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Evaluation of quality of paper-based versus electronic nursing documentation in Australian residential aged care homes

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School of Information Systems and Technology, Faculty of Informatics

EVALUATION OF QUALITY OF PAPER-BASED VERSUS ELECTRONIC NURSING DOCUMENTATION IN AUSTRALIAN RESIDENTIAL AGED CARE HOMES

Ning Wang

"This thesis is presented as part of the requirements for the award of the Degree of Doctor of Philosophy of the University of Wollongong"

August 2012
CERTIFICATION

I, Ning Wang, declare that this thesis, submitted in fulfilment of the requirements for the award of Doctor of Philosophy, in the School of Information Systems and Technology, University of Wollongong, is entirely my own work unless otherwise referenced or acknowledged. This document has not been submitted for qualifications at any other academic institution.

Ning Wang

July 2012
ABSTRACT

Nursing documentation, a major clinical information source in Australian residential aged care, plays a significant role in the management and delivery of care services. In addition to its importance in supporting effective communication between different care team members, high quality nursing documentation is essential to meet accreditation, funding and quality improvement requirements. Electronic nursing documentation systems were implemented in several aged care organisations in an attempt to improve documentation efficiency and utility of data. The effect of the systems on the overall quality of nursing documentation is yet to be validated. In addition, although documentation practice in the aged care sector is generally shaped by legislative requirements, it is unclear how nursing documentation is managed and conducted in reality in different organisations. To our knowledge, limited studies have been conducted in this area internationally and no study has been conducted in Australia. To fill this knowledge gap, this study investigated nursing documentation practices in several Australian residential aged care organisations and compared the quality of nursing documentation between paper-based and electronic documentation systems.

A nursing documentation evaluation framework was established by conducting a systematic literature review of documentation quality and its evaluation approaches and, based on this, developing a nursing documentation audit instrument. Three attributes of nursing documentation quality were identified in the review and addressed by the audit instrument. These are the structure and format, process and content of nursing documentation. The audit instrument addresses different components of nursing documentation in a resident record which follow the five steps of the nursing process model: assessment, problem/diagnosis, goal, intervention and evaluation.

Applying the audit instrument, four nursing documentation audit studies were conducted in nine residential aged care facilities belonging to three aged care organisations. The first study focused on the resident admission forms. The overall completeness and comprehensiveness rates varied significantly among different versions of forms and both rates were higher in the electronic than in the paper-based forms. A comparison was also made for common items, showing higher
completeness and comprehensiveness rates in the electronic forms than in their paper-based counterparts. A correlation analysis showed a negative association between the number of items in a form and its completeness rate, but a positive association between the number of items in a form and its comprehensiveness rate.

The second study addressed resident assessment forms. Varying practices of documentation of assessment were found among the three organisations. On average, the quantity of assessment forms was higher in the electronic than in the paper-based records. No improvement was found in the electronic systems in regard to the completeness and timeliness of nursing assessment documentation, but the comprehensiveness of assessment forms was increased in the electronic systems. There was a similar pattern of assessment documentation assigned to various defined assessment categories for both types of systems.

The third study assessed the quality of paper-based and electronic resident nursing care plans (NCPs). Free-text NCPs were found in two organisations and standardized NCPs were found in the other. Various terms were used to label the four sections of the NCPs. The amount of information used to describe a resident problem was higher in the electronic free-text than in the paper-based NCPs. An analysis at the level of each step of the nursing process showed a significant difference between the paper-based and electronic systems in the description of nursing diagnosis/problem in both free-text and standardized NCPs.

The final study compared the quality of documentation structure, format and process between the paper-based and electronic resident records. The results of assessment by 10 relevant questions in the instrument suggested a higher mean total score for each electronic than for each paper-based record.

This research revealed that the electronic documentation systems appear to generate better data than the paper-based systems in terms of documentation structure, format and process. The content of nursing documentation could be determined by complex underlying factors. To meet care, management and nursing development needs, electronic documentation systems need to be integrated seamlessly with other relevant factors to improve documentation practice and quality in residential aged care.
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LIST OF ABBREVIATIONS

ACFI - The Aged Care Funding Instrument
ACT - Australian Capital Territory
ADL - Activities of daily living
ECT - electroconvulsive therapy
EHR - Electronic health record
IQR - Interquartile range
ICN - International Council of Nursing
NCP – nursing care plan
ICNP - International Classification for Nursing Practice
IT - Information technologies
NANDA - North American Nursing Diagnosis Association
NIC - Nursing Interventions Classification
NOC - Nursing Outcomes Classifications
NNN – NANDA, NIC, NOC
QANDAC - Quality of Australian Nursing Documentation in Aged Care
Q-DIO - Quality of Diagnoses, Interventions and Outcomes
QOD - Quality of Nursing Diagnosis
RCS - Resident Classification Scale
SD – Standard deviation
SPSS - Statistical Package for the Social Sciences
VIPS - an acronym formed from the Swedish words for wellbeing, integrity, prevention and security
CHAPTER 1. OVERVIEW OF STUDY

1.1 Introduction
Australian aged care organisations are confronting a significant increase in demand for care from an ageing population with complex care needs and diverse preferences (Productivity Commission 2011). The organisations strive to deliver efficient and quality care services and their quality and safety standards are strictly monitored by the government as part of government funding and accreditation requirements. However, all this is hampered by a number of workforce issues such as staff shortages and lack of skilled workers in the aged care sector (Spoehr and Barnett 2008, National Health Workforce Taskforce 2009). Among the many strategies which are being employed to deal with these challenges, information technologies (IT) are believed to have the potential for productivity gains and increased quality of care (Oroviogoicoechea et al. 2008, Productivity Commission 2011). With such expectations, several Australian residential aged care organisations have implemented electronic nursing documentation systems in the past few years. There is a need, however, to evaluate the effectiveness of these electronic documentation systems in supporting aged care service delivery in order to understand if the potential has been realised.

In health care environments, information about clients is important because effective communication between different care team members is necessary for the coordination of care (Urquhart et al. 2009, Voutilainen et al. 2004, Wong 2009, Törnvall et al. 2009). Within residential aged care organisations in Australia, nursing documentation, as a major clinical information source, plays a significant role in the administration and operation of care services. It is also essential for meeting both funding and aged care accreditation requirements and for quality improvement purposes (Resnick et al. 2004).

Evaluation of an electronic nursing documentation system is primarily concerned with the quality of the documentation which the system produces. The system ‘should be judged by its ability to present reliable, relevant data to clinicians in a usable form, when and where needed’ (Powsner et al. 1998 p. 1619 cited in Oroviogoicoechea et al. 2008). This provides straightforward evidence reflecting how the documentation system is performing to support care delivery. For this reason, a nursing documentation audit study was conducted in three aged care organisations where electronic documentation systems had been implemented. In addition, documentation practice in the aged care sector is generally shaped by legislative...
requirements, but there is a lack of studies to reveal how nursing documentation is managed and conducted in reality in different organisations. Therefore, the aims of the study were to:

1. Describe nursing documentation practice in Australian aged care homes.

2. Evaluate and compare the quality of nursing documentation between paper-based and electronic documentation systems.

The quality of nursing documentation is a multi-dimensional concept (Kerr 2006). A systematic assessment of a set of attributes of nursing documentation quality was required to achieve the aims of this study. To our knowledge, inadequate attention has been paid on this field by international research and there have been no studies conducted in the aged care setting in Australia. This study attempted to fill the knowledge gap by presenting an overall picture of the quality of paper-based documentation compared with electronic nursing documentation.

Audits of nursing documentation have usually been concerned with the quality of the documentation itself rather than the quality of care. Well written nursing records may reflect good care planning and delivery, which is an essential step toward care quality assurance. However, deficiencies in nursing documentation may not necessarily reveal poor nursing care because information documented in the records may not accurately and adequately reflect the actual care provided (Ehrenberg and Ehnfors 2001, Björvell et al. 2000). Hence, the scope of this nursing documentation audit study is confined to the quality of paper-based and electronic documentation. No inference about nursing care quality is to be drawn from the results of such an audit.

Nursing documentation has been highly influenced by legal, management and professional issues (Oroviogoicoechea et al. 2008). It was suggested that effective nursing record systems can be as diverse as nursing practice itself (Urquhart et al. 2009). In such a complex context, the evaluation of the electronic systems needs to take into account the documentation practice of the study setting and the underlying factors influencing the practice.

This research is theoretically grounded on a systematic literature review which identified the attributes of nursing documentation quality and evaluation approaches. Nursing theory underpinning the documentation practice of the study setting was also applied in the study. The theoretical contribution of the study is the development of a nursing documentation audit instrument and detailed measurement approaches of documentation quality. This study used
the nursing documentation audit instrument and approaches to assessing the documentation quality of different components of residents’ nursing records, in both paper-based and electronic documentation systems.

1. 2 Background

1.2.1 Australian residential aged care

Residential aged care in Australia provides suitable accommodation and personal and/or nursing care to the frail or disabled who can no longer remain in their own homes. The care is offered at two levels: low care and high care. Low care includes accommodation and related services, such as laundry, meals and cleaning. It also provides personal care services such as assistance with the activities of daily living. In addition to the services offered by low care, high care also provides services such as nursing care, palliative care, other complex care, equipment to assist with mobility, medical management and therapy services. The aged care services are delivered by private, government and not-for-profit providers, which are approved by the government and whose major funding is provided by government subsidies. Not-for-profit and private organisations are the main providers, accounting for 60% and 29% of aged care homes, respectively (Australian Institute of Health and Welfare 2011, Australian Government Department of Health and Ageing 2009a).

1.2.2 Challenges for residential aged care services

The Australian population is ageing. The number of people aged 65-84 years was 2.4 million in 2007 and is projected to grow to 6.4 million by 2056. The number of people aged 85 years and over is expected to reach 1.7 million by 2056 (Australian Bureau of Statistics 2009). As a result, there is a high demand for aged care services. It is expected that the number of Australians receiving aged care services will increase by around 150 per cent over the next forty years (Australian Institute of Health and Welfare 2010, Productivity Commission 2011).

Aged care services are also expected to be needed in order to meet the complex care needs of clients due to the increasing prevalence of chronic diseases and dementia among older Australians. People aged 65 or over reported an average of 2.8 health conditions in 2003 (Productivity Commission 2011). Fifty-two per cent of the residents in aged care had a recorded diagnosis of dementia. More than 40% of the residents had other recorded health conditions including circulatory diseases and diseases of the musculoskeletal and connective
tissue (Australian Institute of Health and Welfare 2010, 2011). In addition to meeting these complex care needs, residential aged care services have to satisfy diverse preferences and expectations among their clients. For example, culturally relevant care is required by older people from specific ethnic backgrounds and Indigenous communities (Productivity Commission 2011).

In addition to high demand for aged care services, a number of workforce issues are faced by the residential aged care organisations. There is increased difficulty in recruiting qualified nurses and high staff turnover in the aged care sector. It has been estimated that a quarter of personal care workers and close to one in five nurses have to be replaced each year by their current employer (Department of Education, Employment and Workplace Relations 2011, Richardson and Martin 2004). This trend is continuing as the nursing workforce is ageing (Australian Bureau of Statistics 2005). In addition, a survey investigating workforce issues in a number of health care settings including aged care indicated that the nurses in aged care were more likely to perceive their workload and job stress as high and their skill mix as inadequate, although these issues existed across all of the settings (Hegney et al. 2006). It is obvious that these factors can limit the delivery of effective nursing care to the residents.

1.2.3 Australian aged care legislation and accreditation

Australian residential aged care services are strictly regulated by Commonwealth government legislation, the Aged Care Act 1997. The Act sets out a range of matters relating to the planning of services, the approval of service providers and care recipients, payment of subsidies and the responsibilities of service providers. The Act also contains sets of principles which outline the criteria to be met regarding these matters. Principles relevant to this study include The Quality of Care Principle, The Classification Principle and The Record Principle. These are related to the provision of quality care, funding and documentation in aged care (Australian Government Department of Health and Ageing 2008a).

As outlined in The Quality of Care Principle, residential aged care services must meet accreditation and quality improvement requirements. To obtain government subsidies, residential aged care organisations are closely assessed against, and must meet, the aged care accreditation standards (Aged Care Standards and Accreditation Agency Ltd 2012). The assessment is undertaken by the designated accreditation body, the Aged Care Standards and Accreditation Agency. The aged care accreditation standards outline a wide range of residents’ needs, from health and personal care and safety to a range of lifestyle matters.
including independence, privacy and dignity (Australian Government Department of Health and Ageing 2012).

1.2.4 Documentation in Australian residential aged care

In Australian residential aged care, documentation is required by law. The Record Principle of the Aged Care Act 1997 stipulates that an approved provider must keep records of assessments, appraisals for classification and classifications of care recipients, individual care plans for care recipients, medical records, progress notes and other clinical records.

From a nursing perspective, resident records in aged care settings function as a principal information source about the residents and their care. The nursing process model is the theoretical basis of nursing documentation (Daskein et al. 2009). Nursing documentation contained in the resident records supports care delivery by providing a communication platform for care team members to share information about the residents.

The importance of nursing documentation is also highlighted for accreditation purposes. Information presented in resident records can demonstrate whether services were provided in compliance with the standards. During the accreditation process, the aged care accreditation agency seeks evidence from the resident records to corroborate evidence from observations of practices and interviews with the residents, staff and others to judge whether a residential aged care home has provided care that is up to the defined standards (The Aged Care Standards and Accreditation Agency Ltd 2012, Australian Government Department of Health and Ageing 2009b).

The aged care funding requirements have always focused on nursing documentation through the use of funding tools - previously the Resident Classification Scale (RCS) and now the Aged Care Funding Instrument (ACFI) (Australian Government Department of Health and Ageing 2008b). The ACFI requires a significant amount of assessment documentation by nurses to record a resident’s care needs upon admission and during their stay in a nursing home. It includes a number of assessment tools to be completed in order for the relevant level of funding to be allocated for a resident (Australian Government Department of Health and Ageing 2009).

In pursuit of quality improvement in aged care services required by the Aged Care Act 1997, a quality management system is established in each aged care organisation with three
components: people, processes and documentation. The system is used as a tool to achieve expected outcomes through the interaction of the three components to enable the service to demonstrate that standards are being met (Australian Government Department of Health and Ageing 2004).

### 1.2.5 The research project

This study is a component of an Australia Research Council (ARC) industry linkage project in conjunction with five aged care organisations (LP0882430). The project is aimed at evaluating the success of the introduction of electronic nursing documentation systems in Australian residential aged care homes. It is undertaken by the Health Informatics Research Laboratory, eHealth Research Centre, School of Information Systems and Technology, Faculty of Informatics, University of Wollongong, Australia. The timeframe of the project is 2008 to 2011.

This specific study focused on the evaluation of the quality of paper-based versus electronic nursing documentation in participating aged care homes. Ethics approval for the study was obtained from the Human Research Ethics Committee of the University of Wollongong.

### 1.2.6 Study setting

The study was carried out in nine residential aged care homes belonging to three not-for-profit aged care organisations. The three aged care organisations are coded as Organisation 1, Organisation 2 and Organisation 3 in this study.

Organisation 1 is one of the Australia’s largest providers of retirement living and aged care services, with more than 29 retirement communities throughout Queensland and New South Wales. Two residential aged care homes participating in the study (coded as Homes A and B) are located on the Sunshine Coast, Queensland.

Organisation 2 is a medium sized aged care service provider in New South Wales. The organisation operates eight residential aged care homes mainly in the Illawarra region. Four homes (coded as Homes C, D, E and F) participated in the study.

Organisation 3 is the largest single provider of aged care services in New South Wales and the Australian Capital Territory (ACT). The organisation runs 84 residential aged care homes
with about 5,500 beds. Three residential aged care homes (coded as Homes G, H and I) participated in the study, all located in the Illawarra area.

The nine participating aged care homes included high care, low care and dementia care units with the number of beds per home ranging from 76 to 163.

1.2.7 Methods

The study was a retrospective nursing documentation audit study. It consisted of a set of individual studies which addressed various issues specific to the major components of the resident records. Each particular study addressed specific aims and objectives and used distinct audit indicators and approaches, which are presented in the respective chapters.

1.3 Thesis structure

This thesis consists of eight chapters. Following this overview of the study, Chapter 2 is a systematic literature review of the relevant previous studies. One of the outcomes of the review is the identification of the attributes of quality of nursing documentation. It also explores nursing documentation audit approaches. Key concepts about nursing documentation are explained. Problems with nursing documentation and the means to improve its quality are also presented. This chapter lays down the theoretical foundation for the development of evaluation approaches and the criteria for measuring the quality of nursing documentation in residential aged care homes. The systematic review has been published in the Journal of Advanced Nursing, so the chapter adopts the format of the paper.

Chapter 3 describes the development and testing of a nursing documentation audit instrument, in light of the evaluation approaches identified in the review and the nursing theory underpinning the documentation practice of the study setting. The audit instrument is structured with questions addressing different quality attributes of nursing documentation. These questions are listed in different sections of the instrument, corresponding to the components of documentation in a resident record, which follow the steps of the nursing process model. A number of components of resident records are studied using this instrument.

Chapter 4 presents a study that aims to explore documentation practice relating to the recording of residents’ background information in admission forms (referred to as ‘nursing history’ in the instrument). The study also aims to compare the quality of the admission forms between the paper-based and electronic documentation systems. Based on one question set up
in the instrument to address this component of the resident records (Is the resident’s nursing history complete?), the study further developed more specific measurement approaches. It initially derived the scope of information to be collected in practice by establishing a checklist, which contains all of the items from various versions of admission forms. In accordance with the full items in each version of the admissions forms and with the full items in the checklist, the extent to which each data item on the form is completed is investigated, namely the completeness and comprehensiveness rates. The association between the number of items in each form and its completeness and comprehensiveness rates is examined respectively. The format of this chapter follows that required by the International Journal of Medical Informatics because it is to be published in the journal.

Chapter 5 describes a study which aims to investigate documentation practice relating to nursing assessment, as well as to compare the quantity and quality of nursing assessment forms between the paper-based and electronic documentation systems. The quality of the assessment forms is evaluated by three relevant questions in the instrument. These questions address the completion of items in admission and ongoing assessment forms and the timeliness of completion of the admission assessment forms in compliance with organisational requirements. Further, the study investigated the extent to which the documented paper-based and electronic admission assessment forms cover the care needs of the residents against the assessment domains defined in the accreditation standards. In addition, the frequency of documentation on each assessment domain was compared between the paper-based and electronic admission assessment forms.

Chapter 6 describes a study that aimed to explore the practices of documenting nursing care plans (NCPs) and to evaluate the quality of paper-based versus electronic NCPs. The format and terminologies of various NCPs are explored. The quantity of information recorded in each NCP is compared between the two types of documentation system. Sixteen relevant questions in the audit instrument are used to measure the quality of the NCPs in both systems. The study provides insight into the importance of nursing language in documentation systems for nursing professional development and practice.

Chapter 7 presents a study focusing on the general presentation of data in all types of resident records and the signing and dating of the records. The study applied 10 relevant questions in the last section of the audit instrument. The results of the study suggest whether resident data collected in the two types of the systems were clearly presented for effective communication.
Chapter 8 summarizes the main findings of the above studies. It also highlights the contribution of the research, the implications of the study for practice, information system design and nursing development. The thesis concludes by pointing out directions for future research.
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CHAPTER 2. QUALITY OF NURSING DOCUMENTATION AND APPROACHES TO ITS EVALUATION: A MIXED-METHOD SYSTEMATIC REVIEW

2.1 Abstract

Title. Quality of nursing documentation and approaches to its evaluation: a mixed-method systematic review

Aims. This review identifies and synthesizes nursing documentation audit studies, with emphasis on exploring auditing approaches, identifying audit instrument and describing the quality of nursing documentation.

Introduction. Quality nursing documentation promotes effective communication between caregivers, which facilitates continuity and individuality of care. The quality of nursing documentation has been measured using various audit instruments, which reflected variations in the perception of documentation quality among researchers across countries and settings.

Data Sources. Searches were made of seven electronic databases. The keywords “nursing documentation”, “audit”, “evaluation”, “quality”, both singly and in combination, were used to identify articles published in English between 2000 and 2010.

Review Methods. A mixed-method systematic review of quantitative and qualitative studies concerning nursing documentation audit and of reports of audit instrument development was undertaken. Relevant data were extracted and a narrative synthesis was conducted.

Results. Seventy-seven publications were included. The audit approaches used in the studies have focused on three natural dimensions of nursing documentation: structure or format, process and content. Numerous audit instruments were identified and their psychometric properties were described. The review also identifies flaws in nursing documentation and the effects of study interventions on its quality.

Conclusion. Research should pay more attention to the accuracy of nursing documentation, factors leading to variation in practice and flaws in documentation quality and the effects of these on nursing practice and patient outcomes, as well as the evaluation of quality measurement.

Key words: Systematic review, nursing documentation, quality, evaluation approaches, audit, instruments, quality criteria
2.2 Introduction
In modern health care organisations, the quality and coordination of care depend on communication between different caregivers about their patients. Documentation is a communication tool for exchange of information stored in records between nurses and other caregivers (Urquhart et al. 2009). Quality nursing documentation promotes structured, consistent and effective communication between caregivers and facilitates continuity and individuality of care and safety of patients (Voutilainen et al. 2004, Björvell et al. 2000).

Nursing documentation is defined as the record of nursing care that is planned and given to individual patients and clients by qualified nurses or by other caregivers under the direction of a qualified nurse (Urquhart et al. 2009). It attempts to show what happens in the nursing process and the basis of decision-making by presenting information about admission, nursing diagnoses, interventions, and evaluation of progress and outcomes (Nilsson and Willman 2000, Karkkainen and Eriksson 2003). In addition, nursing documentation can be used for other purposes such as quality assurance, legal purposes, health planning, allocation of resources, and nursing development and research. To achieve these purposes, nursing documentation needs to hold valid and reliable information and comply with established standards (Idvall and Ehrenberg 2002, Karkkainen and Eriksson 2003, Urquhart et al. 2009).

