER ONE
INTRODUCTION

1.1 Introduction

Nursing-sensitive indicators (NSIs) are central measures that provide standardized numerical data to evaluate the quality of nursing care, implement quality improvement initiatives, maintain cost efficiency, and develop resource plans (Brown, Donaldson, Burnes Bolton, & Aydin, 2010; Burston, Chaboyer, & Gillespie 2014; Doran, Mildon, & Clarke, 2011; Montalvo, 2007; Patrician, Loan, McCarthy, Brosch, & Davey, 2010). The NSIs agreed by the nurses as measures for nursing quality monitoring and reporting and the NSIs used commonly in current clinical practice at a Melbourne metropolitan public health service were explored in the present study.

An overview of the study is provided in this chapter, and the background, research question, and aims of the study are presented. The justification for the study, research design and conceptual framework are also explained. Finally, an overview of the thesis, including the definitions of terms used in the study and the structure of the thesis, is provided.

1.2 Background

Nurses are the largest group of health professionals in Australia (Australian Nursing & Midwifery Federation, 2009). In 2012, there were 334,078 registered nurses (RNs) and midwives in Australia (Australian Institute of Health and Welfare, 2013). They deliver professional, ongoing and comprehensive nursing care to individuals, families, and communities from conception to death, promoting health for all (American Nurses Association, 2012a; Australian Nursing & Midwifery Federation, 2009; World Health Organization, 2013). Nurses are also accountable for a large proportion of hospital labor costs (Dall, Chen, Seifert, Maddox, & Hogan, 2009; Needleman, Buerhaus, Stewart, Zelevinsky, & Mattke, 2006; Welton, 2008). Therefore, the quality of nursing care not only relates to high-quality and safe care delivered to patients but also affects the budget plan formulation in healthcare organizations. For these reasons, it is important to monitor and report the quality of nursing care in healthcare

systems (Australian Nursing & Midwifery Federation, 2009; Goossen et al., 2001; Wright, 2007). In particular, changes in the structure and composition of the nursing workforce (e.g., nurse shortage) in the last decades have diminished the quality of nursing care and patient safety (Aiken, Shang, Xue, & Sloane, 2013; Schubert et al., 2008; Twigg, Pugh, Gelder, & Myers, 2015). Therefore, more concerns have been raised about monitoring and reporting of the quality of nursing care (Aiken, Clarke, Sloane, Lake, & Cheney, 2008; Lucero, Lake, & Aiken, 2009).

To monitor and report the quality of nursing care, NSIs should be developed and used. NSIs are numerical measures that quantify the effectiveness of nursing care, cost efficiency and organization performance (Aydin et al., 2004; Brown et al., 2010; Doran et al., 2011). They reflect the structure, process and outcome of nursing care (Montalvo, 2007), and demonstrate the influence of nursing care on patient safety, healthcare outcomes and workplace practice (American Nurses Association, 1996; Doran et al., 2011; Gallagher & Rowell, 2003; Needleman, Kurtzman, & Kizer, 2007). Over the last decades, NSIs have been used extensively to monitor and report the quality of nursing care and demonstrate the influence of structure and process of nursing care on patient outcomes (e.g., American Nursing Association 1995, 1996; Montalvo, 2007; Pazargadi, Tafreshi, Abedsaeedi, Majd, & Lankshear, 2008). Nevertheless, the development of NSIs is inadequate at present. NSIs have often been used without the support of a clear conceptual or theoretical basis, and the pattern of usage of NSIs in current nursing quality monitoring and reporting processes is not explicit (Burston et al., 2014). In addition, the majority of research related to NSIs has been conducted in the United States (Doran et al., 2011). For example, sets of systematic, standardized and comprehensive nursing quality measurement databases, such as the National Database of Nursing Quality Indicators (NDNQI) and California Nursing Outcomes Coalition (CalNOC), have been developed as repositories of NSIs in that country. However, in Australia indicators to measure and monitor the quality of nursing care often co-exist with other indicators of healthcare. For example, some indicators related to nursing, such as patient fall and pressure ulcer rates, are incorporated within the clinical indicators program launched by Australian Council on Healthcare Standards (2012) and Australia's National Safety and Quality Health Service Standards (Twigg et al., 2015). There is no national minimum data set of NSIs (Australian Nursing & Midwifery Federation, 2009; Burston et al., 2014). The

lack of integral, individual and consistent indicators results in insufficient definitive evidence to reflect the impact of nursing interventions and staffing levels on patient outcomes. It also limits the comparison of nursing care quality and longitudinal analyses of nursing improvement processes. Furthermore, lack of definitive evidence of NSIs contributes only limited data to inform nurses about the delivery of safe quality care (Duffield et al., 2007; Shand & Callen, 2003). Consequently, the effectiveness of nursing interventions and their contribution to patient outcomes is difficult to monitor and report; and nurses have difficulty in implementing patient safety and quality improvement initiatives and activities.

1.3 Research questions

Two questions are addressed in the study:

- What NSIs do nurses agree on as measures for nursing quality monitoring and reporting?
- What NSIs are used commonly in current clinical practice?

1.4 Aims of the study

The aims of the study were to identify the:

1. NSIs agreed by the nurses as measures for nursing quality monitoring and reporting, and
2. NSIs used commonly in current clinical practice.

1.5 Justification for the study

In Australia, there is a need to develop a set of agreed NSIs against which the quality of nursing care can be effectively monitored, reported and improved. Indeed, the Australian Nursing and Midwifery Federation (2009, p. 9) has recommended that 'the Federal Government should fund a national research project to develop national nursing indicators against which healthcare services can be evaluated'.

Nurses provide care to patients at the bedside, so they are appropriate informants to suggest which indicators are important measures for nursing quality monitoring and reporting (Kennedy, Murphy, & Roberts, 2013; Needleman & Hassmiller, 2009). The

NSIs suggested by nurses themselves are indicative of 'reflective practice' and are suitable for and specific to local circumstances. Thus, knowing the NSIs that nurses agree as measures to reflect their practice is imperative for the development of NSIs; however, little is known about the perceptions of Australian nurses on NSIs.

The present study fills this gap by identifying the NSIs that a sample of Australian nurses agree on as measures for nursing quality monitoring and reporting at a Melbourne metropolitan public health service, and the NSIs that were used commonly in current clinical practice.

1.6 Research design and conceptual framework

A two-phase study was designed to identify the NSIs for nursing quality monitoring and reporting at a Melbourne metropolitan public health service. Phase One was a concept analysis of NSIs that was used to inform the development of a survey instrument (nursing-sensitive indicators questionnaire, NSIQ). Phase Two was an online survey, using the NSIQ, to identify the NSIs agreed by nurse respondents as measures for nursing quality monitoring and reporting and the NSIs used commonly in current clinical practice.

The conceptual framework adopted in this study was the Donabedian Structure–Process–Outcomes (SPO) Model (Donabedian, 1984). In according with this Model, the identification and classification of NSIs in the present study were organized into three dimensions: structure, process and outcome.

1.7 Definitions of terms

Terms that are used frequently in the present study are described in this section.

- **Nursing-sensitive indicators** are the central quality indicators (measures) used to monitor and report the quality of nursing care and nursing services' contribution to patient care. They sensitively reflect structure, process and outcomes of nursing care, and the influences of nursing workload and process on outcomes[1].

[1] This definition was proposed by the concept analysis of NSIs in the present study. See Chapter 5, Section 5.3 and Section 5.9 for more information about the definitions of NSIs.

- **A quality indicator** is ‘a measure of the clinical management and outcome of care; a method of monitoring consumer/patient care and services which attempts to ‘flag’ problem areas, evaluate trends and so direct attention to issues requiring further review’ (Australian Council on Healthcare Standards, 2012).
- **A structure indicator** reflects the availability of resources in the health system. It describes physical, organizational and other characteristics of the system (American Nurses Association, 1996; Mainz, 2003).
- **A process indicator** assesses the process of care nurses provided to patients, which are important and often linked to patient outcomes (American Nurses Association, 1996; Mainz, 2003).
- **An outcome indicator** measures what happens (or does not happen) to a patient following an episode of care (American Nurses Association, 1996; Mainz, 2003).
- **A concept** is ‘a mental image of a phenomenon, an idea or a construct in the mind about a thing or an action’ (Walker & Avant, 2005, p. 26).
- **A concept analysis** is a rigorous and precise procedure for identifying the core attributes, frequency of use, necessary conditions, and case scenarios related to a concept, so that the analysis builds an explicit and consistent meaning for a concept (Walker & Avant, 2011).
- **A conceptual meaning** includes the core attributes, frequency of use, necessary conditions, and case scenarios related to a concept (Hupcey & Penrod, 2005; Rodgers, 1989; Walker & Avant, 2011). It includes the definition, surrogate terms or related terms, core attributes, cases, antecedences, consequences and empirical referents of a concept (Walker & Avant, 2005).
- **The pattern of usage of NSIs** is interpreted using the matrix of the Holzemer Outcome Model that indicates the terms, frequency and dimensions of the use of NSIs in current nursing quality monitoring and reporting processes.

1.8 Structure of the thesis

This thesis is comprised of eight chapters. In Chapter 2, a literature review is presented related to quality of nursing care, limitations of current nursing quality

monitoring and reporting processes in Australia, and a discussion of quality indicators and NSIs. In Chapter 3, the conceptual framework and research design used in the present study are explained. The Donabedian SPO Model was chosen as the conceptual framework. The two-phase study design is described in detail. In Chapter 4, Phase One of the study, the concept analysis of NSIs using the modified Walker and Avant method (Walker & Avant, 2011) is described. In Chapter 5, the results of the concept analysis of NSIs are elaborated, including the definitions, core attributes, borderline cases, antecedents, consequences, empirical referents and pattern of usage of NSIs. These findings informed the development of the instrument used in the NSIs survey (Phase Two of study). In Chapter 6, Phase Two of the study, an overview of the self-administered online NSIs survey is described. In Chapter 7, the results of the survey are outlined. The results focus mainly on NSIs that respondents agreed upon as measures for nursing quality monitoring and reporting; and the NSIs that were used commonly in current clinical practice. In Chapter 8, a discussion of the key findings and implications of the study is presented. The implications of the study in relation to health policy and administration, research, clinical practice, and education for health personnel are also discussed, followed by the limitations and strengths of this study.

1.9 Summary

In this introductory chapter, general information about the study is provided. Information about NSIs in current nursing quality monitoring and reporting processes is also introduced, and a justification for the present study is given. Research questions and aims of the study are discussed. The two-phase study design and conceptual framework (Donabedian SPO Model) adopted in the present study are also outlined.

CHAPTER TWO
LITERATURE REVIEW

2.1 Introduction

The context of the study is introduced in this chapter. Because NSIs are indicators used to monitor and report the quality of nursing care, the review commences with an explanation of the quality of nursing care. Then, the review focuses on the limitations of current nursing quality monitoring and reporting processes in Australia, which justify the study and enable identification of the research questions to examine NSIs. To understand contextual background of NSIs, the review examines the literature related to the quality indicators, development of NSIs and related initiatives.

2.2 Quality of nursing care

2.2.1 Definition of the quality of nursing care

Quality is not a homogeneous property; it involves several characteristics or dimensions. Each dimension needs to be considered and appraised separately. Hence, quality is a complex concept to define (Donabedian, 1969). Evaluation of quality is influenced by individual values, beliefs and perceptions. Clients, physicians, and nurses have their own standards and criteria by which to judge the quality of care. Empirical and normative standards are two criteria used to assess quality. Empirical standards are derived from actual practice and are generally used to compare quality between various settings. Normative standards are derived from sources that legitimately set the standard of knowledge and practice in the dominant care system, so they do not stem from specific examples of actual practice and can be put at the leadership level. These various standards and criteria for the judgment of quality embody the ambiguous definitions of quality (Donabedian, 1984).

Donabedian is recognized as the founder of research into quality in healthcare and health outcomes (Sunol, 2000). Since the 1950s, he has endeavored to define all aspects of quality in health systems. He has claimed that healthcare has three distinct but interlinked aspects: structure, process and outcome (Donabedian, 1984). The quality of nursing care, therefore, is defined in three dimensions and expressed in a

classical framework, the Donabedian SPO Model[2] in which structure and process of care act upon each other, and in turn, influence outcomes of care (Donabedian, 2005). His conceptualization of the quality of healthcare is accepted widely (e.g., American Nurses Association, 1995; Holzemer, 1994; Needleman et al., 2007). However, others have offered alternative explanations on the conceptualization of quality. For example, in 2001 the Joint Commission on Accreditation of Healthcare Organizations defined the quality of care as, '…the degree to which patient care services increase the probability of desired patient outcomes and reduce the probability of undesired outcomes' (Kapoor, 2011, p. 206). The American Institute of Medicine defined quality as, '….the degree to which health services for individuals and populations increase the likelihood of desired health outcomes and are consistent with current professional knowledge' (Mitchel, 2008, p. 1). Similarly, the Australian Council on Healthcare Standards, Australia's leading independent, not-for-profit organization dedicated to improving the quality and safety of healthcare, defines quality as, '…the extent to which the properties of a service or product produce a desired outcome' (Australian Council on Healthcare Standards, 2012). Although most definitions of quality include a measurement against outcomes, Harteloh (2003) had a slightly different view. This author conducted a conceptual analysis of quality of care, and clarified the conceptual meaning of quality as 'the relations between possibilities realized and a framework of norms and values' (Harteloh, 2003, p. 259). Harteloh's definition of quality demonstrates that quality is an abstract rather than a discrete entity.

Nursing is a complex human service that not only encompasses nursing professional care but also the art of caring, such as emotional labor and psychological support for patients (Jasmine, 2009). The blending of the science and art of caring makes many aspects of nursing intangible and invisible, and difficult to define, measure and evaluate (Twigg & Duffield, 2009). In response to these difficulties, great effort has been made to explore the quality of nursing care (Aiken et al., 2013; American Nurses Association, 1995; Harteloh, 2003; Kunaviktikul et al., 2001; Tafreshi, Pazargadi, & Saeedi, 2007). The American Nurses Association (ANA) implemented a Nursing Patient Safety and Quality Initiative to define and examine the quality of nursing care

[2] See Chapter 3, Section 3.2 for more information about Donabedian SPO Model.

in 1994. The ANA's *Nursing Report Card for Acute Ca*re (1995) reviewed explicit propositions of what was known about the quality of nursing care and measurement of nursing quality. The Royal College of Nursing, Australian Member of International Council of Nurses (2009, p. 1), describe quality care in nursing as, 'care planned by Registered Nurses (RNs) in consultation with clients and focused on outcomes identified by nursing assessment; implemented through planned evidence-based interventions; and delivered and evaluated in partnership with clients'. A number of studies have also examined this concept. For example, Tafreshi et al. (2007) interviewed nursing experts and clinical nurses to define and describe quality in Iran. They concluded that 'standard of care' and 'patient satisfaction' were important aspects of quality; and the conceptualized meaning of quality can be understood as 'delivery of safe care based on nursing standards which eventuates in patient satisfaction' (p. 320). Moreover, in Thailand, a descriptive study was employed to develop a definition of quality of nursing care and quality indicators to evaluate and report nursing care given in acute care settings. The study led to a definition of quality of nursing care as, '…nursing's response to the physical, psychological, emotional, social and spiritual needs of patients provided in a caring manner, so that the patients are cured, healthy, to live normal lives; and both patients and nurses are satisfied' (Kunaviktikul et al., 2001, p. 781). Similarly, an American study aimed to examine the influence of nurse managers' quality focus on patient satisfaction, job satisfaction and turnover of nursing personnel, unit effectiveness, and staff perceptions of quality. Their notion of quality was '…the features and characteristics of a service that impact the ability to satisfy or meet the customer's implied needs' (Lageson, 2004, p. 336). This concurs with the definition of quality developed by American Society for Quality (2013). The various definitions demonstrate that the quality of nursing care is multidimensional and influenced by many factors and hence, difficult to define.

2.2.2 Key factors influencing the quality of nursing care

Given that nursing is complex and multidimensional, there exists a wide range of factors that influence the quality of nursing care. Needleman et al. (2007) summarized the influencing factors of quality of nursing care as falling into four broad categories: nursing practice environment (NPE) and culture, nurse training and competencies, physical plant and structure, and nursing organization.

2.2.2.1 NPE

(1) Conceptualization of NPE

The NPE comprises the characteristics of the system and environment in which nurses work, and have a degree of autonomy and control over processes of nursing care delivery (Naylor, 2007). This is a contested territory and Allred et al. (1994) noted that the factors composing NPE, state of NPE, as well as the relation between NPE and quality of nursing care are uncertain. Since that time, many researchers have proposed definitions to clarify NPE (Hoffart & Woods, 1996; Scott, Sochalski, & Aiken, 1999; Zelauskas & Howes, 1992). These definitions are summarized in Table 2.1. Aiken and Patrician (2000) and Lake (2002) have made significant contributions to the conceptualizations of NPE with a focus on two key factors. The first focus relates to the nurse's role in care delivery (Aiken & Patrician, 2000), while the second relates to the impact of encouragers and constraints of the environment on nursing practice (Lake, 2002). Based on the works of Aiken and Lake, more recently the Registered Nurses' Association of Ontario (2013) emphasized the impact of NPE on quality of nursing care and used it to define NPE.

Table 2.1 Definitions of NPE

Author	Definition	Emphasis point
Zelauskas and Howes (1992)	Work conditions for providing nurses with more opportunities for autonomy, accountability and control over the environment in which they deliver care	Autonomy, accountability and control over the environment
Hoffart and Woods (1996, p. 354)	A system that supports RN control over the delivery of nursing care and the environment in which care is delivered	Control over the delivery of nursing care and environment
Scott et al. (1999)	Facilities which have therapeutic nurse–patient relationships	Positive nurse–patient relations
Aiken and Patrician (2000)	A organizational context in which nurses' practice is important in explaining variation in patient, nurses and institutional outcomes	Nursing professional autonomy, control over practice environment and better physician–nurse relationships
Lake (2002, p.187)	The organizational characteristics of a work setting that facilitate or constrain professional nursing practice	Nurse participation in hospital affairs, nursing foundations for quality of care, nurse manager ability, leadership, and support of nurse, staffing and resource adequacy and collegial nurse–physician relations
RN Association of Ontario (2013)	A practice setting that maximizes the health and well-being of nurses, quality patient/client outcomes, organization performance, and societal outcomes	The impact of NPE on the health and well-being of nurses, quality patient/client outcomes, organization performance, and societal outcomes

(2) Instruments for measuring NPE

There are various views about the most appropriate parameters for the measurement of NPE (Aiken & Patrician, 2000; Estabrooks et al., 2002; Lake, 2002; Roche, Diers, Duffield, & Catling-Paull, 2010; Schubert et al., 2008). Consequently instruments to measure NPE vary considerably; to the date three main instruments have been developed which are discussed (Table 2.2). Since 1983, the development of these instruments has occurred in the Magnet Recognition Program in the United States, through which magnet hospitals are accredited (American Nurses Credentialing Center, 2013). Magnet hospitals have quality nursing care, positive patient outcomes and experience, and low rates of staff turnover. Most have satisfactory and attractive NPE characteristics that include professional autonomy, control over nursing practice, adequacy of staffing, supportive management and effective interdisciplinary relationships (Aiken, Buchan, Ball, & Rafferty, 2008; Kelly, McHugh, & Aiken, 2011; Lake, Shang, Klaus, & Dunton, 2010). Based on magnet hospital characteristics, Kramer and Hafner (1989) developed the Nursing Work Index (NWI) to measure NPE in 1989. The index has 65 items derived from the organizational traits of NPE in magnet hospitals (Table 2.2). The NWI is recognized as a strong and valid foundation instrument for measuring NPE (Lake, 2002). However, it has limitations: there are no empirical and reference-valued domains, the items are extensive, and it lacks a subscale about nurse autonomy (Aiken & Patrician, 2000; Lake, 2002).

Table 2.2 Summary of the instruments used to measure NPE

Instrument	Authors	Items	Development	Advantages	Limitations
NWI	Kramer and Hafner (1989)	65 items, covering the domains of: (1) nursing job satisfaction (2) perceived productivity (3) perceptions of an environment conducive to quality nursing care	Developed from the organizational characteristics of 46 magnet hospitals which participated in the nurse survey conducted by the American Academy of Nursing	A strong foundation and ideal instrument	(1) No empirical and reference-valued domains (2) Extensive items (3) Lack of a subscale about nurse autonomy
NWI-R	Aiken and Patrician (2000)	57 items, 4 subscales (1) Autonomy (2) Control over the practice setting (3) Nurse-physicians relationship (4) Organizational support	(1) Eliminated 10 items, modified one item, and added 2 items in the NWI (2) Retained the 'presence' statement, deleted the two 'value' statements in the NWI (3) Tested the reliability and validity in an American national AIDS care study	(1) Derivation from the concept of professional work environments (2) Wide utilization in different countries and hospitals	(1) Too many items (2) Failure to replicate statistically four-subscale structure in the NWI-R (3) Absence of statistical model to examine the study data (4) Insufficient common domains content

Table 2.2 Continued

Instrument	Authors	Items	Development	Advantages	Limitations
PES-NWI	Lake (2002)	31 items, 5 subscale (1) Nurse participation in hospital affairs (2) Nursing foundations for quality of care (3) Nurse manager ability, leadership, and support of nurse (4) Staffing and resource adequacy (5) Collegial nurse-physician relation	(1) Selected 48 items from the NWI (2) Identified subscales representing domains with exploratory factor analysis (3) Determined subscale reliability with Cronbach's alpha criterion (4) Evaluated construct validity of the subscales and the composite by comparing the scores of nurses in magnet and non-magnet hospital samples (5) Tested the generalization of selected subscale model using oblique multiple-group principal components cluster analysis	(1) Including four theory-based domains and a staffing/workload domain (2) Fewer items (3) Adopted as an NSI in the NDNQI	(1) Failure to cover all salient domains of NPEs (2) A need for the improvement of its five-factor model (3) Further development of a short form of PES (4) Less application than the NWI-R

To alleviate the deficiencies of NWI, Aiken and Patrician (2000) proposed the Revised Nursing Work Index (NWI-R). The NWI-R focuses on the presence of special organizational traits that reflect the features of nursing job satisfaction and hospital outcomes at unit and hospital levels. It comprises 57 items within four subscales (Table 2.2). The NWI-R has been used widely in many countries and across different types of hospitals (Flynn & McCarthy, 2008; Gerhardt & VanKuiken, 2008; Tervo-Heikkinen, Partanen, Aalto, & Vehviläinen-Julkunen, 2008; Van Bogaert, Clarke, Vermeyen, Meulemans, & Van de Heyning, 2009). Its content, criterion and construct validity have been established and a four-factor model is used for reliability (Joyce & Crookes, 2007; Kanai-Pak, Aiken, Sloane, & Poghosyan, 2008). However, some researchers have had distinct opinions about the stability, dissemination and utility of the NWI-R (Cummings, Hayduk, & Estabrooks, 2006; Lake, 2002, 2007; Slater & McCormack, 2007). The criticisms include: (1) too many items that are time consuming for respondents (Lake, 2002); (2) failure to replicate statistically four-subscale structure in the NWI-R (Slater & McCormack, 2007); (3) absence of statistical model to examine the study data (Cummings et al., 2006); and (4) insufficient common domains content (Lake, 2007). In response to these concerns, Lake (2002) further examined the data from the Kramer and Hafner (1989) study. From this examination, a psychometrically sound Practice Environment Scale of NWI (PES-NWI) emerged (Lake, 2002). The PES-NWI comprises four theory-based domains plus a staffing/workload domain, and has 31 items in five subscales (Table 2.2). The domain content is sufficient and empirical. At the same time, the survey length of 31 items is shorter and encourages a high response rate. For these reasons, PES-NWI has been adopted by the ANA as a NSI to measure NPE in the NDNQI. Nevertheless, the PES-NWI still has limitations. It cannot cover all the salient domains of NPE (Lake, 2007) and its five-factor model requires improvement of validity (Cummings et al., 2006). A short form of PES is needed to facilitate its use as a tool at computer ‘dashboards’ (Lake, 2007). One difficulty with this model is that a target level of the organization (hospital or nursing unit) has not been explicitly studied and its application is not as wide as the NWI-R (Lake, 2007).

(3) The relationship between NPE and the quality of nursing care

A large number of international studies confirm that the various NPE factors — strong, supportive and visible nurses’ leadership; autonomy over practice and the practice

environment; good relations and communication with other practitioners; professional development; career advancement opportunities; flattening of organizational structures; and flexible scheduling—have a strong impact on the quality of nursing care (e.g., Aiken & Patrician, 2000; Gormley, 2011; Kramer, Halfer, Maguire, & Schmalenberg, 2012; Lake, 2002; Tervo-Heikkinen, Partanen et al., 2008; Van Bogaert et al., 2009). Some examples of these studies are analyzed below in terms of the country where the research was conducted.

Since 2000, researchers in the United States, led by Aiken (2001, 2008, 2009, 2011, 2012), have undertaken a series of studies to examine comprehensively the influence of NPE on diverse patient outcomes of hospitals (e.g., 30-day inpatient mortality, failure to rescue,[3] satisfaction with nursing care, and willingness to recommend hospitals). These research results demonstrated that a satisfactory and automatic NPE had a significant influence on improving the quality of nursing care, achieving positive patient outcomes and increasing patient satisfaction. Similarly, Lake et al. (2010) used the NDNQI data collected from 108 magnet and 528 non-magnet hospitals to examine the relationship between hospital magnet status, nursing unit staffing, and patient falls. They found that the fall rate in magnet hospitals decreased by 5% in comparison to non-magnet hospitals. The findings indicated that creating environments using magnet hospital standards provided the potential to enhance patient safety. More recently, in an American narrative study to examine nurses' perception of meaningful work (Pavlish & Hunt, 2012), nurses identified learning-focused environment, teamwork, constructive management, and time with patients as positive factors for meaningful nursing work. The findings suggested that there is a need to improve work environments and job satisfaction to produce positive healthcare outcomes.

In Canada, Laschinger, and Leiter (2006) surveyed 8,597 hospital-based nurses to test a theoretical model of professional nurse work environments. The model demonstrated that NPE conditions played a significant role in decreasing nurse burnout and producing positive patient safety outcomes.

[3] Failure-to rescue refers to the rate of death among patients with treatable serious complications, for example patient death following postoperative complications (Aiken, Clarke et al., 2008; National Quality Forum, 2004).

In Finland, Tervo-Heikkinen, Partanen et al. (2008) conducted a cross-sectional survey of 664 RNs to explore the relationships between NPE and nursing outcomes. They found that collegial nurse–physician relationships, adequate staffing and standards of professional nursing were the most important factors of work environment, and these had significant impact on nurses' job-related stress, job satisfaction, patient satisfaction and adverse events for patients and nurses. Pelander, Leino-Kilpil, and Katajisto (2007) undertook a cross-sectional survey of Finnish children's perceptions toward the quality of pediatric nursing care. The study ascertained that the children gave the highest score to the NPE, in which nurses played entertainment activities with children and there was good communication and trustworthiness between nurses and children. The findings suggested that a quality environment includes physical, warm social and safe emotional elements.

Using the Dutch version of NWI-R, Van Bogaert et al. (2009) observed associations between NPEs and nurse-reported outcomes in Belgian hospitals. The study discovered that NPE factors (collegial nurse–physician relationships, nurse management at the unit level, hospital management and organizational support), had significant associations with nurse job satisfaction, intention to stay at the hospital, nurse-assessed unit level quality of care and personal accomplishment.

In Australia, Duffield et al. (2007) undertook a comprehensive in-depth study to investigate the relationships between NPE and patient safety. Using cross-sectional data collected from 286 nursing wards and longitudinal 5-year data in hospital administrative data systems, they found that: (1) nurses' autonomy, control over their practice and good nursing leadership on wards had a substantial impact on job satisfaction; (2) nurse leadership, presence of a nurse educator on the ward, adequate resources, nurse autonomy and nurses' control over their own practice ensured patients were provided with safe and quality care; and (3) stability of the ward environment promoted positive patient outcomes (Duffield et al., 2007). These findings all demonstrated that a satisfactory work environment for nurses was associated with the delivery of high quality care, thereby reducing staff turnover and promoting patient safety.

Kazanjian, Green, Wong, and Reid (2005) gathered and critically reviewed 27 primary studies that focused on the effect of NPE on patient mortality. Of the 27 identified studies, 19 asserted that one or more attributes of NPE had an impact on patient mortality, specifically autonomy, nursing workload, inter-professional relationships, nursing management, nursing standards, professional development, and nurse-mediating processes. In addition, Cummings et al. (2010) also conducted a systematic review to examine the effects of various styles of leadership on nursing workforce and NPE. The review showed that transformational and relational leadership increased nurse satisfaction, recruitment, retention, and satisfactory work environments.

2.2.2.2 Nurse training and competencies

(1) Conceptualization of nurse training and competencies

Nurse training and competencies refer to the skills and abilities of a nurse to perform a task and achieve desired outcomes (Meretoja, Isoaho, & Leino-Kilpi, 2004). Competencies include professional knowledge, clinical skills, communication ability, problem-solving skills, and moral sensibility. They enable nurses to have autonomy to perform and have control over their own professional interventions with patients. At the same time, they facilitate nurses to develop collegial nurse–physician relationship, validating teamwork and collaboration in the practice team.

(2) Relationship between nurse training and competencies and quality of nursing care

A number of studies have confirmed nurse training and competencies as the key factors influencing the quality of care (Aiken, Clarke, Cheung, Sloane, & Silber, 2003; Aiken et al., 2011; Al Qadire, 2014; Bai et al., 2014; Ball, Murrells, Rafferty, Morrow, & Griffiths, 2014; Ridley, 2008). Aiken et al. (2012), for example, examined whether the proportion of hospital nurses educated at the bachelor degree or higher was associated with 30-day inpatient mortality and failure to rescue. They found that a 10% increase in the number of nurses with bachelor degrees in nursing was associated with a decrease of approximately 4% in mortality and failure to rescue rates. Furthermore, in a study seeking to understand the influence of nurses' knowledge about palliative care on the quality of nursing care, Al Qadire (2014) surveyed 190 RNs working in five Jordanian government hospitals. The study showed that nurses' lack of sufficient

knowledge and conceptions about palliative care were obstacles to providing high-quality palliative care services. In a similar approach, Ridley (2008) investigated how nurse education level affected patient safety by using patient safety indicators from the Agency for Healthcare Research and Quality. He found 30-day mortality and pneumonia were inversely related to nurse education. Higher level of nurse education was associated with improved patient safety. In general, because of the strong link between nurse training/competencies and quality, many researchers have identified related nurse education factors such as RN education level and years of experience as NSIs (e.g., Aydin et al., 2004; Blegen, 2006; Dunton, Gajewski, Klaus, & Pierson, 2007; Pazargadi et al., 2008). These are listed in nursing quality measurement databases such as the NDNQI, CalNOC, MilNOD, and VANOD.

2.2.2.3 Physical plant

(1) Conceptualization of physical plant

Physical plant refers to facilities, resources and unit layout in the physical environment of nursing care. The facilities and resources include computerization (e.g., physician-order entry systems) and communication-enhancing technology (e.g., call systems). Nursing unit layout includes design of patient rooms and equipment (Needleman et al., 2007).

(2) The relationship between physical plant and the quality of nursing care

The construction of physical plant (e.g., information system, equipment, unit design) ensures high quality nursing care by reducing errors in data entry, retrieval, and charting; promoting efficient and effective care; and creating a humanistic environment. For example, in magnet hospitals in the United States, physical plant in the nursing environment, such as information and resources, provides easier access for nurses and adequate support services for nurses to spend time with patients (Upenieks, 2003). Therefore, it is without question that physical plant has an impact on the quality of nursing care. Physical plant has been included in instruments (NWI-R and PES-NWI) to measure the relationship between NPE and quality of nursing care (Aiken & Patrician, 2000; Lake, 2002; Needleman et al., 2007; Ulrich et al., 2008). Nevertheless, empirical research focusing on the influence of physical plant on patient outcomes is still scant. One team led by Ulrich (Ulrich et al., 2008, 2010) studied the impact of the physical environment of hospitals on patient outcomes. They reported

that the physical environment had strong links with three general types of outcome: patient safety issues (e.g., infections, medical errors and falls), other patient outcomes (e.g., pain, sleep, stress, depression, length of stay, and overall patient satisfaction), and staff outcomes (injuries, stress, work effectiveness and satisfaction). This evidence-based research suggests well-designed physical settings, good acoustic environment, superior ergonomic design, and improved floor layouts and work settings contributed significantly to the quality of nursing care delivered to patients and provided safe places for nurses to work. In addition, Fornara, Bonaiuto, and Bonnes (2006) surveyed 220 patients, visitors and staff about the physical and social environments in three orthopedic units in Rome that represented low, moderate and high levels of environmental humanization (design features that support users' needs and well-being). From the survey, they developed 12 Perceived Hospital Environment Quality Indicators (PHEQIs) scales, covering spatial–physical and social–functional aspects of the hospital environment. The study confirmed that the hospital environment was significantly linked to the quality of service provision. Later, Andrade, Lima, Fornara, and Bonaiuto (2012) used PHEQIs to survey 562 hospital users, including patients, staff and visitors/companions in four orthopedic units of Portuguese hospitals. That study further tested the reliability and validity of the PHEQIs scales in a different cultural context, and provided evidence for the development of a culture-neutral hospital Environmental Quality Perception measure.

2.2.2.4 Nursing organization

(1) Conceptualization of nursing organization

Nursing organization refers to the organizational attributes of nursing facilities or units. An organization's attributes can be described by various variables, such as nurse staffing, organizational standardization, expertise and discretion (Needleman et al., 2007). These variables are related to the quality of care. A flat organizational structure facilitates quality and safe care delivery to patients.

(2) The relationship between nursing organization and the quality of nursing care

Although a nursing organization can influence the quality of care, its precise impact is not well established because only selected factors in the organization, such as nurse staffing, have been studied extensively (Aiken et al., 2013; Cho, Ketefian, Barkauskas,

& Smith, 2003; Lee, Blegen, & Harrington, 2014; Mark, Harless, McCue, & Xu, 2004; Patrician et al., 2011; Serratt, 2013). Other factors (e.g., patient turnover and nurse turnover) lack consistent definitions and rigorous design, thus direct comparisons of the quality of nursing care in different organizations and facilities are rare in the literature (Needleman et al., 2007). Three variables have been used to measure nurse staffing levels:

(1) the proportion of the nursing staff who are RNs (Aiken, Clarke, Sloane, Sochalski, & Silber, 2002; Aiken et al., 2013; Needleman et al., 2002a, 2002b; Tourangeau, Giovannetti, Tu, & Wood, 2002; Twigg, Duffield, Bremner, Rapley, & Finn, 2011),

(2) the number of hours per patient day of nursing care from RNs or licensed nursing staff (Mark et al., 2004; Taylor et al., 2011; Twigg et al., 2011), and

(3) an equivalent measure of volume of care such as patient–nurse ratio (Aiken et al., 2012; Buffet-Bataillon et al., 2010; Mark, Salyer, & Wan, 2003; Serratt, 2013).

Several outcomes or complications associated with low nurse staffing are identified in the literature:

(1) mortality (Aiken, Clarke, & Sloane, 2002; Aiken et al., 2011; Kovner, Jones, Zhan, Gergen, & Basu, 2002; Needleman et al., 2011; Twigg et al., 2011; West et al., 2014),

(2) failure to rescue (Aiken et al., 2013; Aiken et al., 2011; Needleman, Buerhaus, Vanderboom, & Harris, 2013; Talsma, Jones, Guo, Wilson, & Campbell, 2013),

(3) hospital acquired infections (Ausserhofer et al., 2013; Cho et al., 2003),

(4) length of stay (American Nurses Association, 2000; Needleman et al., 2002a; Spetz, Harless, Herrera, & Mark, 2013),

(5) hospital costs (Barkell, Killinger, & Schultz, 2002; Dimick, Swoboda, Pronovost, & Lipsett, 2001; Twigg, Geelhoed, Bremner, & M Duffield, 2013), and

(6) patient satisfaction (American Nurses Association, 2000; Barkell et al., 2002; Yu & Kim, 2013).

The relationship between nurse staffing and some specific organizational outcomes or complications has attracted interest in a wide range of studies (e.g., American Nurses Association, 2000; Aiken et al., 2012; Aiken et al., 2013; Kovner et al., 2002; Tourangeau et al. 2002; Twigg et al., 2011; Unruh, 2003). For example, the ANA (2000) commissioned a large-scale study examining the impact of nurse staffing

(licensed hours per acuity adjusted day or higher RN skill mix) on patient outcomes and professional wellbeing of nurses. The study revealed that adequate staffing levels or higher RN skill mix led to shorter lengths of stay or lower secondary infection rates, such as bacterial pneumonia, post-operative infection, pressure ulcer and urinary tract infection. Furthermore, Aiken et al. studied the influence of nurse staffing (patient–nurse ratio and agency-employed supplementary registered nurses) on 30-day in-hospital mortality and failure to rescue (Aiken, Clarke, Sloane, Sochalski, & Silber, 2002; Aiken et al., 2013). These studies found that sufficient nurse staffing significantly decreased the likelihood of 30-day patient mortality and failure to rescue. Similarly, Needleman, Buerhaus, Mattke, Stewart, and Zelevinsky (2002a, 2002b) examined the relationship between the amount of care hours provided by RNs, LPNs, and nurses' aides in hospital and 14 adverse patient outcomes, such as failure to rescue, pneumonia, shock or cardiac arrest, upper gastrointestinal bleeding, sepsis, or deep venous thrombosis. This study concluded that the number of hours of care by RNs per day was associated inversely with the rate of adverse patient outcomes. In Canada, to understand the effects of nursing-related hospital variables on 30-day mortality rates of hospitalized patients, Tourangeau et al. (2002) examined the discharge data of 46,941 patients from 75 acute care Canadian hospitals, and 3,998 responses to the Ontario RN Survey of Hospital Characteristics. The study revealed a richer skill mix among RNs, more years of experience on the clinical unit, and higher nurse-reported adequacy of staffing and resources led to lower 30-day mortality.

Research to examine the relations between nurse staffing and patient outcomes has also received attention in Australia. For example, a research group (Twigg et al., 2011, 2012) investigated the influence of the nursing hours per patient day staffing method on nursing-sensitive outcomes. They found that its implementation decreased the rates of nursing-sensitive outcomes at the hospital and ward level, such as mortality, shock/cardiac arrest, ulcer/gastritis/upper gastrointestinal bleed, length of stay and urinary tract infections. Similar to other studies, Needleman et al. (2011) used Cox proportional hazards models to examine the relations between patient mortality and patients' exposure to nursing staffing levels, with statistical adjustment for characteristics of patients and hospital units. They found that mortality was positively associated with patients' exposure to nursing staffing and patient turnover, and that consequently, nurse staffing was an important component of delivery of care. In

Korea, Yu and Kim (2013) evaluated the differences in length of hospitalization, incidence of death, RN overtime hours and nursing job performance at one surgical unit prior to and after the addition of extra staff. They found that the addition of extra nursing staff reduced the length of patient hospitalization and RN overtime hours, and improved nurse job performance scores in the unit. The findings support the belief that appropriate nurse staffing levels improve patient and nurse outcomes. Several studies, conversely, concluded there were no significant associations between nurse staffing and outcomes (e.g., Barkell et al., 2002; Cho et al., 2003; Dimick et al., 2001; Mark et al., 2003). These studies investigated a subset of patients with a specific way of delivering and organizing nursing care (Needleman, 2008). For example, Needleman et al. (2002a) found that there was an association between nurse staffing levels and failure to rescue for surgical patients but not for medical patients. The results therefore may only reflect the status of specific cohorts of patients.

2.3 Limitations of current nursing quality monitoring and reporting processes in Australia

Monitoring and reporting of the quality of nursing care began when Florence Nightingale used statistical methods to identify the relationship between patient outcomes and environmental conditions in the 1850s (Montalvo, 2007). However, compared to those earlier times, nursing has developed into a complex human service, mixing science and art of care. It has multiple dimensions, with those relevant to subjectivity and intuition difficult to define and measure. Therefore, efforts to monitor and report the quality of nursing care were not implemented widely and comprehensively until the late 1970s (Doran et al., 2011). For example, the concept of NSIs in the realm of quality monitoring and reporting emerged in the 1990s (Burston et al., 2014; Harrington, 2009); and in Australia there is still no standardization of or consensus on NSIs for nursing quality monitoring and reporting. This next section of the review examines the limitations of current nursing quality monitoring and reporting processes in Australia.

2.3.1 Inadequate development of NSIs

In response to increasing expectations to measure and monitor the quality of healthcare, Australian authorities and organizations have developed various quality

indicators (Mcloughlin, Leatherman, Fletcher, & Owen, 2001). For example, the Australian Council on Healthcare Standards, Australia's National Safety and Quality Health Service Standards, Classification of Hospital-Acquired Diagnoses, Joint Working Party of the Australian Commission on Safety and Quality in Health Care, Independent Hospital Pricing Authority, and the Victorian Department of Health developed separate sets of safety and quality indicators (Twigg et al., 2015). In addition, some healthcare organizations have developed databases (e.g., Riskman, PRIME and TREND) to collect quality indicators, some of which are nursing-focused. Nevertheless, sets of NSIs to monitor and report nursing care quality specifically are lacking or are often integrated with other healthcare indicators. Furthermore, there is no consensus or clarity about which NSIs can be measured confidently as indicators of the quality of nursing care. Development of agreed upon and explicit NSIs for monitoring and reporting the quality of nursing care in hospitals is still at an early stage, and a national minimum dataset of nursing quality indicators for the accountability and benchmarking of nursing care does not exist (Australian Council on Healthcare Standards, 2012; Australian Nursing & Midwifery Federation, 2009). There is a dearth of information about how best to use routine data as indicators to monitor and report the quality of nursing care and how to incorporate this type of NSI data into nurses' day-to-day work such as nursing handover (Burston et al., 2014; Duffield et al., 2007). These limitations in the development of NSIs in Australia make the contribution of nursing care to patient outcomes difficult to evaluate and report. Such limitations are an obstacle to nurses receiving meaningful information to support their endeavors to monitor and maintain nursing care quality. Shand and Callen (2003) stated that nursing managerial and clinical information provided to hospital administrators and clinicians was insufficient; only one dimension of nursing process was tracked in the existing information systems; and there was a need for investigation of the linkages between clinical and management information systems in Australian public and private hospital sectors.