Nursing has been concerned with patient data since the early days of Nightingale (Hullin et al. 2008). It was advanced with the introduction of the nursing process into the clinical setting (Oroviogoicoechea et al. 2008). The nursing process as a structured problem-solving approach to nursing practice and education was first explained by Yura and Walsh in 1967. It originally comprised four phases: assessment, planning, implementation and evaluation of care and more recently has included nursing problem or diagnosis (Björvell et al. 2000). The nursing process model has been widely used as a theoretical basis for nursing practice and documentation.

Over the last few decades, more efforts have been made to advance nursing documentation to increase its usability. One of these initiatives was the development and use of research-based standardized nursing terminologies such as the International Classification of Nursing Practice (ICNP) and the International Nursing Diagnoses Classification (NANDA International). Standardized nursing language provides common definitions of nursing concepts and allows for theory-based and comparable data to emerge. Therefore, it promotes
shared understanding and continuity of care and makes it possible to use records for research and management purposes (Thoroddsen and Ehnfors 2007, Müller-Staub et al. 2007).

The introduction of electronic documentation systems into care practice has led to the transformation of nursing record-keeping. Electronic documentation systems can improve health professionals access to more complete, accurate, legible and up-to-date patient data (Oroviogoicoechea et al. 2008, Larrabee et al. 2001), even though their effects on patient outcomes are inconclusive (Urquhart et al. 2009). With the widespread use of information technologies (IT) in nursing practice, standardized nursing language becomes essential because a uniform and controlled vocabulary enables electronic documentation systems to aggregate data (Müller-Staub et al. 2008(b), Ehrenberg et al. 2001).

Despite wide recognition of the importance of quality nursing documentation and efforts made to enhance it, there may be inconsistencies in the definition of good nursing documentation due to variations in nursing documentation practice based on different local requirements, documentation systems and terminologies across countries and settings. In research settings, the quality of nursing documentation was assessed by various auditing instruments with different criteria reflecting how quality was perceived by the researchers. The systematic review presented in this paper of nursing documentation audit studies on measurement standards and outcomes helps to recognize issues with quality of nursing documentation and to establish an evidence-based nursing documentation quality measurement framework as a reference for future practice and research.

There have been several recent reviews of nursing documentation. A systematic review conducted by Saranto and Kinnunen (2009) covered 41 studies on evaluating nursing documentation and focused on research designs and methods, which were not limited to record audit. The review provided insights into several audit instruments and issues relating to documentation quality, but quality measures were not fully addressed. Other reviews of nursing documentation have had different focuses (Müller-Staub et al. 2006, Urquhart et al. 2009, Oroviogoicoechea et al. 2008, Jefferies et al. 2010). None has concentrated on overall measurement standards and outcomes of nursing documentation itself, though segmental relevant information was found. This review attempts to provide such information to fill the gap.
2.3 The review

2.3.1 Aim

This review identifies and synthesizes nursing documentation audit studies. The objectives of the review mainly include exploring nursing documentation auditing approaches, identifying audit instruments and their measurement criteria and describing issues with nursing documentation identified by auditing.

2.3.2 Design

A mixed-method systematic literature review was conducted, following the guidelines of the Centre for Reviews and Dissemination (2008).

2.3.3 Search methods

A search for relevant publications was mainly undertaken in November and December 2009 on seven electronic databases (CINAHL, the Cochrane Library, Health Reference Center, ProQuest - Nursing, Wiley InterScience, Medline 1996- and Nursing Resource Centre). The search terms “nursing documentation”, “nursing records”, “audit”, “evaluation” and “quality”, both singly and in combination, were used to identify articles. The search was restricted to articles published in English from 2000 to 2009. However, a new search for update evidence was carried out on August 2010. The following criteria were used in selecting papers:

Inclusion criteria:

- Publications of nursing documentation audit studies
- Reports on the development or testing of nursing documentation audit instruments
- Any type of nursing documentation system, either paper-based, electronic, terminologically standardized, or pre-formatted or structured
- Any component of nursing documentation such as nursing assessment forms, care plan and progress notes
- Audit studies conducted in any setting: hospital, aged care home and community etc.

Exclusion criteria:

- Papers not dealing with nursing documentation
• Review and contextual papers, editorials, letters and case studies
• Publications about nursing documentation requirements or guidelines
• Papers on issues of nursing documentation other than its quality, e.g., development of documentation systems, factors affecting the quality of documentation, and how to complete nursing documentation
• Papers on evaluating nursing documentation through surveys and interviews
• Papers concerning documentation of health professions other than nursing
• Duplicated papers on the same study

2.3.4 Search outcome

The titles and abstracts from the primary search were manually screened by the first author. Reference lists from good quality literature reviews were also scrutinized for relevant articles. Uncertain papers were checked by the third author to determine their relevance. Seventy-seven papers were finally included in the review following a screening process as shown in Figure 2-1.

Figure 2-1. Publication search process
2.3.5 Quality appraisal

As determining the methodological adequacy of studies was not essential for the purpose of the review, a formal quality assessment of review studies was not conducted; however some consideration was given to prioritizing studies for analysis according to the level of detail given on the audit instruments, and the relevance and significance of auditing approaches to nursing practice.

2.3.6 Data abstraction

Extracted data were placed in an Endnote file. These data included study aim, design, study intervention, country of origin, setting, sample size, documentation audit instrument, quality criteria, source of criteria, validation of instrument, approach of evaluation and key findings of the studies.

2.3.7 Synthesis

Given the purpose of the review, meta-analysis was neither appropriate nor feasible for data synthesis. The papers were grouped by the type of studies. A narrative synthesis of extracted data was undertaken using tables with emerging thematic headings.

2.4 Results

2.4.1 Characteristics of studies

The 77 eligible papers consisted of different types of studies carried out in various health care settings across 15 countries. The sample sizes ranged from 15 to 13,776 presented as the number of records, number of patients, number of documentation items and number of patient visits. Nursing documentation was audited for different purposes. These were either explicitly or indirectly stated by the authors primarily to address the quality of description of care or the quality of described care. Summarized information on the studies is shown in Table 2-1.

2.4.2 Approaches to nursing documentation audit

Nursing documentation was assessed by quantitative and qualitative content analysis methods, mostly with one or more formally defined instruments. Commonly, each nursing record was graded quantitatively using yes/no tick boxes or 3, 4, 5 and/or 6 point Likert scales. A few studies, however, used qualitative content analysis methods such as critical discourse analysis (Karlsen 2007), constant comparative analysis (Laitinen et al. 2010) and a
case-by-case approach to draw out themes from nursing records (Hegarty et al. 2005). Different auditing approaches were identified in the study instruments. These approaches were classified into three thematic categories, which reflected natural dimensions of nursing documentation: structure and format, process and content. In 47 studies, a single approach was used, while a mixture of approaches was applied in the remainder. Detailed quality criteria are presented in Table 2-2. Different types of auditing approaches are displayed in Table 2-3.

**Table 2-1. Summary of included publications (n=77)**

<table>
<thead>
<tr>
<th>Study type</th>
<th>Descriptive studies (45)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Analytic studies (25): pre-post intervention test (12), quasi-experimental studies (6), randomized controlled trials (3), cluster-randomized trial (1), prospective (1), stratified and randomized intervention study (1), prospective cohort study (1)</td>
<td></td>
</tr>
<tr>
<td>Instrument development and testing reports (7)</td>
<td></td>
</tr>
<tr>
<td>Countries of origin</td>
<td>Sweden (27), USA (11), Australia (8), Finland (8), Switzerland (4), Norway (4), UK (3), Germany (2), Canada (2), Iceland (2), Italy (1), Netherlands (2), Ireland (1), Rwanda (1), Denmark (1)</td>
</tr>
<tr>
<td>Study setting</td>
<td>Auditing studies: Hospital (51), long term care (7), primary care (6), community care (4), school health centre (1), mixture of hospital and nursing home (1)</td>
</tr>
<tr>
<td>Reports of instrument development and testing (7): six instruments were reported in the seven papers and were developed based on hospital settings.</td>
<td></td>
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</tbody>
</table>

**Approach concerning documentation format and structure**

The approach concerning the format or structure dealt with constructive or material features rather than the message of the data. It focused on physical presentations of the data such as the quantity of records, completeness, legibility, readability, redundancy, and the use of abbreviations. Twenty studies applied this approach.

**Approach concerning documentation process**

The process approach focused on procedural issues of capturing patient data such as signature, designation, date, timeliness, regularity of documentation and its accuracy to reality. The accuracy of documentation was measured by the concordance between different notes, or between documentation content and the results of patient assessment (Gunningberg and Ehrenberg 2004, Voyer et al. 2008), nurses’ self reports (Lamond 2000), interviews with
nurses and patients (Ekman and Ehrenberg 2002, Wong 2009) and observation of nurse performance (Marinis et al. 2010). The process approach was used in 23 studies.

\textit{Table 2-2. Quality criteria of nursing documentation}

<table>
<thead>
<tr>
<th>Category</th>
<th>Quality criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quality criteria of documentation structure and format</td>
<td>Completeness, quantity, legibility, appearance, plausibility, patient identification, abbreviations, correction of error, linguistic correctness (objective or factual language and scientific terms), chronological report of events, the colour of the ink, blank spaces and gaps within the text, documentation in a correct section, the phrases of recording, succinct and clear language, avoidance of use of jargon or technical terms</td>
</tr>
<tr>
<td>Quality criteria of documentation process</td>
<td>Signature, date, timeliness, chronological report of events, designation, regularity, accuracy in comparison with reality and accessibility</td>
</tr>
<tr>
<td>Comprehensiveness of description of care</td>
<td>Presence of specific types of documentation (e.g., nursing history and discharge note), presence of specific variables (e.g., patient’s background information, cause of admission, address of discharging unit), comprehensiveness of five phases of nursing process, scope of care (e.g., FHP), presence of information about specific care topics (e.g., teaching and learning of the patient, emotional and physical support of the patient or family, patient preference).</td>
</tr>
<tr>
<td>Appropriateness of description of care</td>
<td>Nursing assessment: Presence of specific assessment variables in relation to the problem according to guideline (e.g. grade, size and location and risk assessment for pressure ulcer), use of specific keywords defined in the system in relation to the problem concerned (e.g., pedagogically related assessment keywords defined in the VIPS model).</td>
</tr>
<tr>
<td></td>
<td>Nursing problem/diagnosis: Adequacy or accuracy of problem statement in accordance with NANDA standardised terminologies (e.g., PES format), the relevance within PES</td>
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<td></td>
<td>Goal: Being clear rather than abstract and vague</td>
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<td></td>
<td>Intervention: Presence of particular types of intervention in relation to the nursing problem according to guidelines (e.g., fluid intake, turning schedule for pressure ulcer), use of specific keywords defined in the system in relation to the nursing problem (e.g., intervention keyword of health promotion for school nursing programmed in the computer system), presence of NIC interventions</td>
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<td></td>
<td>Evaluation: Presence of NOC (nursing outcome classification) outcomes</td>
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<td></td>
<td>General: Internal relationship with five steps of nursing process</td>
</tr>
<tr>
<td>Reference</td>
<td>Instrument</td>
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<tr>
<td>Bergh 2007</td>
<td>ESCI*</td>
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<tr>
<td>Ehrenberg and Birgersson 2003</td>
<td>ESCI*</td>
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<td>Idvall and Ehrenberg 2002</td>
<td>ESCI*</td>
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<tr>
<td>Ehrenberg 2004</td>
<td>ESCI*</td>
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<td>Gunningberg and Ehrenberg 2004</td>
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<td>Gunningberg et al. 2009</td>
<td>EPUAP*</td>
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<td>Gjevjon and Hellesø 2010</td>
<td>Level one VIPS* categories</td>
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<td>Friberg et al. 2006</td>
<td>ESCI*</td>
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<tr>
<td>Björvell et al. 2000</td>
<td>Cat-ch-Ing instrument</td>
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<td>Aling 2006</td>
<td>Cat-ch-Ing instrument (modified)</td>
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<tr>
<td>Törnwall et al. 2009</td>
<td>Cat-ch-Ing instrument (part)</td>
</tr>
<tr>
<td>Durmer et al. 2006</td>
<td>Cat-ch-Ing instrument (modified)</td>
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<td>Reference</td>
<td>Instrument</td>
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<tr>
<td>Nilsson and Willman 2000</td>
<td>Cat-ch-ing instrument (part)</td>
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<tr>
<td>Rykkje 2009</td>
<td>NoGA instrument*</td>
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<td>Häyrimen et al. 2010</td>
<td>Modified Cat-ch-ing instrument</td>
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<tr>
<td>Florin et al. 2005</td>
<td>Cat-ch-ing instrument (part)</td>
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<td>Larsson et al. 2004</td>
<td>QOD instrument*</td>
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<td>Müller-Staub et al. 2009</td>
<td>Q-DIO instrument*</td>
</tr>
<tr>
<td>Müller-Staub et al. 2007</td>
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<td>Månsson et al. 2008b</td>
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<td>Ammenwerth et al. 2001</td>
<td>Checklist</td>
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<td>Cadd et al. 2000</td>
<td>Proforma</td>
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<tr>
<td>Considine et al. 2006</td>
<td>Standardized audit tool</td>
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<tr>
<td>Davis et al. 2000</td>
<td>HRQOL* model</td>
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<td>Dalton et al. 2001</td>
<td>Audit instrument</td>
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<tr>
<td>Daly et al. 2002</td>
<td>Standardized instruments</td>
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<tr>
<td>De Marinis et al. 2010</td>
<td>Checklists</td>
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<tr>
<td>Delaney et al. 2000</td>
<td>An auditing tool</td>
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<td>Dochterman et al. 2005</td>
<td>NIC* (250/514) interventions</td>
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<tr>
<td>Ehrenberg and Elmfors 2001</td>
<td>Record audit protocol</td>
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<tr>
<td>Eid et al. 2008</td>
<td>PDA/T*</td>
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<tr>
<td>Ehrenberg et al. 2001</td>
<td>Approaches derived from a literature review</td>
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<td>Ekman and Ehrenberg 2002</td>
<td>FIS*</td>
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<td>Gartlan et al. 2010</td>
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<td>Gebru et al. 2007</td>
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<td>Junttila et al. 2000</td>
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<td>Karkkainen and Eriksson 2005</td>
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<td>Lamon 2000</td>
<td>Coding scheme of MSA*</td>
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<td>Lunney 2006</td>
<td>NNN*</td>
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<tr>
<td>Lagerin et al. 2007</td>
<td>Checklist</td>
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<td>Luutinen et al. 2010</td>
<td>Strauss and Corbin’s paradigm model</td>
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<tr>
<td>Larrabee et al. 2001</td>
<td>NCPDCI*</td>
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<td>Mahler et al. 2007</td>
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<td>Mbabazj and Cassimier 2006</td>
<td>3- section quality measurement checklist</td>
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<td>Moul et al. 2004</td>
<td>EQIB*</td>
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<td>Paans et al. 2010a</td>
<td>D-Catch instrument</td>
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<td>Paans et al. 2010b</td>
<td>D-Catch instrument</td>
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<td>Reference</td>
<td>Instrument</td>
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<td>Souder and O’Sullivan 2000</td>
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<td>Thoroddsen and Ehnfors 2007</td>
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<td>Thoroddsen et al. 2010</td>
<td>Structured data collection tool</td>
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<td>Voyer et al. 2008</td>
<td>Chart review using series of measures</td>
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<td>Voutilainen et al. 2004</td>
<td>The Senior Monitor instrument</td>
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<tr>
<td>Wagner et al. 2008</td>
<td>FMAT*</td>
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<tr>
<td>Whyte 2005</td>
<td>Audit tool</td>
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<td>Wulf 2000</td>
<td>Audit form and score sheet</td>
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</tbody>
</table>

**Abbreviations*: CAM - Confusion Assessment Method; CHF - Chronic Heart Failure; EPUAP – The European Pressure Ulcer Assessment Advisory Panel data collection form; EQIP - The Ensuring Quality Information for Patient; ESCL - Ehnfors and Smedby’s comprehensiveness in recording instrument; FHP – Functional Health Patterns ; FIS - Fatigue Interview Schedule; FiCND: the Finnish Classification of Nursing Interventions (FiCNI); FiCNI: the Finnish Classification of Nursing Diagnoses; FMAT - The Falls Management Audit Tool; MSA - multidimensional scalogram analysis; NCPDCI - The Nursing Care Plan Data Collection Instrument; Q-DIO - Quality of Diagnosis, Intervention and Outcomes; NANDA – North America Nursing Diagnosis Association; NIC – Nursing Intervention Classification; NOC – Nursing Outcome Classification; NNN – NANDA Diagnosis, NIC and NOC; NoGA – not reported. PDAT - The Pain Documentation Audit tool; PES - problem, etiologies and signs and symptoms; PNDS – Perioperative Nursing Data Set; QOD - Quality of Nursing Diagnosis Instrument; RAPs - Resident Assessment Protocols; TWEEAM –not reported; VIPS - an acronym formed from the Swedish words for wellbeing, integrity, prevention and security.**
Approach concerning nursing documentation content

The content approach focused on the meaning of data about a care process. This approach was adopted in nearly all of the studies included, where the content of documentation was reviewed in general or specifically in relation to a range of focused care issues. When nursing care or nurses’ knowledge about care was concerned, the authors made judgments based on an underlying assumption that the information documented in the nursing records was complete and accurately reflected reality. Two quality aspects of documentation content were assessed in this approach: what the documentation recorded and how good it is.

• What has the documentation recorded?

This approach referred to the comprehensiveness of documentation content. It concerned the presence of data about a care process at a general level, without considering its logical connection to a particular care issue or the patient’s condition. Issues measured included whether documentation contained certain types of data such as nursing history, nursing status (Björvell et al. 2002, Gjevjon and Hellesø 2010), baseline data and a discharge summary (Mbabazi and Cassimjee 2006); whether documented nursing care was sufficient for the scope of care needs defined by the study, such as the Health-Related Quality of Life (HRQOL) model’s seven dimensions (Davis et al. 2000); and most commonly, whether information about the five steps of the nursing process was adequately documented (Ehrenberg and Birgersson 2003, Mahler et al. 2007, Thoroddsen et al. 2010, Häyrinen et al. 2010).

• How good is the nursing documentation content?

This approach addressed the appropriateness of nursing documentation or documented care at a level specific to a particular clinical care issue such as pressure ulcers (Gunningberg et al. 2009) or postoperative pain (Idvall and Ehrenberg 2002). Documentation content about each step of the nursing process was measured by seeking data specifically related to the clinical issue concerned: could the particular keywords be pre-formatted in a standardized
documentation system (Bergh et al. 2007), variables of clinical policies or guidelines (Considine and Potter 2006, Junttila et al. 2010, Gartlan et al. 2010) or standardized terminologies (Lunney 2006, Häyrinen et al. 2010). The structure and format of the diagnostic statement (PES format: problem, aetologies and signs and symptoms) and the internal linkage between the five phases of the nursing process (Florin et al. 2005, Müller-Staub et al. 2009, Paans et al. 2010b) were also covered by this approach.

**Nursing documentation audit instruments**

The majority of papers described the development or use of nursing documentation auditing instruments, which adopted part or all of the audit approaches described above. It was common that more than one instrument was used in a study. On the other hand, some instruments such as Ehnfors’ instrument (Bergh 2007), the Cat-ch-Ing instrument (Björvell et al. 2000) and the Q-DIO instrument (Müller-Staub et al. 2009) were used in a range of studies. Details about the instruments are summarized in Table 2-3.

**Validation of instruments**

Most of the studies reported the criteria generation for development of the instruments. Development was based primarily on the nursing process model, previous audit instruments, relevant local law and regulations, organizational policies and practice guidelines/protocols/models, focus group interviews with clinical experts, literature review, theoretical frameworks, existing documentation forms and standardized terminologies. The psychometric properties of the instruments were reported with different levels of details in 54 out of 77 publications (70%). The general results were as follows:

- **Content validity:** in 9 studies, content validity of the instruments was formally established (CVI > 0.80) with a group of experts using a consensus model and focus group approach (Müller-Staub et al. 2009). The number of experts ranged from 3 to 20.
• **Face validity**: three studies measured face validity by having experts review the instruments and judge their accuracy (Eid and Bucknall 2008, Lamond 2000, Muller-Staub et al. 2009).

• **Construct validity**: In a study of Paans et al. (2010a), construct validity was assessed on 245 records by explorative factor analysis with principal components and varimax rotation. In Lamond’s (2000) study, it was assessed by comparing information obtained in the study with measures identified from previous research to see the correspondence between their varieties of classification schemes. In Larson et al.’s (2004) study, factor analysis was performed by 20 auditors on 180 records using principal component analysis for extraction and the varimax orthogonal rotation of the instrument items to determine the interdependencies between observed variables.

• **External validity**: in the study by Gjevjon et al. (2010), external validity was strengthened by the auditor acquiring in-depth knowledge from reading, practising and testing the procedures before initiating the actual study.

• **Criterion-related validity**: three instruments were tested for their criterion-related validity using a second instrument having similar objectives to the one being tested to audit a proportion of sampled records (Moult et al. 2004, Björvell et al. 2000, Törnvall et al. 2004).

• **Internal consistency**: ten publications reported the estimation of internal consistency of the instruments. The resulting Cronbach’s Alpha was acceptable as mostly above 0.70.

• **Inter-rater reliability**: forty studies reported the inter-rater reliability of the instruments. This was evaluated by involving two to eight persons to audit the same records independently. One study reported that the inter-rater reliability of the instrument was ensured by using the same researchers (Considine et al. 2006). The number of records for estimation ranged from 4 to 310. About 10% of the total sample was used in eight studies. Inter-rater agreements ranged from 40% to 100%, most were more than 80%. Cohen’s kappa values were estimated from 0.37 to 1.0 with the majority more than 0.7. In three studies, the inter-rater reliability was
estimated by calculating the Spearman’s rank correlation coefficient and the values were 0.78 (p < 0.001) in Törnvall et al (2009) and 0.90-0.98 in Larson et al (2004). In addition, two studies have reported the use of a coding book or user manual and training for the auditors, which might help establish interrater reliability (Junntila et al. 2010, Thoroddsen et al. 2010).