Duffield, Diers, Aisbett, and Roche (2009) concurred with Shand and Callen, claiming that the absence of ward-level metrics created a barrier for nursing unit/ward managers to evaluate the quality and efficiency of care. The Australian Nursing and Midwifery Federation, Australia's largest health union representing over 240,000 nurses and midwives, has recognized the limitation of NSIs. It has argued that 'a

national system of indicators to evaluate the performance of all healthcare services (both public and private) include nurse sensitive outcome indicators and indicators for nursing workload, staffing and skill-mix should be developed' (Australian Nursing and Midwifery Federation, 2009, p. 9).

2.3.2 Lack of standardization in nursing quality monitoring and reporting processes

Current nursing quality monitoring and reporting processes vary across Australia. This variation occurs predominantly because of a lack of consensus and clarity about which NSIs should be selected for measurement (Xu, Lu, Burton, & Heslop, 2011). Each organization and population identifies and documents its own standards and indicators as measures to monitor and report the quality of nursing care (Shand & Callen, 2003; Pearce et al., 2009; Roche et al., 2010). The inconsistency of monitoring and reporting makes it impossible to compare performances across like-sized organizations and health services.

2.3.3 Absence of nursing data in health databases

Although there are abundant data to record patients/clients healthcare usage and health outcomes within existing health databases, much of the data needed to monitor and report the quality of nursing care and nurses' contributions to patient care are absent from these databases (Duffield et al., 2007; Kleib, Sales, Doran, Mallette, & White, 2011; Murphy, 2010). The absence of nursing data has hindered evaluation of nursing care, improvement of the quality of care, planning of nursing resources, and providing evidence to show that nurses deliver quality care to patients.

2.3.4 Lack of input from clinically-based nurses

Nurses form the largest component of the healthcare workforce (Australian Nursing and Midwifery Federation, 2009). They understand the work of patient care and are keen to monitor the quality of care. Therefore, nurses are in a prime position within the quality monitoring and reporting processes, and their views and perceptions should inform the initiatives and activities of quality evaluation and improvement (Kennedy et al., 2013; Needleman & Hassmiller, 2009). However, studies still suggest that nurses are not particularly engaged in discussions about quality monitoring and

reporting (Burhans & Alligood, 2010; Xu et al., 2011). At the same time, nursing quality monitoring and reporting processes require nurses to report indicator data such as falls and pressure ulcers, which is a time-consuming and burdensome process to complete (Burston et al., 2014,). As a result, input from clinically-based nurses remains peripheral to quality monitoring and reporting (Twigg et al., 2015).

Remedying the dearth of NSI development research in Australia is a priority because NSIs are the foundation of nursing quality monitoring and reporting processes. They are basic measures, providing data for policy makers, nurse administrators and frontline nurses to monitor and report the quality of care, produce positive patient outcomes and improve service performance (Aiken et al., 2008; Kurtzman, Dawson, & Johnson, 2008; Lucero et al., 2009; Needleman et al., 2007; Schubert et al., 2008; Sjetne, Veenstra, Ellefsen, & Stavem, 2009). In the absence of NSIs, the quality of nursing care cannot be monitored longitudinally and reported properly, and comparison across different organizations and sectors is difficult to undertake. Additionally, standardized nursing data cannot be integrated and collected in databases. Therefore, it is necessary to develop NSIs and construct a national minimum dataset of NSIs in Australia. In order to understand the contextual background of the study of NSIs, the literature relevant to NSIs (quality indicators and development of NSIs) is reviewed in the following section.

2.4 Quality indicators and NSIs

Quality indicators, sometimes described as clinical indicators, are effective tools and measures for defining, monitoring, and evaluating the quality of healthcare. They ‘provide the data used to assess the appropriateness of specific healthcare decisions, services and outcomes’ (Kavanagh, Adams, & Wang, 2009, p. 458), and to determine the potential to improve care (Australian Council on Healthcare Standards, 2012). In essence, NSIs should be a form of quality indicator in nursing; hence this review begins with an explanation of quality indicators in health disciplines.

2.4.1 Definitions of quality indicators

A quality indicator is defined in various ways, making its conceptualization dynamic and evolving. The Joint Commission on Accreditation of Healthcare Organizations

(JCAHO) is a leading agency in the United States charged with continuously improving healthcare for the public by evaluating healthcare organizations. JCAHO started indicator development initiatives in the late 1980s and has proposed the most frequently used definition of quality indicators (Dagher & Lloyd, 1992; Fielo, 1993; JCAHO, 1989, 1993, as cited in Idvall, Rooke, & Hamrin, 1997; Tapaneeyakpm, 2002). It defined an indicator as 'a quantitative measure that can be used as a guide to monitor and evaluate the quality of important patient care and support service activities' (Idvall et al., 1997, p. 6). In 1993, the definition of indicators was expanded in a more complex way. An indicator came to be described as 'a valid and reliable quantitative process or outcome measure related to one or more dimensions of performance such as effectiveness and appropriateness and a statistical value that provides an indication of the condition and direction over time of an organization's performance of a specified outcome' (Idvall et al., 1997, p. 7). With the evolution of health disciplines, the definition of quality indicators has changed over time. More recently, JCAHO has defined a quality indicator as: 'a measure used to determine, over time, an organization's performance of functions, process, and outcomes' (Tapaneeyakpm, 2002, p. 17).

In 2012, the Australian Council on Healthcare Standards launched a clinical indicator program. It conceptualized an indicator as 'a measure of the clinical management and outcome of care; a method of monitoring consumer/patient care and services which attempts to 'flag' problem areas, evaluate trends and so direct attention to issues requiring further review' (Australian Council on Healthcare Standards, 2012). The Canadian Council on Health Service Accreditation (Mainz, 2003, p. 524) defined quality indicators as 'measurement tools, screens, or flags that are used as guides to monitor, evaluate, and improve the quality of patient care, clinical support services, and organizational function that affect patient outcomes'. In addition, several researchers have developed other definitions. Catts et al. (2011) described quality indicators as indirect or partial measures that summarize or act as proxies for complex situations. Podgorny (1991, p. 48) suggested a nursing indicator could be 'a statement or a question that is used to monitor and evaluate identified important aspects of care'. Taken together, these definitions suggest that quality indicators are intrinsically quantitative measures to monitor and report the quality of care and improve organizational performance.

2.4.2 Key characteristics of an ideal quality indicator

Definitions of quality indicators demonstrate several characteristics of an ideal indicator in quality monitoring and reporting processes. Indicators must be optimally specific and sensitive to the discipline, and valid and reliable (Wollersheim et al., 2007). Validity means the indicator reflects and measures what it is intended to measure. In other words, the measurement resulting from using the indicator is aligned with the actual state of the phenomena being measured. At the same time, it can discriminate between high and low quality. Reliability is the extent to which repeated measurements of a stable phenomenon by different data collectors, judges, or instruments, at different times and places, have similar results (Mainz, 2003, p. 574). A reliable indicator allows consistent and congruent measurement of a stable phenomenon, which makes internal or external comparisons possible. Indicators must also be evidence-based (Australian Medical Association, 2012), identified on the basis of research evidence with clinical expertise and practice values, and with reliability and validity supported by research evidence. An ideal indicator should be precise and explicit, with precise conceptual and operational definitions and measurement methods so that it can be understood, collected and analyzed in a standardized and consistent manner. Finally, indicators should be available and accessible (Australian Medical Association, 2012) and derived from empirical data (e.g., retrieved from existing health databases in which data are available and accessible), so that they are easily accessible and linked directly to empirical practice, producing real-time and effective information for healthcare (Wollersheim et al., 2007).

2.4.3 Types of indicators

Indicators have various classifications according to their given purposes. There are two common classifications of indicators in practice: sentinel versus aggregated-data indicators, and indicators related to structure, process and outcome dimensions of care.

2.4.3.1 Sentinel indicators versus aggregated-data indicators

A sentinel indicator identifies an individual event or phenomenon, a process or outcome that is intrinsically undesirable, serious and often avoidable (Mainz, 2003). Occurrence of sentinel events is usually low, but always triggers further analysis and

investigation, such as an indicator about the number of patients who die during surgery. Aggregated-data indicators are those measures based on the collection and aggregation of data about many events. They contain two subtypes: rate-based (or discrete variable) and continuous variable indicators. Rate-based indicators such as pressure ulcer rate and fall in injury rate are frequently used in nursing. They measure patient care events for which a certain rate of occurrence is acceptable, or aggregated data in which the value of each measurement is expressed as a proportion or ratio (Idvall et al., 1997, p. 264). Occurrence indicators and compliance/performance indicators are two kinds of rate-based indicators (Tanpaneeyakorn, 2002). Occurrence indicators measure the outcomes of care while compliance/performance indicators are used to assess the process of care.

2.4.3.2 Indicators related to structure, process and outcome dimensions of care

As mentioned previously, Donabedian (1984, 2005) conducted fundamental and essential works in the area of monitoring and reporting of quality of healthcare (Sunol, 2000). He suggested that the quality of healthcare could be measured in three dimensions (structure, process and outcome). Therefore, three types of indicator related to these dimensions have been developed and used in the measurement of healthcare quality. Structure indicators are those that describe the attributes of a health system or organization. Process indicators assess the extent and quality of activities and interventions for patients (Mainz, 2003). Outcomes indicators capture the effects of care regarding the health status of patients and populations. These three types of indicators are interlinked and affect each other, providing a comprehensive and in-depth reflection of care. They are the most used commonly indicators in the realm of nursing quality monitoring and reporting. Their uses in current nursing quality monitoring and reporting processes are now discussed.

2.4.4 Quality indicators used in current nursing quality monitoring and reporting processes

2.4.4.1 Structure indicators

Structure indicators evaluate the characteristics of the physical and human resources used for providing nursing care and the manner in which they are organized. They

mainly reflect four key influencing factors of the quality of nursing care.[4] Examples of structure indicators in nursing include nurse staff mix, hours of nursing care per patient day, percentage of hours supplied by RNs, RN education, and organizational factors of the NPE.

The use of structure indicators is the preferred approach to monitoring and reporting of the quality of nursing care. There is a trend on examining the influence of nurse staffing on patient outcomes (Aiken et al., 2012; American Nurses Association, 2000; Burston et al., 2014, Mark et al., 2003; Needleman et al., 2002a; Serratt, 2013; Twigg et al., 2011). This trend may be prompted by the fact that structure measures are readily extracted from existing healthcare databases. Structure has effects on the quality of nursing care, but it is often influenced by the process of care, thus it is difficult to interpret its influence on the quality of care (Donabedian, 1969, 2005). In addition, apart from structure measures like nurse staffing and the structural characteristics of NPE, the relationships between other structure measures (patient turnover and nurse turnover) and process or structure and outcomes are not well established. This demonstrates that structure measures are insufficient proxies in the monitoring and reporting of nursing quality of care (Needleman et al., 2007). It is therefore important to further develop and refine structure NSIs (Hearld, Alexander, Fraser, & Jiang, 2008).

2.4.4.2 Process indicators

Process indicators assess what nurses do for patients and generally measure discrete steps in the nursing care process that are important and often linked to patient outcomes. Examples of process indicators in nursing are nursing interventions/nursing practice and nursing documentation/nursing care plans. The use of process indicators is sometimes regarded as the most direct approach to monitor and report the quality of nursing care because process indicators examine the direct process of nursing care. They are sensitive and straightforward and allow interpretation in differences in the quality of care with fewer risk-adjustment procedures (Donabedian, 2005; Rubin, Pronovost, & Diette, 2001a). The collection of process measures data is quick and

[4] See Chapter 2, Section 2.2.2 for more information about key influencing factors of the quality of nursing care.

needs only a small sample (Alexander, 2007; Mant, 2001; Needleman et al., 2007; Rubin et al., 2001a).

The use of process indicators is based on consensus about which management processes are appropriate in the delivery of nursing care and with validated connections to patient outcomes (Rubin et al., 2001a). Unfortunately, such consensus is often lacking, which has hindered the measurement of the influence of processes on the quality of nursing care, and in turn, the use of process measures (Needleman et al., 2007; O'Connell & Warelow, 2001). Many researchers (e.g., Alexander, 2007; Mant, 2001; National Quality Forum, 2004; Needleman et al., 2007) have been aware of this flaw and advocated that there is a need to develop and use process indicators in quality monitoring and reporting processes.

With regard to the development and testing of process indicators to measure care processes, one research group (Rubin et al., 2001b, p. 489) proposed a seven-step procedure. Following these steps, process NSIs can be developed in terms of their specific purpose, area and aspect of care.

1. Define audience and use for measurement
2. Choose clinical area to evaluate
3. Organize assessment team
4. Select aspect of care or process criteria to be measured
5. Write measure specifications
6. Perform preliminary tests
7. Write scoring, analytical specifications.

2.4.4.3 Outcome indicators

Outcome indicators evaluate the results of care that are related to patients, nurses and organizations. Currently, the most common examples of outcomes include pressure ulcer, urinary tract infection, falls and falls injury, pneumonia, restraint, medication errors, mortality, patient satisfaction with care and nurse job satisfaction (Duffield et al., 2011; Dunton et al., 2007; Hall et al., 2003; Hill, 2010; Jull & Griffiths, 2010; Lee, 2007; Mark & Harless, 2010; Ridley, 2008; Tervo-Heikkinen, Kvist, Partanen, Vehviläinen-Julkunen, & Aalto, 2008; Vangilder, Amlung, Harrison, & Meyer, 2009; Wagner & Bear, 2009; Yamagishi, Kanda, & Takemura, 2003).

The use of outcome measures is the most frequent approach in current nursing quality monitoring and reporting processes (Donabedian, 2005; Doran et al., 2011). There are two principal reasons for their widespread use. It is interesting to know outcomes of care even though sometimes the outcomes may have nothing to do with nursing care. In addition, outcomes of care, particularly adverse events, are regularly recorded and readily available from existing health databases (Mant, 2001) and are therefore suitable to use outcome indicators to monitor and report the quality of nursing care. Nevertheless, there are limitations on the use of outcome measures (Needleman et al., 2007; O'Connell & Warelow, 2001). First, because outcomes reflect all aspects of nursing care, it is essential to control for and adjust the risk factors of care when interpreting outcome measures. Secondly, some outcome measures, such as patients' physical and social disabilities, cannot be used to evaluate care because they are not contemporaneous with it and may take a long time to appear. Thirdly, the issue of which outcomes reflect the quality of nursing care relies on primary research that examines the relationship between nursing structure, process and outcome on a theoretical basis. However, most primary research is empirical rather than theoretically derived and tested, so conclusions are limited and only reproducible in similar subgroups of patients. Fourthly, outcomes that are defined subjectively may be difficult to measure, for example patient perceptions and satisfaction, social restoration and rehabilitation. Finally, while certain outcomes may appear consistent with the criteria for good or poor quality care, they are relative and only suitable for specific groups.

In summary, it is evident that there are disadvantages when an individual indicator is used in quality monitoring and reporting processes. As a result, all three types of indicator should be used concurrently as complementary and interacting measures to provide a comprehensive and precise reflection of the quality of nursing care.

2.4.5 The development of NSIs and related initiatives

NSIs meet the key characteristics of ideal quality indicators,[5] quantifying the quality of nursing care and nurses' contributions in the healthcare system (Association of UK University Hospitals, 2012; Doran et al., 2011; National Database of Nursing Quality Indicators, 2012). For more than two decades across the world, a number of healthcare quality initiatives and studies have identified various NSIs suitable for monitoring and reporting the quality of nursing care, implementing quality improvement initiatives, and making resource plans (Alexander, 2007; American Nurses Association, 1995; Aydin et al., 2004; Montalvo, 2007; Patrician et al., 2010). The United States has been a forerunner in relation to NSIs, and several systematic, comprehensive and standardized nursing quality measurement databases have been constructed incorporating NSIs (e.g., NDNQI, CalNOC, MilNOD, and VANOD). A summary of international NSIs and their related initiatives is provided as follows (also see Table 2.3).

[5] See Chapter 2, Section 2.4.2 for more information about key characteristics of an ideal quality indicator.

Table 2.3 Overview of NSIs and its related initiatives

Initiative	Advocate	Country	Indicator list
NDNQI	ANA	United States	Nursing hours per patient day(including hours worked by RNs , licensed practical/vocational nurses, and unlicensed assistive) Nursing turnover Nosocomial infections Patient falls Patient falls with injury, injury level Pressure ulcer rate (including community-acquired, hospital-acquired, and unit-acquired) Pediatric pain assessment, intervention, reassessment (AIR) Cycle Pediatric peripheral intravenous infiltration Psychiatric physical/sexual assault RN education/certification RN survey (including Job Satisfaction Scales and Practice Environment Scale-Nursing Work Index) Restraints Staff mix (including RNs, licensed practical/vocational nurses, and unlicensed assistive nurses, and percent agency staff)
CalNOC	ANA, ANA/California and the Association of California Nurse Leaders	United States	Hours of nursing care per patient days Skill mix Percent contracted hours Nurse–patient ratios Voluntary turnover RN characteristics–education, experience years of service Unit rate of admissions, discharges and transfers Nursing intervention process (risk assessment, risk status, prevention protocols, PICC practice) Hospital acquired pressure ulcers Fall rate and injury fall rates Restraint prevalence rate Central line-associated blood stream infections in PICC lines Medication administration error rates

Table 2.3 Continued

Initiative	Advocate	Country	Indicator list
MilNOD	Department of Defense Military hospitals leaders	United States	Nursing care hours Staff mix Staff category Nurse education/experience Pressure ulcers Restraints Falls Medication errors Patient satisfaction with planning for needs after discharge/pain management/education Nursing job satisfaction Nursing needlestick injuries Nursing work environment Patient turnover Patient acuity
VANOD	Veterans Affairs Health providers	United States	RN education & certification Nursing hours per patient day of care (HPPD) Nursing hours & cost per outpatient encounter Percentage of HPPD hours from RNs Skill mix Nursing staff injuries Nursing turnover RN job satisfaction Nursing practice environment survey Patient pressure ulcer Patient falls Patient satisfaction

Table 2.3 Continued

Initiative	Advocate	Country	Indicator list
NQF-15	National Quality Forum	United States	Death among surgical inpatients with treatable serious complications (failure to rescue) Pressure ulcer prevalence Falls prevalence/Falls with injury Restraint prevalence (vest and limb only) Urinary catheter-associated urinary tract infection (UTI) for intensive care unit (ICU) patients Central line catheter-associated blood stream infection rate for ICU and high-risk nursery patients Ventilator-associated pneumonia for ICU and high-risk nursery patients Smoking cessation counselling for acute myocardial infarction (AMI) Smoking cessation counselling for heart failure (HF) Smoking cessation counselling for pneumonia Skill mix (RN [RN], Licensed Vocational/Practical Nurse [LVN/LPN], unlicensed assistive personnel [UAP], and contract) Nursing care hours per patient day (RN, LVN/LPN, and UAP) Practice Environment Scale-Nursing Work Index (PES-NWI) Voluntary turnover
HOBIC **C-HOBIC**	Ontario Ministry of Health and Long-Term Care Manitoba in long-term and home care Saskatchewan in long-term care	Canada	Functional health status Therapeutic self-care Falls Pressure ulcers Symptom (pain, dyspnea, fatigue, nausea) Patient satisfaction with nursing care

Table 2.3 Continued

Initiative	Advocate	Country	Indicator list
B-NMDS	Belgian Ministry of Public Health	Belgium	Care related to: hygiene, mobility, elimination, feeding Tube feeding Mouth care Pressure sore prevention Assist to dress Tracheostomy care Endotracheal tube care Nursing admission ADL training Emotional support Care of disoriented patient Isolation care Monitor vital signs Monitor clinical signs Cast care Blood samples Medication management (intramuscular, subcutaneous, intravenous) Infusion therapy Surgical wound care Trauma wound care
Nurse Sensitive Indicators Program	the Association of UK University Hospital	United Kingdom	Official complaints Drug errors Infection Slips, trips & falls Pressure Ulcers Nutrition

Legend: B-NMDS: Belgium Nursing Minimum Data Set; CalNOC: California Nursing Outcomes Coalition; HOBIC: Health Outcomes for Better Information and Care; MilNOD: Military Nursing Outcomes Database; NDNQI: National Database of Nursing Quality Indicators; NQF: National Quality Forum; PICC: Peripherally Inserted Central Catheter; VANOD: Veterans Affairs Nursing Outcomes Database

2.4.5.1 NDNQI

The NDNQI was the first national standardized outcomes database in the United States. It was developed by the American Nurses Association in 1998 as a repository of NSIs to promote and facilitate the measurement and improvement of nursing quality and patient outcomes. It provides unit-based comparative NSI data to participating hospitals, enabling them to monitor and report the quality of nursing care and compare quality with other hospitals that have similar characteristics (Alexander, 2007). The NDNQI is recognized as a systematic and large national database for NSIs. Over 1,500 hospitals report quarterly NSI data on nursing structure, process and outcomes, and an annual RN survey provides information on nursing workforce characteristics. However, the NDNQI has limitations because the participating hospitals are a self-selected sample and it does not include all hospitals in the United States (Dunton et al., 2007).

The NSIs collected by the NDNQI have evolved. There are currently 13 NSIs housed in the NDNQI, reflecting the structure, process and outcome of nursing care (American Nurses Association, 2012b, Table 2.3). Of these indicators, patient falls, patient falls with injury, pressure ulcer rate and RN survey are deemed as both process and outcome indicators. The development of NSIs in the NDNQI occurred as follows (Monaltvo, 2007):

1. Information about the indicators' reliability and validity was obtained from researchers in the field
2. The indicator definitions, data collection guidelines, and data collection forms were drafted and reviewed
3. The indicator definitions, guidelines, and forms were revised and reviewed again to confirm face validity and feasibility of reliable data collection
4. The indicators definitions, guidelines, and forms were updated again based on the clinical expert feedback
5. Pilot study was conducted using the draft data collection materials to identify additional threats to reliability and validity
6. Indicators definitions, data collection guidelines and forms were finalized
7. Database participants were trained in standardized data collection practices

2.4.5.2 CalNOC

CalNOC is the largest state-wide nursing outcomes database in the United States. It contains a series of structure, process and outcome NSIs at the unit level (Alexander, 2007). The ANA, ANA/California (the California affiliate of the American Nurses Association) and the Association of California Nurse Leaders developed the database collaboratively in 1996 in an ANA research and development project as an initial nursing quality indicator report card. Based on the indicators listed in the first ANA's Report Card, the CalNOC steering committee refined and defined the NSIs that were suitable and feasible to collect for Californian hospitals. Subsequently, a pilot project was undertaken to test the refined indicators, gain better understanding of the structure required for a data repository, and develop experience with data collection across sites state-wide (Brown, Donaldson, Aydin, & Calson, 2001). After feedback from the pilot study, three additional NSIs (restraint, patient satisfaction with care, and RN education/certification) were added in 1997. To standardize these NSIs for clinical, administrative, and scientific quality measurement in nursing, the CalNOC was formed to house the NSIs sensitive to California nurse staffing and nursing care quality. Since that time, several research projects have been undertaken to advance the reliability and validity of NSI data. The NSIs currently used in the CalNOC include unit level acute nurse staffing and work characteristics indicators, process of care indicators, and key outcome indicators endorsed by the National Quality Forum (NQF) (Table 2.3).

The CalNOC has expanded rapidly because of its robust scientific strength. By the end of 2010, 225 hospitals from six states in the United States had enrolled in the CalNOC (Brown, Aydin, Donaldson, Fridman, & Sandhu, 2010). The unit types collected by the CalNOC include adult acute care (critical care, step-down, medical, surgical, medical/surgical combined), pediatrics, post-acute (skilled nursing facility, distinct part), acute rehabilitation, emergency department, child and maternal care (Doran et al., 2011). It has collaborations with countries including Sweden, England and Australia, and it made a substantial intellectual contribution to the development of MilNOD and VANOD.

2.4.5.3 MilNOD

MilNOD is an outcomes database used as a repository of NSIs specific to the military health system in the United States (McCarthy, Loan, & Patrician, 2012; Patrician et al., 2010). It built on collaboration with the CalNOC group in 2000 to respond to the growing trend of evaluation and comparison of nursing quality in military health organizations. MilNOD includes 111,500 shifts, representing 57 units of 13 participating hospitals. It enables military hospitals to measure internal performance and make external comparisons with other hospitals. However, further work on MilNOD has been suspended because of a lack of research funding. With an emphasis on NSIs in CalNOC, additional NSIs customized to military requirements, such as the NSIs to measure patient satisfaction with care, the work environment of nurses and nurses' job satisfaction in military facilities, were added to MilNOD (Patrician et al., 2010). The detailed NSIs in MilNOC can be found in Table 2.3.

2.4.5.4 VANOD

The American Veterans' Association Office of Nursing Services designed VANOD as a resource for quality indicators in 2002, to improve the quality of care to veterans and support evaluation of the influences of nurse staffing and practice environments on patient outcomes. The NSIs in VANOD were originally modelled on CalNOC (Doran et al., 2011), but the resources for NSI data and elements in the VANOD were different. They were extracted from existing Veterans' Association electronic medical records rather than hospital data collection efforts. The VANOD system contributed to the development of a structured, standardized language for Veterans' Affairs clinical documentation systems (Veterans' Affairs Office of Nursing Services, 2009).

2.4.5.5 NQF-15

NQF-15 refers to 15 national voluntary consensus standards for nursing-sensitive care endorsed by the NQF in 2004 (Kurtzman & Corrigan, 2007; National Quality Forum, 2004). These consensus standards were developed through two phases of candidate measurement evaluation and endorsement decisions. They evaluate nurses' contribution to patient safety, quality of care and professional NPE. The NQF-15 consist of five structure NSIs, three process NSIs and seven outcome NSIs within three categories (patient-centered outcome measures, nursing-centered intervention measures and system-centered measures, Table 2.3). Among three categories, nursing-

centered intervention measures were developed based on the Nursing Role Effectiveness Model.[6]

2.4.4.6 Health outcomes for better information and care (HOBIC)

The HOBIC is a central repository that collects data on patient outcomes sensitive to nursing care in the province of Ontario, Canada (McGillis Hall, 2002; Pringle & White, 2002). It was established in 1999, when a set of nursing-sensitive patient outcomes relevant to the adult population in acute care, long-term care and chronic care settings, was identified (Table 2.3). Data are collected when patients are admitted and discharged (Doran et al., 2011). Currently, the HOBIC has 20 member organizations across the province of Ontario (VanDeVelde-Coke et al., 2012).

2.4.5.7 Canadian health outcomes for better information and care (C-HOBIC)

The C-HOBIC is based on the HOBIC program and expands the data in HOBIC from the province of Ontario to Saskatchewan and Manitoba, Canada. The data in C-HOBIC are collected using the standardized language and concepts within the International Classification for Nursing Practice (Doran et al., 2011). For this reason, it is endorsed by Canada Health Infoway (2012) as a Canadian-approved standard, sharing standardized nursing information among clinical disciplines and care settings.

2.4.5.8 National nursing quality report-Canada (NNQR (C))

NNQR (C) is the latest Canadian national nursing quality reporting system established in 2011 to measure the quality of nursing care (VanDeVelde-Coke et al., 2012). It collects, stores, and retrieves unit level NSI data on a quarterly basis. The NSIs in NNQR (C) include nurse staffing structural indicators, process of care indicators, and nursing-sensitive outcomes indicators submitting to the Patient Safety Metric System,

[6] Nursing Role Effectiveness Model was developed by Irvine, Sidani and Hall (1988). It investigates the process domain of nursing care within the context of three kinds of nursing roles (independent, dependant and interdependent), and reveals associations between these roles and outcomes of patient care (Endacott, Eliott, & Chaboyer, 2009; Manojlovich, 2005). Independent nursing role refers to the functions that nurses implement independently, such as nursing process of patient assessment, decision-making, plan, implementation and evaluation. Dependant roles concerns the clinical judgements and activities that nurses implement associated with medical orders and medical treatments, such as nurse intervention of medication prescribed by the physician. Interdependent role refers to the activities that nurses implement through the cooperation with other members of the healthcare team, such as nurse activities to promote continuity, co-ordination, and the integration of patient care in healthcare team (Doran, Sidani, Keatings, & Doidge, 2002).

and an annual survey of nurses to ascertain job satisfaction and work environment (VanDeVelde-Coke et al., 2012).

2.4.5.9 B-NMDS

The Belgian Ministry of Public Health implemented the Belgium Nursing Minimum Data Set (B-NMDS) in 1998 and revised it in 2008, in response to the dramatic changes in nursing care. It is a unique database in current nursing quality monitoring and reporting system, focusing on the patterns of nursing practice (nursing process) rather than a single change of data element (e.g., pressure ulcer rate or length of stay). Currently, 23 indicators about nursing interventions and activities are captured within the B-NMDS (Table 2.3). These indicators were identified from the Nursing Intervention Classification[7] (Van den Heede, Michiels, Thonon, & Sermeus, 2009). B-NMDS includes patient demographic data and International Classification of Disease (ICD)-M codes, and service data such as service characteristics, episode of care descriptors, nurse hours available and nursing staff mix from hospital discharge data (Doran et al., 2011).

2.4.5.10 Nursing quality Programs in the United Kingdom

There are several initiatives in the United Kingdom to analyze, improve and track the areas where nursing care contributes to patient outcomes. The Nursing-Sensitive Indicator Program is an initiative designed to develop NSIs in the United Kingdom (Griffiths, Richardson, & Blackwell, 2009). It was modelled on the work of NDNQI, CalNOC and VANOD. Six domains of outcome NSIs were developed and described in the patient safety portfolio published by the Association of UK University Hospitals (AUKUH, 2012, Table 2.3). The NSIs are used to support the measurement of nursing contributions to patient outcome and the deployment of nurses in appropriate numbers and skill mix (University of Kentucky & UK Healthcare, 2012). In addition, the National Institute for Health and Care Excellence (2014) launched the Quality Standards Programme in 2009 to manage and improve quality within health

[7] Nursing Intervention Classification is a comprehensive, research-evidenced and standardized language to describe the interventions that nurses perform to patients (Bulechek, Butcher, Dochterman, & Wagner, 2013). Each intervention has a unique code and uniform guideline meeting for information system vendors. As a result, the classification has great value in nursing documentation, communication of care across settings, integration of data across systems and settings, effective research, productive measurements, and competency evaluation (Bulechek et al., 2013).

and social care. The programme developed sets of quality standards that describe prioritized areas for quality improvement within a wide range of healthcare, social care and public health settings. Each standard is composed of two main components: quality statement and quality measures. A quality statement defines a concept or requirement for quality care. Quality measures are indicators used to evaluate the quality of care. Some of these measures are related to nursing, such as preventing unintentional injury and pressure ulcers.

In general terms, the summary of findings from these international initiatives relating to NSIs indicates that three dimensions of NSIs are identified to reflect the structure, process and outcome of nursing care. They demonstrate the influences of nursing input (structure) and interventions (process) on the outcome of care. Patient safety is the most common nursing-sensitive outcome, and these dimensions are the most widely used in current international nursing outcome databases and initiatives.

2.5 Summary

A review of the literature was undertaken to establish the context and knowledge relevant to the examination of NSIs for quality monitoring and reporting in the present study. Three main themes arose from the review of the literature: (1) quality of nursing care, (2) limitations of current nursing quality monitoring and reporting processes in Australia, (3) quality indicators and NSIs. From the literature review the significance of the present study and research questions were developed.

CHAPTER THREE

METHODOLOGY

3.1 Introduction

The conceptual and methodological issues in the study are explained in this chapter. The conceptual framework for the study, the Donabedian SPO Model, is presented first. It is followed by the description of the two-phase study design, which includes the detailed design adopted in each phase of the study and their connections. In addition, the rationale for using a two-phase study design, and the strategies to ensure methodological rigor, are discussed.

3.2 Conceptual framework for the study

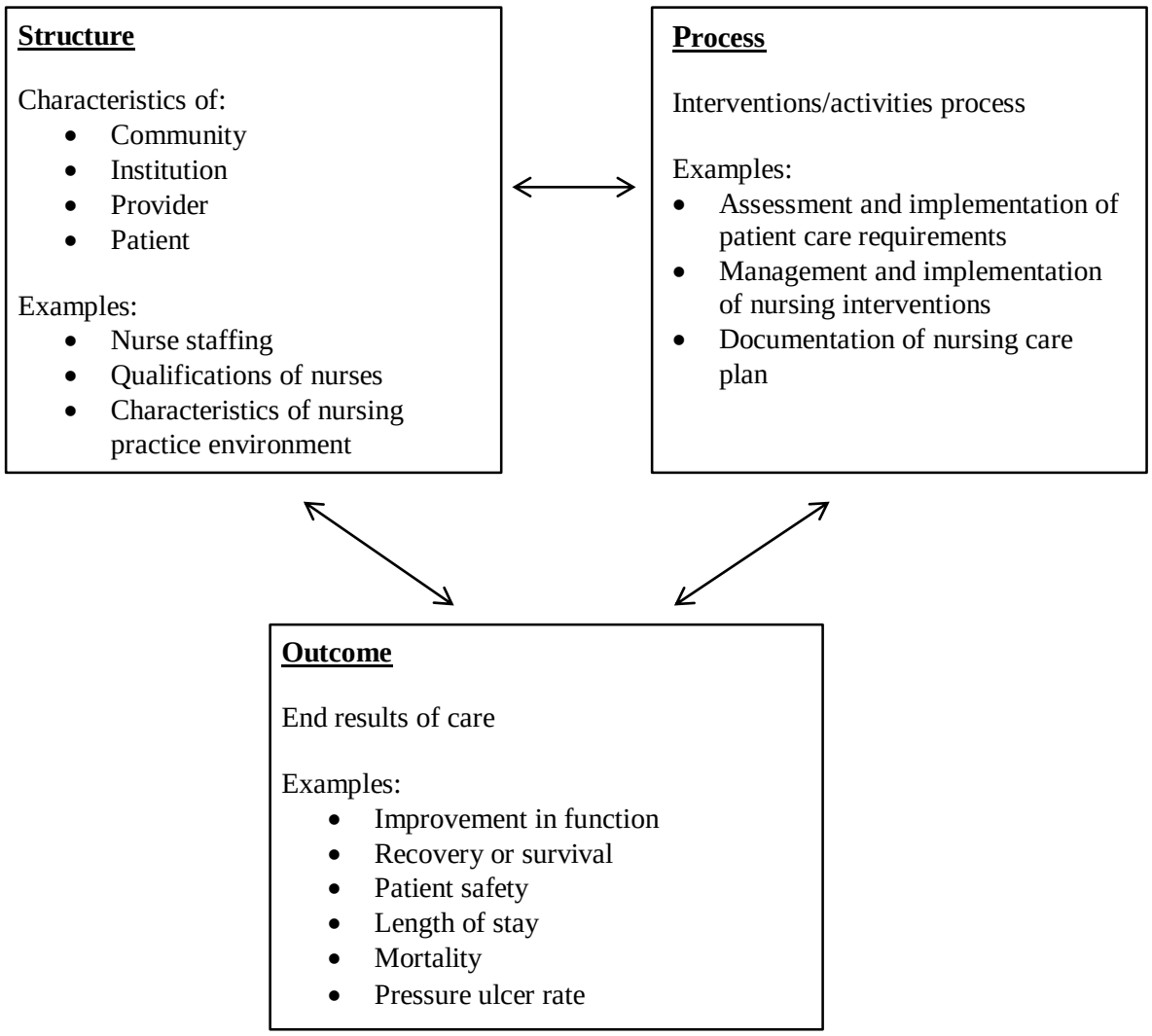
In the present study, the NSIs that the nurses agreed as measures to monitor and report the quality of nursing care are explored. A fundamental and universal framework in the field of quality monitoring and reporting, the Donabedian SPO Model (1984),[8] was adopted as the conceptual framework for the study. The Donabedian SPO Model is a linear model in which structure and process of care act upon each other, and in turn, influence the outcome of care (Figure 3.1). Supporting structures and effective nursing processes contribute to desirable outcomes. Structure refers to the characteristics of various components in the healthcare system in which care is delivered, including adequate facilities and equipment, qualifications of care providers, administrative structure and operation of programs. Process examines how care is provided, in terms of appropriateness, acceptability, completeness or competency. Outcome refers to the end points of care, such as improvement in function, recovery or survival. In accordance with the Model, the quality of health provision needs to be examined in the dimensions of structure, process and outcome (Donabedian, 2005).

The Donabedian SPO Model has been acknowledged and cited widely by studies relating to the quality of nursing care (Gallagher & Rowell 2003; Pazargadi et al., 2008). For example, the American Nursing Association used the Model as a conceptual framework to develop a *Nursing Report Card for Acute Care Setting* to evaluate and measure the quality of nursing care (American Nurses' Association,

[8] See Chapter 2, Section 2.2.1 for more information about the Donabedian SPO Model.

1995). Twenty-one NSIs were identified to measure structure, process and outcomes of nursing care. Structure NSIs reflect nurse staffing in an organization and the attributes of the nursing practice environment. Process NSIs measure the nature, amount and quality of care nurses provide to patients. Outcome NSIs examine patient conditions that are affected by nursing care and the extent to which nurses are satisfied with their work (American Nurses' Association, 1995).

Figure 3.1 Donabedian's Structure–Process–Outcome Model



In Phase One of the present study (the concept analysis of NSIs), an extension of Donabedian SPO Model, the Holzemer Outcome Model (Holzemer, 1994) was used to categorize the attributes and empirical referents of NSIs, revealing a pattern of usage of NSIs in current nursing monitoring and reporting processes. In Phase Two of the study (the NSIs survey), the Donabedian SPO Model was used to categorize the NSIs identified by nurses in three dimensions (structure, process and outcome).

3.3 Two-phase study design

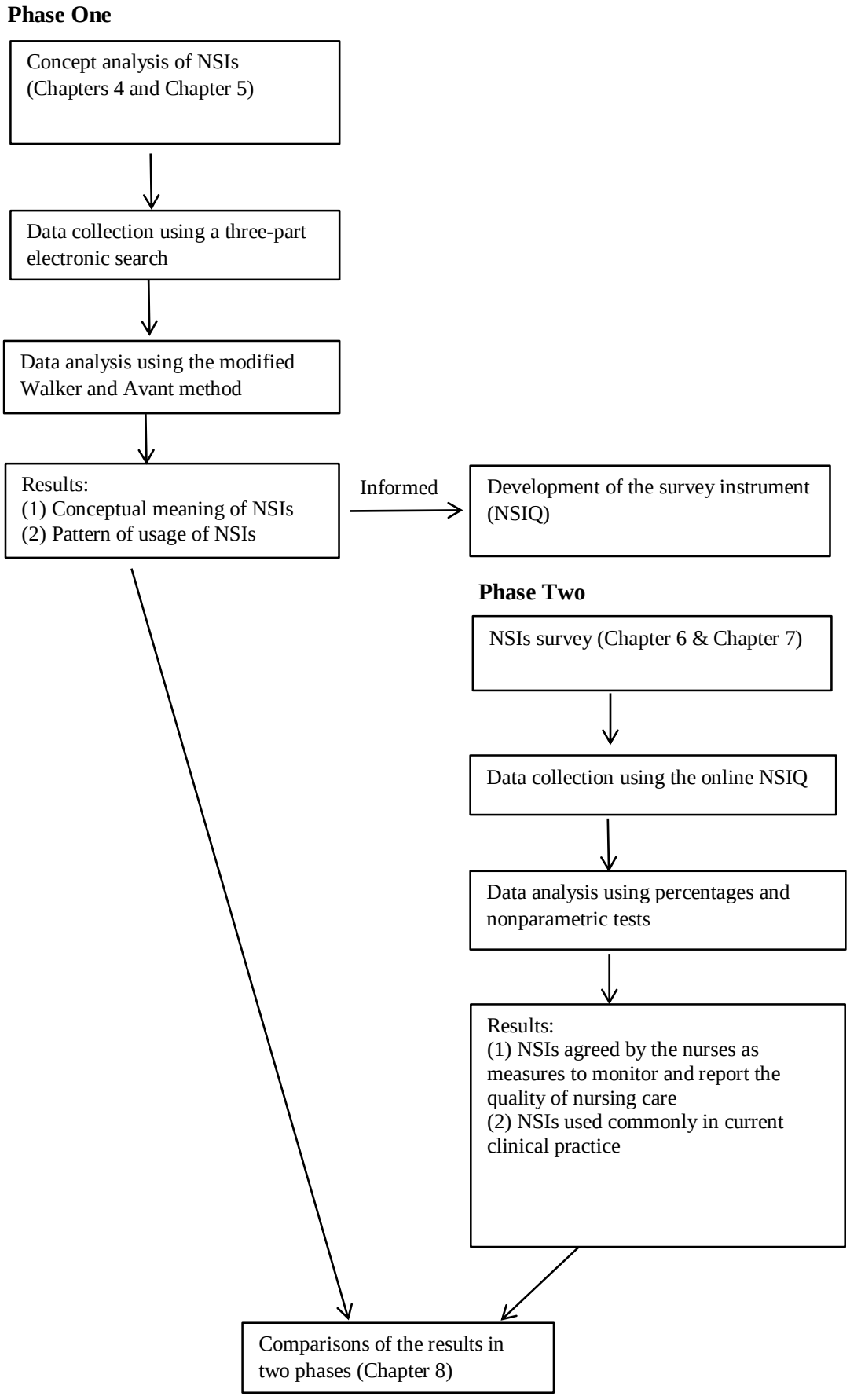
The two-phase study was designed to explore the NSIs agreed by the nurses as measures for nursing quality monitoring and reporting and the NSIs used commonly in current clinical practice (Figure 3.2): Phase One was a concept analysis of NSIs; Phase Two was an online survey of nurses, using the instrument developed from Phase One (NSIQ).[9]

Phase One involved a concept analysis of NSIs using a modified Walker and Avant method (Walker & Avant, 2011). Concept analysis is a rigorous and precise procedure for identifying the core attributes, frequency of use, necessary conditions, and case scenarios related to a concept (Tofthagen & Fagerstrøm, 2010; Walker & Avant, 2011). It produces explicit theoretical and operational definitions for a concept, and the results provide a conceptual basis for development of theory, instruments, and taxonomy (Allan, Carrick-Sen, & Martin, 2013; Holcomb, Hoffart, & Fox, 2002). Through the concept analysis of NSIs, the conceptual meaning and pattern of usage of NSIs were clarified within the theoretical context of Holzemer Outcome Model.