- **Intra-rater reliability** was reported in five studies with varying degrees of agreement, from fair to very good (Müller-Staub et al. 2008a, Müller-Staub et al. 2007, Wagner et al. 2008, Hellesø 2006, Larson et al. 2004).

- Usability: the usability of the instrument was tested in the study by Björvell et al. (2000) by three nurses auditing five records in terms of understanding questions and the phrasing of the instrument. The instrument was revised after this process. In the study of Moult et al. (2004), the instrument was read by parents, volunteers and clinicians to test its usability.

### 2.4.3 Summary of study findings

The results of the nursing documentation audit can be summarized as: 1) issues of nursing documentation and study interventions and 2) their effects on nursing documentation.

**Issues of nursing documentation**

This review reveals many shortcomings in nursing documentation. One of the major issues was the lack of documentation concerning a series of nursing care topics. Many studies showed the predominance of documentation of a biomedical nature and insufficient recording of psychological, social, cultural and spiritual aspects of care (Altken et al. 2006, Törnvall et al. 2007, Gunhardsson et al. 2007, Hegarty et al. 2005, Gebru et al. 2007). There was also inadequate documentation about assessment of patient preferences and need for knowledge, previous health behaviour, general health perceptions and quality of life (Cadd et al. 2000, Davis et al. 2000, Laitinen et al. 2010). In addition, patient teaching was rarely evidenced in the records (Fribeg et al. 2006, Karkkainen and Eriksson 2003).
A number of studies showed inadequate documentation of the five phases of the nursing process (Bergh et al. 2007, Ehrenberg and Birgersson 2003, Gjevjon and Hellesø 2010). In regard to specific care issues, identified deficiencies included insufficient documentation of assessment and the rare use of an assessment tool for pain and cognitive impairment (Eid et al. 2008, Hare et al. 2008). Gaps were also found in documentation of assessment, treatment and prevention of pressure ulcers (Bååth et al. 2007, Gunningberg et al. 2000, Ehrenberg and Birgersson 2003), assessment of physical characteristics of wound, (Gartlan et al. 2010), specific assessment and interventions for older patients with chronic heart failure (Ehrenberg et al. 2004), nursing actions and evaluation for patients in palliative care (Gunhardsson et al. 2007), and assessment of mental ability and interventions to support independent functioning for patients with dementia (Voutilainen et al. 2004, Souder and O’Sullivan 2000). Additionally, some studies showed a lack of documentation of specific patient data such as vital signs, pupil reaction, and mental state, the diagnosis for hospitalization and electrocardiography ECT (electroconvulsive therapy) results.

Issues were found with the use of standardised nursing terminologies. Paans et al. (2010b) found inaccurate documentation of nursing diagnoses and interventions, despite use of nursing process-based documentation systems. These included lack of PES format with nursing diagnoses, outcome-oriented selection of nursing interventions and incoherence between steps of the nursing process. Junttila et al. (2010) identified deficiencies in the clinical usability of nursing diagnoses during the intra-operative phase of care. Use of various local diagnostic systems was shown in Karlsen’s (2007) study.

In relation to structure and process features of nursing documentation, problems included inconsistence in terminologies and timing of documentation (Wong 2009), abstract and unclear recording, inappropriate phrasing of statements (Karlsen 2007); and documenting under a wrong section (Hayrinen and Saranto 2009). Issues identified by Ammenwerth et al. (2001) included incomplete documentation and poor legibility with paper-based documentation and unspecific and overly lengthy care plans with electronic records. Importantly, poor concordance between record content and results from patient assessment, interviews with patients and nurses and observations of nurses’ performance (Lamond

**Study interventions and their effects on nursing documentation**

In 25 analytic studies, various study interventions were implemented and their effects were assessed. These interventions included: electronic health record systems (EHRs) (Ammenwerth et al. 2001, Mahler et al. 2007), standardized documentation systems such as the VIPS model (Darmer et al. 2006), a menu-driven incident reporting system (Wagner et al. 2008), standardized nursing languages (Müller-Staub et al. 2007), changing ward organization (Hansebo and Kihlgren 2004), nursing process model (Ehrenberg and Ehnfors 2001), ED (emergency department) nursing documentation standards (Considine et al. 2006), specific nursing care theories (Aling 2006, Karkkainen and Eriksson 2005), education on specific care issues such as post-operative pain (Dalton et al. 2001), and a mixture of some of these interventions.

Nursing documentation could be improved to some extent by the study interventions, as shown in most of the study results, though at times no effect or even some negative effects were reported. The implementation of EHRs integrated with standardized structure and language could improve the completeness of common mandatory fields (Hellesøn 2006), the comprehensiveness of documentation of the nursing process (Gunningberg et al. 2009, Larrabee et al. 2001, Daly et al. 2002, Darmer et al. 2006), the use of standardized language (Larrabee et al. 2001), and the recording of specific items regarding particular patient issues (Gunningberg et al. 2009). Improvement was also noted in the relevance of the message (Hellesøn 2006, Törnvall et al. 2009) and structure and process features of documentation such as dating, signing, abbreviations and symbols (Mahler et al. 2007, Rykkje 2006).

Education and organizational support for documentation of the nursing process and the use of standardized nursing languages could improve documentation. This helped nurses understand nursing process theory and improve clinical reasoning skills in conducting

Education was effective in Dalton et al’s (2001) study regarding documentation of acute postoperative pain management, but had no obvious effect in Gunningberg’s (2004) study about documentation of ulcer prevention. Considine et al. (2006) showed that a series of written ED standards augmented by an in-service education session could improve initial nursing assessment. Additionally, body mass index tables placed in examination rooms could encourage nurses to document BMI, thus leading to a statistically significant increase in the diagnosis of obesity (Lemay et al. 2004).

In regard to nursing theories, Karkkainen and Eriksson (2005) reported that introducing Eriksson’s caring theory to the clinical context could improve recording of patient experiences and health behaviour. Aling’s study (2006) showed that introducing five different nursing theories was associated with an increase in the documentation of nursing history and status upon patients’ arrival.

2.5 Discussion

This review was a cross-sectional survey of nursing documentation audit studies with different designs and study aims. A large number of publications were included. Its utility is to provide an overview of current measurement of nursing documentation, from which definitions, measurement approaches and issues of the quality of nursing documentation can be identified. In addition, the review identifies the means by which the quality of nursing documentation could be improved.

While conceptually comprehensive, one limitation of the review was the absence of a critical approach to the studies. The results of the review were briefly presented without describing many details in the original papers. There was no formal appraisal of study quality, so various types of potential bias were not assessed. The review also lacks a critique of nursing documentation audit approaches. The psychometric properties of the
audit instruments were generally presented without details about each individual item and without statistical significance data.

This review identifies a range of nursing documentation audit instruments. Four instruments were most commonly used in the studies: Ehnfors and Smedby’s comprehensiveness-in-recording instrument, the Cat-ch-Ing instrument, the Q-DIO instrument and a protocol including strategies for prevention and treatment of pressure ulcers. The first three were developed in 1993, 2000 and 2007, respectively. They may reflect the development of nursing documentation over the past two decades, from the use of a nursing process model to the implementation of standardized nursing documentation systems, then to the application of standardized nursing terminologies. The fourth was a typical instrument for measuring documented care content in relation to a particular clinical issue. In addition, a special instrument was used to measure the quality of information for patients rather than for communication among health professionals (Moult et al. 2004). These instruments, together with other instruments identified, addressed different aspects of nursing documentation quality. They applied various approaches and reflected a complete picture of the quality of nursing documentation as perceived by researchers from different countries.

The audit approaches mainly addressed three natural dimensions of nursing documentation: structure or format, process and content, which constitute a complete profile of nursing documentation. Quality structure and format of nursing documentation are essential in ensuring that patient data is presented in a friendly way to facilitate easy access by nurses or other health professionals to information essential for clinical decision-making. A proper process of data capture is required as it enables documentation of valid and reliable information about patients and care. The content of nursing documentation should be the central audit focus because of its implications for nursing care practice. In sum, nursing care should be fully expressed in the content of the nursing documentation, in a quality structure and format and through an appropriate documentation process.
The accuracy of documentation content in relation to patients' actual conditions and the care given is an important process feature of documentation quality. If there were no assurance of nursing documentation holding valid and reliable data, there would be no value in discussing its quality. The concordance between documentation content and patient assessment or interviews with nurses and patients can reflect the accuracy of data. However, this corroboration of evidence from different sources rather than in situ observation is still an indirect method of approving the accuracy of nursing documentation and has potential bias.

The content of nursing documentation, which contains evidence about care, is closely associated with nurses’ professional expertise. Urquhart et al. (2009) stated that nursing documentation had been used to support different philosophies of nursing practice. While nurses’ theoretical knowledge and concepts of nursing can be embodied in the written text, evaluation of nursing documentation should have implications for advancement of the nursing profession. The two basic quality elements, comprehensiveness and appropriateness of nursing documentation, define the requisite quality of the content of nursing documentation for each step of the nursing process. Important information sources included standardized nursing terminologies, clinical policies or guidelines and standardized nursing documentation systems with pre-formatted items or keywords. These information sources support nurses in documenting nursing process and in making decisions on care-delivery to the patients. They can also generate quality criteria for the evaluation of documentation content.

The shortcomings in nursing documentation included deficiencies at different levels of the content. This indicated that nursing care was not fully expressed in the records, so written communication between different caregivers about patients was inadequate. Further, inaccurate formulation of nursing diagnoses and incoherence in documentation of the nursing process (Paans et al. 2010b) have reflected the nurses’ lack of knowledge and skill in clinical reasoning and connecting the reasoning process to the nursing process.
The structure and process of nursing documentation can be improved by the implementation of standardized electronic nursing documentation systems. Approaches such as the implementation of standardized documentation systems with pre-structured keywords, standardized nursing terminologies, nursing theories and nursing practice standards or guidelines were shown to help improve the content of nursing documentation.

2.6 Conclusion

Nursing documentation has continuously developed with increasing research on the nursing process. In the studies reviewed, the concept of quality of nursing documentation has been operationally defined by various audit instruments, which have focused on different aspects of documentation quality and revealed variations in practices worldwide. All the audit studies used local standards to evaluate local practice. It may not be practical to seek a universal instrument that fits all study settings due to the use of different nursing documentation systems and terminologies based on these local circumstances. However, the underlying factors causing this and their effects on patient outcomes need to be addressed in further research.

Several other areas of documentation would also benefit from further research. The causes of documentation flaws and their effects on patient outcomes need to be investigated. More attention needs to be paid to the concordance between nursing documentation and care delivery on the floor. This is especially important with the increasing application of electronic documentation systems in health care with the capacity to increase aggregation and the accuracy of data by a more structured and uniform format of data organization. Examination of causes for inaccuracy of data and factors leading to improvement should result in better system designs.

There is a need to evaluate the quality of audit instruments from conceptual, theoretical and technical perspectives. Conceptual analysis of measurement standards helps to improve understanding of the definition of quality of nursing documentation and to clarify ambiguous concepts and reach precise operational attributes. Theoretical analysis can help determine whether audit standards are relevant to nursing. Critiques of measurement
techniques used in audit instruments are essential in determining whether instruments are valid and reliable and can produce strong evidence reflecting the quality of nursing documentation.

Nursing documentation has come a long way but still has deficiencies. Further research and more consistent application of established standards will lead to improvements, with associated benefits for practice management and patient outcomes.
References:


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CHAPTER 3. DEVELOPMENT OF THE QUALITY OF AUSTRALIAN NURSING DOCUMENTATION IN AGED CARE (QANDAC) INSTRUMENT TO MEASURE PAPER-BASED AND ELECTRONIC RESIDENT RECORDS

3.1 Introduction

Nursing documentation as a major clinical information source contains data recorded by care staff on a daily basis about resident conditions, care planned and provided, and resident responses to their care (Björvell et al. 2000, Jefferies et al. 2010; Urquhart et al. 2009). The nursing process model, as an internationally accepted concept for nursing practice and documentation, is the theoretical framework of nursing documentation in the Australian aged care sector (Deskein et al. 2009). It contains five steps: assessment, nursing problem/diagnosis, goal, intervention and evaluation (Björvell et al. 2000). Accordingly, nursing documentation in a resident record mainly consists of the person’s background information (admission form), numerous assessment forms, a nursing care plan (NCP) and progress notes, which record resident data captured at the relevant steps of the nursing process.

The quality of nursing documentation is emphasized in the residential aged care setting as it is required to establish funding needs, meet accreditation requirements and support and demonstrate quality of care (Pellete et al. 2002; Jeong 2003; Daskein et al. 2009). Implementation of electronic nursing documentation systems was expected to increase documentation efficiency and the quality of data recorded in the resident records. To determine whether electronic systems could achieve such expectations, a nursing documentation audit study was conducted. This chapter describes the development of a nursing documentation audit instrument to be used to measure and compare the quality of documentation between the paper-based and electronic documentation systems in this study.
3.2 Background

A range of audit instruments has been developed or used in previous studies to measure the quality of nursing documentation. These instruments have addressed different aspects of nursing documentation in relation to its quality within different study contexts and reflected different documentation practices (Wang et al. 2011).

In regard to documentation content pertinent to the nursing process, existing audit instruments include Ehnfors and Smedby’s comprehensiveness in recording (Berg et al. 2007; Gunningberg et al. 2009), the Cat-ch-Ing (Björvell et al. 2000; Törnvall et al. 2007), the Quality of Nursing Diagnosis (QOD) (Florin et al. 2005), the Quality of Diagnoses, Interventions and Outcomes (Q-DIO) (Müller-Staub et al. 2008), and the D-Catch (Paans et al. 2010). These instruments were concerned with recording information about each step of the nursing process. Both quantitative and qualitative approaches were used. The QOD, Q-DIO and D-Catch instruments specifically addressed documentation of the nursing process in association with the use of NANDA (North American Nursing Diagnoses Association) standardized terminologies. The NANDA terminologies are a set of terms used to describe the clinical judgments involved in assessments (nursing diagnoses), along with the interventions, and outcomes related to the documentation of nursing care. This classification system for describing, communicating, organizing and defining nursing is commonly implemented internationally (Thoroddsen and Ehnfors 2007; Muller-Staub 2009).

These instruments were considered to be neither suitable for used in our study setting where standardized nursing terminology is not required, nor adequate for the purpose of comparing the overall quality of paper-based and electronic nursing documentation. Therefore, we synthesized relevant approaches used in the previous instruments and customized them to our problem domain for the development of our instrument. Development and testing of the instrument made use of care staff and records from two residential aged care organisations.
3.3 Aim
The aim of this study was to develop a nursing documentation audit instrument which could be used to measure and compare the overall quality of paper-based and electronic nursing documentation in resident records.

3.4 Methods
In developing the instrument, approaches to designing criterion-referenced measures were applied (Muller-Staub et al. 2009, Waltz et al. 2005). Criterion-referenced measures are used to determine an object’s domain status, usually with respect to some predetermined criterion or performance standard (Waltz et al. 2005). The process of developing our audit instrument involved five phases: identification of attributes of nursing documentation quality; specifying quality criteria; construction of an audit instrument; developing means for measuring quality indicators; and establishing psychometric properties of the instrument.

3.4.1 Identification of attributes of nursing documentation quality
The quality of nursing documentation is a multidimensional concept. To identify quality attributes of nursing documentation, a systematic review of nursing documentation audit studies was conducted (Wang et al. 2011). This identified three relevant characteristics:

- **Quality of documentation structure and format**: relates to constructive features and physical presentations of documentation such as the quantity of records, completeness, legibility, readability, redundancy and the use of abbreviations.

- **Quality of documentation process**: is associated with procedural issues of capturing patients’ data such as signature, designation, date, chronological order, timeliness, regularity of documentation and concordance between nursing documentation and reality.

- **Quality of documentation content**: refers to the message of nursing documentation about a care process. It has two quality domains: comprehensiveness and
appropriateness of nursing documentation. The former concentrates on the presence of five steps of the nursing process and general scope of care. The latter concerns the logical relationships at different levels within these five steps and that between each step and the clinical care issue concerned.

These measurable characteristics identified in the previous audit studies have reflected distinct quality features of nursing documentation, which need to be addressed by our instrument by setting up relevant criteria.

3.4.2 Specifying quality criteria

To derive quality criteria to measure the attributes of nursing documentation, relevant Australian standards were prioritized, with consideration given to international perspectives from the literature.

The World Health Organization (WHO) specifics that medical records and clinical documentation need to be clear, concise, complete, contemporary, confidential, consecutive, correct, comprehensive, collaborative and patient-centred (WHO 1997). These principles have been integrated into several professional guidelines for documentation that are recommended by different state nursing boards in Australia (ACT Nursing and Midwifery Board 2004; Nurses Board South Australia 2006; Nursing Board of Tasmania 2008). These requirements were considered as general standards for our instrument.

Specific requirements on nursing documentation for Australian aged care homes were explored from several relevant local information sources. These included governmental requirements and recommendations for aged care and its documentation practice (Australian Government Department of Health and Ageing, 1997, 2005, The Aged Care Standards and Accreditation Agency Ltd, 1997, 2009). Aged care organizational documentation policies and audit tools were also reviewed. In addition, some quality criteria used in previous audit studies were adopted for our instrument. The quality criteria explored from these information sources fitted well into the categories of quality
characteristics in regard to documentation structure and format, documentation process and documentation content.

### 3.4.3 Construction of an audit instrument

The construction of the audit instrument involved: determining the structure of the instrument, formulating instrument questions and specifying observable indicators.

To determine the structure of the instrument, it was decided that the instrument should follow approaches used in the previously validated instruments such as the Cat-ch-Ing and Q-DIO instruments; these, followed the five steps of the nursing process, a structure that was consistent with the documentation process in the participating residential aged care homes.

It was decided that our audit instrument would only address the quality of resident admission and assessment forms at a general level by focusing on the completeness and the process characteristics of the documentation, without considering their content. A reason for this is that nursing assessment can cover a wide range of care issues. It is not feasible to use a single instrument to assess the quality of content of assessment on various care issues.

For NCPs, both quantitative and qualitative questions were formulated to address whether and how nurses describe resident problems, goals, interventions and evaluation in the relevant sections of the NCP. Further, in order to assess the overall structure, format and process characteristics of documentation between paper-based and electronic systems, a separate section was set up with a series of questions focusing on documentation quality in terms of data presentation and issues with data capture. A further section was built to evaluate the compliance of the documentation with accreditation requirements.

Based on these considerations, a preliminary instrument was drafted with a series of questions in four sections: A: Completion of nursing history and assessment, B: description of care process, C: Meeting requirements of data entry and D: Meeting accreditation
requirements. A measurable indicator was specified for each question. The process of constructing the instrument is reflected in Table 3-1.

3.4.4 Developing means to measure the indicators

Given the nature of the study, we used an ordinal scale of measurement, with scores assigned in rank order for particular attributes (Waltz et al. 2005). The instrument included a five-point Likert scale for each of the items, except for two that used yes/no options. For most of the questions in the instrument, the value of measurement on each individual item was graded on a scale from zero to four where, as appropriate for the nature of the question, zero indicated “never”, “missing” or “poor” and four points indicated “always”, “fully” or “excellent”. For example, “fully” was for the completeness of assessment; “always” was for consistency between the NCP and assessment forms and “excellent” was for legibility of the records. The two questions with yes/no options could be given either zero for a “no” answer or four points for a “yes” answer. A higher score represented better quality of nursing documentation. A summative scoring method was used to get a total score for a nursing record.

In order to accurately interpret the study results, precise, specific and consistent scoring standards were set up in an audit instrument user manual with detailed information explaining the meaning of each question and how to grade it. An example of the standards set up in the manual is as follows:

A2. Is the resident’s assessment on admission complete?

This item assesses the completeness of the initial assessment forms for a resident when the resident was first admitted to a nursing home. A five-point scale is used to measure the completeness of each assessment form:

• Fully – 100% of items in the form are completed – scored 4;
• Mostly – above 66%, but less than 100% of items are completed – scored 3;
• Partly – between 33% and 66% of items are completed – scored 2;
Table 3-1. Formulation of the Quality of Australian Nursing Documentation in Aged Care (QANDAC) instrument

<table>
<thead>
<tr>
<th>Section</th>
<th>Structure</th>
<th>Quality characteristics</th>
<th>Instrument questions</th>
<th>Observable indicators</th>
<th>Scale</th>
</tr>
</thead>
<tbody>
<tr>
<td>Completion of nursing history and assessment</td>
<td>Nursing history</td>
<td>Complete nursing history</td>
<td>Structure A1. Is nursing history completed? (quantity)</td>
<td>A1. Percentage of completed items of resident background information form</td>
<td>5-Likert</td>
</tr>
<tr>
<td></td>
<td>Proper conduction of assessment</td>
<td>Process</td>
<td>A4. Are those assessments carried out by appropriate staff (RN)? (quality) A5. Are those assessment forms completed in a timely fashion according to the residential aged care home’s defined protocol? (quality) A6. Is the nursing assessment conducted using assessment tool or predefined forms? (quality)</td>
<td>A4. Percentage of assessment forms which are completed by a RN A5. Percentage of assessment forms which are completed within the timeframe required by the organisation. A6. Percentage of assessment forms which are predefined assessment tool</td>
<td>5-Likert</td>
</tr>
<tr>
<td>Description of care process</td>
<td>Nursing problem</td>
<td>Identification of nursing problem</td>
<td>Content B1a. Is/are nursing problem(s) identified (quantity)? B1b. Is/are there clear nursing problem statement(s) describing the type and nature of the resident’s current and/or potential problem(s)/risk(s)/care needs?</td>
<td>B1a. Presence of nursing problem for which care plan is created. B1b. Presence of proper problem statement</td>
<td>Yes – 4; No - 0</td>
</tr>
<tr>
<td>Precise nursing problem statement</td>
<td>Process and content</td>
<td>B1c. Is/are nursing problem(s)/risk(s) identified in care plans consistent with the findings of assessment? (quality)</td>
<td>B1c. Percentage of problems, which are consistent with assessment.</td>
<td>5-Likert</td>
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<td></td>
<td>B1d. Does/do the statement(s) of problem(s)/ risk(s) indicate one or more contributing factors? (quality)</td>
<td>B1d. Percentage of problem statements which indicate one or more contributing factors.</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>B1e. Is/are sign(s) and/or symptom(s) stated in relation to the problem(s) identified? (quality)</td>
<td>B1e. percentage of problem (s) with sign(s) and/or symptom(s)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nursing goal</td>
<td>Setting up of nursing goals</td>
<td>Content</td>
<td>B2a. Percentage of care plan domains which have nursing goals set up.</td>
<td>5-Likert</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>B2a. Is/are goal(s) set up in relation to the problem(s)/risk(s) identified? (quantity)</td>
<td>B2a. Percentage of care plan domains which have nursing goals set up.</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>B2b. Is/are the goal(s) resident-centred? B2c. Is/are the goal(s) measurable or observable? (quantity)</td>
<td>B2b. Percentage of goals which are resident-centred. B2c Percentage of goals which are measurable or observable.</td>
<td>5-Likert</td>
<td></td>
</tr>
<tr>
<td>Appropriate nursing goals</td>
<td>Planning of nursing intervention</td>
<td>Content</td>
<td>B3a. Percentage of care plan domains which have nursing interventions planned.</td>
<td>5-Likert</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>B3a. Is/are nursing intervention(s) planned to address the nursing problem(s)/risk(s) identified? (quantity)</td>
<td>B3a. Percentage of care plan domains which have nursing interventions planned.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>B3b. Is/are nursing interventions appropriate or suitable to the goals? (quality) B3c. Is/are the intervention(s) specific</td>
<td>B3b. Percentage of interventions which are suitable to the goals. B3c Percentage of interventions, which are specific and detailed</td>
<td>5-Likert</td>
<td></td>
</tr>
<tr>
<td>Category</td>
<td>Description</td>
<td>Question</td>
<td>Rating</td>
<td></td>
<td></td>
</tr>
<tr>
<td>-------------------------------</td>
<td>-----------------------------------------------------------------------------</td>
<td>----------------------------------------------------------------------------------------------</td>
<td>--------</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nursing evaluation</td>
<td>Documenting nursing evaluation</td>
<td>B4. Has/have intervention(s) been implemented? (quality)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>B4. Percentage of interventions which have been implemented as documented.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Appropriate nursing evaluation</td>
<td>Content</td>
<td>B5a. Is/are there nursing evaluation(s) conducted in relation to planned care? (quantity)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>B5a. Percentage of care plan domains with evaluation documented</td>
<td>5-Likert</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Content</td>
<td>B5b. Is/ are resident outcomes in relation to planned care documented in the care plan? (quality)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>B5b. Percentage of evaluations with resident outcomes documented.</td>
<td>5-Likert</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>B5c. Does/do evaluation(s) show the effectiveness of care provided in terms of achieving the goals? (quality)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>B5c. Percentage of evaluations indicating the effectiveness of planned interventions.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>B5d. Is/are nursing evaluation(s) conducted regularly? (quantity)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>B5d. Percentage of care plan domains with regular evaluations</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td>Proper formulation of care plan</td>
<td>B6. Is/are care plan(s) made by an appropriate nurse? (quality)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>B6. Designation of nurse is RN in the care plan</td>
<td>5-Likert</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Documentation of care process for temporary nursing problem(s)/care needs</td>
<td>B7. Is/are the resident condition changes noted in progress notes addressed by a care process? (quantity)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>B7. Percentage of temporary problems which are addressed by a care process as documented in the progress notes</td>
<td>5-Likert</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Meeting requirement of data entry</td>
<td>Presentation of documented nursing data</td>
<td>Clear documentation structure and format and appropriate data capturing</td>
<td>Structure and format</td>
<td>Process</td>
<td></td>
</tr>
<tr>
<td>----------------------------------</td>
<td>----------------------------------------</td>
<td>---------------------------------------------------------------</td>
<td>---------------------</td>
<td>--------</td>
<td></td>
</tr>
<tr>
<td>C1. Is the writing of all records is legible? (quality)</td>
<td>C10. Are all documents (quantity) • Signed? • Dated?</td>
<td>C1. Perceived level of legibility of the records</td>
<td>C10. Presence of signature, date, printed name and designation of the nurse.</td>
<td>Yes - 4, No-0 (1)</td>
<td></td>
</tr>
<tr>
<td>C2. Are statements made by nurses using clear and succinct language? (quality)</td>
<td></td>
<td>C2. Perceived level of clarity and succinctness of languages</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>C5. Are all entries using 24hr clock? (quality)</td>
<td></td>
<td>C5. Percentage of entries using 24hr clock.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>C6. Is/are error(s) crossed out with a single line and signed? (quality)</td>
<td></td>
<td>C6. Perceived level of appropriate correction of errors with a single line and signed</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>C7. Are all spaces between entries in progress notes crossed out with a single line?</td>
<td></td>
<td>C7. Perceived level of spaces between entries which are crossed with a single line.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>C8. Is/are abbreviation(s) officially recognized? (quantity)</td>
<td></td>
<td>C8. Perceived level of appropriate use of abbreviations according to the list of abbreviations required by the home</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>C9. Are all pages labelled with the resident’s identification? (quality)</td>
<td></td>
<td>C9. Percentage of pages labelled with the resident’s identification</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
• Printed name?
• With designation of the nurse?
• Occasionally – more than 0%, but less than 33% of items are completed – scored 1;
• Missing – blank form – scored 0.

The final score for this item is calculated using the following formula:

\[
\text{Score} = \frac{\sum \text{score (assessment form1, 2, ..., n)}}{\text{Number of assessment forms (n)}}
\]

Scoring for Section C of the instrument about quality of data entry took account of the applicability of questions to electronic documentation. For example, with questions regarding legibility and use of black ink, a full score of 4 should be generally applicable to nursing records generated by all electronic systems.

3.4.5 Validation of the instrument

Validity

In depth discussions with an international peer leading researcher were carried out to determine whether the instrument items adequately represented content domains of nursing documentation quality and if each item was relevant and appropriate for the purpose of measurement.

The face and content validities of the instrument were assessed through a series of validation procedures. Initially, the face validity was estimated using a focus group approach (Muller-Staub et al. 2009) with five aged care home managers (RNs) and one IT project manager in a meeting at an aged care organization. This was immediately followed by individual discussions with three clinical nursing experts in three aged care homes to determine the relevance of the instrument. Consultations with two experienced nursing researchers in the aged care field were also undertaken via a telephone conference. The instrument was continuously revised following each of these validation processes. As a result, the number of items was reduced from 55 to 44.
The content validity of the instrument was then formally tested using a consensus approach (Muller-Staub et al. 2009) in a meeting with five nursing managers during a meeting in another organisation. Inclusion of five nursing experts was considered adequate to judge the content validity (Yaghmaie 2003). These nursing managers were asked to tick or cross each item based on their judgment about whether the item was essential. The Content Validity Ratio (CVR) was computed using the formula: \( CVR = \frac{(ne - N/2)}{(N/2)} \), where ‘ne’ was the number of panellists who agreed with the item and ‘N’ was the total number of panellists participating in the assessment.

Negative values of CVR were obtained for a section concerning documentation for meeting accreditation requirements. The nursing managers disagreed with this section and suggested that the items in it were already covered in other parts of the instrument. Consequently, the section was removed. After this formal validation process, further nursing records were reviewed, in both paper-based and electronic formats, and it was found necessary to add four items to the instrument to reflect flaws with nursing documentation. To validate these newly-added items, the opinions of five nursing experts, either clinical managers or team leaders were sought. These experts strongly agreed with the new items, leaving 34 items in the final version of the instrument.

**Reliability**

Following the estimation of the content validity, a pilot study was conducted to validate the reliability of the instrument. Consent was obtained from the residents and their representatives to use nursing records for this purpose. The testing of inter-rater reliability was conducted on two occasions, each involving three raters. On the first occasion, the author and two registered nurses with advanced experience in aged care graded a convenience sample of 20 electronic records by the instrument questions in sections A and B. Section C could not be tested at the time because it was more applicable to paper-based records, which were not available. On the second occasion the questions in Section C were tested. The author and two researchers with advanced qualifications and research experience graded 20 paper records which were also conveniently collected. On both
occasions, the three auditors started by discussing how to grade each record and method to resolve any disagreements. Once consensus was reached, the rest of records were independently assessed by each auditor.

The inter-rater reliability was estimated by calculating the percentage agreement between the three auditors for each of the instrument questions. Use of Fleiss’s Kappa to provide comparative estimates was considered but proved unsuitable as it gave low values for Kappa, or could not be calculated, when the distribution of ratings for an item by the three auditors was skewed. Percentage agreement was calculated from the number of ratings with agreement on the 20 records, divided by the total number of ratings on the 20 records for which that measurement property was assessed, following Mokkink et al. (2010). For each instrument item, agreement meant that either two or three of the auditors gave the same rating to the 20 records. A percentage agreement above 80% was considered appropriate to indicate reliability.

3.5 Results
The final version of the QANDAC instrument consisted of three sections: completion of nursing history and assessment (six questions), description of care process (18 questions) and meeting requirements of data entry (10 questions). Each section included quantitative and qualitative questions addressing the structure, format, process and content of nursing documentation. Detailed instrument structure, quality criteria, instrument questions and measurable indicators are shown in 3-1. A complete instrument is presented as Appendix 1.

3.5.1 Validity
The CVRs of the instrument questions ranged from 0.2 to 1.0 for the responses from five nursing managers. There was full agreement on 23 questions. Ten questions had a CVR of 0.6 (agreement by 4 of the 5 panellists) and one had a CVR of 0.2 (3 of 5 panellists). The detailed results of content validity assessment are presented in Table 3-2.
3.5.2 Reliability

The percentage agreements by the three raters with the 34 instrument questions on the 20 records ranged from 81% to 100%, indicating favourable results from testing of the inter-rater reliability of the instrument. Details about the percentage agreements are shown in Table 3-2.

3.6 Discussion

A new instrument has been developed for measuring the quality of nursing documentation in Australian aged care homes. To our knowledge, the QANDAC is the first that has been developed to assess the quality of nursing documentation in resident records. Unlike the previous instruments, this multiple concept approach not only considers the documentation content pertinent to the nursing process, but also pays attention to the documentation structure, format and process. The instrument was developed based on a systematic literature review and review of local requirements for nursing documentation. This application of validated audit approaches and relevant quality criteria derived from local sources provided assurance of the content validity of the instrument. The instrument was further strengthened through validation processes with nursing managers from two aged care organizations.

Satisfactory results about the content validity and inter-rater of the instrument were obtained. It was valuable to test the face validity of the instrument with a group of nursing managers before studying its content validity. Discussions with the peer experts to seek their input and judgment on the instrument criteria helped refine the initial draft instrument. The credibility of the instrument was confirmed during the formal study of the content validity where high agreement was obtained on whether the questions were essential for measuring the quality of nursing documentation. Assessment of inter-rater reliability showed high percentages of agreement (more than 80%) for all the instrument questions by the three auditors, indicating that they often chose the same ratings.
Table 3-2. Content Validity Ratio (CVR) (n=5 panellists) and inter-rater agreement (n=3 auditors) of the instrument questions

<table>
<thead>
<tr>
<th>Instrument item</th>
<th>CVR</th>
<th>Percentage of agreement</th>
<th>Instrument question</th>
<th>CVR</th>
<th>Percentage of agreement</th>
</tr>
</thead>
<tbody>
<tr>
<td>A1</td>
<td>1.0</td>
<td>100%</td>
<td>B4</td>
<td>0.6</td>
<td>100%</td>
</tr>
<tr>
<td>A2</td>
<td>0.6</td>
<td>100%</td>
<td>B5a</td>
<td>0.6</td>
<td>98%</td>
</tr>
<tr>
<td>A3</td>
<td>1.0</td>
<td>98%</td>
<td>B5b</td>
<td>0.6</td>
<td>90%</td>
</tr>
<tr>
<td>A4</td>
<td>1.0</td>
<td>93%</td>
<td>B5c</td>
<td>1.0</td>
<td>100%</td>
</tr>
<tr>
<td>A5</td>
<td>1.0</td>
<td>98%</td>
<td>B5d</td>
<td>1.0</td>
<td>100%</td>
</tr>
<tr>
<td>A6</td>
<td>1.0</td>
<td>100%</td>
<td>B6</td>
<td>1.0</td>
<td>100%</td>
</tr>
<tr>
<td>B1a</td>
<td>1.0</td>
<td>100%</td>
<td>B7</td>
<td>1.0</td>
<td>81%</td>
</tr>
<tr>
<td>B1b</td>
<td>0.6</td>
<td>93%</td>
<td>C1</td>
<td>0.6</td>
<td>88%</td>
</tr>
<tr>
<td>B1c</td>
<td>1.0</td>
<td>97%</td>
<td>C2</td>
<td>0.6</td>
<td>87%</td>
</tr>
<tr>
<td>B1d</td>
<td>1.0</td>
<td>92%</td>
<td>C3</td>
<td>0.6</td>
<td>87%</td>
</tr>
<tr>
<td>B1e</td>
<td>1.0</td>
<td>1.0</td>
<td>C4</td>
<td>1.0</td>
<td>92%</td>
</tr>
<tr>
<td>B2a</td>
<td>1.0</td>
<td>88%</td>
<td>C5</td>
<td>1.0</td>
<td>100%</td>
</tr>
<tr>
<td>B2b</td>
<td>1.0</td>
<td>93%</td>
<td>C6</td>
<td>0.6</td>
<td>97%</td>
</tr>
<tr>
<td>B2c</td>
<td>0.2</td>
<td>90%</td>
<td>C7</td>
<td>0.6</td>
<td>85%</td>
</tr>
<tr>
<td>B3a</td>
<td>1.0</td>
<td>98%</td>
<td>C8</td>
<td>1.0</td>
<td>95%</td>
</tr>
<tr>
<td>B3b</td>
<td>1.0</td>
<td>92%</td>
<td>C9</td>
<td>1.0</td>
<td>90%</td>
</tr>
<tr>
<td>B3c</td>
<td>1.0</td>
<td>88%</td>
<td>C10</td>
<td>1.0</td>
<td>98%</td>
</tr>
</tbody>
</table>

There were some limitations with the development of the instrument. It has been suggested that a certain degree of subjectivity always exists in auditing patient records (Larson et al. 2004). Inevitably, our instrument possesses this inherent weakness. To minimize the effects it may have on auditing results, explicit scoring standards have been established. However, it was difficult to establish these standards for some questions such as those regarding the legibility of records and succinctness and objectiveness of language. Thus, it is necessary to
calibrate the auditors to one another when more than one person is involved in conducting an audit using the instrument.

The instrument was tested on 20 resident records, which were selected conveniently rather than randomly from an aged care home. They might not be representative of the whole population of nursing records across all aged care settings. Also this relatively small sample size was inadequate for the investigation of other aspects of validity and reliability such as construct validity and internal consistency. Therefore, further studies are needed to test the instrument with a larger sample size from a wider range of homes or settings.

Identification of flaws with nursing documentation using the instrument may lead to improvement in documentation in aged care. The instrument can be used for a thorough, but basic appraisal of nursing documentation to address issues with completion of a range of resident records as required. It is applicable to both paper-based and electronic documentation to reflect the record keeping capability of the systems. A further instrument would be required to measure nurses’ professional knowledge in documenting their clinical management of focused care issues such as pain, mobility, incontinence and skin ulcers.

3.7 Conclusion

The QANDAC instrument was developed following established theories, including the nursing process model and the three quality characteristics of nursing documentation: documentation structure and format, process and content identified in a comprehensive literature review. The instrument can be used for a thorough appraisal of nursing documentation to address issues, with the completion of a range of resident records as required. It is applicable to both paper-based and electronic documentation to reflect the capability of the systems in record keeping. Identification of flaws with nursing documentation using the QANDAC instrument may lead to improvement in the aged care documentation.
References


Nurses Board South Australia (2006) *Guiding principles for documentation.*

Nursing Board of Tasmania (2008) *Standards of Documentation for Nurses and Midwives.*


The Aged Care Standards and Accreditation agency Ltd (2007) *Results and processes guide.* AS_GD_00407v2.0 ISSN 1448-4986 (print), 1448-6172 (Electronic)


CHAPTER 4. COMPARISON OF THE QUALITY OF PAPER-BASED AND ELECTRONIC DOCUMENTATION: RESIDENT ADMISSION FORMS

4.1 Abstract

Purpose: To describe the paper-based and electronic formats of resident admission forms used in several aged care homes in Australia; and to compare the extent to which resident admission information was documented in paper-based systems and the electronic health records.

Methods: Retrospective observation and comparison of the documentation quality of paper-based and electronic resident admission forms were conducted. A checklist of admission data was qualitatively derived from different formats of the admission forms collected. Three measures were used to assess the quality of documentation of the admission forms, including completeness rate, comprehensiveness rate and the frequency of documented data element. Associations between the number of items and their completeness and comprehensiveness rates were estimated at a general level and at each information category level.

Results: Various paper-based and electronic formats of admission forms were collected, reflecting varying practices among the participant homes. The overall completeness and comprehensiveness rates of the admission forms were poor, but were higher in the electronic health records (EHRs) than in the paper-based records (60% vs 56% and 40% vs 29% respectively, p<0.01). There were differences in the overall completeness and comprehensiveness rates between the different formats of admission forms (p<0.01). At each information category level, varying degrees of difference in the completeness and comprehensiveness rates were found between different form formats and between the paper-based records and the EHRs. A negative association between the completeness rate and the number of items on the forms was found at each information category level (p<0.01). However, associations between the comprehensiveness rates and the number of items were highly positive at both overall and individual information category levels (p<0.01).
Conclusion: Better quality of documentation in resident admission forms was identified in the EHRs than in previous paper-based systems, but still needs to be further improved in practice. The quality of documentation of resident admission data should be analysed in relation to its specific content.
4.2 Introduction
The importance of information about clients and care in the operation of modern health care organizations has been well recognized (Oroviogoicoechea et al. 2008, Urquhart et al. 2009, Saranto and Kinnunen 2009). Information systems that facilitate data collection and tracking for patient care can also sustain care quality improvement (Resnick et al. 2004). In past decades, application of electronic health records (EHRs) has streamlined data processing and management in many health care settings with benefits including increasing access to more complete, accurate and up-to-date data and reducing redundancy (Oroviogoicoechea et al. 2008, Larrabee et al. 2001). In aged care settings, the implementation of EHRs has potential to improve efficiency in administrative and operational areas and to enhance quality of care and integration of services (Resnick et al. 2004).

Given the fundamental significance of nursing documentation in the Australian aged care sector for the purposes of funding, accreditation and quality improvement (Pelleter et al. 2002, Jeong 2003, Daskein et al. 2009), several aged care organizations in Australia have implemented EHRs. However, the actual benefits of this format of record keeping have yet to be validated.

As a significant part of resident records in aged care, resident admission forms contain information about residents’ personal and health history, support networks and discharge planning. Such resident data are essential for administrative purposes, resident assessment, and planning of care. Quality resident admission data may also play a vital role in service coordination, public health research and health planning.

Numerous studies have been carried out to investigate the impact of EHRs on information quality of a range of documentation components and improved completeness of documentation with EHRs has been reported (Hayrinen et al. 2008). Several studies conducted in acute settings have reported poor completion of selected elements of admission information such as admission diagnosis, allergies, medication, occupation, social class, name/telephone of contact person and religion (Chan and Schonfeld 2003,
Yussuff and Awotunde 2005, Prins et al. 2002, Mbabazi and Cassimjee 2006). In regard to EHRs, Prins et al. (2002) identified inadequate documentation of admission diagnosis and reason for admission. Pringle et al. (1995) showed that the documentation of occupation was incomplete and no information about social class and ethnicity had been recorded. In addition, Floor-Schreudering et al. (2009) have reported poor documentation in EHRs of patient telephone numbers and drug history after their first visit to a local pharmacy.

However, inadequate research attention has been paid to the quality of overall admission information. To date, there has been no study on the quality of admission data in the aged care setting. Therefore, our study investigated the quality of resident admission data documented in paper-based and electronic admission forms in several aged care homes from different organizations where commercial EHRs had been implemented. The objectives of the study were to describe the paper-based and electronic formats of resident admission forms used in aged care homes; and to compare the extent to which resident admission information was documented in these formats.

4.3 Methods

4.3.1 Study design

This was a nursing documentation audit study. Retrospective review and comparison of the documentation quality of paper-based and electronic resident admission forms were conducted.

4.3.2 Study sites

The study was carried out at nine residential aged care homes from three aged care organizations in Australia. These organizations have implemented two commercial EHR systems at different time points since 2005. The study was conducted between August 2010 and March 2011.
4.3.3 Study sample

The study samples were the resident records conveniently selected from the nine residential aged care homes. These included 251 electronic and 147 paper-based resident admission forms from the resident records. The number of samples varied among the nine homes due to differences in the number of residents who gave their consent and the unavailability of archived paper-based records at some homes.

4.3.4 Participants

Participants were the residents of the residential aged care homes whose admission forms were accessed by the researchers after consent had been provided. Before seeking written consent, an information sheet with a detailed description about the study including data handling procedures was given to the residents or to their representatives, depending on the residents’ cognitive capacity.

4.3.5 Ethics approval

The study was approved by University of Wollongong/Illawarra Area Health Service Human Research Ethics Committee and the ethics committee of a participating aged care organization.

4.3.6 Development of an auditing checklist

A checklist to compare the documentation quality of the different admission form formats used by the participating aged care homes was developed using data elements that were qualitatively derived from the admission forms using a similar approach to that of Schleyer et al. (2007). The different formats used by the homes shared some common items, but varied in their content. As the study was intended to present a full picture about the scope of information to be collected from the residents by using the admission forms, the checklist included all items in the admission forms, except those about resident discharge information. Discharge-related items were excluded because most of the participating residents’ admission status was current. Inclusion of all items from the different admission
forms recognized that they had been developed and validated by experienced nursing managers in each aged care organization.