Phase Two involved a self-administered online survey about NSIs using the NSIQ. The sample was drawn from nurses employed at Western Health, Melbourne, Victoria, via its Nurse Global Email. The survey identified the NSIs that nurses agreed upon as measures for nursing quality monitoring and reporting, and the NSIs that were used commonly in current clinical practice.

[9] See Chapter 4, Section 4.9 and Chapter 6, Section 6.2.1 for more information about how the concept analysis of NSIs informed the development of survey instrument (NSIQ).

Figure 3.2 An illustration of the two-phase study



Given that the aim of present study was the development of NSIs, as identified by the nurses, Phase Two was the main focus of the study and Phase One was used to provide evidence for the development of the survey instrument. The findings of the two phases are discussed and compared in Chapter 8 to better understand the differences and similarities of NSIs between those agreed by the nurses and those used in current quality monitoring and reporting processes.

3.4 Rationale for choosing a two-phase study

There was no suitable instrument available for the identification of NSIs. In order to address this deficit and develop a suitable instrument to achieve the research aims, the two-phase study, mentioned previously, was designed.

Phase One, a concept analysis, was conducted to develop the survey instrument. The absence of a suitable instrument may be because the conceptual meaning of NSIs has not been clarified consistently in the literature. Researchers vary in their understanding of NSIs and use various terms to describe the concept of NSIs (e.g., nursing performance quality indicators, quality of care indicators or nursing sensitive outcome indicators), and there is no standardized definition of NSIs (Savitz, Jones, & Bernard, 2005). The vague, inconsistent, or arbitrary concept of NSIs has created difficulty in understanding and examining NSIs in a standardized and consistent way. In addition, NSIs are used diversely and the pattern of usage of NSIs in current nursing quality monitoring and reporting processes is not straightforward (Burston et al., 2014). A concept analysis design was considered an appropriate means to produce a scientific meaning of a concept through clarifying its attributes, dimensions and pattern of uses (Fawcett, 2012). For these reasons, and in order to clarify the conceptual meaning of NSIs and pattern of usage of NSIs, a concept analysis of NSIs was undertaken. The results of the concept analysis of NSIs informed the development of the survey instrument (NSIQ).

Phase Two, an online survey using the NSIQ, was conducted to elicit the NSIs nurses agreed on as measures for nursing quality monitoring and reporting and the NSIs used commonly in current clinical practice. Knowing the nurses' agreed indicators is essential for the development of NSIs. Those developed by nurses themselves enable

valid information to be visible at the point of care. However, various studies (e.g., Burhans & Alligood, 2010; Cline, Rosenberg, Kovner, & Brewer, 2011) have suggested that nurses are not particularly engaged in current quality monitoring and reporting activities. There is a dearth of research on NSIs in Australia and no previous studies have been identified that examined nurses' preferences for NSIs (Xu et al., 2011). Conducting a survey provided population-based information about nurses' views about the NSIs. In addition, undertaking the study in two phases made it relatively easy to conduct and straightforward to report and provided a clear delineation for research.

3.5 Rigor of the study

Strategies to ensure the rigor of the study in each phase were implemented as discussed in Chapter 4 and Chapter 6.[10] Furthermore, combining and comparing the sets of data in two phases enabled cross-checking of data. The assessment of reliability and validity of the survey instrument (NSIQ) confirmed the credibility of the concept analysis of NSIs. Comparisons of NSIs in both phases of the study deepened the understanding of the NSIs agreed by the nurses, so that the rigor of the survey was increased.

3.6 Chapters relating to the research methods in the thesis

The modified Walker and Avant method for concept analysis and a self-administered online survey were used in the two phases of study respectively. In Chapter 4, the rationale and procedure for using the modified Walker and Avant method in the concept analysis of NSIs (Phase One) is explained comprehensively. In Chapter 6, the survey design including instrument, setting, respondents, administration, data collection, and data analysis (Phase Two) is discussed in detail.

3.7 Summary

The conceptual framework and research design adopted in the study are the focus of this chapter. The conceptual framework for the study was the Donabedian SPO Model. In accordance with the research aims to identify the NSIs nurses agreed on as

[10] See Chapter 4, Section 4.3 and Chapter 6, Section 6.7 for more information about the strategies to ensure the rigor of concept analysis of NSIs and NSIs survey respectively.

measures for nursing quality monitoring and reporting, and the NSIs used commonly in current clinical practice, a two-phase study was designed: Phase One was a concept analysis of NSIs and development of an NSI survey instrument. Phase Two was an online survey of nurses, using this instrument.

CHAPTER FOUR
PHASE ONE: CONCEPT ANALYSIS OF NURSING-SENSITIVE INDICATORS

4.1 Introduction

Phase One of the study consisted of a concept analysis of NSIs using the modified Walker and Avant method. It was conducted to inform the development of a survey instrument used in Phase Two of the study. To provide the context relevant to the concept analysis of NSIs, the chapter begins with background information introducing the theoretical underpinnings of concept analysis. This section provides the significance of the concept analysis of NSIs and explains the rationale for using the modified Walker and Avant method. Following the Walker and Avant method, the approaches to determining research aims, data sources, surrogate term or related term, core attributes, cases, antecedents and consequences, and empirical referents of the concept of NSIs are introduced respectively. In addition, strategies to ensure the rigor of this concept analysis are discussed.

4.2 Background

4.2.1 Conceptualization of concept

Prior to a detailed discussion of concept analysis, an explanation of the notion of concepts is required. A concept is 'a mental image of a phenomenon, an idea or a construct in the mind about a thing or an action' (Walker & Avant, 2005, p. 26). It is a mental abstraction or meaning derived to represent some aspects or elements of the human experience, not the thing or behavior itself (Chinn & Kramer, 1995). Concepts representing complex phenomena of interest within a scientific discipline are categorized into some forms of meaning through language. They 'promote the organization of experience, facilitate communication among individuals, and enable the cognitive recall of phenomena that may not be immediately present' (Rodgers, 1989, p. 330).

Concepts are usually defined constitutively and operationally (Fawcett & Desanto-Madeya, 2012). The constitutive definition provides the specific nominal meaning to a

concept. It enables the concept to be distinguished from other concepts. The operational definition offers empirical utility to a concept. It serves as a link between a concept and the 'real' activities necessary to measure or use it. For example, the constitutive definition of the concept of self-esteem is 'the caregiver's feeling of personal worth and value' and its operational definition can be defined as 'self-esteem measured by Rosenberg's Self-Esteem Scale' (Newman, 2005, p. 417).

Concepts can be classified into two types: ordinary (everyday) and scientific concepts. Ordinary or everyday concepts refer to those used by people in everyday life to develop intuitive understandings of how to do things. They have a common meaning within a cultural context and are defined in standard dictionaries. A scientific concept is a conceptual label used to encompass a unit of meaning where a degree of precision is required. A precise scientific concept can be communicated, recognized and applied consistently in a scientific discipline (Morse, 2000). Compared with ordinary concepts, scientific concepts require clearer and more specific definitions to form a theoretical representation of reality and are the concerns of concept analysis (Hupcey & Penrod, 2005).

4.2.2 Nature of concept analysis

Concept analysis is a rigorous and precise linguistic procedure for identifying the core attributes, frequency of use, necessary conditions, and case scenarios related to a concept. This approach builds a consistent and coherent meaning for a concept (Hupcey & Penrod, 2005; Rodgers, 1989; Walker & Avant, 2011). It examines comprehensively the definitions, attributes, context, surrogate terms or related terms, examples, antecedents, and consequences of the concepts in question, and develops a standardized language to describe practice. Concept analysis contributes the constitutive and operational definitions of a concept to scientific endeavors. The conceptual understanding of phenomena of interest directly translates knowledge to evidence-based practice. It facilitates to ground theoretically and explicitly taxonomic work and nursing language. As a result, concept analysis is often recommended as a way to examine information in preparation for theory construction and theoretical model development (Tofthagen & Fagerstrøm, 2010). It is considered as an ideal

method for determining the state of the science and advancing the level of scientific utility.

4.2.3 The need for concept analysis in nursing

Over recent decades, with the evolution of nursing science, many concepts and terms have emerged to describe evolving phenomena and circumstances in nursing disciplines. Defining concepts in a precise manner is the first step for the development of hypotheses and any subsequent testing. The process of scientific enquiry into the meaning of concepts within nursing is not well developed; therefore, many concepts that have been identified require further scrutiny. In such situations, it is necessary to conduct a concept analysis, which is a pragmatic and rigorous approach to defining concepts (Baldwin, 2008). Concept analysis assists in (1) defining nursing professional boundaries and a comprehensive system as a theoretical foundation; and (2) supporting theory and knowledge development in nursing (Tofthagen & Fagerstrøm, 2010).

4.2.4 Application of the results of concept analysis

Concept analysis provides explicit and consistent understandings of a concept through analyzing its attributes, elements and usages in empirical practice. The results of concept analysis can be used in distinct aspects of nursing practice. They facilitate actions such as developing an instrument, proposing a nursing diagnosis, intervention or outcome name, or constructing an operational definition and creating a middle-range theory (Walker & Avant, 2011). For example, the results of a concept analysis of autonomy by Spear and Kulbok (2004) were used to develop an instrument to assess the levels of autonomy about specific health behaviors.

4.2.5 Methods for concept analysis

Currently, there are three main methods for undertaking a concept analysis in nursing: Walker and Avant's method (Walker & Avant, 2011), Rodgers' evolution concept analysis (Rodgers, 1989) and the pragmatic utility method (Morse, 2000). A brief overview of these methods follows.

4.2.5.1 Walker and Avant method

The Walker and Avant method (2011) is a formal linguistic exercise to examine the internal structure and function of concepts, using an approach of clarifying, refining and sharpening. It is a traditional and systematic technique used to develop a concept when it is vague, outmoded, or overused. According to the conclusions suggested by several researchers (e.g., Allan et al., 2013; Weaver & Mitcham, 2008; Xyrichis & Ream, 2008), the Walker and Avant method is the most used approach to concept analysis. The Walker and Avant method (2011), which was developed from the Wilson (1963) method for concept analysis, has eight steps (p. 160).

1. Selection of a concept

   A chosen concept reflects the topic or area of greatest interest to researchers.

2. Determination of the aims of analysis

   This provides guidance for researchers to implement concept analysis. The analysis should focus attention on achieving the aims.

3. Identification of the data sources that use the concept

   Identifying as fully as possible the data sources that use the concept is a fundamental step for concept analysis. Data sources may include dictionaries, thesauruses, colleagues' discussions and available literature.

4. Determination of core attributes

   Core attributes refer to the cluster of characteristics that are the most frequently associated with the concept. Their determination varies in terms of research aims and interests for a concept. The determined core attributes should reflect the research aims.

5. Identification of a model case

   A model case is a paradigmatic example of the use of the concept. It is a pure case of the concept, demonstrating all core attributes.

6. Determination of additional cases including borderline, related, contrary and invented cases

   Borderline cases are examples or instances of the use of the concept that demonstrate most of the core attributes of the concept being examined, but not all of them. *Related* cases are instances of the use of concepts that are related to the concept being studied but do not contain all core attributes. *Contrary* cases are examples that do not relate to the concept. *Invented* cases are cases

that contain ideas outside our own experience. Determination of additional cases assists researchers in judging the defined core attributes.

7. Identification of antecedents and consequences

   Antecedents are those events or incidents that must occur prior to the occurrence of the concept. Consequences are those events or incidents that occur as a result or outcome of the occurrence of the concept. Antecedents and consequences reveal the social contexts where the concept is used.

8. Determination of empirical referents

   Empirical referents are measurable, observable or verifiable actual phenomena that demonstrate a concept in the real world. They are valuable in practice, presenting the occurrence of the concept in the empirical world. They are also useful in instrument development, demonstrating the theoretical base of the concept that strengthens the content and construct validity of a new instrument. Empirical referents can be identical to core attributes in many cases (Goosen, 1989; Walker & Avant, 2011).

The rigorous and systematic process of the Walker and Avant method clarifies the core attributes of a concept and distinguishes the similarities or otherwise between concepts. It brings theoretical enhancement to the concept and assists theory construction.

4.2.5.2 Rodgers' evolutionary method

Rodgers proposed this method in 1989 based on the evolutionary view of concepts (Rodgers, 1989). Rodgers and Knafl (1993) asserted that concepts are subject to change, and their development occurs through the cycle of concept significance, concept use (definition and attributes) and concept application. *Concept significance* refers to the concept's ability to assist to resolve problems and to characterize phenomena adequately. It determines the frequency of use and the value of analysis. *Concept use* means the frequency and extent of the use of the concept. It conveys the attributes and definition of concept. *Concept application* refers to the characteristics of the concept in various settings, across time, and within different disciplines, groups and theories. The application of the concept identifies its scope or range and helps with its refinement and development. The evolutionary method aims to identify the attributes of a concept to provide a foundation for further research. In comparison

with Walker and Avant's method, Rodgers' (2000) evolutionary method pays more attention to the dynamic (not static) nature of the concept, changing with time and context. Such complex, evolutionary and rigorous thinking may make the method difficult to grasp for scientific examination and use. Thus, this method is regarded as more limited when applied in scientific endeavors than the Walker and Avant method.

4.2.5.3 Pragmatic utility method

Morse (2000) developed the pragmatic utility method in response to criticisms about the rigor and sufficiency of the Walker and Avant and Rodgers' evolutionary methods (Hupcey, Morse, Lenz, & Tasón, 1996; Hupcey & Penrod, 2005; Rew et al., 2005). The pragmatic utility method is based on principles rather than a series of steps, to analyze the concept comprehensively within theoretical frameworks of references (Hupcey & Penrod, 2005; Weaver & Mitcham, 2008). Four broad philosophical principles are used in the pragmatic utility method are: epistemological, pragmatic, linguistic and logical principles. The *epistemological principle* sets criteria for definition and differentiation of the concept. The *pragmatic principle* states criteria for the utility and fit of conceptualizations. The *linguistics principle* focuses on the consistency and appropriateness of use. The *logical principle* identifies criteria for examination of theoretical integration with other concepts. The pragmatic utility method reveals the state of science of the concept (Hupcey & Penrod, 2005, p. 204). However, it has several limitations (Weaver & Mitcham, 2008). First, the method is conducted according to principles, and it does not provide a clear and complete users' manual to guide the approach. Second, the analysis is only applied to some partially mature concepts that have adequate samples cited in scientific literature. Third, the method requires a large workspace and skillful techniques for viewing the whole when used with the concept. These characteristics limit the use of this method in the nursing discipline.

4.3 Rationale for choosing the modified Walker and Avant method

A two-fold rationale is provided for using Walker and Avant method in the concept analysis of NSIs. First, the Walker and Avant method is the most common and mature method for concept analysis (Allan et al., 2013; Xyrichis & Ream, 2007). It has been

applied extensively in the discipline of nursing (e.g., Antoinette Bargagliotti, 2012; Bu & Jezewski, 2007; Cahill, 1996; Holcomb et al., 2002; Schick Makaroff, 2013). Second, it provides a systematic and structured manual to guide the process. The eight-step procedure ensures the concept analysis is focused and leaves little room for distraction, which is particularly useful for novice concepts and neophyte researchers (Brennan, 1997; Freeman, Baumann, Blythe, Fisher, & Akhtar-Danesh, 2012; Schick Makaroff, 2013). Although the Walker and Avant method is applied widely in concept analysis, distinct criticisms about its stability, accuracy and utility exist (Hupcey et al., 1996; Hupcey & Penrod, 2005; Morse, Hupcey, Mitcham, & Lenz, 1996). Three strategies were implemented in an attempt to minimize these deficiencies and ensure rigor in the concept analysis of NSIs. These were use of an electronic search of scientific literature as the main search strategy, use of the Holzemer Outcome Model as the theoretical context, and identification of real cases as borderline cases. These strategies are now discussed.

4.3.1 Use of an electronic search of scientific literature as the main search strategy

Scholars such as Hupcey and Penrod (2005) believe that the best data source for concept analysis is scientific literature using a concept, rather than relying on a dictionary definition, creative image, art forms, interview data or any other form of representation. Therefore, in the concept analysis of NSIs, in addition to examining dictionary definitions of NSIs, a three-part electronic search in relevant databases and websites was adopted as the main search strategy in the present study. It was expected that this strategy would increase the likelihood of retrieving data sources.

4.3.2 Use of the Holzemer Outcome Model as the theoretical context

The process of concept analysis can derive strong and coherent conceptual insights into the phenomena of interest through the examination of multiple theoretical contexts (Fawcett, 2012). It is suggested that concept analysis should be conducted in a theoretical context to ensure the conceptual meaning of concept is precise and specific to a certain context (Paley, 1996; Penrod & Hupcey, 2005; Risjord, 2009). Therefore, to clarify the specific conceptual meaning of NSIs in the context of nursing quality monitoring and reporting, the Holzemer Outcome Model was used as the

theoretical context to strengthen the step 'determining the core attributes of NSIs'. The Holzemer Outcome Model (Holzemer, 1994) extends and stratifies the structure, process and outcome dimensions of the Donabedian's SPO Model as patient-, provider- or setting-related. It is represented in a matrix (Table 4.1) with a horizontal axis of input (structure), process and outcome, and a vertical axis of client (patient), provider and setting (Holzemer, 2009). The Holzemer Model provides a framework to guide database development, quality improvement initiatives and outcomes management in health care (Brennan & Daly, 2009). In the concept analysis of NSIs, this matrix served as an organizing framework to categorize the core attributes of NSIs.

Table 4.1 Matrix of Holzemer Outcome Model

	Input/structure	**Process**	**Outcome**
Client	The variables and characteristics of clients (patients, healthy individuals, families, groups, communities, etc.)	Many processes in addition to the care process itself that clients use to help them move on health and healing	A change in health status of the patient/client that is attributable to an intervention of a health care provider(s) or system, including indicators of: functional status, quality of life, hospital length of stay, use of resources, satisfaction with care delivery services, etc.
Provider	The training and experience of the providers	All types of health care delivery systems, interventions or treatments that are delivered by providers	Provider satisfaction, provider intention to stay or leave, and level of ongoing continuing education that demonstrates continued competence
Setting	Values, perceptions and beliefs, and available resources including finances, equipment, number or type of providers and health conditions of communities	Staff mix and patient acuity[a], documentation of care process	Provider turnover[b], morbidity, mortality, re-admissions, etc.

Legend: [a] These are also deemed as setting/structure variables. [b] This is also deemed as setting/structure variable.

4.3.3 Identification of the real cases as borderline cases

In the Walker and Avant method, researchers may not use real-life cases to construct model and additional cases (Walker & Avant, 2011). Some critics consider that using cases irrelevant to actual practice will reduce the validity of concept analysis (Hupcey et al., 1996; Hupcey & Penrod, 2005; Morse et al., 1996; Weaver & Mitcham, 2008). For this reason, only real cases that use the concept of NSIs in current nursing practice were included in the present analysis. For example, the NDNQI, a national voluntary nursing quality measurement database that uses NSIs to monitor and report the quality of nursing care in the United States, was identified as a real borderline case of NSIs.

4.4 Determining the aims of the concept analysis of NSIs

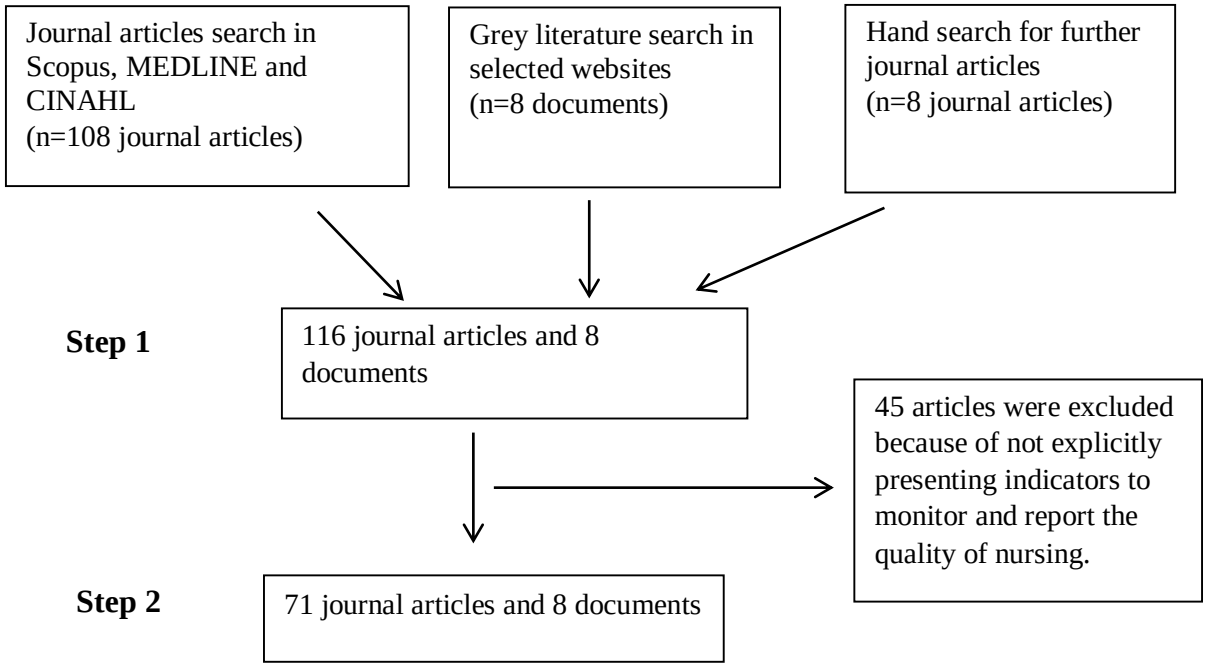
Determining the specific aims of concept analysis provides a guideline to identify the core attributes of a concept. In this study, the principal aim of the concept analysis of NSIs was to help develop a valid and reliable survey instrument (NSIQ). The specific aims were:

- To clarify the conceptual meaning of NSIs including definitions, core attributes, antecedents, consequences, borderline cases and empirical referents related to the concept of NSIs
- To synthesize the pattern of usage of NSIs in current quality monitoring and reporting processes.

4.5 Identifying data sources using the concept of NSIs

In the present analysis, data sources used for the concept analysis of NSIs were identified in two steps (Figure 4.1). In the first step, a three-part electronic search was used to identify initial data sources, which included 116 journal articles and eight documents. In the second step, the initial data sources were refined using the inclusion criteria of explicit presentation of indicators. Journal articles that did not present explicitly indicators as measures for nursing quality monitoring and reporting were excluded. A total of 71 journal articles and eight documents were identified as the final data sources for the concept analysis of NSIs.

Figure 4.1 Procedure for identifying the data sources using the concept of NSIs



4.5.1 Step one: identify the initial data sources

(1) Approach 1: electronic databases search

Three scientific databases highly relevant to the nursing discipline (Scopus[11], MEDLINE and CINAHL) were searched.

1. In Scopus, the search was undertaken using the terms 'quality indicator' and 'nursing' in the title, abstract and keywords. The retrieved articles were then refined to include the terms 'hospital' and 'sensitive'.
2. In MEDLINE and CINAHL, the search was undertaken using the Medical Subject Headings (MeSH)[12] term 'quality indicators', and the search was further refined using the terms 'nursing', 'hospital' and 'sensitive'.

The search began with the term 'quality indicator' because it is the MeSH term for NSIs (National Library of Medicine, 2012). The search using MeSH terms ensured the data sources relevant to the subject/topic of 'quality indicators' could be retrieved,

[11] Scopus is 'the largest abstract and citation database of peer-reviewed literature and quality web sources' (Burnham, 2006). It includes 'a more expanded spectrum of journals than PubMed and Web of Science', and is 'easy to navigate, even for the novice use' (Falagas, Pitsouni, Malietzis, & Pappas, 2008, p. 432).

[12] MeSH is the thesaurus developed by the National Libraries of America to index articles that have similar research subjects/topics in the biomedicine discipline (Lowe & Barnett, 1994).

thereby minimizing the loss of data sources that used surrogate or related terms[13] to represent NSIs. Incorporation of the terms 'nursing', 'hospital' and 'sensitive' ensured the study discipline and the foci of the present analysis were captured in the search. In addition, because the term NSIs was just proposed in 1996 by Maas, Johnson, and Moorhead (1996) and the development of NSIs began during the late 1990s, the selection years were narrowed to articles published in English between 2000 and 2011. This search produced 108 journal articles.

(2) Approach 2: grey literature search in selected websites

Since the mid-1990s, a number of nursing professional bodies (e.g., International Council of Nurses, American Nurses Association, Association of California Nurse Leaders, and Association of UK University Hospitals) have launched initiatives to identify NSIs, and published a variety of grey literature[14] to describe NSIs. To include the grey literature, the search was undertaken using the term 'nursing quality indictor' in the websites of nursing professional bodies and initiatives related to NSIs. These websites included NDNQI, CalNOC, MilNOD, VANOD, HOBIC, the International Council of Nurses, the National Quality Forum, the Association of UK University Hospitals, the Collaborative Alliance for Nursing Outcomes, Australian Council on Health Care Standards, Australian Nursing and Midwifery Federation, Australian College of Nursing and the Australian Practice Nurses Association. This search produced eight documents for analysis.

(3) Approach 3: hand search

Reference lists from the selected articles collected by Approach 1 were checked for further relevant sources. This search produced an additional eight articles. In summary, the above three-part search resulted in 116 journal articles and eight documents.

4.5.2 Step two: identify the final data sources

[13] Surrogate terms are 'words that express concept ideas through words other than those that apply to the concept in the study. Related terms are words that have something in common with the concept yet do not possess the same characteristics' (Tofthagen & Fagerstrøm, 2010, p. 25).

[14] Grey literature is 'that which is produced on all levels of government, academic, business and industry in print and electronic formats, but which is not controlled by commercial publishers. It traditionally has three categories of documents: conference proceedings, reports and doctoral theses' (Farace & Schöpfel, 2010, p. 1–2).

The focus of the concept analysis of NSIs was quality indicators used for monitoring and reporting the quality of nursing care in hospital settings, hence the inclusion criterion for the selection of final data sources were those that presented explicit indicators to monitor and report the quality of nursing care in hospital settings. Using this inclusion, 45 articles were excluded from the initial data sources (116 journal articles and eight documents), thus the final data sources for the concept analysis of NSIs comprised 71 articles and eight documents. Of the 71 articles, the majority of articles (53/71) reported primary research and 18 were either review or editorial articles; 55 were from the United States; four from Canada; two from Thailand, two from Australia; and one each from Sweden, Finland, Germany, Belgium, New Zealand, Iran, South Korea and Japan. The eight documents were sourced from the websites of National Quality Forum, NDNQI, CalNOC, MilNOD, VANOD, AUKUH, HOBIC and International Council of Nursing, respectively.

4.6 Identifying surrogate terms or related terms for NSIs

Identifying surrogate terms or related terms is part of concept analysis, and enables the concept to be understood completely and clearly, decreasing misunderstanding and confusion about the meaning of the concept. During the concept analysis of NSIs, surrogate terms or related terms used to represent or relate to the concept of NSIs in the data sources were identified.

4.7 Determining core attributes and empirical referents of NSIs

There are no concrete guidelines for determining core attributes of concepts in the Walker and Avant method (Hupcey & Penrod, 2005; Paley, 1996); therefore, research aims may be a useful guide to determine core attributes (Walker & Avant, 2011). For the aims of the present analysis,[15] the core attributes of NSIs were interpreted as the terms that represented NSIs to monitor and report the quality of nursing care. All terms used in the data sources were identified and organized into the matrix of Holzemer Outcome Model (1994). They were classified in the categories of structure, process and outcome and subcategories of patient-, nursing-, and setting-related. To

[15] See Chapter 4, Section 4.4 for more information about the aims of the concept analysis of NSIs.

further understand the terms in the category 'patient-related outcome' that were most frequently used in the data sources, this category was sorted into different subcategories in accordance with a modified classification of patient outcome proposed by Jennings, Staggers, and Brosch (1999) and Doran (2011). The subcategories were safety, perception, use of health care, functional status and clinical management[16]. The matrix involving the NSI terms used in data sources was interpreted as the pattern of usage of NSIs in current nursing quality monitoring and reporting processes. These NSI terms (core attributes of NSIs) that demonstrated actual NSIs in current practice were deemed as the empirical referents of NSIs.

4.8 Identifying cases, antecedents and consequences of NSIs

Following the Walker and Avant method, the events or context promoting the occurrence of NSIs and the consequences or outcomes caused by the development of NSIs were identified as the antecedents and consequences of NSIs, respectively. The nursing quality initiatives and activities in relation to the development and application of NSIs were identified as the borderline cases.[17]

4.9 Using the concept analysis of NSIs to develop the survey instrument

Concept analysis clarifies the conceptual meaning of a concept through analyzing its context, core attributes, cases, antecedents, and consequences. The results of concept analysis can be used to develop a survey instrument.[18] In the present study, the concept analysis of NSIs was implemented to inform the development of a survey instrument (NSIQ): (1) explicit definition of NSIs provided a base for the development of NSIQ; (2) three dimensions of NSIs (structure, process and outcome) were recognized as the themes of the NSIQ; and (3) the core attributes (empirical referents) of NSIs that synthesized in the pattern of usage of NSIs were used to construct the NSIQ items.[19]

[16] See Chapter 5, Table 5.2 for more information about the organization of core attributes of NSIs into the matrix of Holzemer Outcome Model.
[17] See Chapter 4, Section 4.3.3 for more information about the identification of the real cases of NSIs.
[18] See Chapter 4, Section 4.2.4 for more information about the application of the results of concept analysis.
[19] See Chapter 6, Section 6.2.1 for more information about the construction of NSIQ.

4.10 Summary

Using the modified Walker and Avant method, the procedure for the concept analysis of NSIs (Phase One) is presented, including determining research aims, data sources, surrogate terms or related terms, core attributes, cases, antecedents, consequences, and empirical referents of NSIs. The concept analysis of NSIs aimed to clarify the conceptual meaning and pattern of usage of NSIs in current nursing monitoring and reporting processes. A three-part electronic search strategy was used to identify the data sources for the concept analysis of NSIs. The core attributes of NSIs were interpreted as the terms that represented NSIs to monitor and report the quality of nursing care. The determined core attributes were organized into the matrix of Holzemer Outcome Model that expressed the pattern of usage of NSIs. Meanwhile, three strategies for ensuring methodological rigor of concept analysis of NSIs are also discussed in the chapter.

CHAPTER FIVE
RESULTS OF PHASE ONE: CONCEPT ANALYSIS OF NURSING-SENSITIVE INDICATORS

5.1 Introduction

The results of Phase One of the study are presented in this chapter. The conceptual meaning of NSIs within the theoretical context of the Holzemer Outcome Model was clarified, which included the surrogate terms or related terms, definitions, core attributes, antecedents, consequences, borderline cases and empirical referents of NSIs. Based on the conceptual meaning of NSIs, the proposed definitions of NSIs and pattern of usage of NSIs are also delineated in this chapter.

5.2 Surrogate terms or related terms

Surrogate terms or related terms express a concept using other words that apply to the concept itself (Tofthagen & Fagerstrøm, 2010). They facilitate the comprehensive examination and understanding of the concept.[20] There were several surrogate terms or related terms for NSIs in the selected data sources. These terms were identified as '*nursing-sensitive outcome indicators*' (Aydin et al., 2004; Doran et al., 2006; Ingersoll, McIntosh, & Williams, 2000; International Council of Nurses, 2012), '*nursing performance quality indicators*' or '*quality of care indicators*' (Aydin et al., 2004; Donaldson, Brown, Aydin, Bolton, & Rutledge, 2005; Kunaviktikul et al., 2005; Loan, Patrician, & McCarthy, 2011; Pazargadi et al., 2008; Simon, Yankovsky, Klaus, Gajewski, & Dunton, 2011), '*patient safety indicators*' (Naylor, 2007; Ridley, 2008), '*consensus standards for nursing sensitive care*' (Kurtzman, 2010; Kurtzman & Corrigan, 2007; Kurtzman & Jennings, 2008), '*clinical/service screening indicators*' (Sullivan, Brust, Wren, & Rich, 2004) and '*outcomes potentially sensitive to nursing*' (Duffield et al., 2011; Needleman et al., 2002a). These terms expressed the concept of NSIs in alternative terms. They were all used as nursing quality indicators to monitor and report the quality of nursing care in health organizations.

[20] See Chapter 4, Section 4.5.1 and Section 4.6 for more information about surrogate terms or related terms.

5.3 Definitions

In the Walker and Avant method, the concept can be examined first in the dictionary. Merriam-Webster's Dictionary–Medical Science (2012) and Collins Cobuild Learner's Dictionary, Concise edition (2003) define 'nursing' and 'indicator', respectively, as 'the duties of a nurse' and 'a measurement or value which gives you an idea of what something is like'. The definition of 'sensitive' is: 'receptive to sense impressions; capable of being stimulated or excited by external agents (as light, gravity, or contact); and highly responsive or susceptible; excessively or abnormally susceptible; capable of indicating minute differences; readily affected or changed by various agents' (Merriam-Webster's Dictionary–Medical Science, 2012).

Most researchers tended to use the term 'NSIs' but did not define it. The definitions found in the data sources primarily referred to measures to evaluate the quality of nursing care and reflect nursing's contribution to patient and health outcomes. These definitions were largely developed by professional nursing bodies or quality measurement authorities. Table 5.1 list the definitions of NSIs used in the data sources.

Table 5.1 Definitions of nursing-sensitive indicators used in the data sources

Author	Definition
American Nurses Association (1996)	Indicators that capture care or its outcomes most affected by nursing care
National Quality Forum (2004, p. 2)	Measurement of quality and quantity in describing materials, processes, products, systems, services, or practices
NDNQI (2012)	Indicators reflecting the structure, process and outcomes of nursing care
International Council of Nurses (2012)	Indicators that are intended to draw correlation between interventions patients have received, and their resulting health status
Association of UK University Hospitals (2012)	Quality indicators that can be linked to nursing staffing issues including leadership, establishment levels, skill-mix and training and development of staff
Doran, Midon, and Clarke (2011, p. 42)	Data elements that are collected and analyzed to identify nursing sensitive outcomes
Hart and Davis (2011, p. 161)	Measures of patient outcomes that are a result of nursing interventions and are classified as structure, process, or outcomes indicators based on Donabedian's classic triad model

5.4 Core attributes

In the concept analysis of NSIs, the terms used in the data sources that represented NSIs to monitor and report the quality of nursing care were determined as the core attributes (Figure 5.1). The core attributes were organized in the matrix of the Holzemer outcome model as structure, process and outcome categories related to patient, nursing and organization.[21] Each attribute and its characteristics, frequency and citation are discussed as follows and summarized in Table 5.2.

5.4.1 Structure NSIs

Structure NSIs reflect and measure the impacts of characteristics and structural factors of patients, nurses and settings on the outcomes of nursing care. They include three subcategories: patient-related, nursing-related, and setting-related.

Patient-related structure NSIs were less frequently used in the data sources. They were mainly expressed as patient characteristics that influenced the quality of nursing care (Brown, Donaldson et al., 2010; Ingersoll et al., 2000; Van den Heede, Clarke, Sermeus, Vleugels, & Aiken, 2007). The term 'patient characteristic' basically was interpreted as patients' demographic features (e.g. gender and age) and their hospitalization variables (e.g. duration of hospitalization, the type of ward, and the type of procedure undertaken).

Nursing-related structure NSIs included Registered Nurses' education level and years of experience. Both indicators have been explicitly identified as NSIs in several large nursing quality measurement databases, such as NDNQI, CalNOC, MilNOD. They are also listed as nursing performance quality indicators in smaller studies, such as Tervo-Heikkinen, Partanen et al.'s study (2008), and Van den Heede et al.'s study (2007). These nursing-related structure NSIs have been widely verified according to their effects on quality of care (Blegen, 2006; Hill, 2010).

[21] See Chapter 4, Section 4.7 for more information about the core attributes of NSIs were categorized in the matrix of Holzemer Outcome Model.