During the development of the checklist, all items from each format of the admission forms were extracted and then grouped into categories. Under each category, any duplicated items were merged to form a single data element for the checklist, including items referring to the same concept, but named differently (e.g., ‘Admission Date’ and ‘Date of Entry’).

For items designed to collect similar data but with different levels of granularity from general to specific, a summary term was adopted to form a single data element. For example, ‘Medical/Surgical Diagnosis’ was used in the checklist for several items such as ‘Provisional Diagnosis’, ‘Principal Diagnosis’, ‘Principal Operation and Major Procedure’ and ‘Other Operations or Procedures’. Additionally, some separate items that are related to each other were combined to a single data element. For example, ‘Surname’ and ‘First Name’ were combined to form a data element of ‘Full Name’.

The checklist was used to determine whether or not information on individual items had been entered into each admission form. No attempt was made to determine whether items were applicable to individuals as the researchers did not have direct contact with the residents. Nor was the quality of narrative entries for some items considered. The validity of the checklist was based on how well its content captured the details from all the resident admission form formats. The checklist was judged by three health informatics researchers who considered and reached consensus on the appropriateness of categorization of the items. The checklist contained 10 categories with 105 data elements. These entirely covered the data intended to be collected by different formats of admission forms from residents at their admission and are listed in Table 4-1.

Two researchers agreed on the protocol for rating the admission forms and then graded the forms in the sample from the participating homes using the checklist spreadsheet listing the data elements. A dichotomous scale with ‘yes/no’ options was adopted to score each admission form depending on the occurrence of documentation for each of the data
elements. One point was given to a ‘yes’ option and zero was given to a ‘no’ opinion. During this process, any question or disagreement was discussed to reach consensus.

<table>
<thead>
<tr>
<th>Categories (number of data elements)</th>
<th>Data elements</th>
</tr>
</thead>
<tbody>
<tr>
<td>Resident Demographics (n=16)</td>
<td>Title, full name, preferred name, date of birth, age, resident usual address, resident phone number, gender, primary language, secondary language, interpreter needed, religion, marital status, country of birth, Aboriginal or Torres Strait Islander, working company</td>
</tr>
<tr>
<td>Admission details (n=16)</td>
<td>Aged care home, room, bed, location, medication trolley, photo taken date, other information, medical record number, resident status (e.g. active), entry type, admission date, admitted from/source of referral, resident category, UR number, medical record number</td>
</tr>
<tr>
<td>Resident Health History (n=9)</td>
<td>Allergies (drugs/other), medical/surgical diagnosis, psychiatric history, other conditions, drugs on admission/medication notes, Flu vaccination, chest x-ray, external cause of injury or poisoning, place of occurrence</td>
</tr>
<tr>
<td>Baseline Health Ranges (n=4)</td>
<td>Height, weight, blood sugar level, blood pressure</td>
</tr>
<tr>
<td>Membership Details (n=16)</td>
<td>Pension type, pension/benefit care number, Centrelink number, DVA card number, DVA card member number, name as it appears on the card, expiry date, Private health insurance provider/fund name, membership number/table, Ambulance fund (y/n), member number, transport access scheme, Hospital of choice, diabetic association number, electoral roll (Yes/No), war service</td>
</tr>
<tr>
<td>End of Life Wishes (n=5)</td>
<td>Funeral arrangement (cremation/burial), funeral director/undertaker, phone number, advanced care directive (Yes/No), summary of wishes/requirements, Medical officer name, address, phone, email, fax</td>
</tr>
<tr>
<td>General contact (n=18)</td>
<td>Primary contact name, relationship, address, phone, email, fax, Secondary contact name, relationship, address, phone, email, fax, Next of kin 1 name, relationship, address, phone, email, fax</td>
</tr>
<tr>
<td>Legal Contact (n=13)</td>
<td>Power of attorney type, power of attorney name, address, power of attorney phone number, email, Guardianship type (public/private), name, address, phone, email, Location of will, solicitor, phone</td>
</tr>
</tbody>
</table>
| Completion of Form (n=3)              | Name of person/nurse completing the form on admission, signature, date
4.3.7 Measurement approaches

Quantitative description of documentation of admission forms was made by mapping items completed in an admission form to the items pre-formatted in the form and to the data elements of the checklist. Two measures were given for this assessment: completeness rate and comprehensiveness rate.

Completeness rate was defined as the proportion of completed items to the total items in a form. It reflects the extent to which data were collected by a nurse as required by the form. A formula for calculating the completeness rate of a form is:

\[
\text{Completeness rate} \, (\%) = \frac{\text{The number of items completed in the form}}{\text{The total number of items designed in the form}} \times 100
\]

However, as different form formats may have varying numbers of items, a high completeness rate of a form may not necessarily mean that more data were captured in this form than another form. Therefore, a second parameter, comprehensiveness rate was used to capture the proportion of completed items in a form format to the total data elements on the checklist. It reflects the amount of data documented by a nurse relative to the full information coverage defined in the checklist based on practice. This measure allows the comparison of the amount of data recorded in different forms.

A formula for calculating the comprehensiveness rate of a form is:

\[
\text{Comprehensiveness rate} \, (\%) = \frac{\text{The number of items completed in the form}}{\text{The number of data elements in the checklist}} \times 100
\]

Both measures were calculated at the overall and at the individual information category level to provide general and specific assessment of completion status of different admission forms.

In addition, the frequency proportion of documentation of each data element was used as a further measurement of documentation at each data element level between the paper-based
and electronic admission forms. It was defined as the ratio of the occurrences of documentation of each data element to the number of forms analyzed. This measure reflected what items were frequently or infrequently documented by the nurses in the paper-based and electronic admission forms for the residents. A formula for calculating the frequency proportion of a data element among the samples is:

\[
\text{Frequency proportion} \, (\%) = \frac{\text{The number of occurrences of documentation of the data element}}{\text{The number of forms analysed}} \times 100
\]

4.3.8 Data analysis

Raw data was entered into an Excel spreadsheet, and then imported into a SPSS file (Software 18.0) for statistical analysis. Statistical methods used included descriptive statistics and non-parametric statistical analysis. The completeness and comprehensiveness rates of admission forms were examined by the Kruskal-Wallis H test to identify any statistically significant differences among the seven formats. If a significant difference was identified, the Mann-Whitney U test was used for the identification of significant differences between any two of seven form formats. Nonparametric correlation analysis with Spearman’s rho test was used to examine the associations between the numbers of items and the completeness rate and comprehensiveness rate of a form format in total and at each information category level. The measurement results are presented as percentage of values.

4.4 Results

4.4.1 Use and characteristics of different formats of admission forms among participating aged care homes

A total of 399 admission forms was collected from the nine aged care homes. There were six formats of paper-based admission forms and two formats of electronic admission forms. As one paper-based form format was only used for one resident, it was excluded from the analysis, leaving 398 usable admission forms in seven formats. A summary of the format of forms by the participating organizations and homes is displayed in Table 4-2.
Table 4-2. Admission form formats and the number of samples

<table>
<thead>
<tr>
<th></th>
<th>Organization 1</th>
<th>Organization 2</th>
<th>Organization 3</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>A</td>
<td>B</td>
<td>C</td>
</tr>
<tr>
<td>Paper-based admission form format (sample size n= 147)</td>
<td>n/a</td>
<td>Form 5 (n=28)</td>
<td>Form 1 (n=22)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Form 2 (n=11)</td>
</tr>
<tr>
<td>Electronic admission form format (sample size n=251)</td>
<td>e-Form 7 (n=28)</td>
<td>n/a</td>
<td>e-Form 6 (n=39)</td>
</tr>
</tbody>
</table>

Six out of 10 categories of data items were common to all types of forms. They include demographics, admission details, health history, membership, doctor and general contact.

e-Form6 was an automation of a paper-based Form 3 and e-Form7 was an automation of Form5. However, both electronic formats have additional items to those in the paper-based formats from which they were derived. e-Form 6 had 11 items in addition to the 68 items in Form 3. e-Form 7 derived 40 out of 47 items from Form 5 and had 27 additional items.

The number of items in each format of the admission forms is presented in Table 4-3.

4.4.2 Completeness of documentation among different formats of admission forms and between paper-based records and EHRs

The overall completeness rates ranged from 38.1% for Form 2 to 59.7% for e-Form 7. The differences in completeness rates among the seven formats was significant (p<0.01). A comparison of any two of the seven form formats showed significant differences in 13 out of 21 pairs (p<0.05).
Table 4.3. Distribution of median completeness and comprehensiveness rate (%), interquartile range and the numbers of preformatted items by information categories among different form formats and information systems

<table>
<thead>
<tr>
<th>Information category</th>
<th>Form 1 (n=73)</th>
<th>Form 2 (n=18)</th>
<th>Form 3 (n=13)</th>
<th>Form 4 (n=15)</th>
<th>Form 5 (n=28)</th>
<th>e-Form 6 (n=223)</th>
<th>e-Form 7 (n=28)</th>
<th>Paper-based (n=147)</th>
<th>EHRs (n=251)</th>
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<tr>
<td>Completeness (%)</td>
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<td>a³b 81 (16)</td>
<td>a³70 (35)</td>
<td>a³b 89 (22)</td>
<td>dB 89 (22)</td>
<td>b³91 (9)</td>
<td>b³86 (18)</td>
<td>a³82 (16)</td>
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<td>9.96*</td>
<td>11*</td>
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<td>Comprehensiveness (%)</td>
<td>a³50 (6)</td>
<td>a³b 44 (13)</td>
<td>b³43 (22)</td>
<td>a³c 60 (6)</td>
<td>b³50 (13)</td>
<td>b³63 (6)</td>
<td>d³59 (13)</td>
<td>50 (13)</td>
<td>63 (6)</td>
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<tr>
<td>Completeness (%)</td>
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<td>a³ 100 (0)</td>
<td>b³75 (0)</td>
<td>a³b c d 67 (0)</td>
<td>a³b d 100 (0)</td>
<td>c³80 (0)</td>
<td>d³83 (0)</td>
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<td>4.29*</td>
<td>14*</td>
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<td>c³56 (6)</td>
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<td>b³e 19 (5)</td>
<td>b³69 (6)</td>
<td>e³31 (0)</td>
<td>a³25 (6)</td>
<td>a³69 (6)</td>
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<tr>
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<td>a³b 50 (50)</td>
<td>c³100 (8)</td>
<td>d³33 (0)</td>
<td>e³c 100 (38)</td>
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<td>a³67 (0)</td>
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<td>c³22 (11)</td>
<td>b³d 22 (11)</td>
<td>b³e 22 (0)</td>
<td>b³ 22 (0)</td>
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<td>a³b 50 (33)</td>
<td>c³31 (12)</td>
<td>c³d 33 (33)</td>
<td>a³e 20 (20)</td>
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<td>a³17 (17)</td>
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<td>c³25 (16)</td>
<td>b³c 19 (19)</td>
<td>a³d 13 (13)</td>
<td>b³31 (19)</td>
<td>c³31 (13)</td>
<td>a³13 (6)</td>
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<tr>
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<td>b³50 (0)</td>
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<td>f 40 (40)</td>
<td>g 20 (2)</td>
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<td>b 1 (42)</td>
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<tr>
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<td>b 38 (11)</td>
<td>c 56 (6)</td>
<td>a 80 (22)</td>
<td>c 52 (16)</td>
<td>g 9 (11)</td>
<td>d 60 (8)</td>
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<td>27 (9)</td>
<td>33 (4)</td>
<td>30 (7)</td>
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<td>41 (7)</td>
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</table>
Significant differences in completeness rates were found among the seven form formats for all of the information categories (p<0.05) except ‘baseline health ranges’ and ‘legal contact’.

A comparison of completeness rates was also made between any two of seven form formats at each information category level. The results showed that 94 out of 154 pairs (61%) had significant differences (p<0.05).

The overall completeness rate in the electronic formats of admission forms was slightly higher than that in paper-based formats of forms (59.5%, interquartile range 0.14 vs 55.8%, interquartile range 0.1, p<0.01). At the level of each information category, a statistically significant increase in completeness rate was found in electronic forms for several information categories (p<0.01). The greatest differences in completeness rate between the electronic and paper forms were in the categories of ‘Health History’ (increased 23.8%); ‘Membership’ (increased 21.8%) and ‘Demographics’ (increased 9.0%). In contrast there was a reduced completeness rate in the electronic admission forms in comparison with the paper forms in the information category of ‘General Contact’ by 14.2%. There was no statistically significant difference between the two types of forms in the categories of ‘End of Life Wishes’, ‘Doctor’ and ‘Legal Contact’.

As e-Form 6 and e-Form 7 were the automation of Form 3 and Form 5 respectively, a comparison of completeness rate of their common items (68 and 40 respectively) within each pair was conducted. The results showed that the completeness rates of the two formats of electronic admission forms were significantly higher than that of their counterparts (P<0.01) (Figure 4-1).

4.4.3 Comprehensiveness of documentation among different formats of admission forms and between paper-based records and EHRs

Variation in the comprehensiveness rate was found among different form formats in total and for each information category (Table 4-3.). The overall comprehensiveness rates for seven formats ranged from 21% for Form 5 to 41% for e-Form 6. The difference among them was significant (p<0.01).
A comparison of the overall comprehensiveness rate between any two of the seven form formats indicated that 17 out of 21 pairs of forms had statistically significant differences (p<0.05). Specific comparison between any two of seven form formats at each information category level showed that 145 out 210 pairs of forms (69%) for an information category had statistically significant differences (p<0.05).

A statistically significant increase in the overall comprehensiveness rate was found in the admission forms in the EHRs compared with paper-based forms (40.0% vs 28.6%, p<0.01). At the level of information category in a form, significant increases (p<0.01) in the electronic forms were found in the data categories of ‘Admission Details’, ‘Baseline Health Ranges’, ‘Membership’, ‘Demographic’, and ‘General Contact’. There was a significant decrease with ‘Completion of Form’ and ‘Health History’ (p<0.01). No change was found in the categories of ‘Doctor’ and ‘Legal Contact’. The difference for the category ‘End of Life Wishes’ was not significant. Figure 4-2 presents the comparison of mean comprehensiveness rates between paper-based and electronic admission forms in total and by information categories.

\[\text{Note: the bar on the top of each histogram is standard error}\]

*Figure 4-1.* Comparison of median completeness rates of common items between paper-based and electronic admission forms by each pair

- 94 -
Figure 4-2. Comparison of mean comprehensiveness rates of admission forms between paper-based records and EHRs in total and by information categories

4.4.4 Frequencies of documented items in admission forms between paper-based records and EHRs

Items of the admission forms were put into groups according to their frequency of documentation among the samples. Sixteen data elements were often recorded (frequency >70%) and 44 were infrequently recorded (frequency<30%) in both documentation systems. Some data elements were frequently documented in paper-based forms, but were seldom present in EHRs forms, or vice versa. (Table 4-4)

4.4.5 Association between number of items and completeness and comprehensiveness rate of admission forms

The overall completeness rate was negatively associated with the total number of items for both paper-based and electronic admission forms, but the trend was not statistically significant. However, at the level of each information category, the negative association between the completeness rate and the number of items designed in a form was statistically significant for paper-based forms (correlation...
Table 4-4. Admission form items in groups by level of frequency of documentation

<table>
<thead>
<tr>
<th>Group</th>
<th>Items</th>
</tr>
</thead>
<tbody>
<tr>
<td>Items with a high frequency of documentation (&gt;70%) in both paper-based and electronic forms</td>
<td>Full name, DOB, gender, religion, marital status, country of birth, aged care facility, admission date, allergies, medical/surgical diagnosis, Medicare card number, doctor name, primary contact name, primary contact relationship, primary contact address, primary contact phone, next of kin name, next of kin relationships, next of kin address, next of kin phone no.</td>
</tr>
<tr>
<td>Items with a low frequency of documentation (&lt;30%) in both paper-based and electronic forms</td>
<td>Resident phone number, secondary language, interpreter needed, working company, other information, resident UR number, medical record number, external cause of injury and poisoning, place of occurrence of injury, Flu vaccination, chest x-ray, psychiatric history, weight, blood sugar level, blood pressure, pension/benefit card number, Australian DVA card number, hospital insurance, private health insurance provider, private health insurance/fund number/table, ambulance fund, diabetes association number, electoral roll, war service, funeral directive phone number, advanced care directive, summary of wishes, doctor address, doctor email, primary and secondary contact and next of kin’s email and fax, power of attorney’s address and email, guardianship’s name, address, phone and email, location of will, solicitor’s name and phone number, name of nurse completing the form.</td>
</tr>
<tr>
<td>Items with a high frequency of documentation (&gt;70%) only in electronic forms.</td>
<td>Title, preferred name, primary language, Aboriginal or Torres Strait Islander, diet, room, location, medication trolley, admission status, entry type, resident category, funeral arrangement, doctor phone.</td>
</tr>
<tr>
<td>Items with a high frequency of documentation (&gt;70%) only in the paper-based forms</td>
<td>None</td>
</tr>
<tr>
<td>Items with a low frequency of documentation (&lt;30%) only in the electronic forms.</td>
<td>Age, resident usual address, admitted from/source of referral, other health condition present, drugs on admission.</td>
</tr>
<tr>
<td>Items with a low frequency of documentation (&lt;30%) only in the paper-based forms</td>
<td>Title, preferred name, diet, room, bed, location, medication trolley, photo taken, admission status, entry type, resident category, care recipient ID, height, Centrelink number, Medicare card member number, name as it appears on Medicare card, Medicare card expiry date, transport access scheme, doctor fax, secondary contact name, secondary contact relationship, secondary contact address, secondary contact phone number, power of attorney type, power of attorney name, power of attorney phone number.</td>
</tr>
<tr>
<td>Items with a frequency between 30% and 70% in both paper-based and electronic forms</td>
<td>Pension type, funeral director/undertaker.</td>
</tr>
</tbody>
</table>
coefficient -0.26, p<0.001). This implies that when collecting the same sort of information in a paper-based admission form, increasing the data items in an admission form is associated with a decreased completeness rate, whereas no such tendency was identified in electronic admission forms. There was a weak positive correlation between the number of data items and completeness rate (correlation coefficient 0.055, p<0.01). This suggests that when collecting the same type of information in an electronic form, increasing the number of items is associated with an increased completeness rate.

The associations between the comprehensiveness rates and the number of items were highly significantly positive at an overall and at each information category level in both paper-based and electronic admission forms (Table 4-5).

<table>
<thead>
<tr>
<th>Correlation variables</th>
<th>Paper-based admission forms</th>
<th>Electronic admission forms</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Correlation coefficient</td>
<td>P value</td>
</tr>
<tr>
<td>Total number of items vs overall completeness rate</td>
<td>-0.156</td>
<td>0.06</td>
</tr>
<tr>
<td>Number of items vs completeness rate for each category</td>
<td>-0.260</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Total number of items vs overall comprehensiveness rate</td>
<td>0.527</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Number of items vs comprehensiveness rate for each category</td>
<td>0.612</td>
<td>&lt;.001</td>
</tr>
</tbody>
</table>

4.5 Discussion

This study used a qualitative approach to derive a checklist of resident admission data that covers all of the information items in seven admission forms used in nine aged care homes. The quality of documentation of paper-based and electronic resident admission forms was quantitatively measured and compared to reflect the extent to which resident admission data were recorded. The measurement was undertaken at three levels in each form: overall, by information category and by individual data element. Three measures were used in the study: completeness rate, comprehensiveness rate and the frequency of documented data element. Additionally, the associations between the number of items and their completeness and comprehensiveness rates were identified at overall and information category levels for all the forms and between paper-based and electronic forms.
Electronic admission forms had better completeness and comprehensiveness rates than paper-based forms. This evidence was further supported by a comparison of completeness rates between the common items in two pairs of paper-based forms and their electronic derivatives (Form 3 vs 6 and Form 5 vs 7). A higher completeness rate in the electronic forms may imply that the EHRs are more convenient for nursing staff to enter data items than paper-based record systems. This result is consistent with the previous findings that the use of EHRs was conducive to more complete documentation by health care professionals (Hayrinen et al. 2008). An increased comprehensiveness rate in electronic admission forms suggests that more resident admission data is contained in the EHRs. This should facilitate nurses and other care staff in conducting risk assessment and planning more appropriate care for residents.

Despite the enhanced quality of documentation of resident admission data in the EHRs, the overall completeness and comprehensiveness rates for both paper-based and electronic admission forms were not high. In regard to the completeness rate, only about 56% of items in the paper-based forms and 60% of those in the current EHRs were recorded. The overall comprehensiveness rate was also low for both paper-based forms and electronic forms (29% and 40% respectively). Incomplete documentation implies that the reliability and validity of the information source is compromised (Larrabee et al. 2001), indicating a need for improvement.

The quality of nursing documentation has three characteristics: documentation structure and format, documentation process and documentation content (Wang et al. 2011). Electronic documentation systems are supposed to improve documentation quality through addressing these three characteristics. Poor completeness and comprehensiveness rates identified in this study can reflect the nurses’ poor documentation behaviour and might also be attributed to the inapplicability of items to the residents. These problems are related to documentation process and content. Electronic documentation systems need to facilitate the documentation process by enhancing nurses’ entry of data. This can be achieved through means such as increasing nurses’ access to the records and providing training to nurses to improve their skills in using electronic systems. In relation to the content of documentation, defining relevant and adequate items is important (Oroviogoicoechea et al. 2008).
Based on these, nurses can more proactively and systematically gather residents’ information on admission.

A factor that might have led to low completion of some items is the narrative nature of these items. Nurses might have difficulty in capturing information for these items accurately and completely, in both paper-based and EHR systems. In relation to the use of electronic systems, nurses’ lack of typing skills may cause incomplete or inaccurate recording of the narrative clinical items.