Figure 5.1 Concept analysis of NSIs

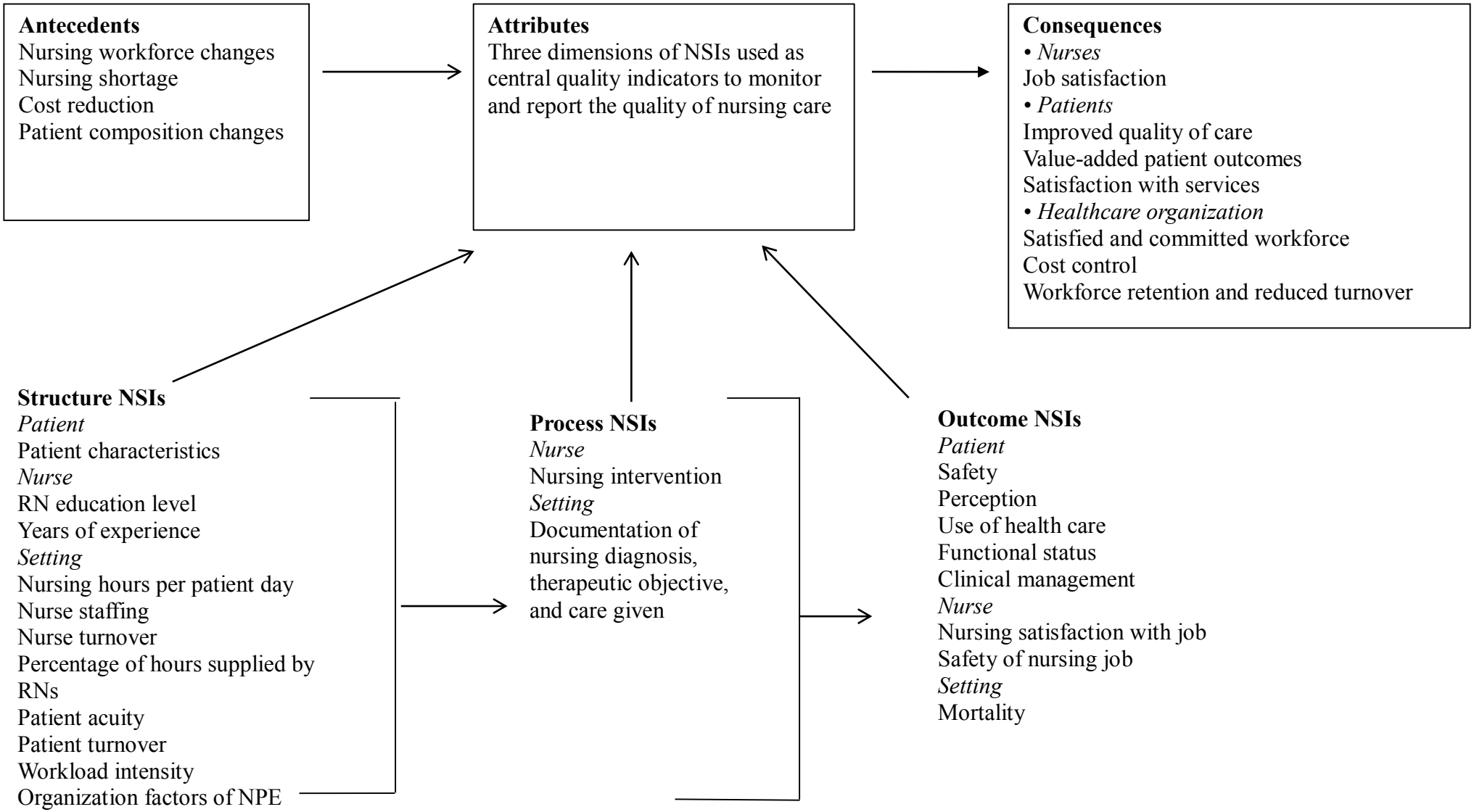


Table 5.2 Category, frequency and citation of NSIs used in the data sources within Holzemer Outcome Model

Category	Subcategories	NSIs	Frequency	Citation
Structure	Patient-related	Patient characteristics	3	Brown, Donaldson et al. (2010), Ingersoll et al. (2000), Van den Heede et al. (2007)
	Nursing-related	RN education level	19	Alexander (2007), Aydin et al. (2004), Blegen (2006), CalNOC (2012), Doran et al. (2011), Dunton et al. (2007), Gallagher & Rowell (2003), Joseph (2007), Kerr (2000), Lacey & Cox (2009), Loan et al. (2011), MilNOD (2012), Montalvo (2007), NDNQI (2012), Needleman et al. (2007), Patrician et al. (2010), Ridley (2008), Van den Heede et al. (2007), VANOD (2012)
		Years of experience	16	Alexander (2007), Blegen (2006), CalNOC (2012), Doran et al. (2011), Dunton et al. (2007), Hill (2010), Ingersoll et al. (2000), Joseph (2007), Kerr (2000), Loan et al. (2011), MilNOD (2012), Patrician et al. (2010), Patrician et al. (2011), Tervo-Heikkinen, Partanen et al. (2008), Van den Heede et al. (2007), VANOD (2012)

Table 5.2 Continued

Category	Subcategories	NSIs	Frequency	Citation
Structure	Setting-related	Nursing hours per patient day	39	Alexander (2007), Aydin et al. (2004), Blegen (2006), Brown, Donaldson et al. (2010), CalNOC (2012), Dall et al. (2009), Doran et al. (2011), Dunton et al. (2007), Furukawa et al. (2011), Gallagher & Rowell (2003), Goetz et al. (2011), Hall et al. (2003), Mark & Harless (2010), Hart & Davis (2011), Jennings et al. (2001), Kerr (2000), Kunaviktikul et al. (2005), Kurtzman & Corrigan (2007), Kurtzman & Jennings (2008), Kurtzman (2010), Lacey & Cox (2009), Loan et al. (2011), McGillis Hall (2002), MilNOD (2012), Montalvo (2007), National Quality Forum (2004), Naylor (2007), NDNQI (2012), Needleman et al. (2007), Pappas (2008), Patrician et al. (2010), Patrician et al. (2011), Pazargadi et al. (2008), Simon et al. (2011), Sujijantararat et al. (2005), Tervo-Heikkinen, Partanen et al. (2008), Van den Heede et al. (2007), VANOD (2012), Whitman et al. (2002)
		Nurse staffing (staff mix, skill mix and staff ratio)	38	Alexander (2007), Aydin et al. (2004), Blegen (2006), Brown, Donaldson et al. (2010), CalNOC (2012), Doran et al. (2011), Dunton et al. (2007), Furukawa et al. (2011), Gallagher & Rowell (2003), Hart & Davis (2011), International Council of Nurses (2012), Jennings et al. (2001), Joseph (2007), Kerr (2000), Kovner et al. (2002), Kunaviktikul et al. (2005), Kurtzman & Corrigan (2007), Kurtzman & Jennings (2008), Kurtzman (2010), Lacey & Cox (2009), Loan et al. (2011), McGillis Hall (2002), MilNOD (2012), Montalvo (2007), National Quality Forum (2004), Naylor (2007), NDNQI (2012), Needleman et al. (2007), Patrician et al. (2010), Patrician et al. (2011), Pazargadi et al. (2008), Ridley (2008), Riehle et al. (2007), Schmid et al. (2007), Sujijantararat et al. (2005), Tervo-Heikkinen, Partanen et al. (2008), Van den Heede et al. (2007), VANOD (2012)

Table 5.2 Continued

Category	Subcategories	NSIs	Frequency	Citation
Structure	Setting-related	Nurse turnover	18	Alexander (2007), Blegen (2006), Brown, Donaldson et al. (2010), CalNOC (2012), Doran et al. (2011), Joseph (2007), Kurtzman & Corrigan (2007), Kurtzman & Jennings (2008), Kurtzman (2010), Lacey & Cox (2009), Montalvo (2007), National Quality Forum (2004), Naylor (2007), Needleman et al. (2007), Riehle et al. (2007), Sullivan et al. (2004), Van den Heede et al. (2007), VANOD (2012)
		Percentage of hours supplied by RNs	12	Berney & Needleman (2006), CalNOC (2012), Doran et al. (2011), Dunton et al. (2007), Furukawa et al. (2011), Hall et al. (2003), McGillis Hall (2002), Pappas (2008), Ridley (2008), Tervo-Heikkinen, Partanen et al. (2008), Van den Heede et al. (2007), VANOD (2012)
		Patient acuity	6	Doran et al. (2011), Joseph (2007), Loan et al. (2011), MilNOD (2012), Patrician et al. (2010), Van den Heede et al. (2007)
		Patient turnover	5	Doran et al. (2011), Loan et al. (2011), MilNOD (2012), Patrician et al. (2010), Van den Heede et al. (2007)
		Workload intensity	5	Brown, Donaldson et al. (2010), CalNOC (2012), Doran et al. (2011), Van den Heede et al. (2007), Kerr (2000)

Table 5.2 Continued

Category	Subcategories	NSIs	Frequency	Citation
Structure	Setting-related	Organizational factors of the NPE		
		Support for nursing education	21	Alexander (2007), Doran et al. (2011), Dunton et al. (2007), Gallagher & Rowell (2003), Joseph (2007), Kurtzman & Corrigan (2007), Kurtzman & Jennings (2008), Kurtzman (2010), Lacey & Cox (2009), Loan et al. (2011), MilNOD (2012), Montalvo (2007), National Quality Forum (2004), Naylor (2007), NDNQI (2012), Needleman et al. (2007), Patrician et al. (2010), Pazargadi et al. (2008), Smith & Jordan (2008), Van den Heede et al. (2007), VANOD (2012)
		Adequate facilities and budget for quality of care	21	Alexander (2007), Doran et al. (2011), Hall et al. (2003), Gallagher & Rowell (2003), Joseph (2007), Kurtzman & Corrigan (2007), Kurtzman & Jennings (2008), Kurtzman (2010), Lacey & Cox (2009), Loan et al. (2011), MilNOD (2012), Montalvo (2007), National Quality Forum (2004), Naylor (2007), NDNQI (2012), Needleman et al. (2007), Patrician *et al.* (2010), Pazargadi et al. (2008), Smith & Jordan (2008), Van den Heede et al. (2007), VANOD (2012)
		Nurse manager ability, leadership and support	20	Alexander (2007), Doran et al. (2011), Gallagher & Rowell (2003), Joseph (2007), Kurtzman & Corrigan (2007), Kurtzman & Jennings (2008), Kurtzman (2010), Lacey & Cox (2009), Loan et al. (2011), MilNOD (2012), Montalvo (2007), National Quality Forum (2004), Naylor (2007), NDNQI (2012), Needleman et al. (2007), Patrician et al. (2010), Pazargadi et al. (2008), Smith & Jordan (2008), Van den Heede et al. (2007), VANOD (2012)

Table 5.2 Continued

Category	Subcategories	NSIs	Frequency	Citation
Structure	Setting-related	Organizational factors of the NPE Relationships with other practitioners	20	Alexander (2007), Doran et al. (2011), Gallagher & Rowell (2003), Ingersoll et al. (2000), Joseph (2007), Kurtzman & Corrigan (2007), Kurtzman & Jennings (2008), Kurtzman (2010), Lacey & Cox (2009), Loan et al. (2011), MilNOD (2012), Montalvo (2007), National Quality Forum (2004), Naylor (2007), NDNQI (2012), Needleman et al. (2007), Patrician *et al*. (2010), Smith & Jordan (2008), Van den Heede et al. (2007), VANOD (2012)
Process	Nursing-related	Nursing intervention (assessment of patient care requirement, management and implementation of nursing intervention, development of nursing care plan)	22	Albanese et al. (2010), Alexander (2007), CalNOC (2012), Chaboyer et al. (2010), Doran et al. (2011), Gallagher & Rowell (2003), Joseph (2007), Kerr (2000), Kurtzman & Corrigan (2007), Kurtzman & Jennings (2008), Kurtzman (2010), Lacey et al. (2006), Lacey & Cox (2009), Montalvo (2007), National Quality Forum (2004), Naylor (2007), NDNQI (2012), Needleman et al. (2007), Riehle et al. (2007), Simpson (2005), Van den Heede et al. (2007), Whitman et al. (2002)
	Setting-related	Documentation of nursing diagnosis, therapeutic objective, and care given	8	Cisler-Cahill (2006), Doran et al. (2006), Dunton et al. (2007), Furukawa et al. (2011), Hall et al. (2003), Ingersoll et al. (2010), Jansson et al. (2010), Pazargadi et al. (2008)

Table 5.2 Continued

Category	Subcategories	NSIs	Frequency	Citation
Outcome	Patient-related Safety	Pressure ulcer prevalence	55	Alexander (2007), AUKUH (2012), Aydin et al. (2004), Berger & Branowicki (2009), Blegen (2006), Brown, Donaldson et al. (2010), CalNOC (2012), Chaboyer et al. (2010), Cisler-Cahill (2006), Dall et al. (2009), Donaldon et al. (2005), Doran et al. (2011), Dunton et al. (2007), Furukawa et al. (2011), Gallagher & Rowell (2003), Goetz et al. (2011), Hall et al. (2003), Harrington (2009), Hart & Davis (2011), Hill (2010), HOBIC (2012), International Council of Nurses (2012), Jennings et al. (2001), Joseph (2007), Jull & Griffths (2010), Kunaviktikul et al. (2005), Kurtzman & Corrigan (2007), Kurtzman & Jennings (2008), Kurtzman (2010), Kutschmann et al. (2010), Lacey & Cox (2009), Loan et al. (2011), Mattke et al. (2004), McGillis Hall (2002), MilNOD (2012), Montalvo (2007), National Quality Forum (2004), Naylor (2007), NDNQI (2012), Needleman et al. (2002, 2007), Pappas (2008), Patrician et al. (2010), Patrician et al. (2011), Pazargadi et al. (2008), Ridley (2008), Riehle et al. (2007), Smith & Jordan (2008), Sullivan et al. (2004), Van den Heede et al. (2007),VANOD (2012), Wakefield et al. (2009), Whitman et al. (2001, 2002), Yamagishi et al. (2003)
		Falls and falls with injury	51	Albanese et al. (2010), Alexander (2007), AUKUH (2012), Aydin et al. (2004), Blegen (2006), Brown, Donaldso(2009), Donaldson et al. (2005), n et al. (2010), CalNOC (2012), Chaboyer et al. (2010),

Table 5.2 Continued

Category	Subcategories	NSIs	Frequency	Citation
Outcome	Patient-related Safety	Falls and falls with injury		Dall et al. (2009), Donaldson et al. (2005), Doran et al. (2011), Dunton et al. (2007), Furukawa et al. (2011), Gallagher & Rowell (2003), Goetz et al. (2011), Hall et al. (2003), Mark & Harless (2010), Harrington (2009), Hart & Davis (2011), Hill (2010), HOBIC (2012), Hou et al. (2011), Jansson et al. (2010), Jennings et al. (2001), Joseph (2007), Kerr (2000), Kunaviktikul et al. (2005), Kurtzman & Corrigan (2007), Kurtzman & Jennings (2008), Kurtzman (2010), Lacey & Cox (2009), Lee (2007), Loan et al. (2011), MilNOD (2012), Montalvo (2007), National Quality Forum (2004), Naylor (2007), NDNQI (2012), Needleman et al. (2007), Pappas (2008), Patrician et al. (2010), Patrician et al. (2011), Riehle et al. (2007), Smith & Jordan (2008), Sullivan et al. (2004), Van den Heede et al. (2007), VANOD (2012), Wakefield et al. (2009), Whitman et al. (2001, 2002), Yamagishi et al. (2003)
		Selective infections	37	Albanese et al. (2010), AUKUH (2012), Blegen (2006), CalNOC (2012), Dall et al. (2009), Doran et al. (2011), Duffield et al. (2011), Duffy (2002), Gallagher & Rowell (2003), International Council of Nurses (2012), Goetz et al. (2011), Jennings et al. (2001), Joseph (2007), Kerr (2000), Kunaviktikul et al. (2005), Kurtzman & Corrigan (2007), Kurtzman & Jennings (2008), Kurtzman (2010), Lacey et al. (2006), Lacey & Cox (2009), Lee (2007), McGillis Hall (2002), Montalvo (2007), National Quality Forum (2004), Naylor (2007), NDNQI (2012), Needleman et al. (2002, 2007), Ridley (2008), Riehle et al. (2007), Siela (2010), Smith & Jordan (2008), Van den Heede et al. (2007), Wakefield et al. (2009), Whitman et al. (2001, 2002), Yamagishi et al. (2003)

Table 5.2 Continued

Category	Subcategories	NSIs	Frequency	Citation
Outcome	Patient-related Safety	Hospital-acquired urinary tract infection	31	Albanese et al. (2010), Alexander (2007), Berney & Needleman (2006), Blegen (2006), Dall et al. (2009), Doran et al. (2011), Duffield et al. (2011), Gallagher & Rowell (2003), Goetz et al. (2011), Hall et al. (2003), Harrington (2009), International Council of Nurses (2012), Kovner et al. (2002), Kunaviktikul et al. (2005), Kurtzman & Corrigan (2007), Kurtzman & Jennings (2008), Kurtzman (2010), Lacey & Cox (2009), Mattke et al. (2004), McGillis Hall (2002), National Quality Forum (2004), Naylor (2007), NDNQI (2012), Needleman et al. (2002, 2007), Pappas (2008), Ridley (2008), Riehle et al. (2007), Sujijantararat et al. (2005), Van den Heede et al. (2007), Wakefield et al. (2009)
		Pneumonia	28	Alexander (2007), Berney & Needleman (2006), Blegen (2006), Dall et al. (2009), Doran et al. (2011), Duffield et al. (2011), Goetz et al. (2011), Hall et al. (2003), International Council of Nurses (2012), Jansson et al. (2010), Kovner et al. (2002), Kurtzman & Corrigan (2007), Kurtzman & Jennings (2008), Kurtzman (2010), Lacey & Cox (2009), Mattke et al. (2004), McGillis Hall (2002), National Quality Forum (2004), Naylor (2007), Needleman et al. (2002, 2007), Pappas (2008), Ridley (2008), Riehle et al. (2007), Siela (2010), Smith & Jordan (2008), Van den Heede et al. (2007), Wakefield et al. (2009)

Table 5.2 Continued

Category	Subcategories	NSIs	Frequency	Citation
Outcome	Patient-related Safety	Failure status/ Failure to rescue	27	Alexander (2007), Berney & Needleman (2006), Blegen (2006), Bobay et al. (2008), Dall et al. (2009), Doran et al. (2011), Duffield et al. (2011), Hall et al. (2003), International Council of Nurses (2012), Joseph (2007), Kurtzman & Corrigan (2007), Kurtzman & Jennings (2008), Kurtzman (2010), Lacey et al. (2006), Lacey & Cox (2009), Manojlovich & Talsma (2007), Mattke et al. (2004), National Quality Forum (2004), Naylor (2007), Needleman et al. (2002, 2007), Ridley (2008), Riehle et al. (2007), Schmid et al. (2007), Silber et al. (2007), Simpson (2005), Van den Heede et al. (2007)
		Restraint	25	Alexander (2007), Aydin et al. (2004), CalNOC (2012), Doran et al. (2011), Dunton et al. (2007), Gallagher & Rowell (2003), Hart & Davis (2011), Kurtzman & Corrigan (2007), Kurtzman & Jennings (2008), Kurtzman (2010), Lacey & Cox (2009), Loan et al. (2011), MilNOD (2012), Montalvo (2007), National Quality Forum (2004), Naylor (2007), NDNQI (2012), Needleman et al. (2007), Patrician et al. (2010), Sullivan et al. (2004), Riehle et al. (2007), Van den Heede et al. (2007), Whitman et al. (2001, 2002), Yamagishi et al. (2003)
		Medication errors	21	AUKUH (2012), Blegen (2006), CalNOC (2012), Chaboyer et al. (2010), Dall et al. (2009), Doran et al. (2011), Hart & Davis (2011), Joseph (2007), Lacey et al. (2006), Loan et al. (2011), McGillis Hall (2002), MilNOD (2012), Pappas (2008), Patrician et al. (2010), Patrician et al. (2011), Riehle et al. (2007), Van den Heede et al. (2007), Wakefield et al. (2009), Whitman et al. (2001, 2002), Yamagishi et al. (2003)

Table 5.2 Continued

Category	Subcategories	NSIs	Frequency	Citation
Outcome	Patient-related Safety	Venous system complication	18	Alexander (2007), Berger & Branowicki (2009), Blegen (2006), Dall et al. (2009), Duffield et al. (2011), Gallagher & Rowell (2003), International Council of Nurses (2012), Kovner et al. (2002), Lacey et al. (2006), Montalvo (2007), NDNQI (2012), Needleman et al. (2002, 2007), Pazargadi et al. (2008), Ridley (2008), Riehle et al. (2007), Van den Heede et al. (2007), Yamagishi et al. (2003)
		Shock	9	Berney & Needleman (2006), Blegen (2006), Duffield et al. (2011), International Council of Nurses (2012), Mattke et al. (2004), Needleman et al. (2002), Ridley (2008), Riehle et al. (2007), Van den Heede et al. (2007)
		Gastrointestinal bleeding	9	Berney & Needleman (2006), Blegen (2006), Dall et al. (2009), Doran et al. (2011), Duffield et al. (2011), International Council of Nurses (2012), Mattke et al. (2004), Needleman et al. (2002), Riehle et al. (2007)
		Sepsis	7	Berney & Needleman (2006), Dall et al. (2009), Duffield et al. (2011), International Council of Nurses (2012), Mattke et al. (2004), Needleman et al. (2002), Ridley (2008)
		Central nervous system complication	2	International Council of Nurses (2012), Mattke et al. (2004)

Table 5.2 Continued

Category	Subcategories	NSIs	Frequency	Citation
Outcome	Patient-related Perception	Patient/family satisfaction with nursing care	29	Albanese et al. (2010), Alexander (2007), Aydin et al. (2004), Berger & Branowicki (2009), Blegen (2006), Doran et al. (2011), Hall et al. (2003), HOBIC (2012), Ingersoll et al (2000), International Council of Nurses (2012), Jansson et al. (2010), Jennings et al. (2001), Joseph (2007), Kerr (2000), Kunaviktikul et al. (2005), Laschinger et al. (2005), Loan et al. (2011), McGillis Hall (2002), MilNOD (2012), Needleman et al. (2007), Patrician et al. (2010), Pazargadi et al.(2008), Riehle et al. (2007), Tervo-Heikkinen, Kvist et al. (2008), Van den Heede et al. (2007), VANOD (2012), Wakefield et al. (2009), Whitman et al. (2001, 2002)
		Patient/family complaint rate	3	AUKUH(2012), Riehle et al. (2007), Van den Heede et al. (2007)
	Patient-related Use of health care	Length of stay	12	Albanese et al. (2010), Blegen (2006), Dall et al. (2009), Doran et al. (2011), Ingersoll et al. (2000), International Council of Nurses (2012), Jansson et al. (2010), Joseph (2007), McGillis Hall (2002), Needleman et al. (2002), Riehle et al. (2007), Van den Heede et al. (2007)
		Waiting time for nursing care	4	Albanese et al. (2010), Ingersoll et al. (2000), Pazargadi *et al* (2008), Whitman et al. (2002)
		Unplanned hospital visits post-discharge	3	International Council of Nurses (2012), Jansson et al. (2010), McGillis Hall (2002)

Table 5.2 Continued

Category	Subcategories	NSIs	Frequency	Citation
Outcome	Patient-related Functional status	Vital signs status, self-care ability	12	AUKUH (2012), Blegen (2006), Doran et al. (2006, 2011), Hall et al. (2003), HOBIC (2012), Ingersoll et al (2000), International Council of Nurses (2012), Jansson et al. (2010), Lee (2007), Van den Heede et al. (2007), Wakefield et al. (2009)
	Patient-related Clinical management	Symptom resolution/ reduction	8	Doran et al. (2006, 2011), Hall et al. (2003), HOBIC (2012), Ingersoll *et al.* (2000), International Council of Nurses (2012), Jansson et al. (2010), Van den Heede et al. (2007)
	Nursing-related	Nursing satisfaction with job	21	Alexander (2007), Best & Thurston (2004), Doran et al. (2011), Dunton et al. (2007), Gallagher & Rowell (2003), Ingersoll et al. (2000), Jennings et al. (2001), Joseph (2007), Kerr (2000), Lacey & Cox (2009), Loan et al. (2011), McGillis Hall (2002), MilNOD (2012), Montalvo (2007), NDNQI (2012), Needleman et al. (2007), Patrician et al. (2010), Pazargadi et al. (2008), Riehle et al. (2007), VANOD (2012), Van den Heede et al. (2007)
		Safety of nursing job	8	Doran et al. (2011), Loan et al. (2011), MilNOD (2012), Patrician *et al.* (2010), Pazargadi et al. (2008), Riehle et al. (2007), Van den Heede et al. (2007), VANOD (2012)
	Setting-related	Mortality	11	Albanese et al. (2010), Berney & Needleman (2006), Dall et al. (2009), Doran et al. (2011), Mark & Harless (2010), International Council of Nurses (2012), Joseph (2007), NDNQI (2012), Needleman et al. (2002), Ridley (2008), Van den Heede et al. (2007)

AUKUH: Association of UK University Hospitals; CalNOC: California Nursing Outcomes Coalition; HOBIC: Health Outcomes for Better Information and Care; MilNOD: Military Nursing Outcomes Database; NDNQI: National Database of Nursing Quality Indicators; VANOD: Veterans Affairs Nursing Outcomes Database

Setting-related structure NSIs included nursing hours per patient day (NHPPD), nurse staffing, nurse turnover, and organizational factors of the NPE involving support for nursing education, nurse manager ability, leadership and support, and relationships with other practitioners. Percentage of hours supplied by RNs, patient acuity, patient turnover and workload intensity were also determined as attributes in several articles when reference was made to NSIs, but these attributes were not explored or used universally or comprehensively (Table 5.2). In the data sources, NHPPD is the most frequent structure NSI used to measure the supply of nursing hours relative to patient workload, such as the total number of productive hours worked by nursing staff with direct care responsibilities per patient per day. The measurement of NHPPD was different in the individual studies. In response to this variation, Simon et al. (2011) assessed the reliability of five patient day reporting methods accepted by the NDNQI. In Australia, for example, NHPPD is 'the sum of the total nursing hours worked (or predicted) over 24 hours, divided by the number of patients occupying beds at midnight, plus other separations during the previous 24 hours' (discharges, deaths, transfers) (Heslop & Plummer, 2012, p. 349).

During recent years, the influence of nurse staffing on the quality of patient care and patient outcomes has been studied comprehensively across patient types, hospital units, hospital programs, and health systems[22] (Kovner et al., 2002; Mark & Harless, 2010). As a result, nurse staffing has been recognized consistently as an NSI to assess the contribution of nursing to patient and health care outcomes (Table 5.2). In addition, organizational factors of NPE, such as support for nursing education, nurse manager ability, leadership and support, adequate facilities and budget for quality of care and relationships with other practitioners, have been documented thoroughly for their association with patient, nursing and institutional outcomes[23] (Aiken, Clarke, & Sloane, 2002; Aiken et al., 2008; Duffield et al., 2007; Tervo-Heikkinen, Partanen et al., 2008; Van den Heede et al., 2007). Three research groups (Aiken et al., 2008; Bae, Mark, & Fried, 2010; Ridley, Wilson, Harwood, & Laschinger, 2009) each proposed that a positive or improved NPE can produce better patient outcomes, better nursing satisfaction, and lower patient mortality. In addition, nursing turnover is a widely

[22] See Chapter 2, Section 2.2.2.4 for more information about the influence of nurse staffing on the quality of nursing care.
[23] See Chapter 2, Section 2.2.2.1 for more information about the influence of NPE on the quality of nursing care.

accepted NSI for measuring structure in health care settings and is verified as a direct influence on nursing job performance and consequently affects nursing service quality (Duffield et al., 2007; Needleman et al., 2007).

5.4.2 Process NSIs

The second dimension of NSIs was process NSIs, which reflect and measure nursing process and nursing intervention in the subcategories of nursing- and setting-related. Nursing-related process NSIs were frequently used in the data sources and they were often described as nursing interventions that had evident influence on nursing outcomes (Alexander, 2007; Chaboyer, Johnson, Hardy, Gehrke, & Panuwatwanich, 2010; Montalvo, 2007; Naylor, 2007). Nursing interventions include interventions undertaken by nurses, based on sound clinical judgment and evidence, to enhance patient/client outcomes (Bulechek et al., 2013, Moorhead, Johnson, & Mass, 2004). There is a wide variety of interventions in nursing. In the data sources, the NSIs measuring nursing process were specific to a particular intervention. For instance, Chaboyer et al. (2010) investigated the association between the 'Transforming Care At the Bedside' improvement strategies and patient's adverse events, such as medication errors, patient falls and pressure ulcers, and concluded that the implementation of this intervention could reduce the occurrence of adverse events. In the NDNQI, the NSI 'pediatric pain assessment, intervention, reassessment (AIR) Cycle' is a specific process NSI to reduce pain in pediatric patients. In general, process NSIs are mainly focused on the measurement of three domains of nursing intervention: assessment of patient care requirement, management and implementation of nursing interventions, and development of nursing care plans. Therefore, these three domains of interventions were identified as nursing-related process NSIs.

Setting-related process NSIs were less frequently used in the data sources. One of the key setting-related process NSIs was documentation of nursing diagnosis, therapeutic objective, and care given. A documented nursing care plan in the NPE is central to standardizing nursing practice, which often directly affects patient outcomes (Jansson, Pilhammar-Andersson, & Forsberg, 2010).

5.4.3 Outcome NSIs

The third dimension of NSIs was outcomes NSIs, which were generally used to measure the outcomes of nursing care. The outcome NSIs had three categories: patient-, nursing-, and settings-related. Of these, patient-related outcome NSIs were most frequently used in the data sources. They were further sorted into the subcategories of safety, perception, use of health care, functional status and clinical management, using Jennings et al.'s (1999) and Doran's (2011) classifications of patient outcome.[24] Patient safety NSIs have been operationalized as measures of adverse events occurrences, for example, the prevalence of hospital-acquired pressure ulcer, failure status/failure to rescue, urinary tract infection, falls and falls with injury, hospital-acquired pneumonia, and use of restraint (Duffield et al., 2011; Dunton et al., 2007; Hall et al., 2003; Hill, 2010; Lee, 2007; Mark & Harless, 2010; Ridley, 2008, Yamagishi et al., 2003). These were the most frequently used outcome NSIs. The NDNQI, NQF, CalNOC, MilNOD, VANOD and International Council of Nurses each defined patient safety outcomes as benchmarks to measure the quality of nursing care. The NSIs related to patient perception in the data sources referred to patient/family satisfaction with nursing care and patient/family compliant rate. The NSIs measuring patients' use of health care included length of stay, waiting time for nursing care, and unplanned hospital visits post-discharge. Patient functional status and clinical management mainly referred to vital signs status and self-care ability as well as symptom resolution/reduction respectively.

With regard to nursing-related outcome NSIs, nursing job satisfaction and safety of nursing jobs were widely used NSIs, regarded as influencing nurse outcomes of care (Alexander, 2007; Best & Thurston, 2004; Montalvo, 2007). Such measures are of central importance when examining the effect of nursing interventions on patient outcomes related to nursing behavior and job performance (Doran et al., 2003). Setting-related outcome NSIs mainly measured patient mortality rate. Several studies examined the relationships between mortality and nursing-related setting characteristics (e.g., Aiken, Clarke, & Sloane, 2002; Needleman et al., 2011; Tourangeau et al., 2002). Aiken et al. (2008) found that hospitals with better care

[24] See Chapter 4, Section 4.7 for more information about the 'patient-related outcome' NSIs were subcategorized using the Jennings et al.'s (1999) and Doran's (2011) classifications.

environments and positive job experiences for staff had decreased concerns about care quality and risks of death and failure to rescue. In addition, Needleman et al. (2011) found that staffing levels of RNs that were below target levels were associated with increased mortality. Such findings confirmed that mortality was an NSI to measure the quality of nursing care.

5.5 Borderline cases

Borderline cases are those examples of the use of concept where most but not all of the core attributes of the concept are demonstrated (Walker & Avant, 2011). The concept analysis of NSIs revealed several borderline cases that used NSIs in nursing empirical practice, such as NDNQI, CalNOC, MilNOD, VANOD and ANA's Nursing Report Card for Acute Care. They are the repositories of NSIs launched by the ANA, in which NSIs were developed and used to monitor and report the quality of nursing care.[25] Most of the core attributes of NSIs identified in this concept analysis, the three dimensions of NSI terms used to measure and monitor the quality of nursing care in the data sources, were included in these borderline cases. For example, the following NSI terms (core attributes of NSIs) were included in the NDNQI: (1) structure NSIs NHPPD, nursing turnover, skill mix, and RN education/certification; (2) process NSIs pediatric pain assessment and intervention reassessment (AIR) cycle, RN survey (Job Satisfaction Scales, Practice Environment Scale); (3) outcome NSIs hospital-acquired infections, patient falls, patient falls with injury, pressure ulcer rate, paediatric peripheral intravenous infiltration, psychiatric physical/sexual assault, and restraints.

5.6 Antecedents

Antecedents refer to the events that promote the occurrence of a concept (Walker & Avant, 2011). The antecedents of NSIs that promoted the development of NSIs were of two kinds, contextual and ability antecedents.

5.6.1 Contextual antecedents

The contextual antecedent that stimulated the occurrence of NSIs was a critical need for more NSIs to monitor and improve the quality of nursing care. This need was in

[25] See Chapter 2, Section 2.4.5 for more information about the development of NSIs and related initiatives.

response to changes in the nursing discipline, such as nurse shortages, patient composition changes and cost reduction (Figure 5.1). Such changes have generated barriers to achieving positive nursing outcomes. Therefore, policy makers, nursing professionals and healthcare consumers have paid increased attention to the development of NSIs to monitor and improve nursing quality (Alexander, 2007; Aydin et al., 2004; Brown et al. 2001; Dunton et al., 2007; Patrician et al., 2010; Pazargadi et al., 2008). In the data sources, many researchers discussed the contextual background that led to the development of NSIs. For example, the ANA (1996) described changes in the structure and composition of the nursing workforce that raised concerns about patient safety and the quality of care provided to patients. These concerns prompted many healthcare organizations and institutions to pay greater attention to quality indicators that reflect the influence of nursing interventions and nurse staffing levels on patient outcomes. Aydin et al. (2004) stated that the rationale for the CalNOC project was increased patient safety, competition and cost containment, which required the hospital to use outcome indicators to monitor and improve the quality of nursing care. In the American military health organization, excessive nursing workloads, work-related injuries, claims of substandard patient care and widely publicized patient deaths triggered a growing trend for using indicators to measure nurse staffing and patient outcomes, so that nursing service "scorecards" for military nursing executives were created (Patrician et al., 2010). Brown, Donaldson et al. (2010) also stated that NSI data were used in a wide range of improvement initiatives in a bid to understand performance. In Iran, researchers found that agreed indicators to measure the quality of nursing care could help decrease concerns about quality of care in hospitals (Pazargadi et al., 2008). Dunton et al., (2007) stated that the error rate in hospitals was more than what the public realized; therefore, it was important to quantify the contribution of nursing to the quality of care. In summary, requirements to monitor, report and improve the quality of nursing care using indicators triggered the development of NSIs.

5.6.2 Ability antecedents

The other antecedent identified in the data sources was an ability antecedent, meaning the indicators were sensitive and specific to nursing (American Nurses Association, 1995; Gallagher & Rowell, 2003) and captured care or outcomes highly relevant to

nursing care (Doran, 2011). Hence, these NSIs had potential for the monitoring and reporting of the quality of nursing care. Gallagher and Rowell (2003) emphasized that the specific criteria for identification of NSIs included: (1) sensitivity to the input of nursing care, (2) specificity to nursing, (3) ability to be tracked, and (4) relations between indicators and high quality nursing care. The ANA proposed that NSIs were those indicators that captured care or its outcomes most affected by nursing care (American Nurses Association, 1996). Similarly, the NDNQI (2012) highlighted that outcome NSIs had to be nursing sensitive and would be improved if nursing care is provided more effectively and efficiently (e.g., pressure ulcers, falls, and intravenous infiltrations). McGillis Hall (2002, p. 173) concurred with the NDNQI proposition and suggested that "indicators for a nursing report card should represent a collection or aggregation of data about a particular nursing phenomena that could be expected to occur with some level of frequency". These perspectives all indicated that some patient outcomes (e.g., frequency of primary Cesarean sections and cardiac failure) that are highly related to other aspects of institutional care, such as medical decisions and institutional policies, should not be considered as NSIs.

5.7 Consequences

Consequences are the outcomes of the occurrence of a concept (Walker & Avant, 2011). In the data sources using the concept of NSIs, it was agreed that the use of NSIs had improved patient safety and the quality of nursing care, informed consumers about hospital care, and assisted businesses and insurers to make decisions about purchasing and reimbursement (Alexander, 2007; Dunton et al., 2007; Patrician et al., 2010). The consequences of use of NSIs reflected outcomes for patients, nurses and organizations (Figure 5.1). From the perspective of patients, NSI data were used to monitor and report the quality of nursing care so that patients received safe care, and this promoted patient satisfaction with services. From the perspective of nurses, NSI data quantified the nurses' contribution to health care and improved nurses' job satisfaction, and also supported nurses in making decisions and adopting strategies for delivering high quality care and producing value-added patient outcomes. From the perspective of organizations, NSI data enabled performance comparisons among like-sized organizations and assisted organizations to create appropriate workforce policies

for cost control and workforce retention. Researchers have also suggested a number of positive consequences of NSIs. For example:

- Establishing a case for nursing-sensitive performance measurement will facilitate the identification of health care quality that is influenced by nursing (Alexander, 2007, p. 44S).
- NSIs enable targeted patient care improvements through data measurement and sharing, and the examination of associations between staffing and outcomes at the shift level (Patrician et al., 2010, p. 359).
- Public reporting of quality indicators can help consumers to choose hospitals and assist businesses and insurers to make purchasing and reimbursement decisions (Dunton et al., 2007).
- Comparative performance data are used by hospitals to determine priorities for quality improvement, by accrediting and regulatory bodies to evaluate performance, and by purchasers and consumers in making healthcare decisions. Benchmarks provide a view of selected performance outcomes and are most valid if they are systematically and rigorously vetted (Brown, Donaldson et al., 2010, p. 10).
- NSI data can be used to examine the quality of care for organizations and to compare the quality across similar health sectors. The availability of unit specific data on quality of nursing care offers nurse administrators the opportunity to evaluate nursing care at a meaningful level for intervention (Gallagher & Rowell, 2003).
- CalNOC permits aggregation of standardized data for benchmarking allowing better understanding of the effect of decisions and supporting quality performance improvements to care; it also enables nursing leaders to provide comparable data to those stakeholders demanding quality data (Brown et al., 2001).

To return to the earlier points, Figure 5.1 illustrates the core attributes, antecedents and consequences of NSIs. It depicts a comprehensive understanding of NSIs, showing how changes in the nursing workforce, cost allocation, and the patient structure promoted the development of NSIs. Three dimensions of NSIs (structure, process and outcome) were developed as central nursing quality indicators to monitor

and report the quality of nursing care. The use of NSIs can produce positive outcomes relating to patients, nurses and organizations.

5.8 Empirical referents

Empirical referents are observable, verifiable or actual phenomena of a concept in practice (Walker & Avant, 2011). The empirical referents of NSIs included three dimensions of NSIs in the matrix of Holzemer's outcomes model (Table 5.2), which were identical to the core attributes. These empirical referents of NSIs have been applied widely in current nursing quality monitoring and reporting processes as measures to demonstrate the relationship between staffing, nursing process and outcomes of nursing care; monitor the quality of nursing care; and make appropriate polices and strategies for the enhancement of nursing care. For example, a large number of studies used certain empirical referents of NSIs (structure and outcome NSIs) to investigate the relationship between nurse staffing and specific patient outcomes or complications (e.g., Aiken et al., 2008; Blegen, Goode, Park, Vaughn, & Spetz, 2013; Blegen, Goode, Spetz, Vaughn, & Park, 2011; Hart & Davis, 2011; Roche, Duffield, Aisbett, Diers, & Stasa, 2012; Schubert et al., 2008).

5.9 Proposed definitions of NSIs

Although definitions of the concept of NSIs were found in the data sources, it was difficult to find an evidence-based, encompassing and precise definition of the concept. Based on the results of this concept analysis, the following constitutive and operational definitions of NSIs within the specific context of nursing quality measurement in hospitals are proposed:

Constitutive definition of NSIs: measures to monitor and report the quality of nursing care, the effectiveness of nursing care, cost efficiency and organization performance

Operational definition of NSIs: three dimensions of quality indicators sensitively reflecting structure, process and outcomes aspects of nursing care and the influences of nursing workload and process on outcomes.

5.10 Pattern of usage of NSIs

The matrix of Holzemer Outcome Model (Table 5.2) illustrated three dimensions of NSIs used in current quality monitoring and reporting processes. It expressed a pattern of usage of NSIs. A total of 39 domains of NSIs (empirical referents of NSIs) were identified. These NSIs had three dimensions (structure, process and outcome) and three subcategories (patient, nurse and setting).

The 10 most frequently used NSIs in the data sources were pressure ulcer prevalence, falls and falls with injury, nursing hours per patient day, nurse staffing (staff mix, skill mix and staff ratio), selective infections, hospital-acquired urinary tract infection, patient/family satisfaction with nursing care, pneumonia, failure status/failure to rescue, and restraint. Patient-related outcome NSIs, particularly patient safety outcome NSIs, were the most frequently used NSIs in current quality monitoring and reporting processes, with eight of the 10 most frequently used NSIs being patient-related outcome NSIs. Nurse-related structure NSIs were the second most frequently used NSIs, with two of the 10 most frequently used NSIs. Process NSIs were the least frequently used NSIs.

5.11 Summary

The results of the concept analysis of NSIs (Phase One of the study) are described in this chapter. Based on the selected data sources, the conceptual meaning of NSIs was identified. In response to the changes in nursing workforce, cost allocation, and patient structure, three dimensions of NSIs were developed and used as central quality indicators to monitor and report the quality of nursing care. The use of NSIs improved patient safety and the quality of nursing care. Among three dimensions of NSIs, patient safety outcome NSIs were the most frequently used NSIs, and process NSIs were the least frequently used NSIs.

CHAPTER SIX
PHASE TWO: NURSING-SENSITIVE INDICATORS SURVEY

6.1 Introduction

Phase Two of the study consisted of an online NSIs survey. Using the instrument developed from the concept analysis of NSIs, the survey was designed to identify the NSIs that nurses agreed on as measures for nursing quality monitoring and reporting, and the NSIs that were used commonly in current clinical practice at the local setting (Western Health). In this chapter, the instrument, setting, respondents, administration of the survey, data collection, and data analysis involved in the survey are described in detail. Ethical considerations relating to the conduct of the survey are also discussed.

6.2 Instrument

The instrument used in the present survey was a self-administered online questionnaire, the NSIQ (Appendix 1). It had three sections and was developed in four phases: construction, assessment of validity, pilot test, and assessment of reliability.

6.2.1 Phase 1: Construction of NSIQ

Section one: Eight questions were designed to identify demographic features of respondents, including gender, age, years of work as a nurse, years of employment at Western Health, employment status, nurse category, main area of practice, and highest level of qualification.

Section two: a seven-point Likert scale with 40 NSI items was constructed to explore respondents' agreements for NSIs. Respondents were asked to rate their level of agreement with the statement 'the NSI is a measure to monitor and report the quality of nursing care' on the Likert scale. Each item was composed of an NSI and its definition.

The 40 NSI items were developed from the concept analysis of NSIs. Thirty-five NSIs were from the pattern of usage of NSIs,[26] and 5 NSIs were modified to make the survey easily understood and relatively short. These modifications included eliminating similarity among NSIs, defining NSIs clearly and omitting less important NSIs. For example, the NSI 'percentage of hours provided by RNs' can be used as an indicator to reflect the level of nursing skill mix. Therefore, it was combined with the NSI 'nursing skill mix'; the NSI 'central nervous system complications' was excluded given that it was the least frequently used NSI in current nursing quality monitoring and reporting processes.[27] The definitions of NSIs were developed from the 'ANA's Nursing Report Card for Acute Care'[28] in conjunction with other relevant literature (Gallagher & Rowell, 2003; Patrician et al., 2010; Tapaneeyakorn, 2002). The detailed NSI items in the NSIQ are presented in Table 6.1.

A seven-point Likert scale was used because it is one of two most commonly adopted formats (five- and seven-point) for a Likert scale and generates more discrimination in responses (Colman, Norris, & Preston, 1997; Dawes, 2008).

1= strongly disagree (strong negative agreement)

2= disagree (negative agreement)

3= somewhat disagree (somewhat negative agreement)

4= neutral (neutral agreement)

5= somewhat agree (somewhat positive agreement)

6= agree (positive agreement)

7= strongly agree (strong positive agreement)

Section three: using the NSI items listed in the second section, a semi-open-ended question was constructed to ask respondents to identify the NSIs that were used commonly in current clinical practice.

[26] See Chapter 5, Section 5.10 and Table 5.2 for more information about the pattern of usage of NSIs.

[27] In terms of the frequency of use of NSIs synthesized in Chapter 5, Table 5.2, 'central nervous system complications' was the least frequently used NSI.

[28] See Chapter 5, Section 5.5 for more information about 'ANA's Nursing Report Card for Acute Care' as a borderline case of the concept of NSIs.

Table 6.1 Summary of 40 NSIs items in the NSIQ

NSIs	Dimension[a]	Definition or example
Nursing staff education	S	Highest educational qualification a nurse achieved
Nursing staff experience	S	Years of work experience of the nurse
Nursing skill mix	S	Proportion of RN, EN, and non-RN/EN hours in care hours
Nursing staff mix	S	Proportion of RN, EN, or unlicensed workers in nursing staff
Ratio of total nursing staff to patients	S	Number of total nursing staff (expressed in full-time equivalents) to patients
Total nursing care hours per patient	S	Total number of hours of direct care provided by all nursing staff per patient day
Adequate facilities and budget for quality of care	S	Adequate support services (e.g., information system, equipment, quality assurance program) that enable nurses to spend more time with patients
Relationship/communication with collaborative practitioners	S	Working relationships between nurses and other members of the health care team
Ability and leadership of nursing managers	S	Nurse manager is supportive of nurses
Opportunities for nursing career development	S	e.g., education and training program for nursing career development
Opportunities for nurse participation in hospital activities	S	e.g., participation in practice and policy committees of the hospital
Nurse turnover	S	Percentage of voluntary departures in total number of full-time and part-time employees in unit per month
Patient turnover	S	Sum of admissions, discharges, and transfers of patients divided by bed numbers during the course of the hospitalization
Patient acuity	S	Level of severity of patients' illness

Table 6.1 Continued

NSIs	Dimension[a]	Definition or example
Assessment of patient care requirement	P	Nurses assess and monitor patient requirements and use this information to develop and implement therapeutic care
Management and implementation of nursing interventions	P	Extent to which nurses manage and implement all interventions patients need, such as therapeutic nursing care, counseling, health education and health promotion/protection, in an accurate and timely manner
Development of nursing care plan	P	Extent to which nurses base their actions on a comprehensive and individualized written plan of care that identifies the specific interventions to reduce or eliminate the patient problems
Documentation of nursing diagnosis, therapeutic objective, and care given	P	Extent to which nurses provide written documentation of the intervention they provided to achieve specific patient outcomes related to nursing diagnosis identified in the nursing care plan
Nurse satisfaction	O	Level of job satisfaction expressed by nurses
Nurse injury rate	O	Rate at which nurses incur physical injuries related to nursing care, e.g., nursing needle-stick injuries
Hospital-acquired pressure ulcer rate	O	Rate at which patients experience skin breakdown (stages I–IV) originating in the hospital
Hospital-acquired infection rate (total)	O	Rate at which patients experience infection (all sites) originating in the hospital
Hospital-acquired urinary tract infection rate	O	Rate at which catheterized patients experience urinary tract infection originating in the hospital
Falls rate & fall with injury rate	O	Rate at which patients experience an unplanned fall or incur physical injuries due to falls during the course of their hospitalization
Hospital-acquired pneumonia rate	O	Rate at which patients develop inflammation of the lungs with exudation and consolidation during the course of their hospitalization
Restraint rate	O	Rate at which patients are physically restrained (by any methods that restricts freedom of movement, physical activity, or normal access to his or her body)

Table 6.1 Continued

NSIs	Dimension[a]	Definition or example
Vein puncture complication rate	O	Rate at which patients receive complications related to the act of vein puncture
Hospital-acquired sepsis rate	O	Rate at which patients develop sepsis during the course of their hospitalization
Gastrointestinal bleeding rate	O	Rate at which patients experience gastrointestinal hemorrhage during the course of their hospitalization
Medication administration error rate	O	Rate at which nurses deviate from the medication prescribed by the physician; error committed during administration
Shock/cardiac arrest rate	O	Rate at which patients experience shock or cardiac arrest during the course of their hospitalization
Length of stay (days)	O	Duration of inpatient hospital stay (in days)
Mortality rate	O	Rate at which patients die during the course of their hospitalization
Failure to rescue rate	O	Rate of death among patients with treatable serious complications acquired in hospitals
Unplanned readmission rate	O	Rate at which patients return to the hospital for unplanned care related to the same diagnosis
Unplanned emergency department visits post-discharge	O	Rate at which patients visit the emergency room for preventable complications related to a previous hospital stay
Unplanned physician visits post-discharge	O	Rate at which patients visit physician without planning for preventable complication related to a previous hospital stay
Patient knowledge of condition and treatment	O	Patients possess the knowledge and skills necessary to care for themselves following discharge
Patient/family satisfaction with nursing care	O	Patients' or families' opinions about the care received from nursing staff
Patient/family complaint rate	O	Rate at which patients complain about the nursing care received

Legend: [a] Dimension of a NSI was identified by the concept analysis of NSIs. S, structure; P, process; O, outcome.