Poor comprehensiveness rate was further determined by the variation in the number and types of items among different form formats, which resulted in more data elements in the checklist. Difference in the formats of admission forms may also raise the question of what items are essential for collecting relevant resident data to meet care and management purposes. Unnecessary items in the forms might compromise the privacy of residents and add to nurses’ workload, thus being counter-productive, discouraging nursing staff from documentation.

Resident admission forms contained a wide range of information concepts under 10 categories. It appears that nurses tended to record certain items more often than the others. Frequently completed items were mainly under the categories of ‘demographic’ and ‘admission details’ for both paper-based and electronic forms. Poorly completed items in both paper-based and electronic forms were mainly under the categories of ‘membership’ and ‘legal contact’. These items might not be applicable to the residents, but the nurses needed to at least document a ‘n/a’ or ‘nil’ in the data fields to inform the message receivers that the information items had been reviewed. As many older people in residential aged care homes have poor cognitive capacity (Netten et al. 2001), incomplete documentation of essential information about these older people might lead to sub-optimal care without comprehensive understanding about their health and life style needs.

The items under the category of ‘baseline health ranges’, which were added to one of the EHRs being widely used in seven homes, were poorly completed. On the other hand, items such as ‘History of Injury’, ‘Flu Vaccination’, ‘Chest X-ray’, ‘Psychiatric Diagnoses’ were not formatted in this new EHR. A lack of this information in the current electronic forms may restrict the planning of appropriate care to residents. The solution for this problem may be recording them in other
sections of the EHRs such as assessment forms, but this may cause confusion to nurses when retrieving the information for immediate use in planning care. Redundancy of documentation could also be a concern if these data were stored in other sections of the systems.

An analysis of the association between the number of items and completeness rate at each information category level reveals a slight negative correlation for paper-based and electronic admission forms respectively. A strong positive correlation was found between the number of items and the comprehensiveness rate for both paper and EHR forms. However, a high completeness rate does not necessarily mean that more information is collected. For example, a form with a higher completeness rate, but fewer items may not contain more information than a form which has more items, but a lower completeness rate. This measure can only indicate the extent to which items in a form are documented by a nurse when different formats of forms are compared. For the same format of forms, however, it could reflect the usefulness of items or the nurses’ documentation behaviour if a low completeness rate is obtained by the forms. On the other hand, a comprehensiveness rate can tell how much information is collected in a form relative to a common checklist and therefore makes different forms with varying number of items comparable. The results of the correlation analysis described above may indicate that when collecting the same sort of information in a paper-based form, increasing the number of items could lead to more data captured, though it might cause nurses to be more reluctant to complete these items, resulting in decreased completeness rate of the forms. The situation in the electronic admission forms was different. The amount of information and the completeness both increased, regardless of whether the number of items in a form increased. These relationships between the number of items designed in a form and the completeness and comprehensiveness rates may provide implications for the design of a form.

The study has also identified issues with coding or terminologies in paper-based forms. For example, in Form 1 under the information category of ‘health history’, several items were designed to capture information about a resident’s different diagnoses. The meanings of these items could overlap or be vague to nurses and this might be the reason for the low completeness rate for this category (36%). Another example is that items referring to the same concept were given different names in
different form formats. For instance, ‘Doctor’ was named ‘Physician’, ‘Medical Doctor’, ‘General Practitioner’, or ‘Medical officer’ in different forms. Application of standardized terminology would ensure the semantic interoperability of EHRs for communication between systems (Ahmadian et al. 2010).

There are several limitations to the study. The admission forms were conveniently collected from nine aged care homes in three organizations. As there was a relatively consistent approach to the documentation in the aged care organization, our results are representative of the documentation practice within the participating homes or organizations. However, the results may not fully reflect the practice of recording resident admission data in other aged care homes or organizations. In addition, the development of the checklist and the analysis of data did not take into account the narrative nature of some items in the admission forms. Moreover, the study focused on the occurrence of documentation and did not consider what had been recorded. This could cause bias to the study results if inconsistent or inaccurate information had been recorded.

4.6 Conclusion

Varying documentation practices existed with previous paper-based systems in collecting resident admission information. The implementation of the electronic nursing documentation system standardized various formats of paper-based admission forms across the aged care homes and organizations. It also contributed to better quality of documentation of resident admission forms. This gives an indication of the benefits of using EHRs in the aged care setting. However, the resident admission forms in the EHRs were still incomplete, implying a need for further improvement in practice. The quality of documentation should be analyzed by examining its content. This study analyzed the data coverage of different admission forms and their completeness both in general and in different information categories. This information will have implications for better design of electronic forms.

Further studies are needed on what information is essential to collect from residents on their admission; what factors lead to incomplete documentation in admission forms; what factors cause varying documentation practices and what is the impact of poor documentation on the quality of care and safety of residents.
Reference:


CHAPTER 5. COMPARISON OF THE QUALITY OF PAPER-BASED AND ELECTRONIC DOCUMENTATION: RESIDENT ASSESSMENT FORMS

5. 1 Introduction
This chapter describes a nursing documentation audit study focusing on the quality of paper-based and electronic resident assessment forms. Resident assessment forms constitute an important part of resident records. They contain information about a resident’s condition, based on which nurses can draw nursing problems or diagnosis for the resident. In response to the aged care accreditation and funding requirements, a series of assessment forms need to be completed for a resident at admission and on an ongoing basis during his/her residency in an aged care home. Quality documentation of nursing assessments is necessary for planning appropriate interventions for the residents and detecting changes of resident health status to determine the effectiveness of the care.

To determine the capacity of the electronic documentation systems to undertake and record comprehensive nursing assessment for the residents as required, a study to compare the quality of nursing assessment documentation in the electronic documentation systems in comparison with the paper-based systems was conducted. The objectives of the study were to:

1) describe the practice of nursing assessment documentation in the participating aged care homes,

2) compare the quantity of nursing assessment documentation obtained using the paper-based and electronic documentation systems, and

3) compare the quality of nursing assessment documentation between the paper-based and electronic systems.

5. 2 Background

5.2.1 The concept of nursing assessment and its documentation
To evaluate the quality of nursing assessment documentation, it is necessary to clarify the concept of nursing assessment as the entity to be documented. Nursing
assessment, which is the first stage of the nursing process, is an important task which nurses carry out on a daily basis during their care practice in health care settings. ‘It is cyclic, requiring ongoing planning, evaluation and reassessment’ (Curtis et al. 2009, p131). During nursing assessment, a nurse systematically collects, verifies, analyses and communicates a health care client’s information to derive a nursing diagnosis and plan individualized nursing care for the client (Crisp et al. 2005). Complete and accurate nursing assessment determines the accuracy of the other stages of the nursing process (White 2002).

To further understand the term ‘nursing assessment’, Beckwith et al. (2010) conducted a systematic review of the health care literature to derive a better operational definition. From this, they identified a core conceptual category of ‘judicial’ for the term nursing assessment. As a way of knowing, the judicial category involves a cognitive judgement making process when nurses undertake nursing assessment. During this process, observed data are interpreted through processes of induction, deduction, and analytical reasoning to reach a nursing diagnosis for planning appropriate care. In this review, the authors also derived another six categories including ‘influenced by’, ‘dependent upon’, ‘identification of indicators’, ‘identification of cues’, ‘part of the nursing process’ and ‘theoretically’. These categories have a close relationship with the core category of ‘judicial’. For example, judgment making is influenced by the experience and knowledge of a nurse and depends upon a nurse’s skill. It also requires cues and indicators which allow a patient’s condition and needs to be identified. Therefore, nursing assessment is linked to intuition and practical, theoretical and experiential knowledge.

The documentation of nursing assessment is the recording of the process about how a judgment was made and its related factors, in addition to the result of the judgment. It makes the process of nursing assessment visible through what is presented in the documentation content (Oroviogoicoechea et al. 2008).

5.2.2 The framework of nursing assessment and its documentation

A framework of nursing assessment is an instrumental guide or assessment tool which defines a range of care domains and helps a nurse to conduct comprehensive and sensitive assessment of a client’s health condition and care needs.
Within the aged care context, numerous operational assessment frameworks have been established both internationally and in many local environments for the conduct and documentation of nursing assessment to guide the planning and provision of care. These assessment frameworks have adopted the holistic model of health, emphasizing social, economic and cultural factors which affect health, as well as individual behaviour. Nursing assessment is not solely limited to physical assessment.

A well-known and widely applied assessment instrument is the Resident Assessment Instrument / Minimum Data Set (RAI/MDS) developed in the US. It covers a resident’s care needs within 18 domains such as cognitive loss, communication, psycho-social well-being, mobility, skin condition, medications and activities of daily living (ADLs) (Glenny and Stolee 2009, Straker and Bailer 2008).

Another example is the Royal College of Nursing’s Older People Assessment Tool that was developed in UK. It contains three essential care components: ‘maximising life potential’, ‘prevention and relief of stress’, and ‘promotion and maintenance of health’. Under these three components, there are 23 specific categories of ability or needs of older people such as spiritual fulfilment, cognition, communication and mobility (Royal College of Nursing 2004).

The VIPS model as a documentation framework was developed in Sweden. The acronym of VIPS stands for the Swedish terms for well being, integrity, prevention and safety (Darmer et al. 2006). In relation to assessing a client’s situation and status, the model contains thirteen key words such as communication, skin, sleep, psycho-social, emotions and medications as assessment domains or categories (Björvell et al. 2000).

5.2.3 Nursing assessment in Australian aged care homes

The contextual framework of nursing assessment for the Australian aged care setting is determined by Aged Care Accreditation Standards (The Aged Care Standards and Accreditation Agency Ltd 2011). The standards have defined the scope of care including nursing assessment in Australian aged care homes. Similar to the international frameworks mentioned above, these standards cover a wide range of resident health status or care needs, from health, personal care and safety to a range
of lifestyle matters including independence, privacy and dignity (Australian Government Department of Health and Ageing 2007a).

The Aged Care Funding Instrument (ACFI) was introduced in March 2008 by the government as a new means of allocating funding to residential aged care providers replacing the Resident Classification Scale (RCS). ACFI emphasizes the assessment of residents’ care needs through the use of standard assessment tools in three domains: activities of daily living (ADLs), behaviour supplement and complex health care supplement (Australian Government Department of Health and Ageing 2007b). This funding instrument may have impact on aged care documentation practice primarily in regard to nursing assessment.

The participating aged care organisations have developed their organisational documentation protocols. These protocols contain detailed requirements which give nurses practical guidance on how to conduct and document resident assessments within a range of domains following admission of residents into the homes. The range of care needs covered by the protocols is consistent with the care scope defined in the accreditation standards.

5.2.4 Previous studies on the quality of nursing assessment and its evaluation

The quality of nursing assessment documentation has been evaluated in previous studies, which applied various measures to focus on different constructs of quality of nursing assessment documentation for different study purposes. A number of studies have focused on the presence of particular assessment data relating to specific clinical issues to assess the nurses’ professional practice embodied in documentation (Barry et al. 2002, Gunningberg and Ehrenberg 2004, Eid et al. 2008, Ehrenberg et al. 2004, Bååth et al. 2007, Altken et al. 2006). For example, Barry et al. (2002) identified poor documentation of vital signs and physical assessment for residents with acute change in condition in nursing home settings.

Davis et al. (2000) had evaluated the documentation of health status as care outcome assessment at an academic nursing clinic. Their study used the Wilson and Cleary Health Related Quality of Life (HRQOL) conceptual model as a framework to determine the characteristics of nursing practice. The model contained a series of variables such as biological variables, functional status, symptoms and the
characteristics of environment. The presence and absence of documentation of these variables was identified in the study.

Björvell et al. (2002) and Darmer et al. (2006) measured the quality of nursing documentation in hospital settings after the implementation of a standardized documentation system using the VIPS model. These studies used the ‘Cat-ch-ing’ instrument with a 4-point scale from zero to three to measure documentation quality. The instrument contains four items addressing the quality and quantity of nursing assessment referred in the study as ‘nursing status’ on arrival and for ongoing updates. The quantity referred to the presence of documentation of the relevant nursing status keywords that were pre-structured in the system. The system contains 19 keywords such as communication, nutrition, skin/tissue, wound, sleep and pain, which defined the scope of patient care needs. The quality was defined as the extent to which the notes are clear, linguistically correct, concise without unnecessary wording, and contain all pertinent information about a patient.

In relation to electronic documentation systems, Mahler et al.’s (2007) study measured the presence of nursing assessment documentation following the implementation of an electronic documentation system in a hospital. The study results showed significant increase in the percentage of patient records with nursing assessment documentation after implementation of the system.

5.3 Method

5.3.1 Study design
This was a nursing documentation audit study. A retrospective review and comparison of paper-based and electronic resident assessment forms was carried out.

5.3.2 Study sites
The study was conducted at nine residential aged care homes belonging to three not-for-profit aged care organisations in Australia. Electronic documentation systems were implemented in the aged care homes at different times since 2005. The documentation audit was carried out between August 2010 and June 2011.
5.3.3 Participants

The study participants were residents whose nursing assessment forms were accessed by the researcher with the informed consent of the residents and/or their families. The residents were considered eligible for the study if they had stayed in the nursing home long enough to undergo a complete admission assessment.

5.3.4 Study sample

The samples of the study were resident assessment forms contained in a total of 159 paper-based and 249 electronic resident records, which were selected using convenience sampling from the resident from whom consent was acquired. The sample size referred to the total number of resident records; it varied for different measurement items, depending on the availability or the suitability of the records. The specific sample size for each of the measurement items in a documentation medium and the justification for the inclusion of the samples are presented in Table 5-1 in the next section.

5.3.5 Measurement approaches

The study was intended to comprehensively assess the quality of both paper-based and electronic resident assessment forms. The measurement approaches used in the previous studies were considered inadequate to meet these study purposes. Therefore, the study developed five measures: 1) quantity of resident assessment forms, 2) completeness of resident assessment forms, 3) timeliness of documentation of resident assessment forms, 4) comprehensiveness of resident assessment forms in accordance with defined care domains in the accreditation standards and 5) frequency of nursing assessment forms among the samples specific to each care domain. Sample size for each of these measures and the inclusion criteria are displayed in Table 5-1.

To measure the quantity of nursing assessment documentation in each record between the two types of documentation systems, the percentage of resident records with nursing assessment forms was calculated. The number of assessment forms in a record was also counted. The mean number of the documented assessment forms in a record was compared between the paper-based and electronic documentation systems.
<table>
<thead>
<tr>
<th>Measure</th>
<th>Sample</th>
<th>Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quantity of resident assessment forms</td>
<td>159 paper-based vs 249 electronic records</td>
<td>All resident records were included.</td>
</tr>
<tr>
<td>Completeness of resident admission assessment forms</td>
<td>139 paper-based vs 145 electronic records</td>
<td>Excluded paper-based records from which admission assessment forms are missing. Excluded electronic records which did not contain any admission assessment forms where residents were admitted before the implementation of the electronic systems and hybrid systems were used in some homes during the gradual implementation of the systems.</td>
</tr>
<tr>
<td>Completeness of resident ongoing assessment forms</td>
<td>104 paper-based vs 163 electronic records</td>
<td>Excluded paper-based and electronic records which did not contain any ongoing assessment forms. The reason for the absence of ongoing assessment forms in the paper-based records was not clear. Eighty-six electronic records lacked ongoing assessment forms due to a few possible reasons: 1) ongoing assessment was documented in the original admission assessment forms in Organisation 1; 2) some residents were not due for ongoing assessments; 3) use of paper forms for ongoing assessment; 4) the ongoing assessment forms were not documented by the nurses.</td>
</tr>
<tr>
<td>Timeliness of documentation of resident assessment forms</td>
<td>121 paper-based vs 145 electronic records</td>
<td>Included the records which contained admission assessment forms. A number of paper-based records were further excluded because the assessment forms were not dated.</td>
</tr>
<tr>
<td>Comprehensiveness of assessment forms</td>
<td>135 paper-based vs 141 electronic records</td>
<td>The comparison was made between residents who were admitted before and after the implementation of the electronic systems respectively.</td>
</tr>
<tr>
<td>Frequency of nursing assessment forms</td>
<td>135 paper-based and 141 electronic records</td>
<td>The comparison was made between residents who were admitted before and after the implementation of the electronic systems.</td>
</tr>
</tbody>
</table>
The completeness and timeliness of nursing assessment documentation were determined by three relevant questions A2, A3 and A5 in our instrument: the Quality of Australian Nursing Documentation in Aged Care (QANDAC) instrument developed for measuring the quality of nursing documentation in Australian aged care homes (referred to in Chapter 3). These questions included:

A2. Are resident admission assessment forms complete?

A3. Are resident ongoing assessment forms complete?

A5. Are those assessment forms completed in a timely fashion according to the residential aged care home’s defined protocol?

Completeness was defined as the extent to which items in an assessment form were filled in by a nurse. The timeliness of nursing assessment documentation referred to the extent to which assessment forms were documented within a timeframe required by the aged care organisation. A five-point Likert scale from 0 to 4 was used to grade each assessment form according to the answers given to the above three questions. For questions A2 and A3 assessing the completeness of admission and ongoing assessment forms, each assessment form was scored on the proportion of completed items to the total items in the form. The ranks for the completeness score were: a score of four was given to an assessment form with 100% of items completed; a score of three was given to a form when greater than 66.6%, but less than 100% of items in the form were completed, a score of 2 was given if 33.3% to 66.6% of items were completed and a score of one was given to a form if less than 33.3% of items in the form had been completed. A score of zero was given to a form with all items incomplete. As each resident’s record can have a number of assessment forms, the mean score of assessment forms was used for each record.

Similarly, for timeliness of completion of assessment forms, a score of four was given to a record when all of the assessment forms were completed within the timeframe as required by the home; a score of three was given if more than 66.6%, but less than 100% of forms were completed within the timeframe; a score of two was given when more than 33.3% but less than 66.6% of forms were completed within the timeframe. When no assessment form was completed within the timeframe, a score of zero was given.
Comprehensiveness referred to the extent to which documented assessment forms covered the required scope of care needs. For this measure, a checklist with a range of assessment domains was established in accordance with the aged care accreditation standards and the existing aged care documentation practice in the participating organisations. It contains 16 domains as shown in Table 5-2. These domains were validated with five nursing managers in a meeting in one of the participating aged care organisations and a full consensus by the managers was obtained. When auditing the records, a dichotomous scale with ‘yes/no’ options was adopted to score each record depending on the presence or absence of the documentation of an assessment domain. One point was given to a ‘yes’ option and zero point was given to a ‘no’ option. The comprehensiveness rate was calculated as the percentage of assessment domains in the checklist covered by the nursing assessment documentation in each record.

The frequency of nursing assessment documentation referred to the presence of assessment documentation specific to each assessment domain of the checklist among the samples (records). For example, specific to pain assessment documentation, the frequency was calculated as the number of records with presence of pain assessment documentation divided by the total number of the records being audited. Such a measure could reflect the extent to which specific resident care needs such as pain and mobility were addressed by the nursing assessment documentation among the residents.

<table>
<thead>
<tr>
<th>Specialized needs</th>
<th>Continence</th>
<th>Emotion</th>
<th>Nutrition/hydration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Medication</td>
<td>Behaviour</td>
<td>Leisure/lifestyle</td>
<td>Skin care</td>
</tr>
<tr>
<td>Pain</td>
<td>Mobility</td>
<td>Cultural/spiritual</td>
<td>Sensory/communication</td>
</tr>
<tr>
<td>Palliative</td>
<td>Oral/dental</td>
<td>Personal hygiene</td>
<td>Sleep</td>
</tr>
</tbody>
</table>

5.3.6 Data analysis

Raw data was entered into an Excel spread sheet and then imported to an SPSS (1.8 version) file for statistical analysis. Descriptive statistics were used to present the results of quantity of nursing assessment documentation. As the data set was not
normally distributed, the non-parametric Mann-Whitney U test was employed to identify any significant difference between the paper-based and electronic systems in the number of documented assessment forms, scores of quality of nursing assessment documentation and the comprehensiveness rates of nursing assessment. The Pearson’s chi-square test was used to test the difference in the frequencies of nursing assessment documentation between paper-based and electronic systems specific to each assessment domain. A p-value less than 0.05 was considered statistically significant.

5.4 Results

5.4.1 The practice of nursing assessment documentation among participating aged care homes

All of the participating homes required the conduction and documentation of admission assessments when a resident was admitted into the home. Ongoing assessments were also required during the resident’s stay in the home. Documentation of admission assessment usually included a series of assessment forms addressing the care needs of the residents in accordance with the aged care accreditation standards. These assessment forms needed to be completed within certain timeframes as per organisational requirements. Ongoing assessment was conducted and documented on a regular basis or when the resident’s condition changed.

However, there were distinct documentation practices at the operational level among these homes. This was reflected across several areas: 1) difference in the use of electronic systems including the brands of computer software used and the levels of application of the electronic systems for assessment documentation, 2) varying organisational requirements for admission and ongoing nursing assessment and 3) difference in the formats of the paper-based and electronic nursing assessment forms.

Difference in the use of electronic documentation systems among the aged care homes

Table 5-3 illustrates the type of electronic documentation systems used in each home, the time the system was introduced and the medium in which nursing assessment was recorded.
Table 5-3. The software used, time the electronic documentation system was introduced and medium in which nursing assessment was recorded

<table>
<thead>
<tr>
<th>Organisation 1</th>
<th>Organisation 2</th>
<th>Organisation 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Home A</td>
<td>Home B</td>
<td>Home C</td>
</tr>
<tr>
<td>Type of electronic system</td>
<td>Software1</td>
<td>n/a</td>
</tr>
<tr>
<td>Implementation date</td>
<td>08/2005</td>
<td>n/a</td>
</tr>
<tr>
<td>Medium for documentation of nursing assessment</td>
<td>All electronic</td>
<td>hybrid</td>
</tr>
<tr>
<td></td>
<td>Home D</td>
<td>Home E</td>
</tr>
<tr>
<td></td>
<td>Home G</td>
<td>Home H</td>
</tr>
</tbody>
</table>

Two types of commercial electronic documentation systems were used by the participating aged care organisations: Software1 was implemented in Organisation 1 and Software2 in Organisations 2 and 3. The two systems contained assessment forms in different formats, covering a similar scope of health status and care issues for the residents as required by the accreditation standards. Generally, the structure of the software was a close replication of the previous paper-based systems.