6.2.2 Phase 2: Assessment of the validity of NSIQ

(1) Face validity and content validity

Burns and Grove (1993) state that the face and content validity of questionnaires can be obtained from three resources: literature, representatives of the relative population, and experts. For the NSIQ, face and content validity were assessed in two ways:

1. The NSIQ was developed through the concept analysis of NSIs, and all NSI items in the NSIQ were NSIs used in current quality monitoring and reporting processes.
2. A panel of six nursing experts (two selected from each of clinical practice, education and administration) assessed face and content validity. Each had extensive experience in nursing practice. The experts were asked to evaluate the appropriateness of the expression of all questions in the NSIQ, the content for nurses, the page layout for the NSIQ, and the coverage of NSIs. They agreed that all existing items in the NSIQ were relevant to NSIs, and recommended slight modifications to several NSIs and their definitions. These modifications, with the rationale for changes, are illustrated in Table 6.2.

Table 6.2 Modifications to the NSIQ recommended by the expert panel

Original item	Modified item	Rationale for the changes
Nurse to patient ratio	Ratio of total nursing staff to patients	Original item was deemed too general because nurse to patient ratio includes various ratios, such as ratio of total nursing staff to patients, ratio of registered nurses to patients, ratio of licensed nurses to patients and ratio of unlicensed workers to patients.
Definition of 'Management and implementation of nursing interventions': The extent to which nurses manage and implement all interventions patients need in an accurate and timely manner	Definition of 'Management and implementation of nursing interventions': The extent to which nurses manage and implement all interventions patients need, such as therapeutic nursing care, counseling, health education and health promotion/protection in an accurate and timely manner	Nursing intervention includes comprehensive nursing actions. Elaborating the detailed categories provided respondents with explicit understanding. To clarify the question of how to measure uncertain areas of nursing care, i.e., emotional support for the patient. This nursing action can be included in the category of intervention of counseling.
Pressure ulcer rate	Hospital-acquired pressure ulcer rate	The modification made the term more precise. It focused on pressure ulcers acquired in hospital.

(2) Construct validity

Construct validity of the NSIQ was assessed by exploratory factor analysis. Exploratory factor analysis is a common way to assess the construct validity of scales (Lake, 2002; Williams, Brown, & Onsman, 2012). It examines the correlations between variables in the scales, and clusters intercorrelated variables together as factors. The identified factors represent the underlying construct or dimensionality of variables (Polit, 2010; Williams et al., 2012). The factors representing the construct of NSIs in the present survey (three factors grouping three sets of NSIs items) are reported in Chapter 7, Section 7.4.4.

Exploratory factor analysis is a multiple-step procedure, including factorability assessment, factor extraction and factor rotation (Williams et al., 2012). The detailed procedure of exploratory factor analysis conducted in the present survey is summarized as follows.

1. **Factorability assessment**

   Factorability is the assumption that there are some correlations among variables so that coherent factors can be identified (Polit, 2010). It thus is a foundation to decide whether exploratory factor analysis is suitable for study. Factorability can be examined with the Kaiser-Meyer-Olkin (KMO) test and Bartlett's test of sphericity (Polit, 2010). If the correlation among variables is high (e.g., KMO index is above 0.50 or Bartlett's test of sphericity is statistically significant), the data are suitable for factor analysis (Williams et al., 2012). In the present survey, the KMO index was 0.914; and Bartlett's test of sphericity was highly significant (P<0.001). The results of these two tests indicated that exploratory factor analysis could be performed on the survey results.

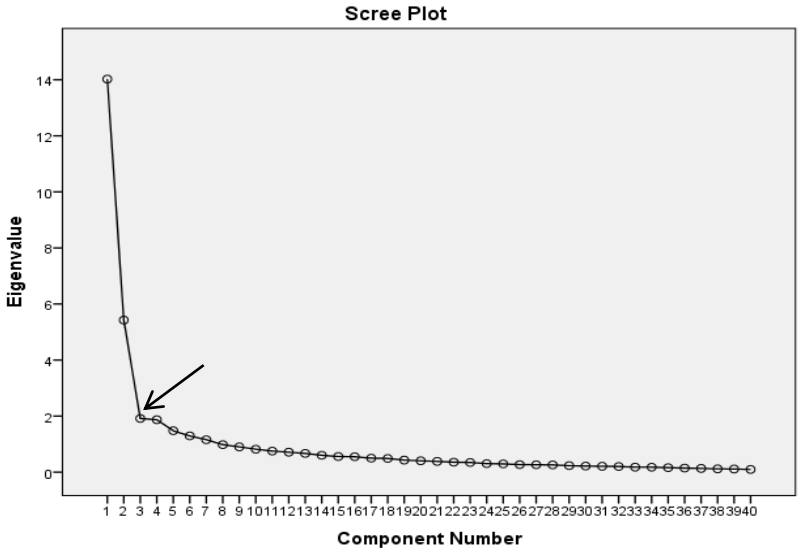
2. **Factor extraction**

   Factor extraction aims to extract factors that represent the construct of variables through the analysis of correlation of variables. There are various methods of factor extraction (e.g., principal component analysis, principal factors method and maximum likelihood method). Principal component analysis was adopted to extract the factors in the present survey because it is the most widely used method of factor extraction (Costello & Osborne, 2005), it analyzes all variance in the

variables and enables the variations in the data to be explained by as few factors as possible (Gorsuch, 2013).

Determination of the number of factors to be extracted is essential during factor extraction. Multiple criteria (e.g. scree plot[29] and cumulative percentage of variance and eigenvalue > 1.0 rule[30]) should be used simultaneously to determine the number of factors extracted (Ledesma & Valero-Mora, 2007; Polit, 2010; Vaingankar, Abdin, & Chong, 2012). The number of factors extracted in the present survey was determined as three using these two criteria. There was a sharp discontinuity in eigenvalues at Point 3 in the scree plot (Arrow, Figure 6.1), which indicated three factors should be extracted; meanwhile, the first three factors explained 54.4% variances[31] and their eigenvalues were all above 1.0.

Figure 6.1 Scree plot for NSI items



3. Factor rotation

Factor rotation is a procedure used to simplify the structure of extracted factors and help understanding of the meaning of these factors (Polit, 2010; Williams et al, 2012). There are two major methods of factor rotation in terms of the

[29] A scree plot is a plot of factors and their eigenvalues. Eigenvalue is the value equal to the sum of the squared weights for each factor; and it is an index of how much variance in a factor solution is explained by a given factor. The point in the plot where there is a sharp discontinuity in eigenvalues for factors indicates the number of factors to be extracted (Polit, 2010).

[30] This rule means the extracted factors should explain at least 50-60% of variances, and their eigenvalues are greater than 1.0 (Williams et al., 2012). Variance is a measure of variation and equals standard deviation squared (Kline, 2014).

[31] See Chapter 7, Section 7.4.4 for more information about the variances explained by three factors.

correlations of factors, orthogonal rotation and oblique rotation (Polit, 2010). Orthogonal rotation identifies factors that are uncorrelated; it has three types, varimax, quartimax, and equimax rotation. Conversely, oblique rotation identifies factors that are correlated; it has two types, direct oblimin and promax rotation.

The principle for determining the method of factor rotation is that oblique rotation is used first to examine the correlations of factors. If factor correlations are modest,[32] orthogonal rotation is an appropriate method. Conversely, if factor correlations are high, it is appropriate to perform oblique rotation (Polit, 2010). Following this principle, oblique rotation was conducted first in the present survey to examine the correlations of the three factors. As shown in Table 6.3, the correlations were modest, ranging from 0.202 to 0.294. This demonstrated that orthogonal rotation should be used. The most widely used type of orthogonal rotation, varimax rotation (Polit, 2010), was adopted in the present survey.

Table 6.3 Correlations of three factors determined by oblique rotation

Factor	1	2	3
1	1.000	0.291	–0.294
2	0.291	1.000	–0.202
3	–0.294	–0.202	1.000

6.2.3 Phase 3: Pilot testing and improving the clarity and feasibility of NSIQ

After assessing face, content and construct validity of the NSIQ, it was pilot tested using a convenience sample of 10 Registered Nurses. The pilot test aimed to determine the clarity and feasibility of the NSIQ. All respondents completed the NSIQ and agreed that the questions could be readily understood.

6.2.4 Phase 4: Assessing reliability of NSIQ

Internal consistency of the NSIQ was assessed using Cronbach's alpha, which is used commonly to test internal consistency in surveys (Fairbrother, Jones, & Rivas, 2009; Parker, Tuckett, Eley, & Hegney, 2010; Williams & Kristjanson, 2009). A Cronbach's alpha of 0.70 or higher is normally acceptable for new measures, representing a

[32] Modest correlation is defined as the correlations of all factors are under 0.30 (Polit, 2010).

modest degree of homogeneity in the instrument (Gomes, de Weerd-Nederhof, Pearson, & Cunha, 2003). The Cronbach's alpha coefficients for the overall NSIQ and three scales of NSI items in the NSIQ that were grouped by three factors were all higher than 0.9 (Table 6.4). The results showed the consistency of the NSIQ was satisfactory.

Table 6.4 Cronbach's alpha reliability coefficients of NSIQ

Scale	Number of NSI items	Cronbach's alpha coefficient
Factor 1	17	0.918
Factor 2	14	0.928
Factor 3	9	0.915
Overall NSIQ	40	0.949

6.3 Setting

The setting was Western Health, one of 19 metropolitan and regional public health services in the State of Victoria (Department of Health, Victoria, 2013). It is a large organization with approximately 5,000 staff, of which 2,682 are nurses working in three acute hospitals, a day hospital and two residential care facilities (Western Health, 2013). It delivers a comprehensive range of health care from acute tertiary services (including emergency medicine, intensive care, medical and surgical services) to sub-acute care and specialist ambulatory care (Western Health, 2013). Western Health was selected as the setting because it was relevant to the aims of the study: to identify the NSIs agreed by the nurses as measures for nursing quality monitoring and reporting, and the NSIs used commonly in current clinical practice.

6.4 Respondents

A census method[33] was used to select respondents (Australian Bureau of Statistics, 2012). All nurses at Western Health were invited to participate in the survey through an invitation email (Appendix 2). There were four reasons for using the census method in the present survey.

1. The results would provide a true reflection of the population of nurses in Western Health.

[33] Census is the study of every unit in a population (Australian Bureau of Statistics, 2012).

2. The census gave the opportunity for all nurses to express their perceptions, so that there was an effective sample size for high statistical confidence.
3. Detailed information about sub-groups of nurses, such as RNs, was more likely to be available.
4. The survey, sent through Western Health's Nurse Global Email (Global Email), was easily accessible to all nurses employed at the service.

6.5 Administration of the survey

Qualtrics Survey Software[34] was used to administer online survey instrument (NSIQ), allowing wide distribution of the survey and efficient data collection. Furthermore, the features of 'Force Response' and 'Content Validation'[35] in Qualtrics were applied to prevent incomplete responses and ensure answers were in a proper format, such as valid email address (Qualtrics University, 2014).

6.6 Data collection

6.6.1 Data collection procedure

Directors of Nursing assisted the researchers to promote the survey at a Nurse Unit Managers' meeting. At this meeting, copies of a poster advertising the survey (Appendix 3) were provided to Nurse Unit Managers who agreed to place them on notice boards in unit settings.

Subsequently, the nurses in Western Health received an email invitation from the Director of Nursing by Global Email. The invitation (Appendix 2) contained the following information: a cover letter to invite nurses to join in the survey, an anonymous URL link to the NSIQ created by Qualtrics (Appendix 1), information for respondents (Appendix 4) and consent form (Appendix 5). Nurses were asked to complete the survey by clicking on the URL link supplied in the email. Completed questionnaires were stored securely in the Qualtrics system until the researchers downloaded the data. The return period for the NSIQ was two months with data collection occurring from 19 October 2012 to 19 December 2012.

[34] Qualtrics, Provo, UT, USA.
[35] 'Force Response' feature in Qualtrics requires respondents to answer each question and not skip any questions. 'Content Validation' feature ensures the responses are in a proper format (Qualtrics University, 2014).

6.6.2 Strategies for increasing response rate

During recent decades, internet penetration, massive Web usage and technological improvements have facilitated the use of online surveys. However, low response rates are still a serious problem (Vehovar, Batagelj, Lozar Manfreda, & Zaletel, 2002). Some researchers reported that the overall response rate in online surveys is about 33%, which is much lower than paper-based surveys (around 50%) (Cook, Heath, & Thompson, 2000; Dillman et al., 2009; Nulty, 2008). The reasons for low response rate include not all target email users can be informed, only some informed users participate in the survey, and not all respondents complete the survey. Several strategies were adopted in the present survey to increase the response rate. First, the survey gained support from the nursing leadership. The Director of Nursing and Nurse Unit Managers assisted in distributing and advertising the survey. Second, the target population—all nurses employed at Western Health—were invited via Global Email. Third, three reminder emails (Appendix 6) were sent reminding nurses to participate in the survey. These reminder emails were distributed in the first week, fourth week and seventh week after the invitation email was sent. Fourth, the researcher visited the wards in Western Health to advertise the survey. Finally, as a token incentive respondents were invited to enter a draw for 30 supermarket gift cards (each valued at $20). Respondents were notified about the draw in the invitation email (Appendix 2), poster (Appendix 3) and information for respondents (Appendix 4). If they wished to be included, respondents provided their email address when prompted in the survey. The email addresses were then collected, and drawn randomly by an independent person in the presence of two nurses at Western Health. Winners were informed by email.

6.7 Data analysis

Data stored in Qualtrics were imported into SPSS Version 20[36] and 'R software environment for statistical computing and graphics' (R software, R Core Team, 2013) for analysis.

[36] IBM Corporation, Armonk, NY, USA.

6.7.1 Data transformation

Two kinds of data were generated from the survey. The first related to demographic information and the second related to NSIs. Prior to data analysis, the data were first inspected for outliers to ensure the data were valid and accurate. To understand respondents' level of agreement with the NSIs as measures for nursing quality monitoring and reporting, the number of responses of 'strongly agree', 'agree', or 'somewhat agree' for each NSI were summated to represent the nurses' 'agreement'.

6.7.2 Grouping NSI data into three dimensions

Current quality monitoring and reporting processes use three dimensions of NSIs (structure, process and outcome) as measures (Burston et al., 2014; Monaltvo, 2007). Therefore, to examine specifically each dimension, the 40 NSIs data were clustered into three dimensions: structure (14 NSIs), process (4 NSIs), and outcomes (22 NSIs).

6.7.3 Missing data

Missing data is a pervasive problem in surveys (Little, 2009). There are three main reasons for missing data (Brick & Kalton, 1996): an element in the target population is not included in the survey's sampling frame (non-coverage); a responding sampled element fails to provide acceptable responses to one or more survey items (item non-response); and a sampled element does not participate in the survey (unit non-response). A number of weighting methods can be used to compensate for missing data, so that the weighted sample estimates conform as closely as possible to the population of inference. These methods encompass raking, cell weighting, linear weighting, and logistic regression weighting (Kalton & Flores-Cervantes, 2003). In the present survey, the following approaches were used to compensate for the three kinds of missing data:

1. Non-coverage missing data was not relevant because the entire population of nurses at Western Health was invited to participate in the survey.
2. Item non-response missing data was prevented by using the function of 'Force Response' in Qualtrics,[37] which prevented the submission of an incomplete survey.

[37] See Chapter 6, Section 6.5 for more information about the use of function of 'Force Response' in Qualtrics to prevent incomplete survey.

3. Unit non-response missing data was compensated by using raking.[38] Raking is a method of compensation for unit non-response missing data using auxiliary variables[39] (Battaglia, Hoaglin, & Frankel, 2013; Bethlehem, 2012).

The raking procedure applied in the present survey is summarized as follows.

1. The actual proportions of five auxiliary variables (gender, age, employment status, nurse category, main area of practice, [see Table 7.2]) in the population of nurses were known from the human resource department of Western Health.
2. Following the formula of 95% proportion confidence interval = $p \pm 1.96\sqrt{[(p \times (1-p)/n]}$, where p is the proportion of auxiliary variable in the sample (Chernick & Friis, 2003), the estimates of 95% proportion confidence intervals of the above five auxiliary variables in the population were calculated. The confidence interval[40] is a standard way of articulating the statistical accuracy of a sample based assessment (Brown, Cai, & DasGupta, 2001). Hence, it was used in the present survey to evaluate the consistency in the proportions of auxiliary variables between the sample and population.
3. The actual proportions and calculated 95% proportion confidence intervals of the above five auxiliary variables were compared. If the actual proportion lay outside the calculated proportion confidence interval of an auxiliary variable, the proportion of this auxiliary variable between the sample and population was deemed to be inconsistent. This auxiliary variable was thus included in the raking procedure.
4. Based on those auxiliary variables included in the raking, the weights were determined in the R software and then attached to each response for the subsequent statistical analysis.

[38] Raking is an iterative procedure of weighing the sample based on those auxiliary variables whose proportions between the sample and population are inconsistent. It reduces the biases from missing data and improves the accuracy of survey results through adjusting the consistency of the proportions of auxiliary variables between sample and population (Battaglia, Izrael, Hoaglin, & Frankel, 2004; DeVoe, Krois, & Stenger, 2009).

[39] Auxiliary variable is a variable that is known for every unit of the population, and is not a variable of interest but is instead employed to improve the sampling plan or to enhance estimation of the variables of interest, such as age and gender (Cohen, 2008, p. 46).

[40] Confidence interval provides a range of values that is likely to contain population parameter based on a sample statistics estimate (Croarkin & Tobias, 2012).

6.7.4 Statistical tests

(1) Analysis of demographic data

Frequency counts and percentages were employed to describe the demographic characteristics of respondents.

(2) Analysis of NSI data

Statistical tests comprise two broad groups, parametric tests and nonparametric tests (Corder & Foreman, 2009). In order to choose appropriate statistical tests for NSI data, prior to performing the data analysis, the assumptions for using parametric tests were tested, such as the normality of data. The normality of NSI data was tested by skewness index, kurtoses index and Kolmogorov–Smirnov Goodness-of-Fit Test (Corder & Foreman, 2009). Because the NSIs data were not normally distributed (e.g., Kolmogorov–Smirnov significance test was significant), and were not measured at the interval level, the assumptions for applying parametric tests were not achieved. As a result, percentages and nonparametric tests (i.e., Friedman test and Wilcoxon signed-rank test) were performed to analyze NSIs data.

The next two sections describe the data analysis procedures that aimed to answer two research questions listed in Chapter 1, Section 1.3.

Question 1: What NSIs do nurses agree on as measures for nursing quality monitoring and reporting?

First, the agreement[41] percentage for each NSI was calculated. Second, in each dimension (structure, process and outcome), the levels of agreement for NSIs were compared using the Friedman test. If there were significant differences in the levels of agreement for the NSIs in the same dimension, the additional post hoc test for the Friedman test—Wilcoxon signed-rank test (Corder & Foreman, 2009)—was conducted to further examine the significant differences between every two NSIs in the same dimension.

Question 2: What NSIs are used commonly in current clinical practice?

This was answered by computing the frequencies of NSIs rated by respondents in the semi-open-ended question.

[41] See Chapter 6, Section 6.7.1 for more information about the 'agreement'.

6.8 Ethical considerations

Ethics approval to conduct the survey was obtained from the Human Research Ethics Committee, Victoria University and Western Health, in June and July 2012 respectively (Appendix 7; Appendix 8). Several ethical issues based on Polit and Beck's (2013) primary principles were addressed thoroughly in the conduct of the survey.

6.8.1 Informed consent

The researchers informed respondents in writing about the nature of the survey, their rights, the researcher's responsibilities and the benefits associated with the study. This information was provided to respondents in the poster (Appendix 3) and information for respondents (Appendix 4). Formal written consent (Appendix 5) was obtained from all respondents when they returned the NSIQ.

6.8.2 Privacy, confidentiality and anonymity

The survey was distributed to respondents through an anonymous survey link. This link ensured that no identifying information for respondents, such as email address, could be tracked in the survey. Therefore, for respondents who did not join the prize incentive, the survey was anonymous; whereas, for respondents who joined the incentive, the survey was still confidential, because only their email addresses were accessible to the researchers and used for the draw of gift cards. Furthermore, during data analysis, the email addresses were separated from the survey results. The results were reported as aggregated data only for groups of respondents, and any personal information was disguised.

6.8.3 Minimizing the risk of harm

The survey was conducted with minimal risk to respondents. It is unlikely that there were physical, psychological or social risks for respondents. Their participation in the survey would not affect their employment in any way. For example, although the Director of Nursing distributed the Global Email in the survey, she was not privy to

information about nurses' participation, and the data were only accessible to the researchers.

6.8.4 Data storage, access and disposal

Data were stored securely on the researchers' computers using password-protected files. The data will be stored for five years and destroyed afterwards.

6.9 Summary

Phase Two of the study, the online NSIs survey, is described in this chapter. The survey design, including instrument, setting, respondents, survey administration, and data collection and analysis, are elaborated in detail. The instrument was constructed based on the concept analysis of NSIs and created using Qualtrics software. The survey was conducted with the nurses employed at Western Health. After weighting by raking, the survey data were analyzed using percentages and nonparametric tests. Finally, the ethical considerations in conducting survey were outlined.

CHAPTER SEVEN
RESULTS OF PHASE TWO: NURSING-SENSITIVE INDICATORS SURVEY

7.1 Introduction

The results of the NSIs survey are presented in this chapter. Respondents' demographic profile is described first, and is followed by the raking procedure used to compensate for missing data in the survey. Then the two findings, including the NSIs that nurses agreed on as measures for nursing quality monitoring and reporting, and the NSIs that were used commonly in current clinical practice, are outlined respectively in the following sections of chapter.

7.2 Demographic profile of respondents

Of the 2,682 nurses eligible to take part in the survey, 245 completed the survey; equivalent to a response rate of 9.1%. The demographic profile of respondents is presented in Table 7.1. The findings indicated that almost all respondents worked full- or part-time. Most were female and worked as RNs. More than half the respondents were aged over 40 years and had worked at Western Health for more than five years. Their main practice areas were medical and surgical services, and the majority held a bachelor or higher degree qualification.

7.3 Raking procedure

Not all nurses at Western Health participated in the survey. Therefore, raking was used to compensate for missing data and to improve the accuracy of survey results.

Table 7.1 Demographic characteristics of the respondents (n=245)

Variables	N	%
Gender		
Female	217	88.6
Male	28	11.4
Age		
18 to 30 years	42	17.1
31 to 40 years	46	18.8
41 to 50 years	77	31.4
51 years or more	80	32.7
Years of work as a nurse		
10 years or less	69	28.2
11 to 20 years	55	22.4
21 to 30 years	66	27.0
31 years or more	55	22.4
Years of employment at Western Health		
1 year or less	28	11.4
2 to 5 years	71	29.0
6 to 15 years	97	39.6
16 to 25 years	34	13.9
26 years or more	15	6.1
Employment status		
Full-time	101	41.2
Part-time	133	54.3
Bank[a]	6	2.5
Graduate Nurse Program	4	1.6
Nurse Pool[b]	1	0.4
Nurse category		
Registered nurse[c]	219	89.4
Enrolled nurse	26	10.6
Main area of practice		
Medical and surgical	101	41.2
Emergency care	24	9.8
Maternity	14	5.7
Aged care	8	3.3
Other[d]	98	40.0
Highest level of qualification		
Hospital certificate	25	10.2
Diploma	39	15.9
Bachelor degree	90	36.7
Bachelor honours degree/Graduate certificate/Graduate diploma	65	26.6
Masters degree	25	10.2
Doctoral degree	1	0.4

Legend: [a] Bank nurses are paid at casual rates and work flexibly in a designated hospital (Department of Health Victoria, 2014). [b] Pool nurses are permanent staff employed by the health service. They are not usually attached to a ward but are assigned for a minimum number of shifts (Department of Health Victoria, 2014). [c] Registered nurses included 7 midwives, 24 clinical nurse specialists, 14 clinical nurse educators, 17 clinical nurse consultants and 41 associate or nursing unit managers. [d] Other included intensive care, sub-acute care, specialist ambulatory clinics, coronary care, hemodialysis.

Using the raking procedure[42], it was found that the proportions of three auxiliary variables (*age, employment status and main area of practice*) between the samples and population were inconsistent (Table 7.2). Therefore, these variables were included in the raking procedure. The weights calculated by raking were then attached to each response to reduce bias in survey estimates.

Table 7.2 Comparisons of the proportion of five auxiliary variables between the sample and population (%)

Variables	**Responses** (n=245)	**Population** (n=2682)	**95% confidence interval**
Gender			
Male	11.4	9.2	7.4-15.4
Female	88.6	90.8	84.6-92.60
Age			
18 to 30 years	17.1	21.2	12.4-21.8
31 to 40 years	18.8	27.0	13.9-23.7[a]
41 to 50 year	31.4	25.5	25.6-37.2[a]
51 years or more	32.7	26.3	26.8-38.6[a]
Employment status			
Full-time	41.2	24.2	35.1-47.3[a]
Part-time	54.3	52.7	48.1-60.5
Bank	2.5	18.3	0.5-4.5 [a]
Graduate nurses program	1.6	4.8	0.0-3.2 [a]
Nurse pool	0.4	0.0	1.5-6.5 [a]
Nurse category			
Registered nurse	89.4	88.9	85.5-93.3
Enrolled nurse	10.6	11.1	6.7-14.5
Main area of practice			
Medical and surgical	41.2	36.6	35.0-44.7
Emergency care	9.8	12.7	6.1-13.5
Maternity	5.7	11.4	2.8-8.6[a]
Aged care	3.3	1.4	1.1-5.5
Others	40.0	37.9	33.9-46.1

Legend: [a] The actual proportion of this auxiliary variable in the population of nurses lay outside 95% proportion confidence interval, the proportions of the auxiliary variable between the sample and population were thus inconsistent, and this variable was included in the raking procedure.

Given that almost all respondents were full- or part-time nurses (n=234), only their weighted responses were selected for data analysis to make the survey results homogeneous.

[42] See Chapter 6, Section 6.7.3 for more information about the raking procedure adopted.

7.4 NSIs nurses agreed on as measures for nursing quality monitoring and reporting

7.4.1 Levels of agreement for total 40 NSIs

The agreement percentages for the 40 NSIs rated by the nurses are presented in Table 7.3. These percentages ranged from 47.6% to 93.5%. Except for the NSI 'gastrointestinal bleeding rate', the other 39 NSIs all achieved more than 50% agreement; among them, 36 achieved more than 60% agreement, and 10 achieved more than 85% agreement.

7.4.2 Ten most and least agreed-upon NSIs

As shown in Table 7.3, the 10 most agreed-upon NSIs rated by the nurses consisted of seven structure NSIs (ratio of total nursing staff to patients, nursing staff experience, relationship/communication with collaborative practitioners, total nursing care hours per patient day, opportunities for nursing career development, nursing staff education, ability and leadership of nursing managers) and three process NSIs (assessment of patient care requirement, management and implementation of nursing interventions, and development of the nursing care plan). The 10 least agreed-upon NSIs were all outcome NSIs (gastrointestinal bleeding rate, unplanned physician visits post-discharge, mortality rate, shock/cardiac arrest rate, restraint rate, nurse injury rate, unplanned emergency department visits post-discharge, unplanned readmission rate, failure to rescue rate, and patient/family complaint rate).

Table 7.3 Levels of agreement for 40 NSIs as measures for nursing quality monitoring and reporting (n=234, %)

NSIs[a]	Dimension of NSIs[b]	Strongly Disagree	Disagree	Somewhat Disagree	Neutral	Somewhat agree	Agree	Strongly agree	Agreement[c]
1. Assessment of patient care requirement	P	0.6	0.3	1.8	3.8	13.0	34.7	45.8	93.5
2. Ratio of total nursing staff to patients	S	0.8	0.0	3.1	3.4	12.2	26.0	54.5	92.7
3. Nursing staff experience	S	0.7	0.3	3.6	2.8	20.1	37.9	34.6	92.6
4. Relationship /communication with collaborative practitioners	S	0.3	0.0	1.6	5.8	8.1	36.1	48.1	92.3
5. Management and implementation of nursing interventions	P	0.3	0.3	3.7	3.8	12.7	32.7	46.5	91.9
6. Total nursing care hours per patient	S	0.6	1.5	1.4	4.8	12.9	36.0	42.8	91.7
7. Opportunities for nursing career development	S	1.1	1.1	2.2	4.4	15.5	35.9	39.8	91.2
8. Nursing staff education	S	0.8	2.0	4.1	3.7	20.8	39.7	28.9	89.4
9. Ability and leadership of nursing managers	S	1.4	1.4	2.4	6.4	9.6	32.6	46.2	88.4
10. Development of the nursing care plan	P	1.1	1.4	3.9	7.0	14.9	40.3	31.4	86.6
11. Documentation of nursing diagnosis, therapeutic objective, and care given	P	1.3	1.7	1.5	9.2	21.3	35.5	29.5	86.3

Table 7.3 Continued

NSIs[a]	Dimension of NSIs[b]	Strongly Disagree	Disagree	Somewhat Disagree	Neutral	Somewhat agree	Agree	Strongly agree	Agreement[c]
12. Adequate facilities and budget for quality of care	S	1.3	4.2	4.3	4.7	5.4	32.2	47.9	85.5
13. Medication administration error rate	O	0.8	2.2	2.2	9.9	25.6	28.5	30.8	84.9
14. Hospital acquired pressure ulcer rate	O	0.5	1.6	2.7	11.3	22.4	32.7	28.8	83.9
15. Nurse satisfaction	O	1.8	1.6	3.8	9.5	11.4	30.8	41.1	83.3
16. Patient knowledge of condition and treatment	O	0.9	0.8	4.8	10.4	23.3	35.7	24.1	83.1
17. Patient/family satisfaction with nursing care	O	0.6	1.0	1.9	14.2	22.1	33.9	26.3	82.3
18. Opportunities for nurse participation in hospital activities	S	1.3	0.2	3.5	13.3	16.3	38.6	26.8	81.7
19. Patient acuity	S	3.1	2.0	2.5	11.3	12.6	33.0	35.5	81.1
20. Nosocomial infection rate (total)	O	0.5	1.3	4.1	14.0	24.0	36.4	19.7	80.1
21. Falls rate & fall with injury rate	O	0.2	1.5	6.4	12.4	29.1	31.8	18.6	79.5
22. Nosocomial urinary tract infection rate	O	0.8	2.7	3.1	14.3	27.7	34.1	17.3	79.1
23. Nursing skill mix	S	1.9	1.4	5.8	13.3	17.4	36.7	23.5	77.6
24. Nursing staff mix	S	2.8	3.5	6.2	10.1	16.2	32.8	28.4	77.4
25. Nurse turnover	S	0.9	2.6	4.1	16.3	22.5	31.0	22.6	76.1
26. Patient turnover	S	1.5	3.1	3.9	17.9	20.1	31.6	21.9	73.6

Table 7.3 Continued

NSIs[a]	Dimension of NSIs[b]	Strongly Disagree	Disagree	Somewhat Disagree	Neutral	Somewhat agree	Agree	Strongly agree	Agreement[c]
27. Vein puncture complication rate	O	0.8	3.7	6.7	16.9	26.2	29.7	16.0	71.9
28. Nosocomial pneumonia rate	O	0.3	1.0	6.0	21.7	27.4	29.4	14.2	71.0
29. Hospital-acquired sepsis rate	O	2.1	1.3	7.0	19.0	23.8	29.1	17.7	70.6
30. Length of stay	O	1.9	3.6	8.9h	15.3	28.2	22.8	19.3	70.3
31. Patient/family complaint rate	O	2.5	2.0	7.4	18.6	27.9	21.7	19.9	69.5
32. Failure to rescue rate	O	3.0	4.3	6.4	17.1	26.6	23.4	19.2	69.2
33. Unplanned readmission rate	O	0.8	4.5	10.3	15.3	21.2	30.9	17.0	69.1
34. Unplanned emergency department visits post-discharge	O	1.0	3.8	10.3	16.2	23.2	28.2	17.3	68.7
35. Nurse injury rate	O	0.3	2.6	7.0	22.3	23.1	27.0	17.7	67.8
36. Restraint rate	O	1.5	5.1	9.0	22.6	26.1	20.8	14.9	61.8
37. Shock/cardiac arrest rate	O	2.5	6.1	6.9	24.8	23.9	21.0	14.8	59.7
38. Mortality rate	O	4.3	5.5	9.2	22.7	23.1	20.2	15.0	58.3
39. Unplanned physician visits post-discharge	O	1.7	5.3	8.5	28.2	22.2	21.0	13.1	56.3
40. Gastrointestinal bleeding rate	O	5.2	6.3	12.2	28.7	21.1	16.2	10.3	47.6

Legend: [a] NSIs were ordered by descending agreement percentage. [b] Dimension of a NSI was identified by the concept analysis of NSIs. S, structure; P, process; O, outcome. [c] Measured on a 7-point Likert scale from 1 'strongly disagree' to 7 'strongly agree'. 'Agreement' was the sum of number of responses of 'strongly agree', 'agree', or 'somewhat agree' for each NSI.

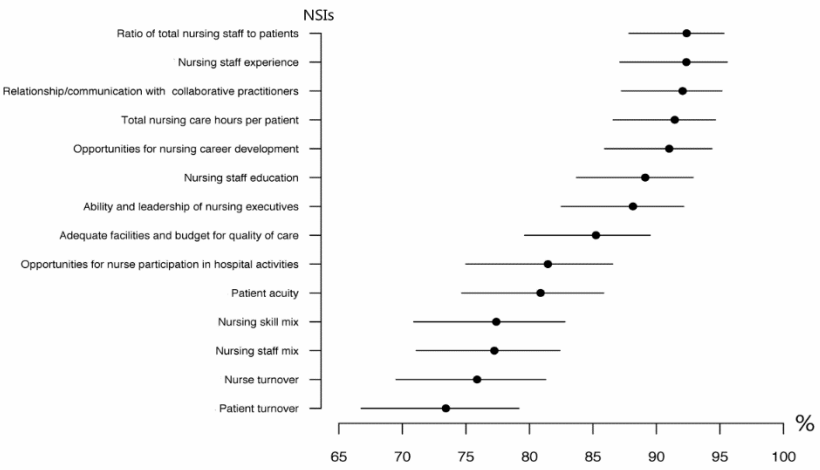
7.4.3 Most agreed-upon structure, process and outcome NSIs

Three dimensions of NSIs (structure, process and outcome) are used in current quality monitoring and reporting processes (Burston et al., 2014). To identify the most agreed-upon structure, process and outcome NSIs, the levels of agreement for the NSIs in each dimension were compared using the Friedman test and Wilcoxon signed-rank test (post hoc test), respectively.

7.4.3.1 Structure dimension

The agreement percentages for the 14 structure NSIs ranged from 92.6% to 73.6% (Figure 7.1). The Friedman test showed that the levels of agreement for these structure NISs were significantly different (χ^2=305.784, P<0.001). Therefore, the differences in the level of agreement between every two structure NSIs were examined further using Wilcoxon signed-rank test. The results indicated that the levels of agreement for the seven most agreed-upon structure NSIs (ratio of total nursing staff to patients, nursing staff experience, relationship/communication with collaborative practitioners, total nursing care hours per patient day, opportunities for nursing career development, nursing staff education, and ability and leadership of nursing managers) were not significantly different from each other (P>0.05), but were significantly different from the other seven least agreed-upon structure NSIs (P<0.05). As a consequence, the first seven most agreed-upon NSIs were considered as the most agreed-upon structure NSIs.

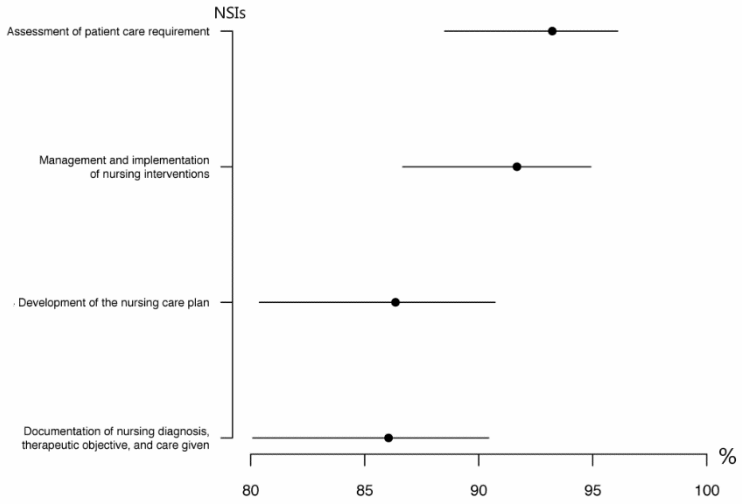
Figure 7.1 Descending sequence of agreement percentages for 14 structure NSIs



7.4.3.2 Process dimension

The four process NSIs received high agreement ranging from 93.5% to 86.3% (Figure 7.2). Using the Friedman test, it was found that there were significant differences in the level of agreement among these process NSIs (χ^2=21.707, P<0.001). Therefore, the Wilcoxon signed-rank test (post hoc test) was conducted to examine further the differences in the level of agreement between every two process NSIs. The results showed that there were no significant differences in the level of agreement between the two most agreed-upon process NSIs (assessment of patient care requirements, and management and implementation of nursing interventions) (P>0.05), but they were significantly different from the two least agreed-upon process NSIs (P<0.05). As a consequence, the two most agreed-upon process NSIs were considered as the most agreed-upon process NSIs.

Figure 7.2 Descending sequence of agreement percentages for 4 process NSIs

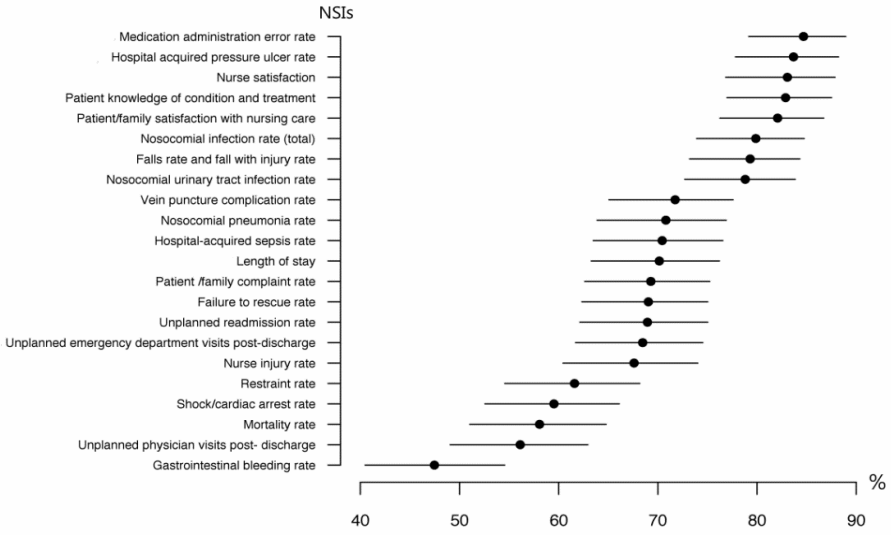


7.4.3.3 Outcome dimension

The agreement percentages for 22 outcome NSIs ranged from 84.9% to 47.6% (Figure 7.3). The Friedman test showed that there were significant differences in the level of agreement among 22 outcome NSIs (χ^2=505.96, P<0.001). Therefore, the differences in the level of agreement between every two outcome NSIs were examined further with the Wilcoxon signed-rank test. The results demonstrated that there were no significant differences in the level of agreement between the eight most agreed-upon outcome NSIs (medication administration error rate, hospital acquired pressure ulcer

rate, nurse satisfaction, patient knowledge of condition and treatment, patient/family satisfaction with nursing care, nosocomial infection rate (total), falls rate & fall with injury rate, and nosocomial urinary tract infection rate) (P>0.05), but they were significantly different from the other 14 least agreed-upon NSIs (P<0.05). Therefore, the eight most agreed-upon outcome NSIs were considered as the most agreed-upon outcome NSIs.

Figure 7.3 Descending sequence of agreement percentages for 22 outcome NSIs



7.4.4 Construct of NSIs

Three factors representing the construct of NSIs were extracted by exploratory factor analysis, explaining 54.4% of the total variance in responses (Table 7.4).

Factor 1 explained 35.0% of the variance. It grouped 17 NSIs (12 structure and five process NSIs) that had the highest factor loadings[43] on Factor 1 (Table 7.4). The structure and process NSIs are considered to be influencing factors on nursing outcomes (Aiken et al., 2008; Alexander, 2007). Consequently, Factor 1 was named as 'Influencing Factor NSIs'.

[43] Factor loading is the correlation between variables and factors. The higher the loading is, the better correlations variables have with factors (Torres-Reyna, 2012).

Table 7.4 Three factors extracted by exploratory factor analysis

NSIs	Dimension of NSIs[a]	Factor loading		
		Factor 1[b]	Factor 2[c]	Factor 3[d]
Opportunities for nursing career development	S	**0.798**	0.017	0.064
Assessment of patient care	P	**0.790**	–0.018	0.157
Nurse satisfaction	P/O[e]	**0.734**	0.103	0.235
Ability and leadership of nursing managers	S	**0.727**	–0.004	0.326
Management and implementation of nursing interventions	P	**0.727**	0.038	0.235
Opportunities for nurse participation in hospital activities	S	**0.726**	0.071	0.225
Relationship/communication with collaborative practitioners	S	**0.706**	–0.021	0.308
Development of nursing care plan	P	**0.687**	0.094	0.105
Documentation of nursing diagnosis, therapeutic objective, and care given	P	**0.681**	0.155	0.098
Adequate facilities and budget for quality of care	S	**0.669**	0.035	0.318
Ratio of total nursing staff to patients	S	**0.664**	0.012	0.141
Total nursing care hours per patient day	S	**0.600**	–0.044	0.307
Nursing skill mix	S	**0.568**	0.073	–0.148
Patient turnover	S	**0.487**	0.414	0.111
Nursing staff mix	S	**0.439**	0.053	0.139
Nursing staff experience	S	**0.386**	0.131	–0.294
Patient acuity	S	**0.362**	0.287	0.230
Unplanned physician visits post-discharge	O	0.026	**0.829**	0.177
Mortality rate	O	–0.004	**0.822**	0.117
Unplanned emergency department visits post-discharge	O	–0.039	**0.810**	0.257
Shock/cardiac arrest rate	O	0.099	**0.802**	0.188

Table 7.4 Continued

NSIs	Dimension of NSIs[a]	Factor loading		
		Factor 1[b]	Factor 2[c]	Factor 3[d]
Unplanned readmission rate	O	–0.053	**0.796**	0.230
Length of stay	O	–0.042	**0.782**	0.047
Gastrointestinal bleeding rate	O	0.027	**0.760**	0.248
Failure to rescue rate	O	0.105	**0.690**	0.326
Restraint rate	O	0.128	**0.627**	0.372
Hospital-acquired sepsis rate	O	0.225	**0.579**	0.555
Patient knowledge of condition and treatment	O	0.280	**0.503**	0.361
Nursing staff education	S	0.384	**0.390**	–0.101
Nurse injury rate	O	0.301	**0.371**	0.318
Nurse turnover	O	0.328	**0.359**	0.358
Hospital acquired pressure ulcer rate	O	0.312	0.218	**0.738**
Nosocomial urinary tract infection rate	O	0.234	0.391	**0.727**
Nosocomial infection rate (total)	O	0.338	0.302	**0.701**
Medication administration error rate	O	0.171	0.378	**0.688**
Nosocomial pneumonia rate	O	0.136	0.555	**0.647**
Falls rate & fall with injury rate	O	0.189	0.462	**0.640**
Vein puncture complication rate	O	0.141	0.530	**0.577**
Patient/family complaint rate	O	0.182	0.199	**0.559**
Patient/family satisfaction with nursing care	O	0.280	0.190	**0.399**
Eigenvalue	Nil	14.00	5.917	1.863
Proportion of variance explained	Nil	35.01	14.70	4.657

Legend: [a] S, structure; P, process; O, outcome. [b] Factor 1: Influencing Factor NSIs, [c] Factor 2: Rarely Used Outcome NSIs, [d] Factor 3: Commonly Used Outcome NSIs. [e] Nurse satisfaction was recognized as an outcome NSI in the present survey; however, it has also been recognized as a process NSI in other international studies, such as NDNQI.

Factor 2 accounted for 14.7% of the variance. It grouped 14 outcomes NSIs that had the highest factor loadings on Factor 2 (Table 7.4). As found in the concept analysis of NSIs[44], these NSIs were less frequent nursing outcomes used to monitor and report the quality of nursing care with the exception of 'nursing staff education'. Accordingly, Factor 2 was named 'Rarely Used Outcome NSIs'.

Factor 3 explained 4.7% of the variance. It grouped nine outcomes NSIs with the highest factor loadings on Factor 3 (Table 7.4). As found in the concept analysis of NSIs[45], these NSIs were frequent nursing outcomes used to monitor and report the quality of nursing care. As a result, Factor 3 was named 'Commonly Used Outcome NSIs'.

7.5 NSIs used commonly in current clinical practice

The NSIs that were used commonly in current clinical practice were determined by counting the frequencies of NSIs identified in the semi-open-ended question. Of the 234 respondents, 168 identified that the NSIs in the NSIQ were used in their current clinical practice; 42 answered there was no NSI used; 11 only answered 'most' and did not provide details; and 13 identified other indicators used but not listed in the NSIQ (e.g., budget constraints, culturally diverse patients requiring interpreters to convey information, and family members leaving patients at the theatre door).

As shown in Table 7.5, each NSI in the NSIQ was used in current clinical practice. However, the most used commonly NSI was only identified by 49 nurses (20.9%). In addition, the 10 most used commonly NSIs comprised seven outcome NSIs (patient/family complaint rate, hospital acquired pressure ulcer, falls rate and fall with injury rate, patient/family satisfaction with nursing care, medication administration error rate, nosocomial infection rate (total), and length of stay) and three structure NSIs (nursing staff education, nursing skill mix, and nurse turnover).

[44] See Chapter 5, Section 5.10 and Table 5.2 for more information about the frequency of use of NSIs in current quality monitoring and reporting processes.
[45] See Chapter 5, Section 5.10 and Table 5.2 for more information about the frequency of use of NSIs in current quality monitoring and reporting processes.

Table 7.5 NSIs used commonly in current clinical practice (n=234)

NSIs[a]	Dimension of NSIs[b]	Frequency[c]	
		N	%
Patient/family complaint rate	O	49	20.9
Hospital acquired pressure ulcer rate	O	48	20.5
Falls rate & fall with injury rate	O	48	20.5
Patient/family satisfaction with nursing care	O	46	19.7
Nursing staff education	S	42	18.0
Nursing skill mix	S	41	17.5
Medication administration error rate	O	41	17.5
Nosocomial infection rate (total)	O	36	15.4
Length of stay	O	35	15.0
Nurse turnover	S	32	13.7
Patient turnover	S	31	13.3
Unplanned readmission rate	O	31	13.3
Nursing staff experience	S	30	12.8
Ratio of total nursing staff to patients	S	29	12.4
Management and implementation of nursing interventions	P	29	12.4
Nurse satisfaction	P/O	29	12.4
Opportunities for nursing career development	S	28	12.0
Assessment of patient care requirement	P	28	12.0
Patient knowledge of condition and treatment	O	28	12.0
Patient acuity	S	27	11.5
Unplanned emergency department visits post-discharge	O	27	11.5
Mortality rate	O	26	11.1
Nursing staff mix	S	25	10.7
Adequate facilities and budget for quality of care	S	25	10.7
Relationship/communication with collaborative practitioners	S	25	10.7
Nurse injury rate	O	25	10.7
Ability and leadership of nursing managers	S	24	10.3
Development of the nursing care plan	P	23	9.8
Nosocomial pneumonia rate	O	23	9.8
Vein puncture complication rate	O	23	9.8
Hospital-acquired sepsis rate	O	23	9.8
Shock/cardiac arrest rate	O	23	9.8
Opportunities for nurse participation in hospital activities	S	22	9.4

Table 7.5 Continued

NSIs[a]	Dimension of NSIs[b]	Frequency[c]	
		N	%
Documentation of nursing diagnosis, therapeutic objective, and care given	P	22	9.4
Total nursing care hours per patient day	S	21	9.0
Restraint rate	O	21	9.0
Failure to rescue rate	O	21	9.0
Unplanned physician visits post-discharge	O	21	9.0
Nosocomial urinary tract infection rate	O	20	8.5
Gastrointestinal bleeding rate	O	18	7.7

Legend: [a] NSIs were ordered by descending frequency. [b] S, structure; P, process; O, outcome. [c] Frequency was the number of respondents that identified this NSI.

7.6 Summary

The results of Phase Two of the study—the NSIs survey—are presented in this chapter. Thirty-six NSIs received 60% agreements from nurses as measures for nursing quality monitoring and reporting. The ten most agreed-upon NSIs consisted of seven structure and three process NSIs, and the ten least agreed-upon NSIs were outcome NSIs. Seven structure, two process and eight outcome NSIs were most agreed-upon by nurses as measures in each dimension of structure, process and outcome. Three factors named 'Influencing Factor NSIs', 'Rarely Used Outcome NSIs' and 'Commonly Used Outcome NSIs' were identified to represent the construct of NSIs. In addition, the use of NSIs in Western Health was found to be infrequent and inconsistent. Seven outcomes and three structure NSIs were used most commonly in current clinical practice.

CHAPTER EIGHT
DISCUSSION AND CONCLUSION

8.1. Introduction

In the present study, the identification of NSIs for nursing quality monitoring and reporting in an Australian context was undertaken. The study was undertaken in two phases: a concept analysis of NSIs was used to inform the development of a survey instrument and, subsequently, an online survey was administered to nurses in one Melbourne metropolitan public health service (Western Health) to identify the: (1) NSIs that respondents agreed on as measures for nursing quality monitoring, and (2) NSIs used commonly in current clinical practice. To the researcher's knowledge, it is the first study to be conducted within Victoria's public health services that comprehensively examines nurses' preferences for NSIs. The NSIs identified by the nurses reflect actual practice and may be help improve the overall quality of nursing care.

In this final chapter, the main findings of the study and their links with other relevant studies are discussed. This is followed by a discussion of the implications of the study, and the limitations and strengths of the study. Finally, a concluding statement about the study is presented.

8.2 NSIs nurses agreed on as measures for nursing quality monitoring and reporting

8.2.1 Levels of agreement for total 40 NSIs

The findings of the present study revealed that 36 out of 40 NSIs in the NSIQ achieved 60% agreement from respondents as measures for nursing quality monitoring and reporting. Given that 60% agreement is often deemed as a point indicating that a reasonable consensus has been achieved (Wells, Kolt, Marshall, & Bialocerkowski, 2014), it is considered that the respondents agreed that the majority of NSIs (36/40) were measures for nursing quality monitoring and reporting in this Australian context. This finding is line with the findings of another Australian study of quality indicators in pediatric nursing (Wilson, Hauck, Bremner, & Finn, 2012),

where authors reported that indicators identified by Australian nurses were consistent with those identified in the United States. The findings of the preset study and Wilson et al.'s study (Wilson et al., 2012) both indicate that the development of NSIs in Australia can be modelled on initiatives about NSIs that have been undertaken internationally, for example, the implementation of NDNQI and CalNOC in the United States. Many countries and researchers have adopted these two initiatives as models to develop NSIs (e.g., the United Kingdom).[46]

8.2.2 Ten most and least agreed-upon NSIs

From the 40 NSIs, the 10 most agreed-upon NSIs, as rated by nurses in the present study, consisted of seven structure and three process NSIs (Table 7.3). The 10 least agreed-upon NSIs were all outcome NSIs (Table 7.3). Results showed that there was greater agreement about structure and process NSIs, as measures for nursing quality monitoring and reporting, than for outcome NSIs. The finding supports the viewpoint of Rubin et al. (2001a) who believed that direct care providers favor structure and process measures that reflect directly the pattern of care they delivered. The majority of nurses in the present study were direct care providers;[47] therefore, it is not surprising that they paid more attention to structure and process NSIs.

The belief that structure and process NSIs alone, were important measures in the present study is supported by a number of international studies. Pazargadi et al. (2008), for example, surveyed Iranian nurses to determine nursing quality indicators in Iran. They found that the process indicator 'time and quality of care' was the highest ranked indicator among three dimensions. However, this belief is contrary to the pattern of usage of NSIs in current nursing quality monitoring and reporting processes[48] and to several other previous studies. The pattern of usage of NSIs synthesized by the concept analysis of NSIs in the present study, revealed that outcome NSIs were currently the measures used most frequently to monitor and report the quality of nursing care by nurse administrators. In addition, a number of internationally relevant studies identified that outcome NSIs were the most important

[46] See Chapter 2, Section 2.4.5 for more information about the initiatives for the development of NSIs.
[47] See Chapter 7, Section 7.2 for more information about the demographic characteristics of respondents.
[48] See Chapter 5, Section 5.10 and Table 5.2 for more information about the pattern of usage of NSIs in current quality monitoring and reporting processes synthesized by the concept analysis of NSIs.

measures for nursing quality. Kunaviktikul et al. (2001, 2005) developed initially numerous nursing indicators of quality in structure, process and outcomes groups and then refined the indicators by developing operational definitions, validating them and determining their applicability in a variety of clinical settings. They eventually decided on nine indicators (five outcomes, two structure and two process indicators), and outcomes indicators were the most used of all indicators. Those findings were echoed by Ingersoll et al. (2000) who used only outcomes indicators to measure the impact of care provided by advanced practice nurses on healthcare outcomes. Moreover, Tapaneeyakorn (2002) investigated the perceptions of nurse administrators about quality indicators of nursing care in Thailand. The findings showed nurse administrators considered that rates of medication errors, nosocomial infections (total) and nosocomial surgical wound infections, accurate and timely execution of therapeutic interventions and procedures, and adverse incident rate as the five most important nursing quality indicators, and four out of five of those 'most' important indicators were outcome NSIs.

8.2.3 Most agreed-upon structure–process–outcome NSIs

The nurse respondents in the present study identified seven structure, two process and eight outcome NSIs (Table 8.1) as the most agreed-upon measures in each dimension of structure, process and outcome. As mentioned in the literature review,[49] structure, process and outcome NSIs should be used as a constellation of measures to provide comprehensive and precise reflection of the quality of nursing care, rather than one indicator alone (National Quality Forum 2004; Needleman et al., 2007). Similarly, a set including these most agreed-upon structure–process–outcome NSIs (Table 8.1) was deemed the most suitable measures for nursing quality monitoring and reporting at Western Health.

[49] See Chapter 2, Section 2.4.4 for more information about the quality indicators used in current nursing quality monitoring and reporting.

Table 8.1 A set of most agreed-upon structure–process–outcome NSIs

Structure	Process	Outcome
Ratio of total nursing staff to patients	Assessment of patient care requirements	Medication administration error rate
Nursing staff experience	Management and implementation of nursing interventions	Hospital acquired pressure ulcer rate
Relationship/communication with collaborative practitioners		Nurse satisfaction
Total nursing care hours per patient day		Patient knowledge of condition and treatment
Opportunities for nursing career development		Patient/family satisfaction with nursing care
Nursing staff education		Nosocomial infection rate (total)
Ability and leadership of nursing managers		Falls rate & fall with injury rate
		Nosocomial urinary tract infection rate

The set of most agreed-upon structure–process–outcome NSIs in the present study is similar to the sets of NSIs collected in United States nursing quality measurement databases, including NDNQI, CalNOC, MilNOD, and VANOD. All the most agreed-upon structure, process, and outcome NSIs in this set are collected in the NDNQI, CalNOC, MilNOD, and VANOD. However, it is interesting that four NSIs (*nurse turnover, patient turnover, nursing staff mix and restraints*) that are collected frequently in the NDNQI, CalNOC, MilNOD, and VANOD were excluded from the set of most agreed-upon structure–process–outcome NSIs in the present study. A number of studies illustrate a possible reason for their exclusion is the dearth of investigations about the influence of these indicators on the quality of nursing care in Australia. For example, first, regarding the NSIs '*nurse turnover*' and '*patient turnover*', the Australian Nursing and Midwifery Federation (2009) stated that patient turnover, as an unpredictable aspect of care, is rarely considered in Australian nurse staffing allocations. Duffield et al. (2009) also claimed that patient turnover and staff turnover rates at ward level are little recognized, and their influences on the quality of nursing care remain an unmeasured phenomenon. Second, although *nurse staff mix* is

an indicator of nurse staffing and nursing workload, it is not used commonly for measuring nursing workload in Australia that is determined based on traditional allocations or budgets which pays little attention to staff mix, and there remains insufficient research evidence supporting the use of nurse staff mix in nursing workloads (Duffield, Roche, & Merrick, 2006). Similarly, the nurse respondents were less likely to agree on the importance of 'nurse staff mix' in the present study. Third, in terms of the findings of previous studies (Duffield et al., 2007; Needleman et al., 2002a), the use of *restraint* is not an outcome potentially sensitive to nursing care; thus, it was not deemed a suitable NSI for nursing quality. Furthermore, the use of physical restraint is not a common nursing intervention and only applied to specific patients who may be at risk of harming themselves in Australia (Wilson et al., 2012). This may be another explanation for why nurse respondents did not agree that use of restraint was a suitable measure to monitor and report the quality of nursing care. The following sections discuss in detail the most agreed-upon structure, process and outcome NSIs identified in the present study.

(1) Structure NSIs

The seven most agreed-upon structure NSIs reflect three factors influencing the quality of nursing care as described in the literature review; namely, nurse staffing, NPE, and nurse training and competencies.[50] They have been examined widely in the international literature to show their influence on the quality of nursing (e.g., Aiken et al., 2013; Mark et al., 2004; Serratt, 2013). In Australia, there is growing concern about the influence of 'ratio of total nursing staff to patients' and 'nursing care hours per patient day' on patient outcomes, recruitment and retention of nurses, and economic benefits to employers and communities (Duffield et al., 2006; Plummer, 2005). The indicator 'ratio of total nursing staff to patients' has been mandated in the state of Victoria, and in the state of Western Australia the 'Nursing Care Hours Per Patient Day Staffing Model' has been implemented to address issues about nurse staffing and workload (Duffield et al., 2006; Twigg & Duffield, 2009). Therefore, nurse respondents in the present study had a better understanding about the influence of these structure NSIs on the quality of nursing care. In addition, in light of the findings of an Australian national survey of nurses (Dawson, Stasa, Roche, Homer &

[50] See Chapter 2, Section 2.2.2 for more information about key influencing factors of the quality of nursing care.

Duffield, 2014), NPE, nurse staffing and nursing training were considered as the focus for nurses because they affect significantly nurses' job satisfaction, retention, and the quality of care. Therefore, it is not surprising that respondents in the present study considered that these structure NSIs were important measures for the quality of nursing care.

The most agreed-upon structure NSIs in the present study are consistent with the most frequently used structure indicators in current nursing quality monitoring and reporting processes. For example, in a systematic review of NSIs, Burston et al. (2014) found the proportion of RNs in the nursing workforce, nurse to patient ratio, nursing care hours per patient day, education level and experience were used commonly as structure NSIs. Similarly, in a descriptive exploratory study of performance quality indicators in nursing care in Iran, level of education and work experiences of nurse manager, number of nurses per patient in intensive care units, and in-service education hours for nursing staff per year were determined as structure indicators (Pazargadi et al., 2008). Consensus on the use of these most agreed-upon structure NSIs confirms that they are sensitive indicators for the quality of nursing care and should be developed and used in nursing quality monitoring and reporting processes.

(2) Process NSIs

The two most agreed-upon process NSIs reflect nursing interventions that influence directly the quality of care. This finding supports the conclusions of previous studies, that indicators should be developed and used to monitor and report the process of nursing care (Alexander, 2007; National Quality Forum, 2004; Needleman et al., 2007). The report *National Voluntary Consensus Standards for Nursing-Sensitive Care: an Initial Performance Measure Set* launched by NQF in the United States advocated the use of nursing intervention process measures (National Quality Forum, 2004). Similarly, Needleman et al. (2007) also suggested that further research studies were needed that focused on the relationship between patient outcomes and nursing interventions. A series of nursing quality measurement databases in the United States (e.g. NDNQI, CalNOC, MilNOD, and VANOD) all developed process NSIs to measure nursing interventions in specific areas, such as the process NSI 'pediatric pain assessment, intervention, reassessment (AIR) cycle' in NDNQI. Moreover, process NSIs are also developed in some smaller studies. For example, in a research

to develop a reporting tool for nursing quality, an 'evaluation of nursing intervention' was included and interpreted as: 'nurses' efforts to manage physical pain' and 'nurse responsiveness to request' (Johnson, Hallsey, Meredith, & Warden, 2006).

(3) Outcome NSIs

The eight most agreed-upon outcome NSIs were patient outcomes, with the exception of the NSI 'nurse satisfaction'. The concept analysis of NSIs in the present study found that these outcome NSIs were the most frequently used measures in current quality monitoring and reporting processes,[51] because the identified patient outcomes: (1) are highly sensitive to nursing care, and producing positive outcomes are often considered as the primary responsibilities of nurses (Tapaneeyakorn, 2002); (2) reflect the end of care which is of much interest for people (Mant, 2001); and (3) are often constructed in the health information system, so they are readily accessible by nurses (Blegen, 2006). Similarly, the nurse respondents, in the present study, agreed that these outcome NSIs were the most important measures for nursing quality monitoring and reporting.

It is interesting that nurses agreed that 'nurse satisfaction' was an important outcome NSI. This reflects the respondents' beliefs that job satisfaction influenced the quality of care. The finding is supported by international studies that pay attention to the correlation between nurses' job satisfaction and the quality of nursing care. For example, Meraviglia et al. (2009) investigated the differences in nurses' perceptions about the quality of nursing care before and after the implementation of the Nurse-Friendly (NF) Hospital Project in 30 rural or small American hospitals. This project aimed to improve nurse satisfaction, work environment, and professional development. These researchers found that nurse satisfaction had a positive influence on the quality of patient care. This impact of nursing job satisfaction on nursing quality indicates that policy makers and nursing administrators should make efforts to improve nurse job satisfaction, which would benefit the delivery of safe and good quality care to patients. Conversely, in the present study the nurse respondents disagreed that mortality is an important outcome NSI. This finding may have been attributable to mortality being perceived as setting- and organizational-level related outcomes

[51] See Chapter 5, Section 5.10 and Table 5.2 for more information about the frequency of use of NSIs in current quality monitoring and reporting processes.

(Holzemer, 2009; Needleman et al., 2007) that are determined by multidisciplinary care in health organizations.

The eight most agreed-upon outcome NSIs in the present study match those observed in international studies. Seven (excluding nurse satisfaction) were included in Burston et al.'s (2014) review. Similarly, in a knowledge synthesis of NSIs and their related initiatives, Doran et al. (2011) found these eight outcome NSIs were collected in the majority of initiatives. Moreover, in the study conducted by D'Amour, Dubois, Tchouaket, Clarke, and Blais (2014), six adverse events (pressure sores, falls, medication administration errors, pneumonias, urinary infections, and inappropriate use of restraints) were recognized widely as nursing-sensitive outcomes, which were consistent with the most agreed-upon outcome NSIs in the present study. These most agreed-upon outcome NSIs were also included in the reporting tool developed by Johnson et al. (2006). In Australia, Chaboyer et al. (2010) used three of the most agreed-upon outcome NSIs (medication errors, patient falls and pressure ulcers) to evaluate the effects of implementing 13 improvement strategies in the *Transforming Care at the Bedside* project.

8.2.4 Construct of NSIs

The construct of NSIs in the present study were determined by exploratory factor analysis. Three factors representing the dimensions of NSIs in the present study were identified. Factor 1 was named 'Influencing Factor NSIs', grouping 12 structure and five process NSIs; Factor 2 was named 'Rarely Used Outcome NSIs', grouping 14 outcome NSIs; and Factor 3 was named 'Commonly Used Outcome NSIs', grouping nine outcome NSIs.

In the present study, structure and process NSIs that influenced the outcomes of nursing care were combined into one dimension (Factor 1) and distinguished from outcome NSIs. This classification of NSIs is aligned with the nature of perceived service quality, which has two attributes: process and outcome (Carman, 2000; Grönroos, 1990). Process attributes describe how the service is delivered, such as ambience of care and provider attentiveness to care, which can be recognized as structure and process NSIs. Outcome attributes describe the quality of what is

delivered, such as patient safety, which can be recognized as outcome NSIs (Carman, 2000). In addition, the outcome NSIs were subdivided into two dimensions in the present study (Factor 2 and Factor 3). The pattern of usage of NSIs synthesized by the concept analysis [52] indicated that the outcome NSIs grouped in Factor 3 were used frequently in current nursing quality monitoring and reporting processes. In contrast, the outcome NSIs grouped in the Factor 2 were used rarely. These findings are consistent with other studies. For example, D'Amour et al. (2014) found that six adverse events (medication administration errors, falls, pneumonia, urinary tract infection, unjustified restraint and pressure ulcers) were considered widely as nursing-sensitive outcomes. They are consistent with the outcome NSIs in Factor 3. Furthermore, two studies (Berney & Needleman, 2006; Burston et al., 2014) found that some outcome NSIs in Factor 2, such as 'unplanned physician visits post-discharge' and 'gastrointestinal bleeding rate', were not used as patient outcome indicators in international studies. The division of outcome NSIs in the present study demonstrates that certain outcomes are more highly sensitive to nursing care and these should be used predominantly to monitor and report the quality of nursing care.

8.3 NSIs used commonly in current clinical practice

The nurse respondents in the present study identified that each NSI listed in the NSIQ was used in their current clinical practice. However, the use of NSIs was infrequent and inconsistent because the most used commonly indicators were only identified by 20.9% of respondents. This finding concurs with the limitations of current nursing quality monitoring and reporting processes in Australia; namely, that nursing data needed to measure and evaluate the quality of nursing care are largely absent or unobtainable for frontline nurses.[53]

Nurse respondents identified the 10 most used commonly NSIs in current clinical practice. These comprised seven outcome and three structure NSIs (Table 7.5). In Australia, most of these NSIs can be extracted from hospital administrative databases (Australian Council on Healthcare Standards, 2012). It thus is understandable that

[52] See Chapter 5, Section 5.10 and Table 5.2 for more information about the pattern of usage of NSIs synthesized by the concept analysis of NSIs.
[53] See Chapter 2, Section 2.3.3 for more information about the absence of nursing data in health databases.

they were the most used commonly NSIs. There is an interesting finding in the present study, with the 10 most agreed-upon NSIs being different to the 10 most used commonly NSIs rated by the nurse respondents. Nine of the 10 most agreed-upon NSIs were not used commonly in current clinical practice. For instance, the most agreed-upon NSIs 'assessment of patient care requirement' and 'management and implementation of nursing interventions' were not among the most used commonly NSIs. This finding suggests that, in order to measure and monitor the quality of nursing care comprehensively and explicitly, these most agree-upon NSIs, identified by the respondents, should be studied and used in clinical practice in the future.

8.4 Overall discussion of findings

In general, three main findings about nurses' perceptions of NSIs were identified in the present study. First, a set of seven structure, two process and eight outcome NSIs that were most agreed upon by respondents, were identified as potentially integral measures for nursing quality monitoring and reporting. This set is similar to those collected in the United States nursing quality measurement databases (NDNQI, CalNOC, MilNOD, and VANOD). However, respondents did not agree that four NSIs (*nurse turnover, patient turnover, nursing staff mix and restraints*) which are also collected in the United States databases were the most sensitive measures. These findings are consistent with those of Duffield and others who argued that the impacts of nurse turnover, nursing staff mix and patient turnover on the quality of nursing care are not measured commonly in Australia (Dawson et al. 2014; Duffield et al. 2006; Duffield et al. 2009; Duffield, et al., 2011). Furthermore, the findings are similar to those found in the study by Wilson et al. (2012) who claimed that the use of restraints was not a common indicator for nursing quality. The exclusion of the four NSIs that are consensus measures in the United States suggests that further study should be undertaken into the reasons why these NSIs were not identified.

Second, respondents agreed that the majority of NSIs in the NSIQ were measures for nursing quality monitoring and reporting. However, they believed the structure and process NSIs were the most useful. The most agreed-upon NSIs in the survey were all structure and process NSIs, and Factor 1, which explained most of the variance,

consisted of structure and process NSIs. The findings suggested that nurses considered the qualities of nursing care, reflected in the structure and process dimensions, were more important than those in the outcome dimension. This finding contradicts the pattern of usage of NSIs in current nursing quality monitoring and reporting processes, in which outcome NSIs are the most prevalent measures used to monitor and report the quality of nursing care.[54] Therefore, further studies that focus on developing and examining structure and process NSIs are recommended to examine this discrepancy.

Third, the use of NSIs in current clinical practice was infrequent and inconsistent. The nurse respondents identified that each NSI in the NSIQ was used in their current clinical practice, but the most used commonly indicator was only identified by 20.9% nurses. This finding echoes the conclusions of previous studies, that nursing data is often limited in information systems and nurses receive insufficient information to drive nursing care quality improvement (Kavanagh, Cimiotti, Abusalem, & Coty, 2012; Pereira, Paiva e Silva, Mendonça, & Delaney, 2010).[55] Therefore, standardized NSI data should be provided regularly to nurses in the future, as evidence of the measurement and improvement of nursing care quality. Nurses should be involved at each stage of quality improvement process.

8.5 Implications of the study

NSIs are valuable for nursing quality monitoring and reporting. They provide reliable and valid data to monitor and report the quality of care, benchmark service performance and improve patients' safety (Kennedy et al., 2013; Needleman & Hassmiller, 2009). The findings of the present study have implications for health policy and administration, research, clinical practice and education in relation to nursing quality monitoring and reporting.

[54] See Chapter 5, Section 5.10 and Table 5.2 for more information about the pattern of usage of NSIs synthesized by the concept analysis.
[55] See Chapter 2, Section 2.3 for more information about the limitations of current nursing quality monitoring and reporting processes in Australia.

8.5.1 Policy and administration

The public expects healthcare providers to deliver high-quality and safe care (Gray, Berta, Deber, & Lum, 2016; Patrician et al., 2010). To this end, policy makers and nurse administrators can adopt the set of most agreed-upon structure–process–outcome NSIs (Table 8.1) as evidence to design integral policies and initiatives about monitoring, reporting and improvement of the quality of nursing care. In particular, the structure and process NSIs that received most agreement from respondents should be investigated. An optimized nursing structure and process facilitates professional nursing practice, so that more positive outcomes can be achieved.

There are five key considerations for policy design. First, the NSIs 'ratio of total nursing staff to patients' and 'total nursing care hours per patient day' could be used to regulate nurse staffing and nursing workload allocation. It is noteworthy that the NSI 'ratio of total nursing staff to patients' has been mandated in Victoria to design and manage nurse recruitment and retention at unit level (Duffield et al., 2006; Twigg & Duffield, 2009). The findings of the present study support and confirm the need for using this NSI to ensure sufficient nurse staffing in units. In addition, the 'Nursing Care Hours per Patient Day Staffing Model', which is currently implemented in public hospitals in Western Australia, can serve as a framework to measure nursing workload in other states in Australia (Twigg & Duffield, 2009).

Second, the NSIs reflecting the characteristics of NPE, such as 'relationship/communication with collaborative practitioners', 'opportunities for nursing career development' and 'ability and leadership of nursing executives', can be used as standards to create and measure a satisfactory NPE. As mentioned in the literature review, initiatives to create and measure satisfactory and healthy NPEs have been implemented comprehensively and systematically in the United States, such as the Magnet Hospital Program (American Nurses' Credentialing Center, 2012) and the development of main instruments to measure NPE (NWI-R and PES-NWI)[56] (Aiken & Patrician, 2000; Lake, 2002). It has been confirmed that these initiatives contribute significantly to the quality of nursing care, nurse job satisfaction and positive patient outcomes (Laschinger & Leiter, 2006; Tervo-Heikkinen, Partanen et al., 2008; Van

[56] See Chapter 2, Section 2.2.2.1 for more information about the Magnet Hospital Program and instruments to measure NPE.

Bogaert et al., 2009). Hence, Australian policy makers and nurse administrators can draw on these initiatives to customize positive and healthy NPEs appropriate to Australian contexts, in which there are collegial relationships between nurses and collaborative practitioners, more opportunities for nursing career development and supportive nursing leadership.

Third, respondents highlighted NSIs reflecting the process of nursing interventions, such as 'assessment of patient care requirements' and 'management and implementation of nursing interventions'. This finding suggests policy makers and nursing administrators should place emphasis on monitoring and reporting the processes of nursing interventions. Nursing interventions include a wide range of actions undertaken by nurses for the treatment of patients; the latest edition of *Nursing Intervention Classification* has 554 nursing interventions in 30 classes and 7 domains (Bulechek et al., 2013). Consequently, the two intervention process NSIs should be developed and used individually in terms of a specific purpose, area and aspect of care. The seven-step procedure of Rubin et al. (2001b) for developing and testing a process indicator offers a systematic approach to the development and use of process NSIs.[57] Following this procedure, a nursing intervention indicator with specific methods for data collection and data analysis could be identified to reflect a specific aspect of nursing interventions. A well-developed nursing intervention indicator could then be used in clinical practice to monitor and report the care provided to patients.

Fourth, policy makers and nurse administrators may use the eight most agreed-upon outcome NSIs to measure and benchmark the quality of nursing care and service performance. These outcome NSIs were the most commonly indicators used in current clinical practice,[58] and can be retrieved from the health information systems such as the RiskMan[59] medical error reporting system. This risk and incident management software is used widely to monitor near misses, sentinel events, and other incidents in Australian hospitals (Lederman, Dreyfus, Matchan, Knott, &

[57] See Chapter 2, Section 2.4.4.2 for more information about the Rubin et al.'s seven-step procedure for developing and testing a process indicator.
[58] See Chapter 7, Section 7.5 for more information about the NSIs used commonly in current clinical practice at Western Health.
[59] RiskMan International Pty. Ltd., Southbank, Victoria, Australia.

Milton, 2013). Consequently, these outcome NSIs are accessible and it is reasonable to use them to monitor and report the quality of nursing care.

Fifth, policy makers and nurse administrators should consider taking steps to build up a NSI data set and incorporate it into health information systems. In particular, this should include those indicators that respondents most agreed on but which were not used commonly in current clinical practice (e.g., ratio of total nursing staff to patients, assessment of patient care requirement, nursing staff experience, total nursing care hours per patient day, and development of the nursing care plan). The incorporation of NSI data in health information system will enable their use and allow reporting in a standardized, regular and ongoing manner.

8.5.2 Research

The present study provides an exploratory overview of the development of NSIs as identified by nurses in a particular public health service. Further research is needed to identify NSIs completely and appropriately. First, ongoing surveys need to be undertaken in a greater number of hospitals, across public and private sectors, and in different geographic areas in Australia. Second, future research that explores the patients' agreed indicators is needed to enrich the understanding of NSIs from the perspective of health care recipients. Third, additional research should be conducted with specific cohorts of nursing staff, such as nurse administrators or nurse educators, to identify opinions about indicators from various levels. Finally, the focus of the present study was identification of NSIs, rather than their actual use. Therefore, to understand the empirical application of NSIs, subsequent research that determines their methodological approaches (including NSIs data collection, analysis and adjustment) and evaluates their use is warranted. Gaining an understanding of NSIs from different angles would promote the accuracy and comprehensiveness of the development of NSIs in Australia.

The findings of the present study indicate that nurse respondents placed greater emphasis on structure and process NSIs than on outcome measures. However, process NSIs are the least frequently used in current nursing quality monitoring and reporting

processes.[60] A possible reason for the infrequent use of process indicators is the paucity of empirical references or conceptual frameworks available to examine associations between nursing process domains and outcomes of care (Alexander, 2007; Mant, 2001; Needleman et al., 2007). Therefore, it is essential to develop more nursing conceptual models or empirical referents to demonstrate the relationships between nursing process and outcome. To date, there are a few conceptual frameworks that can be used to develop process NSIs. For example, the Nursing Role Effectiveness Model, developed by Irvine et al. (1998), has been used as a framework to develop process indicators in the 15 national voluntary consensus standards for nursing-sensitive care (NQF-15) endorsed by the NQF (2004).[61] In addition, the Nursing Intervention Classification has been used as a conceptual framework for developing and revising process indicators in the Belgium Nursing Minimum Data Set (Van den Heede et al., 2009).[62] Although there is a wide tendency on the use of a few structure NSIs (e.g., ratio of total nursing staff to patients and nursing care hours per patient day) in Australia, the association between the quality of nursing care and other structure NSIs (e.g., nurse turnover, patient turnover and nursing staff mix) is still poorly understood. Consequently, further research should be undertaken to examine the influences of these other structure NSIs on the quality of nursing care. In so doing, this will help provide a more accurate way of estimating the level of nurse staffing required in meeting patients' needs.

8.5.3 Clinical practice

The set of most agree-upon structure–process–outcome NSIs could be developed and presented to nurses as a dashboard on nursing desktop computers in clinical units, so that nurses could access them easily to receive ongoing and timely information about their care at the bedside (Johnson et al., 2006). For example, nurses could be provided with updated data about the NSIs 'medication administration error rate', 'hospital acquired pressure ulcer rate', and 'falls rate and fall with injury rate' to reflect the quality of their care. These data could be used as early alerts to improve the quality of

[60] See Chapter 5, Section 5.10 and Table 5.2 for more information about the pattern of usage of NSIs in current nursing quality monitoring and reporting processes synthesized by the concept analysis of NSIs.
[61] See Chapter 2, Section 2.4.5.5 for more information about the use of Nursing Role Effectiveness Model in the NQF-15.
[62] See Chapter 2, Section 2.4.5.9 for more information about the use of Nursing Intervention Classification in the Belgium Nursing Minimum Data Set.

nursing care. Meanwhile, digital documentation about the NSI 'assessment of patient care requirements' in the dashboard could record and monitor the level of nurses' compliance to nursing intervention standards, which would offer evidence to promote the standardization of nursing interventions in practice. In addition, patients may be interested in using NSIs as a standard to evaluate and select the nursing care they receive.

8.5.4 Nursing education

Knowledge of NSIs could be included in pre-registration nursing programs and nursing continuing and postgraduate programs. These should incorporate the concept of NSIs, their development, methods to measure, collect, use and report NSIs, information about the consequences of use of NSIs, and development of a nursing database or 'report card' system based on NSIs. Such knowledge would enable nurses to better understand nursing quality monitoring and reporting processes, and allow them to engage in quality management and improvement activities. Furthermore, it is important that policy makers and nursing administrators provide opportunities for nurses to participate in professional development such as education for NSIs. This would reinforce nurses' professional knowledge and practice skills necessary for providing patients with safe and quality care.

8.6 Limitations of the study

Although the present study contributes a reasonable breadth of knowledge of NSIs, it has three main limitations. First, the survey was conducted at a Melbourne metropolitan public health service, restricting the generalization of the study findings. The findings only provide implications for nursing quality monitoring and reporting in the survey setting and may not be generalizable to other health services and nursing populations working in other practice areas, such as community and mental health. Further studies conducted in a large number of health services and with various cohorts of nursing population could compensate for this limitation in the future.

Second, the response rate in the present study was low even though a number of strategies were implemented to improve it. The unsatisfactory response rate created potential bias arising from non-response missing data. Therefore, to minimize this

bias and improve the rigor of the present study, raking was used to weight the survey responses back to the parameters of the population of nurses at Western Health. In addition, subsequent surveys with recruitment of more nurses should be done to explore comprehensively their preferences of indicators.

Third, psychometric evaluation of NSIQ was conducted preliminarily. Construct validity assessment was limited to exploratory factor analysis. Further validation using other methods, such as confirmatory factor analysis or known-groups method for total items, is needed to strengthen the validity of NSIQ. In addition, only internal consistency reliability of NSIQ was assessed using Cronbach's alpha coefficients. Future studies focusing on other types of reliability (e.g., inter-rater, test-Retest and Split-Half reliability) should be undertaken to evaluate comprehensively the reliability of NSIQ. Meanwhile, some questions, such as 'Do you receive data about your performance on this indicator currently,' may be included in the NSIQ to solicit more information about NSIs.

8.7 Strengths of the study

The strength of the study was to examine NSIs in two phases. First, the examination from different aspects not only clarified the conceptual meaning and pattern of usage of NSIs. More importantly, it explored the nurses' preferences among indicators to monitor and report the quality of nursing care and the NSIs used commonly in current clinical practice. The development of NSIs stemming from the perceptions of nurses themselves enabled the identification of NSIs were reflective of practice and more suitable and specific to the point-of-care. Second, the triangulation of data from two phases of study improved the rigor and validity of the study. The credibility of the concept analysis of NSIs was verified by the survey in two aspects. The survey instrument developed from the concept analysis was reliable and valid, and most of NSIs synthesized by the concept analysis were agreed by respondents as measures in the survey. Furthermore, the comparison of NSIs identified by nurses in the survey, and their pattern of usage in current nursing quality monitoring and reporting processes identified by the concept analysis of NSIs, generated a deeper understanding of nurses' perceptions of these indicators.

8.8 Concluding statement

NSIs are nursing quality indicators for monitoring and reporting the quality of nursing care, the effectiveness of nursing care, cost efficiency and service performance. There are no national NSIs against which healthcare services in Australia can be evaluated (Australian Council on Healthcare Standards, 2012; Australian Nursing & Midwifery Federation, 2009). As the first step in the development of an agreed set of NSIs, the present study surveyed 245 nurses employed at a Melbourne metropolitan public health service to identify NSIs for monitoring and reporting nursing quality.

The findings of the present study provide a set of most agreed-upon structure–process–outcome NSIs. This particular set is consistent with sets of NSIs collected in NDNQI, CalNOC, MilNOD, and VANOD. However, four NSIs (nurse turnover, patient turnover, nursing staff mix and restraints) collected frequently in international nursing quality measurement databases were not included in the set identified, in the present study.

In contrast with the frequent use of outcome NSIs in current nursing quality monitoring and reporting processes, nurse respondents, in the present study, placed greater value on structure and process NSIs. This finding highlights that it is warranted to develop and use structure and process NSIs. Using concurrently structure, process and outcome NSIs, the quality of nursing care can be monitored and reported comprehensively and precisely.

The findings of the study indicate that NSIs were used infrequently and inconsistently in respondents' current clinical practice. This reflects the pitfalls of health information systems in Australia, in which nursing data are incomplete and nurses rarely receive sufficient data to support their endeavors to monitor and improve nursing care quality (Duffield et al., 2009). Therefore, there is a need to adopt measures to ensure the implementation of standardized NSIs and their use in clinical practice.

This thesis is based on an exploratory study of NSIs for nursing quality monitoring and reporting, as perceived by nurses, in a single metropolitan public health service in Melbourne. The findings make a modest contribution to the nursing knowledge about

the development of NSIs, in Australia. The identified NSIs may provide integral and valid measures to monitor, report and improve the quality of nursing care; and assist in developing policies, objectives and goals related to nursing quality monitoring, reporting and improvement in Australian public health services. The study may also increase nursing professionals' awareness about NSIs and highlights the need for the provision of NSIs.