Most participating aged care homes had changed the platform for the nursing assessment documentation from paper-based to electronic at the time of data collection. However, hybrid systems (both paper-based and electronic) were used in two homes during the transition process, even though all of the electronic formats of assessment forms were available by then.

Difference in the organisational requirements for nursing assessment documentation

Each of the three participating aged care organisations had their own documentation requirements with regard to the numbers and type of assessment forms to be used and the timeframes for the documentation of admission and ongoing assessment for residents. A summary of the requirements for nursing assessment in each organisation is displayed in Table 5-4.
Table 5-4. The documentation protocol of nursing assessment in each organisation

<table>
<thead>
<tr>
<th>Type of requirements</th>
<th>Organisation 1 protocol (Home A and B)</th>
<th>Organisation 2 protocol (Home C, D, E, F)</th>
<th>Organisation 3 protocol (Home G, H, I)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of admission assessment forms</td>
<td>10 compulsory</td>
<td>18 compulsory + 9 additional if required</td>
<td>&gt;50 for different homes to select based on their preference</td>
</tr>
<tr>
<td>Timeframe for the completion of admission assessment forms</td>
<td>56 days</td>
<td>Within 28 days</td>
<td>Within 35 days</td>
</tr>
<tr>
<td>Timeframe for the completion of an ongoing assessment form</td>
<td>Overall re-assessment conducted annually; ongoing assessment when condition changes</td>
<td>Overall re-assessment annually; two monthly ongoing assessment and assessment when condition changes</td>
<td>Ongoing assessment when condition changes</td>
</tr>
</tbody>
</table>

Difference in the formats of paper-based and electronic assessment forms among participating aged care homes

Paper-based assessment forms format

The same type of assessment was recorded in different formats of paper-based assessment forms in different aged care organisations. There were also changes in the format of assessment practice over time in a home for the same type of assessment.

All paper-based assessment forms were pre-structured with items, which had tick box answers to select from, yes or no options to choose, or a data field for entering free-text narrative. A few assessment forms such as manual handling assessment and mobility assessment, however, were in a chart format with graphics to highlight. In addition, some forms such as pain and mental status assessment forms had scales into which a score was required to be given.

Electronic assessment forms format

Although the same electronic documentation system was used, the format of the assessment forms was different between Organisation 2 and 3. In Organisation 2, the format of assessment forms was generally standardized. In Organisation 3 however, different format of assessment forms was found in various homes or within one
home. For example, in Home I, three assessment tools were used for pressure ulcer risk assessment for different residents contemporaneously. These included the ‘Norton Scale for Predicting Risk of Pressure Ulcer’, the ‘Ramstadius Pressure Ulcer Risk Assessment and Assessment Tool’, and the ‘Braden Risk Assessment Scale’.

Data entry method for these fixed-format electronic assessment forms included selection from a drop down list with the most items in a form and entering free text into a data field for some items such as ‘Additional Comment’.

5.4.2 Comparison of quantity of nursing assessment documentation between paper-based and electronic documentation systems

Fourteen out of 159 paper-based records (9%) contained neither admission nor ongoing resident assessment forms. In contrast, all of the 249 electronic resident records contained documented assessment forms, either admission or ongoing.

The mean number of documented assessment forms in each record was 28.10 (SD 17.52) in the electronic systems and 14.46 (SD 8.45) in the paper-based systems, indicating a significant increase in the quantity of nursing assessment documentation in the electronic systems (p<0.001).

5.4.3 Comparison of completeness and timeliness of nursing assessment between the paper-based and electronic documentation systems

Table 5-5 illustrates the scores for the completeness of admission and ongoing forms and the timeliness of completion of admission assessment forms for the paper-based and electronic documentation systems at the overall and individual organisational levels.

Overall, there was no statistically significant difference in the completeness score between the paper-based and electronic admission assessment forms. The completeness score for electronic ongoing assessment forms was lower than that for the paper-based ongoing forms (p<0.001). The score for the timeliness of documentation of admission forms was also lower in the electronic than in the paper-based systems (p<0.001).
Table 5-5. Summary of scores for completeness of admission and ongoing assessment forms and timeliness of completion of admission assessment forms overall and at individual organisational levels

<table>
<thead>
<tr>
<th>Instrument questions (n = sample size)</th>
<th>Mean score (SD)</th>
<th>Median score (IQR)</th>
<th>P value (Non-parametric Mann-Whitney U test)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall completeness of admission assessment forms (139 vs 145)</td>
<td>3.24 (0.60)</td>
<td>3.28 (0.42)</td>
<td>3.25 (0.60)</td>
</tr>
<tr>
<td>Organisation 1 (29 vs 31)</td>
<td>3.30 (0.40)</td>
<td>3.71 (0.40)</td>
<td>3.40 (1.00)</td>
</tr>
<tr>
<td>Organisation 2 (60 vs 68)</td>
<td>3.37 (0.54)</td>
<td>3.23 (0.28)</td>
<td>3.50 (0.60)</td>
</tr>
<tr>
<td>Organisation 3 (47 vs 46)</td>
<td>3.09 (0.59)</td>
<td>3.04 (0.41)</td>
<td>3.00 (0.00)</td>
</tr>
<tr>
<td>Overall completeness of ongoing assessment forms (104* vs 163)</td>
<td>3.46 (0.76)</td>
<td>3.13 (0.47)</td>
<td>3.50 (1.00)</td>
</tr>
<tr>
<td>Organisation 2 (43 vs 105)</td>
<td>3.39 (0.83)</td>
<td>3.14 (0.53)</td>
<td>3.60 (1.00)</td>
</tr>
<tr>
<td>Organisation 3 (41 vs 59)</td>
<td>3.21 (0.80)</td>
<td>3.12 (0.33)</td>
<td>3.50 (1.00)</td>
</tr>
<tr>
<td>Overall timeliness of completion of admission assessment forms (121 vs 145)</td>
<td>3.16 (1.39)</td>
<td>2.92 (1.10)</td>
<td>4.00 (1.00)</td>
</tr>
<tr>
<td>Organisation 1 (26 vs 31)</td>
<td>3.08 (1.52)</td>
<td>3.01 (0.97)</td>
<td>4.00 (1.00)</td>
</tr>
<tr>
<td>Organisation 2 (49 vs 68)</td>
<td>3.27 (1.27)</td>
<td>2.91 (1.06)</td>
<td>4.00 (1.00)</td>
</tr>
<tr>
<td>Organisation 3 (46 vs 46)</td>
<td>3.09 (1.46)</td>
<td>2.83 (1.27)</td>
<td>4.00 (1.00)</td>
</tr>
</tbody>
</table>

Notes: Organisation 1 was excluded for the analysis of completeness of ongoing assessment because in the electronic system, it was documented on the original admission assessment forms; *samples for the analysis of overall completeness of ongoing paper-based assessment included the assessment forms from organisation 1.

However, an analysis at each organisational level showed different situations. In Organisation 1, there was significant increase in the completeness score of admission assessment forms in the electronic compared with the paper-based system (3.71 vs 3.30, p<0.001). No difference was found in the timeliness of admission assessment between the two types of systems.

In Organisation 2, a significant decrease was found in the electronic compared with the paper-based system in the completeness score of admission and ongoing assessment forms.
assessment and the timeliness of admission assessment, (3.23 vs 3.37, 3.14 vs 3.39 and 3.07 vs 3.27, respectively, P<0.05).

In Organisation 3, there was no difference in the completeness scores of admission and ongoing assessment and the timeliness of admission assessment between the paper-based and electronic systems.

5.4.4 Comparison of comprehensiveness of assessment forms between paper-based and electronic systems

Table 5-6 displays the comparisons of the comprehensiveness of admission assessment forms between the paper-based and electronic systems overall and at each organisation level.

The mean overall comprehensiveness rate of nursing assessment documentation was 0.58 (SD 0.19) for the paper-based records and 0.66 (SD 0.17) for the electronic records in general for each resident. The difference between the two values was statistically significant (p=0.001).

An analysis within each of the organisations showed a significant increase in the comprehensiveness of admission assessment in the electronic system from 0.76 to 0.81 in Organisation 1 and from 0.49 to 0.61 in Organisation 2 (P<0.001). No statistically significant difference was found between the two systems in Organisation 3.

Table 5-6. Comparisons of the comprehensiveness proportions of admission assessment forms between the paper-based and electronic systems overall and at each organisation levels

<table>
<thead>
<tr>
<th>Instrument questions (sample size: paper vs electronic)</th>
<th>Mean score (Standard Deviation)</th>
<th>Median score (Interquartile range)</th>
<th>P value (Non-parametric Mann-Whitney U test)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall comprehensiveness proportion (135 vs 145)</td>
<td>Paper-based: 0.58 (0.19)</td>
<td>Electronic: 0.66 (0.17)</td>
<td>Paper-based: 0.56 (0.31) Electronic: 0.69 (0.28)</td>
</tr>
<tr>
<td>Organisation 1 (27 vs 31)</td>
<td>Paper-based: 0.76 (0.08)</td>
<td>Electronic: 0.81 (0)</td>
<td>Paper-based: 0.75 (0.06) Electronic: 0.81 (0)</td>
</tr>
<tr>
<td>Organisation 2 (53 vs 68)</td>
<td>Paper-based: 0.49 (0.19)</td>
<td>Electronic: 0.61 (0.20)</td>
<td>Paper-based: 0.50 (0.31) Electronic: 0.69 (0.30)</td>
</tr>
<tr>
<td>Organisation 3 (55 vs 46)</td>
<td>Paper-based: 0.58 (0.18)</td>
<td>Electronic: 0.64 (0.15)</td>
<td>Paper-based: 0.56 (0.31) Electronic: 0.69 (0.25)</td>
</tr>
</tbody>
</table>
5.4.5 Comparison of frequencies of assessment forms specific to each care domain between paper-based and electronic documentation systems

There were variations in the frequencies of nursing assessment documentation among the samples in each assessment domain in both paper-based and electronic documentation systems. These variations had a similar pattern between the two types of documentation systems (Figure 5-1). Statistically significant differences were found between the two systems in 10 out of 16 assessment domains (p<0.05): in seven domains, more residents had assessment forms in the electronic systems than in the paper-based ones; in contrast, in three domains, fewer residents had assessment forms in the electronic than in the paper-based systems. Detailed comparisons are shown in Table 5-7.

![Comparison of the frequency of documented assessment forms between paper-based and electronic records for each required assessment domain (n=135 vs 141 respectively)](image-url)
Table 5-7. Frequencies of documentation of paper-based and electronic assessment forms in each care domains among the samples

<table>
<thead>
<tr>
<th></th>
<th>Paper-based (n=135)</th>
<th>Electronic (n=141)</th>
<th>Pearson’s chi-square P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Specialized needs</td>
<td>0.30</td>
<td>0.49</td>
<td>0.001</td>
</tr>
<tr>
<td>Medication</td>
<td>0.43</td>
<td>0.59</td>
<td>0.006</td>
</tr>
<tr>
<td>Pain</td>
<td>0.60</td>
<td>0.80</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Palliative</td>
<td>0.01</td>
<td>0.00</td>
<td>0.489</td>
</tr>
<tr>
<td>Nutrition/hydration</td>
<td>0.90</td>
<td>0.77</td>
<td>0.003</td>
</tr>
<tr>
<td>Skin care</td>
<td>0.79</td>
<td>0.94</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Continence</td>
<td>0.93</td>
<td>0.86</td>
<td>0.052</td>
</tr>
<tr>
<td>Behaviour</td>
<td>0.49</td>
<td>0.38</td>
<td>0.049</td>
</tr>
<tr>
<td>Mobility</td>
<td>0.81</td>
<td>0.83</td>
<td>0.433</td>
</tr>
<tr>
<td>Oral/dental</td>
<td>0.55</td>
<td>0.77</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Communication/sensory</td>
<td>0.87</td>
<td>0.77</td>
<td>0.031</td>
</tr>
<tr>
<td>Sleep</td>
<td>0.64</td>
<td>0.73</td>
<td>0.079</td>
</tr>
<tr>
<td>Emotional support</td>
<td>0.53</td>
<td>0.51</td>
<td>0.447</td>
</tr>
<tr>
<td>Leisure/life style</td>
<td>0.33</td>
<td>0.70</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Cultural/spiritual</td>
<td>0.26</td>
<td>0.53</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Personal hygiene</td>
<td>0.82</td>
<td>0.80</td>
<td>0.387</td>
</tr>
</tbody>
</table>

5.5 Discussion

To our knowledge, this is the first study to assess the quality of nursing assessment documentation in an Australian aged care setting. The study employed retrospective record review to investigate the documentation practice in nursing assessment in the participating aged care organisations. It also used multiple measures to assess the quality of nursing assessment documentation in regard to the quantity, completeness, timeliness and comprehensiveness of the resident assessment forms and the frequencies of specific assessment in different care domains between the paper-based and electronic records. This provided an overall picture about the capacity of the paper-based and electronic documentation systems in aggregating resident assessment data for care and management purposes.

5.5.1 Nursing assessment documentation practice among participating aged care organisations

Under a common framework of nursing assessment for identifying and documenting the residents’ health status and care needs in accordance with aged care accreditation
standards (Aged Care Standard and Accreditation Agency Ltd 2011), there were variations in nursing assessment documentation at an operational level among the participating aged care organisations. This is reflected in several areas: use of different documentation systems; distinct organisational documentation requirements; and various formats of assessment forms. These differences in nursing assessment documentation practice among the organisations could be determined by their complex contextual factors (Oroviogoicoechea et al. 2008). It may be difficult to ascertain what the most effective documentation system is in clinical practice. In this study, we compared the quality of nursing assessment documentation between the paper-based and electronic systems within each organisation to reflect how the electronic systems performed in different contextual environments in undertaking the documentation task in comparison with their counterparts.

5.5.2 Comparison of quantity of nursing assessment documentation between paper-based and electronic nursing documentation systems

Resident assessment forms were missing in 9% of paper-based resident records, but were contained in all of the electronic records. The quantity of the documented assessment forms contained in the electronic systems was almost double that in the paper-based systems. This suggests better record keeping using the electronic systems compared with the paper-based ones. More complete and up-to-date information about residents’ conditions in the electronic documentation systems available to the care staff should better support the planning and provision of individualized care to the residents.

5.5.3 Comparison of completeness and timeliness of nursing assessment documentation between paper-based and electronic documentation systems

The mean scores of completeness for admission and ongoing nursing assessment forms in both the paper-based and electronic documentation systems were above three out of a full score of four, indicating that the most of items in the forms were completed. However, missing data for up to about 33% of the items in either type of the assessment forms could be essential for the nurses to make the correct judgment.
about the residents’ status. Incompleteness of these items might therefore, put at risk the planning of appropriate care for the resident.

Both types of admission assessment forms had a score of around three out of four for documentation within the organisational timeframes. The delay of the documentation of up to one third of the admission assessment forms in each record indicates that the requirements for timely documentation could not be fully met by either paper-based or electronic systems. It might also put at risk the planning of appropriate care for a resident following his/her admission.

It was anticipated that the implementation of the electronic systems could improve documentation efficiency in those organisations. However, this expectation of efficiency was not fully supported by the study results in terms of completeness of items in the forms and completing the forms within the required timeframe. In general, the electronic assessment forms were given a similar or lower score for the completeness or timeliness of documentation in comparison with the paper-based forms. To further understand whether there was any difference between the two types of systems, a specific analysis was undertaken at each organisational level, which revealed varying situations among the three organisations. In Organisation 1 where Software 1 was used, completeness was better in the electronic system than in the paper-based one. There was no difference in the timeliness of documentation between the two types of forms. Although Software 2 was used in Organisation 2 and 3, the number and format of assessment forms structured in the electronic system were different. The study results showed that both completeness and timeliness of documentation decreased in the electronic system in Organisation 2, but there remained no change in Organisation 3, in comparison with the paper-based systems. These findings may suggest that improvement in documentation could be determined by many complex factors such as organisational requirements and performance and designs of the forms rather than solely the use of computers. However, the study findings suggest a need for improvement in the use of the electronic systems in collecting adequate and timely resident data.

There could be complex factors influencing the documentation of assessment forms. First, it might be affected by issues relating to the platform of documentation systems such as the format and terminologies of the assessment forms. Both types of
assessment forms were in structured format: the paper-based assessment forms contained items with tick box, checklist or graphic answers for a nurse to select, whereas, the electronic assessment forms had a drop-down menu of answers for each item. These were all useful ways to support the completion of items in a form. The electronic system seemed to have no obvious advantage in this respect. Several other factors could also determine the completion of items in a form, including the applicability of an assessment item to the resident, the resident’s capacity to convey valid information to the nurse during the assessment process, the nurse’s workload, time pressure and attitude toward documentation and knowledge and skill in nursing assessment and its documentation (Cheevakasmsook et al. 2006; Daskein et al. 2009, Hsu et al. 2006). A nurse’s computer literacy and the organisational training strategies might affect their documentation of the forms (Yu and Comensoli 2004; Australian Government Department of Health and Ageing 2007c). There could also be workload or timing issues in using the electronic documentation systems; for example, it was found that the nursing staff complained of slow speed of the electronic systems in our study setting (Yu et al. 2008).

5.5.4 Comparison of comprehensiveness and frequency of nursing assessment documentation between paper-based and electronic systems

The comprehensiveness rate has reflected the extent to which the documented assessment forms for each resident covered the scope of care defined in the accreditation standards. On average about 58% and 66% of the required assessment domains for each resident were met by the paper-based and electronic assessment forms respectively. A comparison between the paper-based and electronic assessment forms in each of the three organisations showed improvement in the comprehensiveness of documentation of assessment in the electronic documentation system, though each organisation had individual assessment protocols and formats of assessment forms. This suggests that the electronic documentation systems may have facilitated comprehensive assessment for each resident. As all of the required forms were pre-structured in the electronic systems, easier access to various assessment forms in the electronic systems should lead to more comprehensive documentation of assessment. Despite the improvement in comprehensiveness of assessment in the electronic systems, the scope of care was still not fully covered by electronic
assessment forms. This study finding suggests a need for improvement in practice with the systems.

The frequency of assessment documentation specific to each assessment domain has provided detailed information about the proportion of the residents who had a documented assessment for a specific care need. The finding about this measure reveals similar patterns of assessment documentation between the paper-based and electronic systems, indicating consistent trends in focus of assessment documentation among the residents. This may be determined by the pattern of the residents’ health status and care needs, which should not be affected by the implementation of the electronic system. It might also reflect that the electronic systems did little to change nurses’ documentation practice in terms of prioritising specific care needs. With the electronic systems, more residents had documented assessment for seven out of 16 assessment domains such as specialized needs, medication, pain, leisure/lifestyle and cultural among the samples. On the other hand, for nutrition/hydration, behaviour and communication/sensory loss, fewer residents had documented assessment in the electronic systems. These study findings suggest areas for quality improvement of care services in the participating organisations.

5.5.5 Limitation of the study

There are some weaknesses with the study which need to be noted. First, the study used a convenience sampling method to collect data, so the sample records may not be representative of the documentation practice of the participating aged care organisations (Bethany and Marcello 2011). In addition, the descriptive nature of the study does not help draw a causal relationship between the electronic systems and the quality of nursing assessment documentation. Many potential factors affecting the study results could not be well controlled in this in situ study conducted in a natural aged care setting. For example, a new governmental aged care funding instrument (ACFI) was introduced during the period of implementation of the electronic systems in the aged care organisations. The funding instrument shifts focus onto the documentation of resident assessment rather than many components of the resident records such as care plans. Thus, the large number of assessment forms in the electronic systems revealed in the study might be attributed to the implementation of the new ACFI funding instrument instead of the electronic systems. However, such
expected impact from the ACFI could be counterbalanced by other factors which might lead to a decreased number of assessment forms in the records. For example, the use of hybrid systems in the two homes could reduce assessment documentation in the electronic systems. Also, the time period covered by the paper-based records should be much longer than that covered by the electronic records, so it was expected that the number of paper-based assessment forms should be higher than that of electronic forms. In addition, a big proportion of the residents participating in the study were admitted before the implementation of the electronic documentation systems, so their admission assessment forms could not be contained in the electronic documentation system, causing a smaller number of assessment forms in their electronic records. For the above reasons, we expected that the electronic records should contain far fewer assessment forms compared with the paper-based records, but the study yielded the opposite result. Although these factors were not controllable in the study, the intention of the study was to find whether there was difference in the availability of nursing assessment documentation between the paper-based and electronic resident records in facilitating care planning and evaluation.

5.6 Conclusion

While the electronic nursing documentation systems contained more documented assessment forms which focused on a wider range of resident care needs, the system did not perform better in the completeness and timeliness of documentation of assessment compared with the paper-based systems. Further improvement is required in practice with the use of the electronic documentation systems in completing items in the assessment forms and in completing the assessment forms within the organisationally required timeframe. There is also a need for improvement in the documentation of assessment to comply with standards in terms of addressing full care needs of the residents.

Several areas may need to be further studied. The relationship between the characteristics of the items in a form and their completeness needs to be understood. This may lead to a better design or update of assessment forms in the electronic systems. The quality of nursing assessment documentation specific to focused care issues needs to be understood from the clinical point of view. It would be valuable to investigate the factors leading to the flaws in the nursing assessment documentation
identified in this study such as incompleteness and lack of timeliness of documentation. Variation in nursing assessment documentation practice among the organisations and its impact on quality of care and resident outcomes may also need to be investigated in future studies.
Reference:


Royal College of Nursing (2004) *Nursing assessment and older people: A Royal College of Nursing toolkit.*


CHAPTER 6. COMPARISON OF THE QUALITY OF PAPER-BASED AND ELECTRONIC DOCUMENTATION: NURSING CARE PLAN

6.1 Introduction
As a significant component of nursing documentation in aged care, a resident nursing care plan (NCP) records the residents’ problems, nursing care planned for the residents and the evaluation of the care provided to the residents. Following the implementation of electronic documentation systems, this chapter reports a study aimed at evaluating the quality of paper-based and electronic nursing documentation of resident NCPs in nine residential aged care homes belonging to three aged care organisations in Australia. The objectives of the study are to:

1) describe the characteristics of paper-based and electronic NCPs used in residential aged care homes;

2) measure and compare the quantity of information documented in paper-based and electronic NCPs and

3) evaluate and compare the quality of documentation of NCPs between paper-based and electronic documentation systems.