REFERENCES

Aiken, L. H., Buchan, J., Ball, J., & Rafferty, A. M. (2008). Transformative impact of Magnet designation: England case study. *Journal of Clinical Nursing, 17*(24), 3330–3337.

Aiken, L. H., Cimiotti, J. P., Sloane, D. M., Smith, H. L., Flynn, L., & Neff, D. F. (2011). The effects of nurse staffing and nurse education on patient deaths in hospitals with different nurse work environments. *Medical Care, 49*(12), 1047.

Aiken, L. H., Clarke, S. P., Cheung, R. B., Sloane, D. M., & Silber, J. H. (2003). Educational levels of hospital nurses and surgical patient mortality. *JAMA, 290*(12), 1617–1623.

Aiken, L. H., Clarke, S. P., & Sloane, D. M. (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. A., Busse, R., Clarke, H., … Shamian, J. (2001). Nurses' reports on hospital care in five countries. *Health Affairs, 20*(3), 43–53.

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. *JAMA, 288*(16), 1987–1993.

Aiken, L. H., & Patrician, P. A. (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. *BMJ, 344*. doi: http://dx.doi.org/10.1136/bmj.e1717.

Aiken, L. H., Shang, J., Xue, Y., & Sloane, D. M. (2013). Hospital use of agency-employed supplemental nurses and patient mortality and failure to rescue. *Health Services Research, 48*(3), 931–948.

Aiken, L. H., Sloane, D. M., Clarke, S., Poghosyan, L., Cho, E., You, L., … Aungsuroch, Y. (2011). Importance of work environments on hospital outcomes in nine countries. *International Journal for Quality in Health Care, 23*(4), 357–364.

Al Qadire, M. (2014). Nurses' knowledge about palliative care: A cross-sectional survey. *Journal of Hospice & Palliative Nursing, 16*(1), 23–30.

Albanese, M. P., Evans, D. A., Schantz, C. A., Bowen, M., Disbot, M., Moffa, J. S., … Polomano, R. C. (2010). Engaging clinical nurses in quality and performance improvement activities. *Nursing Administration Quarterly, 34*(3), 226–245. doi: 10.1097/NAQ.0b013e3181e702ca

Alexander, G. R. (2007). Nursing sensitive databases: Their existence, challenges, and importance. *Medical Care Research and Review, 64*(2 suppl.), 44S–63S.

Allan, C., Carrick-Sen, D., & Martin, C. R. (2013). What is perinatal well-being? A concept analysis and review of the literature. *Journal of Reproductive and Infant Psychology, 31*(4), 381–398.

Allred, C. A., Michel, Y., Arford, P. H., Carter, V., Veitch, J. S., Dring, R., ... Finch, N. J. (1994). Environmental uncertainty: Implications for practice model redesign. *Nursing Economic$, 12*(6), 318–326.

American Nurses Association. (1995). *Nursing care report card for acute care.* Washington DC: American Nurses Publishing.

American Nurses Association. (1996). *Nursing quality indicators–definitions and implications.* Washington DC: American Nurses Publishing.

American Nurses Association. (2000). *Nurse staffing and patient outcomes in the inpatient hospital setting*. Washington DC: American Nurses Publishing.

American Nurses Association. (2012a). *What is nursing*. Retrieved from http://nursingworld.org/EspeciallyForYou/What-is-Nursing.

American Nurses Association. (2012b). *National Database of Nursing Quality Indicators (NDNQI®) program*. Retrieved from http://nursingworld.org/MainMenuCategories/ThePracticeofProfessionalNursing/PatientSafetyQuality/Research-Measurement/The-National-Database.aspx.

American Nurses Credentialing Center. (2013). *Magnet Recognition Program® overview*. Retrieved from http://www.nursecredentialing.org/Magnet/ProgramOverview.

American Society for Quality. (2013). *Quality glossary*. Retrieved from http://asq.org/glossary/q.html.

Andrade, C., Lima, M. L., Fornara, F., & Bonaiuto, M. (2012). Users' views of hospital environmental quality: Validation of the Perceived Hospital Environment Quality Indicators (PHEQIs). *Journal of Environmental Psychology, 32*(2), 97–111.

Antoinette Bargagliotti, L. (2012). Work engagement in nursing: A concept analysis. *Journal of Advanced Nursing, 68*(6), 1414-1428.

Association of UK University Hospitals. (2012). *AUKUH nursing sensitive indicators implementation resource pack*. Retrieved from http://www.aukuh.org.uk/members/documents/4NurseSensitiveIndicatorsImplementationResourcePack.pdf.

Ausserhofer, D., Schubert, M., Desmedt, M., Blegen, M. A., De Geest, S., & Schwendimann, R. (2013). The association of patient safety climate and nurse-related organizational factors with selected patient outcomes: A cross-sectional survey. *International Journal of Nursing Studies, 50*(2), 240–252.

Australian Bureau of Statistics. (2012). *Statistical language glossary*. Retrieved from http://www.abs.gov.au/websitedbs/a3121120.nsf/home/statistical+language+-+statistical+language+glossary#C.

Australian Council on Healthcare Standards. (2012). *Australasian clinical indicator report: 2005–2012* (14th ed.). Retrieved from http://www.achs.org.au/media/75524/acir_14th_edition_version_1.1.pdf.

Australian Institute of Health and Welfare. (2013). *Nursing and midwifery workforce*. Retrieved from http://www.aihw.gov.au/WorkArea/DownloadAsset.aspx?id=60129545314.

Australian Medical Association. (2012). *Clinical indicators—2012*. Retrieved from https://ama.com.au/position-statement/clinical-indicators-2012

Australian Nursing & Midwifery Federation. (2009). *Ensuring quality, safety and positive patient outcomes–why investing in nursing makes $ense*. Retrieved from http://anmf.org.au/documents/reports/Issues_Ensuring_quality.pdf.

Aydin, C. E., Bolton, L. B., Donaldson, N., Brown, D. S., Buffum, M., Elashoff, J. D., & Sandhu, M. (2004). Creating and analysing a statewide nursing quality measurement database. *Journal of Nursing Scholarship, 36*(4), 371–378.

Bae, S. H., Mark, B., & Fried, B. (2010). Impact of nursing unit turnover on patient outcomes in hospitals. *Journal of Nursing Scholarship, 42*(1), 40–49.

Bai, J., Zhang, Q., Wang, Y., Yu, L. P., Pei, X. B., Cheng, L., & Hsu, L. (2014). Work environment for Chinese nurses in different types of ICUs: A multisite cross-sectional survey. *Journal of Nursing Management.* doi: 10.1111/jonm.12163.

Baldwin, M. A. (2008). Concept analysis as a method of inquiry. *Nurse Researcher, 15*(2), 49–58.

Ball, J. E., Murrells, T., Rafferty, A. M., Morrow, E., & Griffiths, P. (2014). Care left undone during nursing shifts: Associations with workload and perceived quality of care. *BMJ Quality and Safety, 23*(2), 116–125.

Barkell, N. P., Killinger, K. A., & Schultz, S. D. (2002). The relationship between nurse staffing models and patient outcomes: A descriptive study. *Outcomes Management, 6*(1), 27–33.

Battaglia, M. P., Hoaglin, D. C., & Frankel, M. R. (2013). Practical considerations in raking survey data. *Survey Practice, 2*(5). Retrieved from http://www.surveypractice.org/index.php/SurveyPractice/issue/view/40.

Battaglia, M. P., Izrael, D., Hoaglin, D. C., & Frankel, M. R. (2004). Tips and tricks for raking survey data (aka sample balancing). *American Association for Public Opinion Research*, 4740–4744. Retrieved from http://www.amstat.org/sections/srms/proceedings/y2004/files/Jsm2004-000074.pdf.

Berger, A. M., & Branowicki, P. A. (2009). Linking equitability to quality: The development of a pediatric nursing e-quality measure. *Nursing Administration Quarterly, 33*(1), 18–25.

Berney, B., & Needleman, J. (2006). Impact of nursing overtime on nurse-sensitive patient outcomes in New York hospitals, 1995–2000. *Policy, Politics & Nursing Practice, 7*(2), 87–100.

Best, M. F., & Thurston, N. E. (2004). Measuring nurse job satisfaction. *Journal of Nursing Administration, 34*(6), 283–290.

Bethlehem, J. (2012). *Using response probabilities for assessing representativity*. The Hague/Heerlen, Netherlands: Statistics Netherland. Retrieved from http://www.cbs.nl/NR/rdonlyres/27B3C79B-1B83-44CC-B2E2-406B0702EDF8/0/201212x10pub.pdf.

Blegen, M. A. (2006). Patient safety in hospital acute care units. *Annual Review of Nursing Research, 24(1),* 103–125.

Blegen, M. A., Goode, C. J., Park, S. H., Vaughn, T., & Spetz, J. (2013). Baccalaureate education in nursing and patient outcomes. *Journal of Nursing Administration, 43*(2), 89–94.

Blegen, M. A., Goode, C. J., Spetz, J., Vaughn, T., & Park, S. H. (2011). Nurse staffing effects on patient outcomes: Safety-net and non-safety-net hospitals. *Medical Care, 49*(4), 406–414.

Bobay, K. L., Fiorelli, K. L., & Anderson, A. J. (2008). Failure to rescue: A preliminary study of patient-level factors. *Journal of Nursing Care Quality, 23*(3), 211–215.

Brennan, C. W., & Daly, B. J. (2009). Patient acuity: A concept analysis. *Journal of Advanced Nursing, 65*(5), 1114–1126.

Brennan, M. (1997). A concept analysis of consent. *Journal of Advanced Nursing, 25*(3), 477–484.

Brick, J. M., & Kalton, G. (1996). Handling missing data in survey research. *Statistical Methods in Medical Research, 5*(3), 215–238.

Brown, D. S., Aydin, C. E., Donaldson, N., Fridman, M., & Sandhu, M. (2010). Benchmarking for small hospitals: Size didn't matter!. *Journal for Healthcare Quality, 32*(4), 50–60.

Brown, D. S., Donaldson, N., Aydin, C. E., & Carlson, N. (2001). Hospital nursing benchmarks: The California Nursing Outcomes Coalition Project. *Journal for Healthcare Quality, 23*(4), 22–27.

Brown, D. S., Donaldson, N., Burnes Bolton, L., & Aydin, C. E. (2010). Nursing-sensitive benchmarks for hospitals to gauge high-reliability performance. *Journal for Healthcare Quality, 32*(6), 9–17.

Brown, L. D., Cai, T. T., & DasGupta, A. (2001). Interval estimation for a binomial proportion. *Statistical Science, 16*(2), 101–117.

Bu, X., & Jezewski, M. A. (2007). Developing a mid-range theory of patient advocacy through concept analysis. *Journal of Advanced Nursing, 57*(1), 101–110.

Buffet-Bataillon, S., Leray, E., Poisson, M., Michelet, C., Bonnaure-Mallet, M., & Cormier, M. (2010). Influence of job seniority, hand hygiene education, and patient-to-nurse ratio on hand disinfection compliance. *Journal of Hospital Infection, 76*(1), 32–35.

Bulechek, G. M., Butcher, H. K., Dochterman, J. M. M., & Wagner, C. (Ed.). (2013). *Nursing Interventions Classification (NIC)* (6th ed.). St Louis, MO: Elsevier Mosby.

Burhans, L. M., & Alligood, M. R. (2010). Quality nursing care in the words of nurses. *Journal of Advanced Nursing, 66*(8), 1689–1697.

Burnham, J. F. (2006). Scopus database: A review. *Biomedical Digital Libraries, 3*(1), 1-8. doi:10.1186/1742-5581-3-1.

Burns, N., & Grove, S. K. (1993). *The practice of nursing research conduct,critique, and utilization* (2nd ed.). Philadelphia, PA: WB Saunders Company.

Burston, S., Chaboyer, W., & Gillespie, B. (2014). Nurse-sensitive indicators suitable to reflect nursing care quality: A review and discussion of issues. *Journal of Clinical Nursing, 23*(13-14), 1785-1795.

Cahill, J. (1996). Patient participation: A concept analysis. *Journal of Advanced Nursing, 24*(3), 561–571.

Canada Health Infoway. (2012). *Canadian Health Outcomes for Better Information and Care Project.* Retrieved from http://c-hobic.cna-aiic.ca/about/default_e.aspx.

Carman, J. M. (2000). Patient perceptions of service quality: Combining the dimensions. *Journal of Services Marketing, 14*(4), 337–352.

Catts, S. V., Frost, A. D. J., O'Toole, B. I., Carr, V. J., Lewin, T., Neil, A. L., ... Eadie, K. (2011). Clinical indicators for routine use in the evaluation of early psychosis intervention: Development, training support and inter-rater reliability. *Australian and New Zealand Journal of Psychiatry, 45*(1), 63–75.

Chaboyer, W., Johnson, J., Hardy, L., Gehrke, T., & Panuwatwanich, K. (2010). Transforming care strategies and nursing-sensitive patient outcomes. *Journal of Advanced Nursing, 66*(5), 1111–1119.

Chernick, M. R., & Friis, R. H. (2003). *Introductory biostatistics for the health sciences: Modern applications including bootstrap*. Hoboken, NJ: John Wiley & Sons.

Chinn, P. L, & Kramer, M. K. (1995). *Theory and nursing: A systematic approach* (4th ed.). St. Louis, MO: Mosby.

Cho, S. H., Ketefian, S., Barkauskas, V. H., & Smith, D. G. (2003). The effects of nurse staffing on adverse events, morbidity, mortality, and medical costs. *Nursing Research, 52*(2), 71–79.

Cisler-Cahill, L. (2006). A protocol for the use of amorphous hydrogel to support wound healing in neonatal patients: An adjunct to nursing skin care. *Neonatal Network, 25*(4), 267–273.

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.

Cohen, M. P. (2008). Auxiliary variables. In P. J. Lavrakas (Eds.). *Encyclopedia of survey research methods*. (pp. 46–47). Thousand Oaks, CA: Sage. doi: http://dx.doi.org/10.4135/9781412963947.n31.

Collaborative Alliance for Nursing Outcomes. (2012). *CalNOC overview.* Retrieved from

http://c.ymcdn.com/sites/www.calnoc.org/resource/resmgr/imported/01.20.2011%20calnoc%20overview.pdf?hhSearchTerms=%22nursing+and+sensitive+and+indicator%22.

Collins Cobuild Learner's Dictionary. (Concise edition.). (2003). Glasgow, Great Britain: HarperCollins Publishers.

Colman, A. M., Norris, C. E., & Preston, C. C. (1997). Comparing rating scales of different lengths: Equivalence of scores from 5-point and 7-point scales. *Psychological Reports, 80*(2), 355–362.

Cook, C., Heath, F., & Thompson, R. L. (2000). A meta-analysis of response rates in web-or internet-based surveys. *Educational and Psychological Measurement, 60*(6), 821-836.

Corder, G. W., & Foreman, D. I. (2009). *Nonparametric statistics for non-statisticians: A step-by-step approach*. Hoboken, NJ: John Wiley & Sons.

Costello, A. B., & Osborne, J. W. (2005). Best practices in exploratory factor analysis: Four recommendations for getting the most from your analysis. *Practical Assessment, Research and Evaluation, 10*(7), 1–9.

Croarkin, C., & Tobias, P. (Ed.) (2012). *NIST/SEMATECH engineering statistics handbook.* Retrieved from http://www.itl.nist.gov/div898/handbook/index.htm

Cummings, G. G., Hayduk, L., & Estabrooks, C. A. (2006). Is the Nursing Work Index measuring up? Moving beyond estimating reliability to testing validity. *Nursing Research, 55*(2), 82–93.

Cummings, G. G., MacGregor, T., Davey, M., Wong, C. A., Lo, E., Muise, M., & Stafford, E. (2010). Leadership styles and outcome patterns for the nursing workforce and work environment: A systematic review. *International Journal of Nursing Studies, 47*(3), 363–385.

Dagher, M., & Lloyd, R. J. (1992). Developing EMS quality assessment indicators. *Prehospital and Disaster Medicine, 7*(1), 69–74.

Dall, T. M., Chen, Y. J., Seifert, R. F., Maddox, P. J., & Hogan, P. F. (2009). The economic value of professional nursing. *Medical Care, 47*(1), 97–104.

D'Amour, D., Dubois, C. A., Tchouaket, É., Clarke, S., & Blais, R. (2014). The occurrence of adverse events potentially attributable to nursing care in medical units: Cross-sectional record review. *International Journal of Nursing Studies, 51*(6), 882–891.

Dawes, J. (2008). Do data characteristics change according to the number of scale points used? An experiment using 5-point, 7-point and 10-point scales. *International Journal of Market Research, 50*(1), 61–77.

Dawson, A. J., Stasa, H., Roche, M. A., Homer, C. S. E., & Duffield, C. (2014). Nursing churn and turnover in Australian hospitals: Nurses perceptions and suggestions for supportive strategies. *BMC Nursing, 13*(1), 11. doi: 10.1186/1472-6955-13-11.

Department of Health Victoria. (2013). *Victoria public health service*. Retrieved from http://www.health.vic.gov.au/hospitals/pubwebs.htm.

Department of Health Victoria. (2014). *Nursing in Victoria*. Retrieved from http://www.health.vic.gov.au/nursing/workforce/nurse-banks.

DeVoe, J. E., Krois, L., & Stenger, R. (2009). Do children in rural areas still have different access to health care? Results from a statewide survey of Oregon's food stamp population. *Journal of Rural Health, 25*(1), 1–7.

Dillman, D. A., Phelps, G., Tortora, R., Swift, K., Kohrell, J., Berck, J., & Messer, B. L. (2009). Response rate and measurement differences in mixed-mode surveys using mail, telephone, interactive voice response (IVR) and the Internet. *Social Science Research, 38*(1), 1-18.

Dimick, J. B., Swoboda, S. M., Pronovost, P. J., & Lipsett, P. A. (2001). Effect of nurse-to-patient ratio in the intensive care unit on pulmonary complications and resource use after hepatectomy. *American Journal of Critical Care, 10*(6), 376–382.

Donabedian, A. (1969). Quality of care: Problems of measurement. II. Some issues in evaluating the quality of nursing care. *American Journal of Public Health and the Nations Health, 59*(10), 1833–1836.

Donabedian, A. (1984). Quality, cost, and cost containment. *Nursing Outlook, 32*(3), 142–145.

Donabedian, A. (2005). Evaluating the quality of medical care. *Milbank Quarterly, 83*(4), 691–729.

Donaldson, N., Bolton, L. B., Aydin, C., Brown, D., Elashoff, J. D., & Sandhu, M. (2005). Impact of California's licensed nurse-patient ratios on unit-level nurse staffing and patient outcomes. *Policy, Politics & Nursing Practice, 6*(3), 198–210.

Donaldson, N., Brown, D. S., Aydin, C. E., Bolton, M. L. B., & Rutledge, D. N. (2005). Leveraging nurse-related dashboard benchmarks to expedite performance improvement and document excellence. *Journal of Nursing Administration, 35*(4), 163–172.

Doran, D., Harrison, M. B., Laschinger, H., Hirdes, J., Rukholm, E., Sidani, S., ... Cranley, L. (2006). Relation between nursing interventions and outcome achievement in acute care settings. *Research in Nursing and Health, 29*(1), 61–70.

Doran, D., Mildon, B., & Clarke, S. (2011). On a national report card in nursing: A knowledge synthesis. *Canadian Journal of Nursing Leadership, 24*(2), 38–57.

Doran, D. I., O'Brien-Pallas, L. L., Sidani, S., Hall, L. M., Petryshen, P., Hawkins, J., ... Thomson, D. (2003). An evaluation of nurse sensitive outcomes for quality care. *International Nursing Perspectives, 3*(3), 109–125.

Doran, D. I., Sidani, S., Keatings, M., & Doidge, D. (2002). An empirical test of the nursing role effectiveness model. *Journal of Advanced Nursing, 38*(1), 29-39.

Doran, D. M. (2011). *Nursing outcomes: The state of the science* (2nd ed.). Sudbury, MA: Jones & Bartlett Leaning.

Duffield, C., Diers, D., Aisbett, C., & Roche, M. (2009). Churn: Patient turnover and mix. *Nursing Economic$, 27*(3), 185–191.

Duffield C., Diers D., O'Brien Pallas L., Aisbett C., Roche M., King M. & Aisbett K. (2011). Nursing staffing, nursing workload, the work environment and patient outcomes. A*pplied Nursing Research 24*(4), 244–255.

Duffield, C., Roche, M., & Merrick, E. (2006). Methods of measuring nursing workload in Australia. *Collegian 13*(1), 16–22.

Duffield, C., Roche, M., O'Brien-Pallas, L., Diers, D., Aisbett, C., King, M., ... Hall, J. (2007). *Glueing it together: Nurses, their work environment and patient safety*. Sydney, Australia: Centre for Health Services Management, University of Technology.

Duffy, J. R. (2002). Nosocomial infections: Important acute care nursing-sensitive outcomes indicators. *AACN Clinical Issues, 13*(3), 358–366.

Dunton, N., Gajewski, B., Klaus, S., & Pierson, B. (2007). The relationship of nursing workforce characteristics to patient outcomes. *The Online Journal of Issues in Nursing, 12*(3). doi: 10.3912/OJIN.Vol12No03Man03.

Endacott, R., Eliott, S., & Chaboyer, W. (2009). An integrative review and meta-synthesis of the scope and impact of intensive care liaison and outreach services. *Journal of Clinical Nursing, 18*(23), 3225-3236.

Estabrooks, C. A., Tourangeau, A. E., Humphrey, C. K., Hesketh, K. L., Giovannetti, P., Thomson, D., … Shamian, J. (2002). Measuring the hospital practice environment: A Canadian context. *Research in Nursing & Health, 25*(4), 256–268.

Fairbrother, G., Jones, A., & Rivas, K. (2009). Development and validation of the Nursing Workplace Satisfaction Questionnaire (NWSQ). *Contemporary Nurse, 34*(1), 10–18.

Falagas, M. E., Pitsouni, E. I., Malietzis, G. A., & Pappas, G. (2008). Comparison of PubMed, Scopus, Web of Science, and Google Scholar: Strengths and weaknesses. *The FASEB Journal, 22*(2), 338–342.

Farace, D. J., & Schöpfel, J. (Ed.). (2010). *Grey literature in library and information studies*. Berin, Germany: de Gruyter Saur.

Fawcett, J. (2012). Thoughts on concept analysis: Multiple approaches, one result. *Nursing Science Quarterly, 25*(3), 285–287.

Fawcett, J., & Desanto-Madeya, S. (2012). *Contemporary nursing knowledge: Analysis and evaluation of nursing models and theories*. Philadelphia, PA: F.A. Davis.

Fielo, S. B. (1993). Medication use: Indicators of safe practice. *Journal of Nursing Care Quality, 7*(2), 74–80.

Flynn, M., & McCarthy, G. (2008). Magnet hospital characteristics in acute general hospitals in Ireland. *Journal of Nursing Management, 16*(8), 1002–1011.

Fornara, F., Bonaiuto, M., & Bonnes, M. (2006). Perceived hospital environment quality indicators: A study of orthopaedic units. *Journal of Environmental Psychology, 26*(4), 321–334.

Freeman, M., Baumann, A., Blythe, J., Fisher, A., & Akhtar-Danesh, N. (2012). Migration: A concept analysis from a nursing perspective. *Journal of Advanced Nursing*, *68*(5), 1176–1186.

Furukawa, M. F., Raghu, T. S., & Shao, B. B. M. (2011). Electronic medical records, nurse staffing, and nurse-sensitive patient outcomes: Evidence from the national database of nursing quality indicators. *Medical Care Research and Review, 68*(3), 311–331.

Gallagher, R. M., & Rowell, P. A. (2003). Claiming the future of nursing through nursing-sensitive quality indicators. *Nursing Administration Quarterly, 27*(4), 273–284.

Gerhardt, W. E., & VanKuiken, D. (2008). Assessing magnet readiness using the nursing work index-revised survey. *Journal of Nursing Administration, 38*(10), 429–434.

Goetz, K., Janney, M., & Ramsey, K. (2011). When nursing takes ownership of financial outcomes: Achieving exceptional financial performance through leadership, strategy, and execution. *Nursing Economic$, 29*(4), 173–182.

Gomes, J. F., de Weerd-Nederhof, P. C., Pearson, A. W., & Cunha, M. P. (2003). Is more always better? An exploration of the differential effects of functional integration on performance in new product development. *Technovation, 23*(3), 185–191.

Goosen, G. M. (1989). Concept analysis: An approach to teaching physiologic variables. *Journal of Professional Nursing*, *5*(1), 31–38.

Goossen, W. T. F., Epping, P. J. M. M., Feuth, T., Van den Heuvel, W. J. A., Hasman, A., & Dassen, T. W. N. (2001). Using the nursing minimum data set for the Netherlands (NMDSN) to illustrate differences in patient populations

and variations in nursing activities. *International Journal of Nursing Studies, 38*(3), 243–257.

Gormley, D. K. (2011). Are we on the same page? Staff nurse and manager perceptions of work environment, quality of care and anticipated nurse turnover. *Journal of Nursing Management, 19*(1), 33–40.

Gorsuch, R. L. (2013). *Factor analysis*. Hove, United Kingdom: Psychology Press.

Gray, C. S., Berta, W., Deber, R., & Lum, J. (2016). Organizational responses to accountability requirements: Do we get what we expect?. Health care management review.

Griffiths, P., Richardson, A., & Blackwell, R. (2009). *Nurse sensitive outcomes and indicators in ambulatory chemotherapy*. Retrieved from http://www.nursingtimes.net/Journals/1/Files/2010/2/5/Nurse%20Sensitive%20Outcomes%20and%20Indicators%20in%20Ambulatory%20Chemotherapy%20-%20Report.pdf.

Grönroos, C. (1990). *Service management and marketing: Managing the moments of truth in service competition*. Lexington, MA: Lexington Books.

Hall, L. M., Doran, D., Laschinger, H. S., Mallette, C., Pedersen, C., & O'Brien-Pallas, L. L. (2003). A balanced scorecard approach for nursing report card development. *Outcomes Management, 7*(1), 17–22.

Harrington, L. (2009). Hardwiring nursing quality. *Nurse Leader, 7*(2), 44–46.

Hart, P., & Davis, N. (2011). Effects of nursing care and staff skill mix on patient outcomes within acute care nursing units. *Journal of Nursing Care Quality, 26*(2), 161–168.

Harteloh, P. P. (2003). The meaning of quality in health care: A conceptual analysis. *Health Care Analysis, 11*(3), 259–267.

Hearld, L. R., Alexander, J. A., Fraser, I., & Jiang, H. J. (2008). How do hospital organizational structure and processes affect quality of care? A critical review of research methods. *Medical Care Research and Review, 65*(3), 259–299.

Heslop, L., & Plummer, V. (2012). Nurse staff allocation by nurse patient ratio vs. a computerized nurse dependency management system: A comparative cost

analysis of Australian and New Zealand hospitals. *Nursing Economic$, 30*(6), 347–355.

Hill, K. S. (2010). Improving quality and patient safety by retaining nursing expertise. *The Online Journal of Issues in Nursing, 15*(3). doi: 10.3912/OJIN.Vol15No03PPT03.

Hoffart, N., & Woods, C. Q. (1996). Elements of a nursing professional practice model. *Journal of Professional Nursing, 12*(6), 354–364.

Holcomb, B. R., Hoffart, N., & Fox, M. H. (2002). Defining and measuring nursing productivity: A concept analysis and pilot study. *Journal of Advanced Nursing, 38*(4), 378–386.

Holzemer, W. L. (1994). The impact of nursing care in Latin America and the Caribbean: A focus on outcomes. *Journal of Advanced Nursing, 20*(1), 5–12.

Holzemer, W. L. (2009). Building a program of research. *Japan Journal of Nursing Science, 6*(1), 1–5.

Hou, Q., Mahnken, J. D., Gajewski, B. J., & Dunton, N. (2011). The Box-Cox power transformation on nursing sensitive indicators: Does it matter if structural effects are omitted during the estimation of the transformation parameter? *BMC Medical Research Methodology, 11*, 118. doi:10.1186/1471-2288-11-118.

Hupcey, J. E., Morse, J. M., Lenz, E. R., & Tasón, M. C. (1996). Wilsonian methods of concept analysis: A critique. *Scholarly Inquiry for Nursing Practice, 10*(3), 185–210.

Hupcey, J. E., & Penrod, J. (2005). Concept analysis: Examining the state of the science. *Research and Theory for Nursing Practice, 19*(2), 197–208.

Idvall, E., Rooke, L., & Hamrin, E. (1997). Quality indicators in clinical nursing: A review of the literature. *Journal of Advanced Nursing, 25*(1), 6–17.

Ingersoll, G. L., McIntosh, E., & Williams, M. (2000). Nurse-sensitive outcomes of advanced practice. *Journal of Advanced Nursing, 32*(5), 1272–1281.

International Council of Nurses. (2012). *Nursing sensitive indicators.* Retrieved from http://www.ordemenfermeiros.pt/relacoesinternacionais/gri_documentacao/IC

N_FolhasInformativas_vsINGePT/FI_versao_ING/Nursing_Research/6c_FS-Nursing_Sensitive_Outcome_Indicators.pdf.

Irvine, D., Sidani, S., & Hall, L. M. (1998). Linking outcomes to nurses' roles in health care. *Nursing Economic$, 16*(2), 58–64, 87.

Jansson, I., Pilhammar-Andersson, E., & Forsberg, A. (2010). Evaluation of documented nursing care plans by the use of nursing-sensitive outcome indicators. *Journal of Evaluation in Clinical Practice, 16*(3), 611–618.

Jasmine, T. (2009). Art, science, or both? Keeping the care in nursing. *Nursing Clinics of North America, 44*(4), 415–421.

Jennings, B. M., Loan, L. A., DePaul, D., Brosch, L. R., & Hildreth, P. (2001). Lessons learned while collecting ANA indicator data. *Journal of Nursing Administration, 31*(3), 121–129.

Jennings, B. M., Staggers, N., & Brosch, L. R. (1999). A classification scheme for outcome indicators. *Image: The Journal of Nursing Scholarship, 31*(4), 381–388.

Johnson, K., Hallsey, D., Meredith, R. L., & Warden, E. (2006). A nurse-driven system for improving patient quality outcomes. *Journal of Nursing Care Quality, 21*(2), 168–175.

Joseph, A. M. (2007). The impact of nursing on patient and organizational outcomes. *Nursing Economic$, 25*(1), 30–34.

Joyce, J., & Crookes, P. (2007). Developing a tool to measure 'magnetism' in Australian nursing environments. *Australian Journal of Advanced Nursing, 25*(1), 17–23.

Jull, A., & Griffiths, P. (2010). Is pressure sore prevention a sensitive indicator of the quality of nursing care? A cautionary note. *International Journal of Nursing Studies, 47*(5), 531–533.

Kalton, G., & Flores-Cervantes, I. (2003). Weighting methods. *Journal of Official Statistics, 19*(2), 81–97.

Kanai-Pak, M., Aiken, L. H., Sloane, D. M., & Poghosyan, L. (2008). Poor work environments and nurse inexperience are associated with burnout, job

dissatisfaction and quality deficits in Japanese hospitals. *Journal of Clinical Nursing, 17*(24), 3324–3329.

Kapoor, P. (2011). Why quality in healthcare? *Medical Journal Armed Forces India, 67*(3), 206–208.

Kavanagh, K. T., Cimiotti, J. P., Abusalem, S., & Coty, M. B. (2012). Moving healthcare quality forward with nursing-sensitive value-based purchasing. *Journal of Nursing Scholarship*, *44*(4), 385–395.

Kavanagh, P. L., Adams, W. G., & Wang, C. J. (2009). Quality indicators and quality assessment in child health. *Archives of Disease in Childhood, 94*(6), 458–463.

Kazanjian, A., Green, C., Wong, J., & Reid, R. (2005). Effect of the hospital nursing environment on patient mortality: A systematic review. *Journal of Health Services Research and Policy, 10*(2), 111–117.

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.

Kennedy, R., Murphy, J., & Roberts, D. W. (2013). An overview of the National Quality Strategy: Where do nurses fit?. *The Online Journal of Issues in Nursin*g, *18*(3). doi: 10.3912/OJIN.Vol18No03Man05.

Kerr, P. (2000). Comparing two nursing outcomes reporting initiatives. *Outcomes Management for Nursing Practice, 4*(3), 144–149.

Kleib, M., Sales, A., Doran, D. M., Mallette, C., & White, D. (2011). Nursing minimum data sets. In D. M. Doran (Eds.), *Nursing outcomes: State of the science.* (pp. 487–512). Mississauga, ON: Jones & Bartlett.

Kline, P. (2014). *An easy guide to factor analysis*. Abingdon, United Kingdom: Routledge.

Kovner, C., Jones, C., Zhan, C., Gergen, P. J., & Basu, J. (2002). Nurse staffing and postsurgical adverse events: An analysis of administrative data from a sample of U.S. Hospitals, 1990–1996. *Health Services Research, 37*(3), 611–629.

Kramer, M., & Hafner, L. P. (1989). Shared values: Impaction staff nurse job satisfaction and perceived productivity. *Nursing Research, 38*(3): 172–177.

Kramer, M., Halfer, D., Maguire, P., & Schmalenberg, C. (2012). Impact of healthy work environments and multistage nurse residency programs on retention of newly licensed RNs. *Journal of Nursing Administration, 42*(3), 148-159.

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, 7*(4), 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.

Kurtzman, E. T. (2010). The contribution of nursing to high-value inpatient care. *Policy, Politics, & Nursing Practice, 11*(1), 36–61.

Kurtzman, E. T., & Corrigan, J. M. (2007). Measuring the contribution of nursing to quality, patient safety, and health care outcomes. *Policy, Politics, and Nursing Practice, 8*(1), 20–25.

Kurtzman, E. T., Dawson, E. M., & Johnson, J. E. (2008). The current state of nursing performance measurement, public reporting, and value-based purchasing. *Policy, Politics, & Nursing Practice*, *9*(3), 181–191.

Kurtzman, E. T., & Jennings, B. M. (2008). Trends in transparency: Nursing performance measurement and reporting. *Journal of Nursing Administration, 38*(7/8), 349–354.

Kutschmann, M., Renner, D., & Fischer, B. (2010). Use of logistic regression for developing risk-adjusted quality indicators in nursing. *Methods of Information in Medicine, 49*(6), 608–612.

Lacey, S. R., & Cox, K. S. (2009). Nursing: Key to quality improvement. *Pediatric Clinics of North America, 56*(4), 975–985.

Lacey, S. R., Klaus, S. F., Smith, J. B., Cox, K. S., & Dunton, N. E. (2006). Developing measures of pediatric nursing quality. *Journal of Nursing Care Quality, 21*(3), 210–220.

Lageson, C. (2004). Quality focus of the first line nurse manager and relationship to unit outcomes. *Journal of Nursing Care Quality, 19*(4), 336–342.

Lake, E. T. (2002). Development of the practice environment scale of the Nursing Work Index. *Research in Nursing & Health, 25*(3), 176–188.

Lake, E. T. (2007). The nursing practice environment measurement and evidence. *Medical Care Research and Review, 64*(2 suppl), 104S–122S.

Lake, E. T., Shang, J., Klaus, S., & Dunton, N. E. (2010). Patient falls: Association with hospital Magnet status and nursing unit staffing. *Research in Nursing & Health, 33*(5), 413–425.

Laschinger, H. K. S., & Leiter, M. P. (2006). The impact of nursing work environments on patient safety outcomes: The mediating role of burnout/engagement. *Journal of Nursing Administration, 36*(5), 259–267.

Laschinger, H. S., Hall, L. M., Pedersen, C., & Almost, J. (2005). A psychometric analysis of the patient satisfaction with nursing care quality questionnaire: An actionable approach to measuring patient satisfaction. *Journal of Nursing Care Quality, 20*(3), 220–230.

Lederman, R., Dreyfus, S., Matchan, J., Knott, J. C., & Milton, S. K. (2013). Electronic error-reporting systems: A case study into the impact on nurse reporting of medical errors. *Nursing Outlook, 61*(6), 417–426.

Ledesma, R. D., & Valero-Mora, P. (2007). Determining the number of factors to retain in EFA: An easy-to-use computer program for carrying out parallel analysis. *Practical Assessment, Research & Evaluation, 12*(2), 1–11.

Lee, B. (2007). Identifying outcomes from the nursing outcomes classification as indicators of quality of care in Korea: A modified delphi. *International Journal of Nursing Studies, 44*, 1021–1028.

Lee, H. Y., Blegen, M. A., & Harrington, C. (2014). The effects of RN staffing hours on nursing home quality: A two-stage model. *International Journal of Nursing Studies, 51*(3), 409–417.

Little, R. J. (2009). Comments on: Missing data methods in longitudinal studies: A review. *Test, 18*(1), 47–50.

Loan, L. A., Patrician, P. A., & McCarthy, M. (2011). Participation in a national nursing outcomes database: Monitoring outcomes over time. *Nursing Administration Quarterly, 35*(1), 72–81.

Lowe, H. J., & Barnett, G. O. (1994). Understanding and using the medical subject headings (MeSH) vocabulary to perform literature searches. *JAMA, 271*(14), 1103–1108.

Lucero, R. J., Lake, E. T., & Aiken, L. H. (2009). Variations in nursing care quality across hospitals. *Journal of Advanced Nursing, 65*(11), 2299–2310.

Maas, M. L., Johnson, M., & Moorhead, S. (1996). Classifying nursing-sensitive patient outcomes. *Journal of Nursing Scholarship, 28*(4), 295–302.

Mainz, J. (2003). Defining and classifying clinical indicators for quality improvement. *International Journal for Quality in Health Care, 15*(6), 523–530.

Manojlovich, M., & Talsma, A. (2007). Identifying nursing processes to reduce failure to rescue. *Journal of Nursing Administration, 37*(11), 504–509.

Mant, J. (2001). Process versus outcome indicators in the assessment of quality of health care. *International Journal for Quality in Health Care, 13*(6), 475–480.

Mark, B. A., & Harless, D. W. (2010). Nurse staffing and post-surgical complications using the present on admission indicator. *Research in Nursing and Health, 33*(1), 35–47.

Mark, B. A., Harless, D. W., McCue, M., & Xu, Y. (2004). A longitudinal examination of hospital registered nurse staffing and quality of care. *Health Services Research, 39*(2), 279–300.

Mark, B. A., Salyer, J., & Wan, T. T. (2003). Professional nursing practice. *Journal of Nursing Administration, 33*(4), 224–234.

Mattke, S., Needleman, J., Buerhaus, P., Stewart, M., & Zelevinsky, K. (2004). Evaluating the role of patient sample definitions for quality indicators sensitive to nurse staffing patterns. *Medical Care, 42*(2 suppl), II21–II33.

McCarthy, M., Loan, L., & Patrician P. H. (2012). *Measuring the effects of nurse staffing on patient outcomes: The Military Nursing Outcomes database (MilNOD) Project*. Retrieved from file:///C:/Users/s3858091/Documents/Documents/NSI/NSI/REFERENCE/reports%20of%20intiatives%20of%20NSI/MILNOD.pdf.

McGillis Hall, L. (2002). Report cards: Relevance for nursing and patient care safety. *International Nursing Review, 49*(3), 168–177.

Mcloughlin, V., Leatherman, S., Fletcher, M., & Owen, J. W. (2001). Improving performance using indicators. Recent experiences in the United States, the United Kingdom, and Australia. *International Journal for Quality in Health Care, 13*(6), 455-462.

Meraviglia, M., Grobe, S. J., Tabone, S., Wainwright, M., Shelton, S., Miner, H., & Jordan, C. (2009). Creating a positive work environment: Implementation of the nurse-friendly hospital criteria. *Journal of Nursing Administration, 39*(2), 64–70.

Meretoja, R., Isoaho, H., & Leino-Kilpi, H. (2004). Nurse Competence Scale: Development and psychometric testing. *Journal of Advanced Nursing, 47*(2), 124–133.

Merriam–Webster's Dictionary–Medical Science. (2012). Retrieved from http://www.merriam-webster.com/dictionary/nursing?show=0&t=1402321118

Mitchel, P. H. (2008). Defining patient safety and quality care. In R. G. Hughes (Eds.), *Patient safety and quality: An evidence-based handbook for nurses.* (pp. 1–5). Rockville, MD: Agency for Healthcare Research and Quality.

Montalvo, I. (2007). The National Database of Nursing Quality Indicators® (NDNQI®). *The Online Journal of Issues in Nursing, 12*(3). doi: 10.3912/OJIN.Vol12No03Man02.

Moorhead, S., Johnson, M., & Maas, M. (2004). *Nursing Outcomes Classification*. St. Louis, MO: Mosby.

Morse, J. M. (2000). Exploring pragmatic utility: Concept analysis by critically appraising the literature. *Concept Development in Nursing: Foundations, Techniques, and Applications, 2,* 333–352.

Morse, J. M., Hupcey, J. E., Mitcham, C., & Lenz, E. R. (1996). Concept analysis in nursing research: A critical appraisal. *Scholarly Inquiry for Nursing Practice, 10*(3), 253–277.

Murphy, J. (2010). The journey to meaningful use of electronic health records. *Nursing Economic$, 28*(4), 283–286.

National Database of Nursing Quality Indicators. (2012). *Nursing-sensitive indicators.* Retrieved from http://www.nursingworld.org/MainMenuCategories/ThePracticeofProfessionalNursing/PatientSafetyQuality/Research-Measurement/The-National-Database/Nursing-Sensitive-Indicators_1.

National Library of Medicine. (2012). *Medical Subject Headings.* Retrieved from http://www.nlm.nih.gov/mesh/.

National Institute for Health and Care Excellence (2014). *Health and social care directorate quality standards process guide*. http://www.nice.org.uk/media/default/Standards-and-indicators/Quality-standards/Quality-standards-process-guide-April-2014.pdf.

National Quality Forum (2004). *National voluntary consensus standards for nursing-sensitive care: An initial performance measure set*. Retrieved from http://www.qualityforum.org/Publications/2004/10/National_Voluntary_Consensus_Standards_for_Nursing-Sensitive_Care__An_Initial_Performance_Measure_Set.aspx.

Naylor, M. D. (2007). Advancing the science in the measurement of health care quality influenced by nurses. *Medical Care Research & Review, 64*(2 suppl), 144S–169S.

Needleman, J. (2008). Is what's good for the patient good for the hospital? Aligning incentives and the business case for nursing. *Policy, Politics, and Nursing Practice, 9*(2), 80–87.

Needleman, J., Buerhaus, P., Mattke, S., Stewart, M., & Zelevinsky, K. (2002a). Nurse-staffing levels and the quality of care in hospitals. *New England Journal of Medicine, 346*(22), 1715–1722.

Needleman, J., Buerhaus, P., Mattke, S., Stewart, M., & Zelevinsky, K. (2002b). Nurse staffing and quality of care in hospitals in the United States. *Policy, Politics, & Nursing Practice, 3*(4), 306–308.

Needleman, J., Buerhaus, P., Pankratz, V. S., Leibson, C. L., Stevens, S. R., & Harris, M. (2011). Nurse staffing and inpatient hospital mortality. *New England Journal of Medicine, 364*(11), 1037–1045.

Needleman, J., Buerhaus, P. I., Stewart, M., Zelevinsky, K., & Mattke, S. (2006). Nurse staffing in hospitals: Is there a business case for quality? *Health Affairs, 25*(1), 204–211.

Needleman, J., Buerhaus, P. I., Vanderboom, C., & Harris, M. (2013). Using present-on-admission coding to improve exclusion rules for quality metrics: The case of failure to rescue. *Medical Care, 51*(8), 722–730.

Needleman, J., & Hassmiller, S. (2009). The role of nurses in improving hospital quality and efficiency: Real-world results. *Health Affairs, 28*(4), w625–w633.

Needleman, J., Kurtzman, E. T., & Kizer, K. W. (2007). Performance measurement of nursing care. *Medical Care Research & Review, 64*, 10S–43S.

Newman, D. M. (2005). Functional status, personal health, and self-esteem of caregivers of children in a body cast: A pilot study. *Orthopaedic Nursing, 24*(6), 416–423.

Nulty, D. D. (2008). The adequacy of response rates to online and paper surveys: What can be done? *Assessment & Evaluation in Higher Education, 33*(3), 301–314.

O'Connell, B. O., & Warelow, P. J. (2001). Challenges of measuring and linking patient outcomes to nursing interventions in acute care settings. *Nursing & Health Sciences, 3*(3), 113–117.

Paley, J. (1996). How not to clarify concepts in nursing. *Journal of Advanced Nursing, 24*(3), 572–576.

Pappas, S. H. (2008). The cost of nurse-sensitive adverse events. *Journal of Nursing Administration, 38*(5), 230–236.

Parker, D., Tuckett, A., Eley, R., & Hegney, D. (2010). Construct validity and reliability of the Practice Environment Scale of the Nursing Work Index for Queensland nurses. *International Journal of Nursing Practice, 16*(4), 352–358.

Patrician, P. A., Loan, L., McCarthy, M., Brosch, L. R., & Davey, K. S. (2010). On evidence-based management: Creating an informative database of nursing-sensitive indicators. *Journal of Nursing Scholarship, 42*(4), 358–366.

Patrician, P. A., Loan, L., McCarthy, M., Fridman, M., Donaldson, N., Bingham, M., & Brosch, L. R. (2011). The association of shift-level nurse staffing with adverse patient events. *Journal of Nursing Administration*, *41*(2), 64–70.

Pavlish, C., & Hunt, R. (2012). An exploratory study about meaningful work in acute care nursing. *Nursing Forum, 47*(2), 113–122.

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.

Pearce, C., Phillips, C., Hall, S., Sibbald, B., Porritt, J., Yates, R., … Kljakovic, M. (2009). Contributions from the lifeworld: Quality, caring and the general practice nurse. *Quality in Primary Care, 17*(1), 5–13.

Pelander, T., Leino-Kilpi, H., & Katajisto, J. (2007). Quality of pediatric nursing care in Finland: Children's perspective. *Journal of Nursing Care Quality, 22*(2), 185–194.

Penrod, J., & Hupcey, J. E. (2005). Concept advancement: Extending science through concept driven research. *Research and Theory for Nursing Practice 19*(3), 231–241.

Pereira, F., Paiva e Silva, A., Mendonça, D., & Delaney, C. (2010). On a uniform nursing minimum data set in Portugal. *Online Journal of Nursing Informatics, 14*(2), 1–19. Retreived from http://ojni.org/14_2/Pereira.pdf.

Plummer, V. (2005). The Australian mandatory staffing experience. In D. J. Mason, J. K. Lewitt, & M. Chaffee, M. (Eds). *Policy and politics in nursing and health care* (pp. 527–540). St Louis, MO: Elsevier Health Sciences.

Podgorny, K. L. (1991). Developing nursing-focused quality indicators: A professional challenge. *Journal of Nursing Care Quality, 6*(1), 47–52.

Polit, D. F. (2010). *Statistics and data analysis for nursing research*. Boston, MA: Pearson.

Polit, D. F., & Beck, C. T. (2013). *Essentials of nursing research: Appraising evidence for nursing practice*. (8th ed.). Philadelphia, PA: Lippincott Williams & Wilkins.

Pringle, D. M., & White, P. (2002). Nursing matters: The Nursing and Health Outcomes Project of the Ontario Ministry of Health and Long-Term Care. *Canadian Journal of Nursing Research*, *33*(4), 115–121.

Qualtrics University (2014). *Validation*. Retrieved from http://www.qualtrics.com/university/researchsuite/basic-building/editing-questions/validation/.

Registered Nurses' Association of Ontario. (2013). *Developing and sustaining nurse leadership*. Retrieved from http://rnao.ca/sites/rnao-ca/files/LeadershipBPG_Booklet_Web_1.pdf.

Rew, L., Weaver, K., Morse, J. M., Hupcey, J. E., Penrod, J., Walker, L., & Avant, K. (2005). Letters to the Editor. Discourse on concept analysis. *Journal of Holistic Nursing*, *23*(1), 6–12.

Ridley, J., Wilson, B., Harwood, L., & Laschinger, H. K. (2009). Work environment, health outcomes and magnet hospital traits in the Canadian nephrology nursing scene. *CANNT Journal/Journal ACITN, 19*(1), 28–35.

Ridley, R. T. (2008). The relationship between nurse education level and patient safety: An integrative review. *Journal of Nursing Education, 47*(4), 149–156.

Riehle, A. I., Hanold, L. S., Sprenger, S. L., & Loeb, J. M. (2007). Specifying and standardizing performance measures for use at a national level: Implications for nursing-sensitive care performance measures. *Medical Care Research and Review, 64*(2 suppl), 64S–81S.

Risjord, M. (2009). Rethinking concept analysis. *Journal of Advanced Nursing, 65*(3), 684–691.

Roche, M., Diers, D., Duffield, C., & Catling-Paull, C. (2010). Violence toward nurses, the work environment, and patient outcomes. *Journal of Nursing Scholarship, 42*(1), 13–22.

Roche, M., Duffield, C., Aisbett, C., Diers, D., & Stasa, H. (2012). Nursing work directions in Australia: Does evidence drive the policy?. *Collegian, 19*(4), 231–238.

Rodgers, B. (2000). Concept analysis: An evolutionary view. In B. Rodgers & K. Knafl (Eds.), *Concept development in nursing: Foundations, techniques, and applications*. (2nd ed.). (pp. 77–102). Philadelphia, PA: Saunders.

Rodgers, B., & Knafl, K. (Ed.). (1993). *Concept development in nursing: Foundations, techniques, and applications*. Philadelphia, PA: Saunders.

Rodgers, B. L. (1989). Concepts, analysis and the development of nursing knowledge: Evolutionary cycle. *Journal of Advanced Nursing, 14*(4), 330–335.

Royal College of Nursing, Australia, & Australian Member of International Council of Nurses. (2009). *Position statement: Quality in nursing practice.* Retrieved from http://www.rcna.org.au/WCM/Images/RCNA_website/Files%20for%20upload%20and%20link/policy/documentation/review/quality_in_nursing_practice.pdf.

Rubin, H. R., Pronovost, P., & Diette, G. B. (2001a). The advantages and disadvantages of process-based measures of health care quality. *International Journal for Quality in Health Care, 13*(6), 469–474.

Rubin, H. R., Pronovost, P., & Diette, G. B. (2001b). Methodology Matters. From a process of care to a measure: The development and testing of a quality indicator. *International Journal for Quality in Health Care, 13*(6), 489–496.

Savitz, L. A., Jones, C. B., & Bernard, S. (2005). Quality indicators sensitive to nurse staffing in acute care settings. In K. Henriksen, J. B. Battles, E. S. Marks, & D.I. Lewin (Eds.) *Advances in patient safety: From research to implementation*. Rockville, MD: Agency for Healthcare Research and Quality.

Schick Makaroff, K. L. (2013). The unsayable: A concept analysis. *Journal of Advanced Nursing, 69*(2), 481–492.

Schmid, A., Hoffman, L., Happ, M. B., Wolf, G. A., & DeVita, M. (2007). Failure to rescue: A literature review. *Journal of Nursing Administration, 37*(4), 188–198.

Schubert, M., Glass, T. R., Clarke, S. P., Aiken, L. H., Schaffert-Witvliet, B., Sloane, D. M., & De Geest, S. (2008). Rationing of nursing care and its relationship to

patient outcomes: The Swiss extension of the international hospital outcomes study. *International Journal for Quality in Health Care, 20*(4), 227–237.

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.

Serratt, T. (2013). California's nurse-to-patient ratios, Part 1: 8 years later, what do we know about nurse-level outcome? *Journal of Nursing Administration, 43*(9), 475–480.

Shand, S., & Callen, J. (2003). Management information needs of clinician managers in a metropolitan teaching hospital. *The HIM Journal*, *31*(3), 1–13.

Siela, D. (2010). Evaluation standards for management of artificial airways. *Critical Care Nurse, 30*(4), 76–78.

Silber, J. H., Romano, P. S., Rosen, A. K., Wang, Y., Even-Shoshan, O., & Volpp, K. G. (2007). Failure to rescue: Comparing definitions to measure quality of care. *Medical Care, 45*(10), 918–925.

Simon, M., Yankovsky, E., Klaus, S., Gajewski, B., & Dunton, N. (2011). Midnight census revisited: Reliability of patient day measurements in US hospital units. *International Journal of Nursing Studies, 48*(1), 56–61.

Simpson, K. R. (2005). Failure to rescue: Implications for evaluating quality of care during labor and birth. *Journal of Perinatal and Neonatal Nursing, 19*(1), 24–36.

Sjetne, I. S., Veenstra, M., Ellefsen, B., & Stavem, K. (2009). Service quality in hospital wards with different nursing organization: Nurses' ratings. *Journal of Advanced Nursing*, *65*(2), 325–336.

Slater, P., & McCormack, B. (2007). An exploration of the factor structure of the Nursing Work Index. *Worldviews on Evidence-Based Nursing*, *4*(1), 30–39.

Smith, D. P., & Jordan, H. S. (2008). Piloting nursing-sensitive hospital care measures in Massachusetts. *Journal of Nursing Care Quality*, *23*(1), 23–33.

Spear, H. J., & Kulbok, P. (2004). Autonomy and adolescence: A concept analysis. *Public Health Nursing*, *21*(2), 144–152.

Spetz, J., Harless, D. W., Herrera, C. N., & Mark, B. A. (2013). Using minimum nurse staffing regulations to measure the relationship between nursing and hospital quality of care. *Medical Care Research and Review, 70*(4), 380–399.

Sujijantararat, R., Booth, R. Z., & Davis, L. L. (2005). Nosocomial urinary tract infection: Nursing-sensitive quality indicator in a Thai hospital. *Journal of Nursing Care Quality, 20*(2), 134–139.

Sullivan, J., Brust, P., Wren, P. J., & Rich, V. (2004). A staffing-effectiveness methodology for analysing human resource and clinical/service screening indicator data. *Joint Commission Journal on Quality & Safety, 30*(6), 322–330.

Sunol, R. (2000). Avedis Donabedian. *International Journal for Quality in Health Care, 12*(6), 451–453.

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.

Talsma, A., Jones, K., Guo, Y., Wilson, D., & Campbell, D. A. (2013). The relationship between nurse staffing and failure to rescue: Where does it matter most? *Journal of Patient Safety*, *10*(3), 133–139.

Tapaneeyakorn. (2002). *Nurse administrators perceptions of quality indicators of nursing care in Thailand* (unpublished docotoral thesis). University of Iowa, Iowa City, Iowa.

Taylor, J. A., Dominici, F., Agnew, J., Gerwin, D., Morlock, L., & Miller, M. R. (2011). Do nurse and patient injuries share common antecedents? An analysis of associations with safety climate and working conditions. *BMJ Quality & Safety*. doi: 10.1136/bmjqs-2011-000082.

Tervo-Heikkinen, T., Kvist, T., Partanen, P., Vehviläinen-Julkunen, K., & Aalto, P. (2008). Patient satisfaction as a positive nursing outcome. *Journal of Nursing Care Quality, 23*(1), 58–65.

Tervo-Heikkinen, T., Partanen, P., Aalto, P., & Vehviläinen-Julkunen, K. (2008). Nurses' work environment and nursing outcomes: A survey study among

Finnish university hospital registered nurses. *International Journal of Nursing Practice, 14*(5), 357–365.

Tofthagen, R., & Fagerstrøm, L. M. (2010). Rodgers' evolutionary concept analysis – a valid method for developing knowledge in nursing science. *Scandinavian Journal of Caring Sciences, 24*(suppl 1), 21–31.

Torres-Reyna, O. (2012). *Getting started in factor analysis (using Stata 10)*. Retrieved from http://dss.princeton.edu/training/Factor.pdf

Tourangeau, A. E., Giovannetti, P., Tu, J. V., & Wood, M. (2002). Nursing-related determinants of 30-day mortality for hospitalized patients. *Canadian Journal of Nursing Research, 33*(4), 71–88.

Twigg, D., & Duffield, C. (2009). A review of workload measures: A context for a new staffing methodology in Western Australia. *International Journal of Nursing Studies, 46*(1), 132–140.

Twigg, D., Duffield, C., Bremner, A., Rapley, P., & Finn, J. (2011). The impact of the nursing hours per patient day (NHPPD) staffing method on patient outcomes: A retrospective analysis of patient and staffing data. *International Journal of Nursing Studies, 48*(5), 540–548.

Twigg, D., Duffield, C., Bremner, A., Rapley, P., & Finn, J. (2012). Impact of skill mix variations on patient outcomes following implementation of nursing hours per patient day staffing: A retrospective study. *Journal of Advanced Nursing, 68*(12), 2710–2718.

Twigg, D. E., Geelhoed, E. A., Bremner, A. P., & M Duffield, C. (2013). The economic benefits of increased levels of nursing care in the hospital setting. *Journal of Advanced Nursing, 69*(10), 2253–2261.

Twigg, D. E., Pugh, J. D., Gelder, L., & Myers, H. (2015). Foundations of a nursing-sensitive outcome indicator suite for monitoring public patient safety in Western Australia. Collegian, http://dx.doi.org/10.1016/j.colegn.2015.03.007

Ulrich, R. S., Berry, L. L., Quan, X., & Parish, J. T. (2010). A conceptual framework for the domain of evidence-based design. *Health Environments Research and Design Journal, 4*(1), 95–114.

Ulrich, R. S., Zimring, C., Zhu, X., DuBose, J., Seo, H. B., Choi, Y. S., ... Joseph, A. (2008). A review of the research literature on evidence-based healthcare design. *Health Environments Research and Design Journal, 1*(3), 61–125.

University of Kentucky & UK Healthcare (2012). *The blueprint for improving patient care: Nursing-Sensitive Indicators*. Retrieved from http://academics.uky.edu/ukcon/pub/NewsEventsPublications/Documents/InStep_Spr12_web_pp1-23.pdf

Unruh, L. (2003). Licensed nurse staffing and adverse events in hospitals. *Medical Care, 41*(1), 142–152.

Upenieks, V. V. (2003). The interrelationship of organizational characteristics of magnet hospitals, nursing leadership, and nursing job satisfaction. *The Health Care Manager, 22*(2), 83–98.

Vaingankar, J. A., Abdin, E., & Chong, S. A. (2012). Exploratory and confirmatory factor analyzes of the Multidimensional Scale of Perceived Social Support in patients with schizophrenia. *Comprehensive Psychiatry, 53*(3), 286–291.

Van Bogaert, P., Clarke, S., Vermeyen, K., Meulemans, H., & Van de Heyning, P. (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*(1), 54–64.

Van den Heede, K., Clarke, S. P., Sermeus, W., Vleugels, A., & Aiken, L. H. (2007). International experts' perspectives on the state of the nurse staffing and patient outcomes literature. *Journal of Nursing Scholarship, 39*(4), 290–297.

Van den Heede, K., Michiels, D., Thonon, O., & Sermeus, W. (2009). Using nursing interventions classification as a framework to revise the Belgian nursing minimum data set. *International Journal of Nursing Terminologies and Classifications, 20*(3), 122–131.

VandeVelde-Coke, S., Doran, D., Grinspun, D., Hayes, L., Sutherland Boal, A., Velji, K., & Hannah, K. (2012). Measuring outcomes of nursing care, improving the health of Canadians: NNQR (C), C-HOBIC and NQuiRE. *Canadian Journal of Nursing Leadership, 25*(2), 26–37.

Vangilder, C., Amlung, S., Harrison, P., & Meyer, S. (2009). Results of the 2008–2009 International Pressure Ulcer Prevalence™ survey and a 3-year, acute care, unit-specific analysis. *Ostomy Wound Management, 55*(11), 39–45.

Vehovar, V., Batagelj, Z., Lozar Manfreda, K., & Zaletel, M. (2002). Nonresponse in web surveys. In R. M. Groves, D. A. Dillman, J. L. Eltinge, & R. J. A. Little (Eds.). *Survey Nonresponse*. (pp. 229–242). New York, NY: John Wiley.

Veterans' Affairs Office of Nursing Services. (2009). *Office of Nursing Services (ONS) Annual Report 2009. VA nursing: connecting all the pieces of the puzzle to transform care for veterans*. Retrieved from http://www.va.gov/NURSING/docs/OfficeofNursingServices-ONS_Annual_Report_2009-WEB.pdf.

Wagner, D., & Bear, M. (2009). Patient satisfaction with nursing care: a concept analysis within a nursing framework. *Journal of Advanced Nursing, 65*(3), 692–701.

Wakefield, B. J., Mentes, J., Holman, J. E., & Culp, K. (2009). Postadmission dehydration: risk factors, indicators, and outcomes. *Rehabilitation Nursing, 34*(5), 209–216.

Walker, L. O. & Avant, K. C. (2005). *Strategies for theory construction in nursing*. (4th ed.). Upper Saddle River, NJ: Pearson Prentice Hall.

Walker, L. O., & Avant, K. C. (2011). *Strategies for theory construction in nursing*. (5th ed.). Upper Saddle River, NJ: Prentice Hall.

Weaver, K., & Mitcham, C. (2008). Nursing concept analysis in North America: State of the art. *Nursing Philosophy, 9*(3), 180–194.

Wells, C., Kolt, G. S., Marshall, P., & Bialocerkowski, A. (2014). The definition and application of Pilates exercise to treat people with chronic low back pain: A Delphi survey of Australian physical therapists. *Physical Therapy, 94*(6), 792–805.

Welton, J. M. (2008). Implications of Medicare reimbursement changes related to inpatient nursing care quality. *Journal of Nursing Administration, 38*(7/8), 325–330.

West, E., Barron, D. N., Harrison, D., Rafferty, A. M., Rowan, K., & Sanderson, C. (2014). Nurse staffing, medical staffing and mortality in Intensive Care: an observational study. *International Journal of Nursing Studies, 51*(5), 781–794.

Western Health. (2013). *Western Health annual report 2011–2012*. Retrieved from http://www.westernhealth.org.au/AboutUs/CorporatePublications/Documents/AnnualReport/WH_Annual_Report_2011-2012.pdf.

Whitman, G. R., Davidson, L. J., Rudy, E. B., & Wolf, G. A. (2001). Developing a multi-institutional nursing report card. *Journal of Nursing Administration, 31*(2), 78–84.

Whitman, G. R., Kim, Y., Davidson, L. J., Wolf, G. A., & Wang, S. L. (2002). Measuring nurse-sensitive patient outcomes across specialty units. *Outcomes Management, 6*(4), 152–158.

Williams, A. M., & Kristjanson, L. J. (2009). Emotional care experienced by hospitalised patients: Development and testing of a measurement instrument. *Journal of Clinical Nursing, 18*(7), 1069–1077.

Williams, B., Brown, T., & Onsman, A. (2012). Exploratory factor analysis: A five-step guide for novices. *Australasian Journal of Paramedicine, 8*(3). Retrieved from http://ro.ecu.edu.au/jephc/vol8/iss3/1.

Wilson, J. (1963). *Thinking with concepts*. Cambridge, United Kingdom: Cambridge University Press. Retrieved from http://books.google.com.au/books?hl=en&lr=&id=qmaYm1-XqpAC&oi=fnd&pg=PR7&dq=thinking+with+concepts&ots=oMfwL84LYJ&sig=1oJAlIOGLVj1wAAvSFWyuMkyCO0#v=onepage&q=thinking%20with%20concepts&f=false.

Wilson, S., Hauck, Y., Bremner, A., & Finn, J. (2012). Quality nursing care in Australian paediatric hospitals: A Delphi approach to identifying indicators. *Journal of Clinical Nursing, 21*(11/12), 1594–1605.

Wollersheim, H., Hermens, R. P. M. G., Hulscher, M. E. J. L., Braspenning, J., Ouwens, M. M. T. J., Schouten, J., ... Grol, R. P. T. M. (2007). Clinical indicators: Development and applications. *Netherlands Journal of Medicine, 65*(1), 15–22.

World Health Organization. (2013). *WHO nursing and midwifery progress report 2008–2012*. Retreived from http://www.who.int/hrh/nursing_midwifery/NursingMidwiferyProgressReport.pdf.

Wright, S. G. (2007). Developing nursing: The contribution to quality. *International Journal of Health Care Quality Assurance, 20*(1), 53–60.

Xu, X., Lu, S., Burton, T., & Heslop, L. (2011). Limitations of hospital ward quality monitoring reporting in Australia: A discussion paper. *Electronic Journal of Health Informatics, 6*(3), e21. Retreived from http://www.ejhi.net/ojs/index.php/ejhi/article/view/172.

Xyrichis, A., & Ream, E. (2008). Teamwork: a concept analysis. *Journal of Advanced Nursing, 61*(2), 232–241.

Yamagishi, M., Kanda, K., & Takemura, Y. (2003). Methods developed to elucidate nursing related adverse events in Japan. *Journal of Nursing Management, 11*(3), 168–176.

Yu, S., & Kim, T. G. (2013). Evaluation of nurse staffing levels and outcomes under the government-recommended staffing levels in Korea. *Journal of Nursing Management*. doi: 10.1111/jonm.12155.

Zelauskas, B., & Howes, D. G. (1992). The effects of implementing a professional practice model. *Journal of Nursing Administration, 22*(7/8), 18–23.

APPENDICES

Appendix 1 Nursing-sensitive Indicators Questionnaire

Nursing sensitive indicators questionnaire

(NB: This is a word form and the format is different with formal one in Qualtrics survey software)

Instructions

- **You must answer each question before moving to the next.**
- **You may go back to a previous page and revise your responses at any time by clicking the "Back" button.**
- **The survey should be completed by 19 December, 2012.**
- **For question 1 to question 11, please answer each question by clicking one of the options. Choose ONE answer which most closely fits with your experience.**
- **For question 12, please type words in the spaces provided.**
- **This survey has been sent via nurse global email on 19 October 2012.**
- **Below is the survey link for your completion of online survey. You can copy this link, and then paste it into your website browser.**

http://vuhes.us.qualtrics.com/SE/?SID=SV_2gJDQzeoIlFRpqd

Q1 What is your gender?

- ❍ Male
- ❍ Female

Q2 What is your age?

- ❍ 20 Years or less
- ❍ 21~30 Years
- ❍ 31~40 Years
- ❍ 41~50 Years
- ❍ 51 Years or more

Q3 How long have you been working as a nurse?

- ❍ 10 Years or less
- ❍ 11~20 Years
- ❍ 21~ 30 Years
- ❍ 31 Years or more

Q4 How long have you been employed at Western Health?

- ❍ 1 year or less
- ❍ 2~5 years
- ❍ 6~15 Years
- ❍ 16~25 years
- ❍ 26 years or more

Q5 What is your employment status?

- ❍ Full Time
- ❍ Part Time
- ❍ Bank
- ❍ Graduate nurse program
- ❍ Agency
- ❍ Other, please specify _____

Q6 Are you a (n)?

- ❍ Enrolled nurse
- ❍ Registered nurse
- ❍ Midwife
- ❍ Clinical nurse specialist
- ❍ Clinical nurse educator
- ❍ Clinical nurse consultant
- ❍ Associate or nursing unit manager
- ❍ Other, please specify _____

Q7 What is your MAIN area of practice?

- ❍ Medical and surgical services
- ❍ Emergency care
- ❍ Intensive care
- ❍ Maternity services
- ❍ Pediatrics
- ❍ Sub-acute care
- ❍ Specialist ambulatory clinics
- ❍ Aged care
- ❍ Other, please specify _____

Q8 What is the level of highest qualification you have completed?

- ❍ Hospital certificate
- ❍ Diploma
- ❍ Bachelor degree
- ❍ Bachelor honours degree/ Graduate certificate/ Graduate diploma
- ❍ Master degree
- ❍ Doctoral degree

Q9 Do you wish to be included in the draw of gift cards?

- ❍ Yes
- ❍ No

Q10 If you wish to be included in the draw of gift cards, please provide your email address:

Q11 Based on your experience, to what extent do you agree or disagree that the indicator listed in left hand column is a measure to monitor and report the quality of nursing care?

Nursing care is the care you provide to individuals, families, and communities so they may attain, maintain, or recover optimal health and quality of life from conception to death.

	Strongly Disagree	Disagree	Somewhat Disagree	Neutral	Somewhat Agree	Agree	Strongly Agree
1 Nursing staff education Highest educational qualification a nurse achieved							
2 Nursing staff experience Years of work experience of the nurse							
3 Nursing skill mix Proportion of RN, EN, and non-RN/EN hours in care hours							
4 Nursing staff mix Proportion of RN, EN, or unlicensed workers in nursing staff							
5 Ratio of total nursing staff to patients Number of total nursing staff (expressed in full-time equivalents) to patients							
6 Total nursing care hours per patient day Total number of hours of direct care provided by all nursing staff per patient day							

	Strongly Disagree	Disagree	Somewhat Disagree	Neutral	Somewhat Agree	Agree	Strongly Agree
7 Adequate facilities and budget for quality of care Adequacy of facilities and budget in the hospital to support the quality of nursing care, e.g., information system, equipment, quality assurance program							
8 Relationship/communication with collaborative practitioners Working relationships between nurses and other members of the health care team							
9 Ability and leadership of nursing executives (e.g. a nurse manager is supportive of nurses)							
10 Opportunities for nursing career development (e.g. education and training program for nursing career development)							
11 Opportunities for nurse participation in hospital activities (e.g. participation in practice and policy committees of the hospital)							
12 Assessment of patient care requirement Nurses assess and monitor patient requirements and use this information to develop and implement therapeutic care							

	Strongly Disagree	Disagree	Somewhat Disagree	Neutral	Somewhat Agree	Agree	Strongly Agree
13 Management and implementation of nursing interventions Extent to which nurses manage and implement all interventions patients need, such as therapeutic nursing care, counseling, health education and health promotion/protection, in an accurate and timely manner **14 Development of the nursing care plan** Extent to which nurses base their actions on a comprehensive and individualized written plan of care that identifies the specific interventions to reduce or eliminate the patient problems **15 Documentation of nursing diagnosis, therapeutic objective, and care given** Extent to which nurses provide written documentation of the intervention they provided to achieve specific patient outcomes related to nursing diagnosis identified in the nursing care plan **16 Nurse satisfaction** Level of job satisfaction expressed by nurses **17 Nurse injury rate** Rate at which nurses incur physical injuries related to nursing care, e.g., nursing needle-stick injuries							

	Strongly Disagree	Disagree	Somewhat Disagree	Neutral	Somewhat Agree	Agree	Strongly Agree
18 Nurse turnover Percentage of voluntary departures in total number of full-time and part-time employees in unit per month **19 Patient turnover** Sum of admissions, discharges, and transfers of the patient divided by bed numbers during the course of the hospitalization **20 Patient acuity** Level of severity of patients' illness **21 Hospital acquired pressure ulcer rate** Rate at which patients experience skin breakdown (stages I–IV) originating in the hospital **22 Nosocomial infection rate (total)** Rate at which patients experience infection (all sites) originating in the hospital							

	Strongly Disagree	Disagree	Somewhat Disagree	Neutral	Somewhat Agree	Agree	Strongly Agree
23 Nosocomial urinary tract infection rate Rate at which catheterized patients experience urinary tract infection originating in the hospital							
24 Falls rate& fall with injury rate Rate at which patients experience an unplanned fall or incur physical injuries due to falls during the course of their hospitalization							
25 Nosocomial pneumonia rate Rate at which patients develop inflammation of the lungs with exudation and consolidation during the course of their hospitalization							
26 Restraint rate Rate at which patients are physically restrained (by any methods that restricts freedom of movement, physical activity, or normal access to his or her body)							
27 Vein puncture complication rate Rate at which patients receive complications related to the act of vein puncture							
28 Hospital-acquired sepsis rate Rate at which patients develop sepsis during the course of their hospitalization							

	Strongly Disagree	Disagree	Somewhat Disagree	Neutral	Somewhat Agree	Agree	Strongly Agree
29 Gastrointestinal bleeding rate Rate at which patients experience gastrointestinal hemorrhage during the course of their hospitalization							
30 Medication administration error rate Rate at which nurses deviate from the medication prescribed by the physician; error committed during administration							
31 Shock/cardiac arrest rate Rate at which patients experience shock or cardiac arrest during the course of their hospitalization							
32 Length of stay Duration of inpatient hospital stay (in days)							
33 Mortality rate Rate at which patients die during the course of their hospitalization							
34 Failure to rescue rate Rate of death among patients with treatable serious complications acquired in hospitals							

	Strongly Disagree	Disagree	Somewhat Disagree	Neutral	Somewhat Agree	Agree	Strongly Agree
35 Unplanned readmission rate Rate at which patients return to the hospital for unplanned care related to the same diagnosis **36 Unplanned emergency department visits post-discharge** Rate at which patients visit the emergency room for preventable complications related to a previous hospital stay **37 Unplanned physician visits post-discharge** Rate at which patients visit physician without planning for preventable complication related to a previous hospital stay **38 Patient knowledge of condition and treatment** Patients possess the knowledge and skills necessary to care for themselves following discharge **39 Patient/family satisfaction with nursing care** Patients' or families' opinions about the care received from nursing staff							

	Strongly Disagree	Disagree	Somewhat Disagree	Neutral	Somewhat Agree	Agree	Strongly Agree
40 Patient /family complaint rate Rate at which patients complain about the nursing care received							

Q12 In your current work, what nursing sensitive indicators listed in previous table do you receive?

Appendix 2 Invitation Email

Dear Nurse and Midwife Colleague,

This email is a formal invitation for you to participate in the **nursing sensitive indicators survey**.

Nursing sensitive indicators are key measures that demonstrate the contribution nurses make to patient care.

We would greatly appreciate your participation and feedback. As a way of saying "thank you", you are invited to participate in a draw to win one of thirty supermarket gift cards valued at $20 each.

This survey is entirely confidential. It will only take 10 - 15 minutes to complete. The data will be aggregated and only be used in research about nursing sensitive indicators.

To begin the survey, please click on the following anonymous survey link:

http://vuhes.us.qualtrics.com/SE/?SID=SV_06xsU0ADBUTSC7G

If you cannot open it, you can copy this link, and then paste it into your website browser.

Thanks in advance for your participation.

Yours sincerely,

Xiaoquan Xu

Appendix 3 Poster

Nursing Sensitive Indicators Survey

Dear Nurses and Midwives – please participate in a survey that has been sent via nurse global email on 19 October 2012

It only takes 10 minutes!

Chance to win one of 30 gift cards valued at $20

WHAT ARE NURSING SENSITIVE INDICATORS?

Nursing sensitive indicators are a group of indicators that reflect and demonstrate nursing care quality

WHAT WILL YOU BE ASKED TO DO?

Spend approximately 10-15 minutes to complete an online questionnaire

WHAT WILL YOU GAIN FROM THE PARTICIPATION?

- Have a chance to express your view on nursing sensitive indicators directly related to your work
- Provide valuable survey information about nursing quality improvement
- Have a chance to win the gift card

WHY ARE WE CONDUCTING THIS SURVEY?

- Nursing sensitive Indicators measure nursing care quality
- In Australia, information provided to nurses about nursing sensitive indicators is lacking
- Your opinions are crucial for the development of nursing sensitive indicators

VICTORIA UNIVERSITY
MELBOURNE AUSTRALIA

Contact Information:
Associate Professor Liza Heslop
Western Center for Health Research and Education (WCHRE)
Phone 61 3 8395 8142
Email: liza.heslop@vu.edu.au

Western Health

Appendix 4 Information for Participants

Information for participants

(NB: This is a word form and the format is different with formal one in Qualtrics survey software)

You are invited to participate

You are invited to participate in a research project titled "Nursing Sensitive Indicators Survey". This project is being conducted by student researcher Xiaoquan Xu as part of PhD study at Victoria University under the supervision of Associate Professor Liza Heslop and Dr. Lucy Lu from Victoria University, Western Centre for Health Research and Education (CHRE), Sunshine Hospital.

Project explanation

Nursing sensitive indicators, such as nursing skill mix, fall and hospital acquired pressure ulcers rate, can be used to reflect and demonstrate nursing care quality. Nursing sensitive indicators are key tools to identify the nursing contribution to patient care. They also guide the promotion of quality and safe care to patients.

In Australia, national nursing sensitive indicators have not been agreed upon; nurses often don't receive nursing sensitive indicator data which directly demonstrates their contribution to the patients. It is essential that the development of nursing sensitive indicators occurs in Australia.

As direct patient care providers, your opinions are crucial for understanding the importance you place on nursing sensitive indicators. An online survey aims to seek your opinions about nursing sensitive indicators.

What will you be asked to do?

You will only need to spend approximately 10~15 minutes to complete the online survey.

You will be asked to provide information about gender, age, work experience, education level and employment status. Then you will be invited to indicate your opinions about nursing sensitive indicators on a scale. Finally, a question about the nursing sensitive indicators you receive in your everyday practice needs your responses.

What will you gain from participating?

This survey provides an opportunity for you to express your views. It will ascertain your preferences for nursing sensitive indicators.

Your input will help us understand what nursing sensitive measures are directly related to your practice.

Draw of gift cards

You have a chance to win a supermarket gift card valued at $20. There will be 30 gift cards in the draw so your chances of success are very good.

You will be asked to provide your email address if you wish to be included in the draw.

How will the information you give be used?

The information that you provide will be described in statistics form. The findings of this research will mainly be documented in the student researcher's thesis submitted to Victoria University as a requirement of the doctoral program. The findings will be published, also, in academic journals and presented at conferences. A summary of the outcomes will be presented at a forum at Sunshine hospital in 2013 and you will be invited to attend.

What are the potential risks of participating in this project?

There are virtually no risks, side effects or discomforts associated with your participation in this survey. The survey is entirely voluntary; you are free to discontinue participation in the survey at any time. In addition, the survey is entirely confidential; your name will not appear in any reports or publications. Only the three members of research team have access to the survey data via a specific username and password. The data only will be used in the research work of nursing sensitive indicators. The data will be disposed by deletion of the questionnaire stored in an electronic account. Your participation in the survey will not affect your relationship with your employer in any way.

How will this project be conducted?

The survey will be conducted with all nursing staff employed at Western Health. An online questionnaire will be used to collect your opinions.

Who is conducting the study?

The research team includes two chief investigators (Associate Professor Liza Heslop, and Dr Lucy Lu), a co- investigator (Mrs Wendy Calder) and student researcher (Xiaoquan Xu).

Any queries about your participation in this project may be directed to the Chief Investigator on 61 3 8395 8142.

If you have any queries or complaints about the way you have been treated, you may contact the Research Ethics and Biosafety Manager, Victoria University Human Research Ethics Committee, Victoria University, PO Box 14428, Melbourne, VIC, 8001 or phone (03) 9919 4148.

Many thanks for taking the time to complete the questionnaire.

Appendix 5 Consent Form

Consent form

I have read the explanatory information related to the Nursing Sensitive Indicators Survey above. I understand the general aims of this survey and what is involved for me to complete it.

I understand that any scientific communication arising from the Nursing Sensitive Indicators Survey results will not contain any of my personal details, such as my email address. I understand that my name will not be associated with any published survey results.

I understand that my personal opinions about Nursing Sensitive Indicators Survey will not be passed on to any third parties.

I understand that I can withdraw from this survey at any time.

I give consent to Associate Professor Liza Heslop, Dr Lucy Lu, Mrs Wendy Calder and Ms Xiaoquan Xu to use my Nursing Sensitive Indicators Survey information for academic research.

- ❍ Agree
- ❍ Disagree

Appendix 6 Reminder Email

Dear Nurse and Midwife Colleague,

Just a courtesy reminder—please don't forget to voice your opinions on the **nursing sensitive indicators survey** which was previously sent on the 19th October 2012.

The survey will be closing in **two weeks.**

If you complete the survey, you will have the chance to win one of 30 supermarket gift cards valued at $20 each.

Your input is very important to help us understand the nursing sensitive indicators that you regard as important to measure nursing care quality.

If you have already completed the survey – thank you and please disregard this email.

If you still want to participate in the survey, please click on the following anonymous survey link.

http://vuhes.us.qualtrics.com/SE/?SID=SV_2gJDQzeoIlFRpqd

Many thanks for your assistance

Yours sincerely
Xiaoquan Xu

Appendix 7 Ethics Approval from Victoria University

MEMO

TO	Assoc Prof, Dr Liza Heslop Faculty of Health, Engineering and Science Victoria University	DATE	14/6/2012
FROM	A/Professor Liza Heslop Chair Health Engineering and Science Human Research Ethics Committee		
SUBJEC	Ethics Application – HRETH 12/157		

Dear Assoc Prof Heslop,

Thank you for submitting this application for ethical approval of the project entitled:

HRETH 12/157– Nursing Sensitive Indicators Survey

Comment
The Committee wished to commend the investigators on the thorough nature of the application, noting that it was well written and all requirements were accounted for.

The proposed research project has been accepted and deemed to meet the requirements of the National Health and Medical Research Council (NHMRC) 'National Statement on Ethical Conduct in Human Research (2007)' by the Chair of the Health Engineering and Science Human Research Ethics Committee. Approval has been granted from **14 June 2012 to 14 June 2014.**

Continued approval of this research project by the Health Engineering and Science Human Research Ethics Committee (HES HREC) is conditional upon the provision of a report within 12 months of the above approval date (**14 June 2013**) or upon the completion of the project (if earlier). A report proforma may be downloaded from the VUHREC web site at: http://research.vu.edu.au/hrec.php.

Please note that the Human Research Ethics Committee must be informed of the following: any changes to the approved research protocol, project timelines, any serious events or adverse and/or unforeseen events that may affect continued ethical acceptability of the project. In these unlikely events, researchers must immediately cease all data collection until the Committee has approved the changes. Researchers are also reminded of the need to notify the approving HREC of changes to personnel in research projects via a request for a minor amendment. It should also be noted that it is the Chief Investigators' responsibility to ensure the research project is conducted in line with the recommendations outlined in the National Health and Medical Research Council (NHMRC) 'National Statement on Ethical Conduct in Human Research (2007).'

On behalf of the Committee, I wish you all the best for the conduct of the project.

Kind regards,

A/Professor Liza Heslop
Chair
Health Engineering and Science Human Research Ethics Committee

Appendix 8 Ethics Approval from Western Health

Western HEALTH
Office for Research
3rd Floor, Western Centre for Health Research and Education Sunshine Hospital
Furlong Rd. St Albans VIC 3021
Tel. +61 3 895 8074
Fax. +61 3 895 8259
ABN 61 166 735 672

APPROVAL TO CONDUCT A RESEARCH PROJECT AT WESTERN HEALTH
SITE SPECIFIC ASSESSMENT (SSA) AUTHORISATION

13 September 2012
A/Professor Liza Heslop
Faculty of Health,
Engineering and Science
Victoria University

Dear A/Professor Heslop,
VU- HREC Reference Number: HRETH 12/157

Project Title: Nursing Sensitive Indicators Survey
HREC Approval Date: 14 June 2012

SSA Approval Date: 17 August 2012
Site(s) Approved: All Western Health Campuses

I am pleased to advise that the above project is approved to be conducted at Western Health. This approval is subject to compliance with any conditions imposed by the reviewing HREC.

Table 1

Document	*Version*	*Date*
Ethics Application Form		
VU – HREC Approval Letter		14 June 2012
Appendix 1 - Questionnaire		
Appendix 2 - Invitation email		
Appendix 3 - Poster		
Appendix 4 - Information for Participants		
Appendix 5 - Consent Form		
Appendix 6 - Reminder Email		
Letter of Support for Project from Wendy Davis		02 July 2012

You are required to notify the Office for Research of:

1. The actual start date of the project at Western Health.

2. Any amendments to the project after these have been approved by the reviewing HREC.
3. Any adverse events or unforeseen events that require reporting to the reviewing HREC and involve Western Health Participants.
4. Any changes to the indemnity, insurance arrangements or Clinical Trial Research Agreement for this project. This includes changes to the project budget or other changes
which may have financial or other resource implications for Western Health.
5. Your inability to continue as Principal Investigator or any other change in research personnel involved in the project.
6. Any other matters which may impact the conduct of the project at Western Health.

You are also required to submit to the Office for Research:

1. An Annual Progress Report every 12 months for the duration of the project. This report is due on the anniversary of HREC approval. Ongoing approval for the project is contingent upon receipt of this report.
2. A comprehensive Final Report upon completion of the project.

The Office for Research may conduct an audit of the project at any time.

The Office for Research Western Health wishes you and your colleagues every success in your research.

Yours sincerely,

Dr Tam C. Nguyen PhD

Manager,
Office for Research –Western Health
Tam.Nguyen@wh.org.au