6.2 Background

6.2.1 The nursing care plan and nursing process model
The nursing care plan (NCP) is a clinical document recording the nursing process, which is a systematic method of planning and providing care to clients (White 2002, p3). It was originally developed in hospitals to guide nursing students or junior nurses in providing care to patients; however, the format was task-oriented rather than nursing-process-based (Greenwood 1996). Nowadays, the NCP is widely used in nursing in clinical and educational settings as a tool to direct individualized nursing care for clients (Neilson et al. 1996, Daly et al. 2002, Björvell et al. 2000, Kern et al. 2006).

As the theoretical basis of the NCP, the nursing process model is a systematic, problem-solving approach used to identify, prevent and treat actual or potential
health problems and promote wellness (Chabeli 2007). It involves a cognitive process, during which nurses apply their wide knowledge and critical thinking skills to logically collect and interpret client data and to make rational decisions in solving a clinical issue (Chabeli 2007; White 2002, p6-8).

The nursing process involved four steps when it was first introduced into nursing practice in the 1960s: assessment, planning, implementation and evaluation. In 1974, a separate step of nursing diagnosis was added after the first meeting of the North American Nursing Diagnosis Association (NANDA) (White 2002, p5). These steps are of a circular rather than a linear nature and are to be conducted on an ongoing basis (Culliton 2006, p33) (Figure 6-1).

\[ \text{Assessment} \rightarrow \text{Nursing diagnosis} \rightarrow \text{Planning} \rightarrow \text{Implementation} \rightarrow \text{Evaluation} \]

*Figure 6-1. The five steps of the nursing process*

The nursing process model and its associated NCP have constantly been criticized by nurses for their lack of effectiveness in practice. The NCP is often viewed as a document only for the legal protection of nurses or for chart audit rather than a useful tool for delivering care. Nurses place more value on their own notes, clinical protocols, and rich and effective verbal communication with each other about the clients and their care (Griffiths and Hutchings 1999, O’Connell *et al.* 2000, Pelletier *et al.* 2005, Irving *et al.* 2006). There are a number of problems perceived by nurses regarding the use of the nursing process or the NCP in a practical setting. These include being ineffective in providing holistic care, not structured in a way to prioritise care, not easy to update, time consuming, too wordy and unrealistic for short-term patients. It is also viewed as distracting nurses from care giving, adding more burdens to their heavy workload, a repetition of medical orders, and lacking adequate information about care (Greenwood 1996, Griffiths and Hutchings 1999, O’Connell *et al.* 2000, Irving *et al.* 2006, Ledesma-Delgado and Mendes 2009).

In addition, it has been suggested that the nursing process as a prospective method for planning care may not be useful in some acute practice situations where patient
conditions change suddenly and unexpectedly, requiring rapid action. The documentation is therefore retrospective (Gjevjon and Hellesø 2010). Further, modern nursing is a complex profession involving an interdisciplinary process and emphasizing the clients’ experience. This requires methodical, expanded ways of thinking and reasoning. Traditional NCPs engaging in a procedure according to the steps of the nursing process no longer meet the need for planning holistic care for clients. Innovative approaches such as mind mapping and the core cognitive thinking skills may be more effective in interpreting the nursing process and in developing knowledge and critical thinking skills to guide nursing care (Kern et al. 2006, Chabeli 2007, Castledine 2011).

6.2.2 Nursing care plans in the Australian aged care setting

In Australian aged care, the nursing process model is the theoretical framework of nursing documentation (Daskein et al. 2009). The quality of the NCP is crucial in this setting in supporting the management and delivery of resident-centred care for a number of reasons. First, for accreditation and quality improvement purposes, aged care homes are required to establish outcome-oriented assessment and clinical management system to demonstrate the effectiveness of care provided to the residents (The Aged Care Standards and Accreditation Agency Ltd 2007). The NCP is such a system, which guides nurses to engage in a circular process of problem identification – care provision – outcome evaluation to achieve the purpose of quality improvement. The NCP can also provide evidence reflecting this process in meeting accreditation requirements.

Second, there are several workforce issues in aged care such as nurse shortages, frequent nursing staff turn-over and low educational status of some care staff (Hegney et al. 2006, Commonwealth Department of Education, Science and Training 2002, Australian Government Productivity Commission 2011). These may lead to many complex care procedures being undertaken by low grade nurses or nurses with less knowledge, experience or skill-mix. Also, more casual, floating or agency nurses can be employed in a shift. They may be unfamiliar with the residents’ conditions and interventions needed. In addition, there is a high proportion of residents suffering from dementia who have impaired cognitive capacity in aged care homes (AIHW 2004). Effective communication with these residents is difficult. This may affect the
nurses’ ability to conduct accurate nursing assessment and care evaluation for the residents during the shift. In such a situation, individualized care standards set up in the NCP for each resident would provide a valid reference for the nurses in their provision of care, thus facilitating the continuity of care among caregivers as well as the safety of the residents (Greenwood 1996).

Third, some barriers to the use of NCPs in acute practice situations such as short hospital stays (Gjevjon and Hellesø 2010) do not exist in the aged care setting. The residents are mostly admitted into the nursing homes on a permanent basis. They usually have chronic health conditions and long-term health problems or care needs. NCPs with consistent care standards that are updated on a regular basis would enable individualised and continuous care to be provided to the residents.

6.2.3 Electronic nursing care plans with standardized terminologies

Following the development of standardized nursing terminologies and the wide application of electronic documentation systems in nursing practice in the past two decades, there has been a trend toward the use of electronic NCPs formatted with standardized terminologies across countries and care settings. Numerous nursing terminology systems have been developed to describe the nursing diagnoses, interventions and outcomes. One of the widely recognized and actively used nursing classification systems is the International Council of Nursing’s (ICN) International Classification for Nursing Practice (ICNP) (Warren and Coenen 1998, Bjornsdottir and Thorhallsdottir 2003, Cho and Park 2006; Coenen and Kim 2010; Ehnfors et al. 2003, Hayrinen et al. 2010). Another example is the North American Nursing Diagnosis Association (NANDA)’s NNN terminologies, which include the International Classification of Nursing Diagnosis, the Nursing Interventions Classification (NIC), and the Nursing Outcomes Classifications (NOC) (Delaney et al. 2000, Bjornsdottir and Thorhallsdottir 2003, Lee 2005, Jung and Lee 2006, Lee et al. 2006, Muller-Staub et al. 2006, Hayrinen et al. 2008, Hayrinen et al. 2010).

These standardized terminologies were developed in order to establish a structured and defined common language for describing nursing practice in order to promote communication and decision-making within and across care settings and disciplines. The use of standardized terminologies enables the utilization of client data for
benchmarking, health planning, policy making and research purposes (Warren and Coenen 1998). Further, it is believed that using a unified system of terminology to describe nursing concepts and contributions can improve recognition and development of the nursing profession and provide a framework for nursing education (Hyun and Park 2002, Carpenito-Moyet 2009).

Challenges have been identified, however, in the use of standardized terminologies in NCPs. There is a lack of a unified standardized nursing language system, which can fully express the complex, contextual and rich content of nursing. For example, despite the fact that the ICNP and NANDA terminologies can represent most nursing phenomena and actions, discrepancies have still been identified between these and some other terminology systems, and between these terminology systems and practice as documented by the nurses (Hyun and Park 2002; Ehnfors et al. 2003, Coenen and Kim 2010, Cho and Park 2006, Lee et al. 2006, Hellesø 2006). Further efforts are needed to improve these standardized terminology systems. Another problem is nurses’ attitude toward the use of electronic NCPs with standardized nursing terminologies. Disadvantages perceived included de-individualization of the NCP, loss of professional judgment, lack of consensus for nursing diagnoses, lack of utility in clinical situations and wording problems (Lee 2002, 2005, Bjornsdottir and Thorhallsdottir 2003).

6.2.4 Evaluation of quality of nursing care plan in previous studies

The quality of the NCP has been evaluated by numerous studies which addressed the quantity and quality of documentation of the steps of the nursing process (Wang et al. 2011). The quantity was measured by focusing solely on the presence of the steps of the nursing process in the record (Nilsson and Willman 2000, Ammenwerth et al. 2001, Ehrenberg and Birgersson 2003, Björvell et al. 2002, Darmer et al. 2006, Mahler et al. 2007, Gjevjon and Hellesø 2010, Hayrinen et al. 2010). A variation in the extent of documentation of these steps was reported. For example, Ammenwerth et al. (2001) reported that the mean number of documented problems, aims and interventions were higher in electronic than in paper-based records in a hospital. Nilsson and Willman (2000) reported increased documentation of the steps of the nursing process in the four wards of a hospital after education about the nursing process and the VIPS model. Ehrenberg and Birgersson (2003) measured the
presence of five steps of the nursing process in the records in a primary care setting using a five-point Likert scale. The mean score for the measure was 2.0 out of 5. Additionally, Björvell et al. (2002) used a 4-point Likert scale (0-3) to measure the documentation of the nursing process following implementation of a standardized documentation system on the VIPS model and the associated education and organizational changes. Scores ranging from 0.3 to 2.6 were given to the records for the presence of different steps in the nursing process.

The quality of documentation of the steps in the nursing process has been investigated in previous studies based on the documentation practice of the study settings. These studies looked at the completeness and accuracy of the PES formats of the nursing diagnosis (PES format: problem, etiologies and signs and symptoms (Florin et al. 2005, Paans et al. 2010) and the internal relationships between the five steps of the nursing process (Muller-Staub et al. 2007, 2009). The quality of documentation of the nursing process also refers to the degree to which the written notes are clear and concise, without superfluous text, and include all relevant nursing information with correct use of language (Björvell et al. 2000).

In these studies the quality of the documentation was shown to vary. It was reported that following the implementation of the VIPS model and education on the nursing process in a hospital setting, the quality of nursing diagnoses in regard to the PES format improved, with the frequency of diagnostic statements among the records increasing from 34% to 69%. The percentage of records with a quality point of 10 or more (out of 14) on the diagnostic statements increased from 29% to 49%. The average diagnostic quality score increased from 6.5 to 8.8 after the study intervention Florin et al. (2005). Paans et al. (2010) measured the quantity and quality of nursing diagnosis structured in the PES format in a hospital setting using the D-Catch instrument: 76 percent of records had a score equal to or less than five out of a total score of eight. Only 10% of records had a score more than six. For the internal relationships between the steps of the nursing process, no specific findings were reported (Muller-Staub et al. 2007, 2009).

These different evaluation approaches were based on the contextual characteristics of the study circumstances in relation to the local requirements and use of documentation systems and terminologies. There appears to be no study which has
focused on the quality of the NCP in the aged care setting internationally, nor in Australia. To describe the documentation practice in recording care and to reflect the effect of electronic documentation systems on the quality of the NCP, this study investigated and compared the quality of documentation between paper-based and electronic NCPs in Australian aged care homes.

6.3 Methods

6.3.1 Study design

This is a nursing documentation audit study. A retrospective review and comparison of paper-based and electronic resident NCPs was conducted in 2011.

6.3.2 Study sites

The study was conducted in nine residential aged care homes from three aged care organisations in Australia where two commercial electronic documentation systems were implemented at different times since 2005. The study was conducted between August 2010 and September 2011.

6.3.3 Participants

The study participants were residents whose NCPs in their nursing records were accessed by the researcher after the residents and their families’ informed consent was given.

6.3.4 Study sample

The study samples included 139 paper-based and 223 electronic NCPs, which were selected from the residential aged care homes based on convenience sampling. The sample size varies for different measures based on the suitability of the NCPs. For example, standardized NCPs were not suitable for analysis about the quantity of information documented. Specific sample size and criteria for the exclusion of NCPs for different measures are described in Table 6-1.
Table 6-1. Sample size and justification for inclusion of samples for different measures

<table>
<thead>
<tr>
<th>Measure</th>
<th>Sample</th>
<th>Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>Description of characteristics of NCP</td>
<td>139 paper-based vs 223 electronic NCPs</td>
<td>All of the NCPs</td>
</tr>
<tr>
<td>Quantity of statements of nursing</td>
<td>111 free-text paper-based and 194 electronic NCPs</td>
<td>Excluded standardized NCPs that were pre-formatted with problems, goals and/or interventions</td>
</tr>
<tr>
<td>problems/diagnosis, goals and interventions</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Quality of the NCP by questions in a measurement instrument</td>
<td>111 free-text paper-based and 194 electronic NCPs</td>
<td>Excluded newly admitted residents’ NCPs, which were not due for an evaluation and the NCPs of residents who had no assessment forms in their records.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>All of the standardized paper-based and electronic NCPs were included.</td>
</tr>
</tbody>
</table>

6.3.5 Audit instrument

To measure the quantity of information documented in the NCPs, the number of goals and interventions were counted and compared. Previous studies used the number of nursing problems or diagnoses as a measure to quantify the documentation in a NCP (Mahler et al. 2007; Ammenwerth et al. 2001; Daly et al. 2002). It was found that this measure was not applicable to this study. This is because in compliance with the aged care accreditation requirements, the same number of nursing problems or care needs, which were pre-defined in their NCPs, were applied to all of the residents. These nursing problems were listed as the NCP’s domain labels such as pain, mobility and continence.

On the other hand, in the current electronic NCPs, the first section is named ‘observation’ instead of ‘nursing problem’ or ‘nursing diagnosis’ which was used in the previous paper-based NCPs. The nurses did not have to formulate a nursing diagnostic statement in the NCPs. As they always used dot points to list statements in the first section in both paper-based and electronic NCPs, it was considered meaningful to compare the number of statements between the two types of NCPs to reflect how much information the nurses used to describe a resident’s problem for nursing care.
To assess the quality of the NCPs, sixteen relevant questions in section B of the Quality of Australian Nursing Documentation in Aged Care (QANDAC) instrument were used. The development and validation of the instrument were mentioned in Chapter 3 of this thesis. These 16 questions focus on the presence and quality of each step in the nursing process. A five-point Likert scale from zero to four was used to grade the NCP on each of the instrument questions. A total score from 0-64 could be given to each NCP for the 16 questions. Comparison of quality scores between paper-based and electronic NCPs was made at three levels: total scores, score for each step of the nursing process and score for each individual instrument question. The instrument questions are listed in Table 6-2.

<table>
<thead>
<tr>
<th>Code</th>
<th>Instrument questions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nursing problem/diagnosis</td>
<td>Is/are nursing problem(s) identified?</td>
</tr>
<tr>
<td>B1a.</td>
<td>Is there clear nursing problem/diagnosis statement(s) describing the type and nature of the resident’s current and/or potential problem(s)/risk(s)/care needs?</td>
</tr>
<tr>
<td>B1b.</td>
<td>Is nursing problem(s)/risk(s)/care needs identified consistent with the findings of the assessment?</td>
</tr>
<tr>
<td>B1c.</td>
<td>Does/do the statement(s) of problem(s)/ risk(s) indicate one or more contributing factors?</td>
</tr>
<tr>
<td>B1d.</td>
<td>Is/are sign(s) and/or symptom(s) stated in relation to the nursing problem(s) identified?</td>
</tr>
<tr>
<td>Goals</td>
<td>Is/are goal(s) set up in relation to the problem(s)/risk(s) identified?</td>
</tr>
<tr>
<td>B2a.</td>
<td>Is the goal(s) resident-centred?</td>
</tr>
<tr>
<td>B2b.</td>
<td>Is/are the goal(s) measurable or observable?</td>
</tr>
<tr>
<td>Interventions</td>
<td>Is/are nursing intervention(s) planned to address the nursing problem(s)/risk(s) identified?</td>
</tr>
<tr>
<td>B3a.</td>
<td>Is/are nursing interventions appropriate or suitable to the goals?</td>
</tr>
<tr>
<td>B3b.</td>
<td>Is/are the intervention(s) specific and detailed?</td>
</tr>
<tr>
<td>B3d.</td>
<td>Has/have intervention(s) been implemented?</td>
</tr>
<tr>
<td>Evaluation</td>
<td>Is/are there nursing evaluation(s) conducted in relation to the planned care?</td>
</tr>
<tr>
<td>B4a.</td>
<td>Is/are resident outcomes in relation to the planned care documented in the care plan?</td>
</tr>
<tr>
<td>B4b.</td>
<td>Does/do evaluation(s) show the effectiveness of care provided in terms of achieving the goals?</td>
</tr>
<tr>
<td>B4d.</td>
<td>Is/are nursing evaluation(s) conducted regularly?</td>
</tr>
</tbody>
</table>
6.3.6 Data analysis

Raw data was entered into an Excel file and then imported into statistical software SPSS (version 18) for analysis. Descriptive statistics were used to present the results of quantity of information documented in the NCPs. As the data set was not normally distributed, the non-parametric Mann-Whitney U Test was employed to identify significant differences in the quantity and quality of NCPs between paper-based and electronic documentation systems.

6.4 Results

6.4.1 Characteristics of paper-based and electronic NCPs used in the aged care homes

Various formats of paper-based and electronic NCPs were collected from the nine aged care homes in the three aged care organisations. These NCPs were made between 1989 and 2011. They are either standardized with pre-structured problems, goals and/or interventions, or are (mostly) in a free-text style. The use of different formats of NCPs among the nine aged care homes is summarized in Table 6-3.

<table>
<thead>
<tr>
<th>Home</th>
<th>Organization 1</th>
<th>Organization 2</th>
<th>Organization 3</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>A</td>
<td>B</td>
<td>C</td>
</tr>
<tr>
<td>Paper-based NCP</td>
<td>n/a</td>
<td>Standardized</td>
<td>Various free-text formats with four sections</td>
</tr>
<tr>
<td>Electronic NCP</td>
<td>Standardized</td>
<td>n/a</td>
<td>Free-text</td>
</tr>
</tbody>
</table>

Generally the free text and standardized paper-based as well as the electronic NCPs all contained a series of labelled domains including pain, mobility, lifestyle, nutrition, and continence. In the free-text paper-based and electronic NCPs, there were four sections. Different terms were used singly or in combination to name each of the four sections. These terms are summarized in Table 6-4. It was found that the term ‘nursing diagnoses’ was usually used in the paper-based NCP formats made before the year 2000, but this had been changed to ‘identified problem/care needs’ since then. The current free-text electronic NCP, however, used the term
‘observation’ to replace ‘nursing problem/diagnosis/care needs’ as the heading of the first section of the NCPs for the nurses to document a resident’s problem that needed care.

The standardized paper-based NCP contains a pre-structured care domain label such as pain or skin care, a goal, a number of interventions and a free-text evaluation section. Each of the interventions had a tick-box for the nurses to select. In the standardized electronic NCP, there was also a pre-structured domain label, a goal, and a free-text section termed ‘action’. In this free-text section, it was found that the nurses could document information other than interventions, e.g., a nursing problem or diagnosis statement, assessment findings and/or resident preference about care. There was no evaluation section in this NCP format as the evaluation of the NCP was documented in progress notes.

<table>
<thead>
<tr>
<th>NCP sections</th>
<th>Defining terms</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electronic</td>
<td></td>
</tr>
<tr>
<td>Section 2 Paper-based</td>
<td>Goals, resident goals, expected outcomes, patient objectives, management goals, goal of care. Goal (in both standardized and free-text NCP)</td>
</tr>
<tr>
<td>Electronic</td>
<td></td>
</tr>
<tr>
<td>Section 3 Paper-based</td>
<td>Strategies/interventions/actions, interventions, interventions/actions, nursing action/treatment, care or intervention required, nursing assistance intervention, prevention (specific to potential problem), action, treatment. Action (in standardized NCP), intervention (in free-text NCP)</td>
</tr>
<tr>
<td>Electronic</td>
<td></td>
</tr>
<tr>
<td>Section 4 Paper-based</td>
<td>Evaluation, patient response</td>
</tr>
<tr>
<td>Electronic</td>
<td>Evaluation (in free-text NCP)</td>
</tr>
</tbody>
</table>

6.4.2 The quantity of documentation in free-text paper-based and electronic NCP

The mean number of statements describing a resident’s problem for care was 2.17 (SD 1.76) in free-text paper-based NCPs and 5.41 (SD 3.49) in free-text electronic NCPs. This indicates a significantly higher amount of information recorded in the electronic NCP (P<0.01). The mean number of goals in each domain was 1.9 for both the paper-based and electronic NCPs (SD 0.95 vs 0.78), showing no difference
between the two types of NCPs. The number of interventions was lower in the electronic NCP in comparison with the paper-based NCPs (5.6 vs 6.61, SD 2.26 vs 1.66, P<0.01).

6.4.3 The quality of documentation in free-text paper-based and electronic NCPs

The free-text electronic NCPs had a lower total mean score than the free-text paper-based NCPs (p<0.01). Out of a possible maximum quality score of 64, the total mean quality score was 48.30 (SD 3.80, median 49, IQR 4) for the free-text paper-based NCPs and 47.34 (SD 3.03, median 47, IQR 4) for the free-text electronic NCPs. Figure 6-2 shows the summary of total quality scores for free-text paper-based and electronic NCPs.

![Box plot showing total quality scores for free-text paper-based and electronic NCPs](image)

*Note:* These box plots show the distribution of total quality scores of paper-based versus electronic free-text NCPs from the minimum to the maximum score among the samples. The bottom and top of each box is the 25th and 75th percentile of total quality score respectively. The band in the middle of the box is the median of total quality score. Small circles are outliers.

*Figure 6-2.* Comparison of total quality scores between the free-text paper-based and electronic NCPs

At each step of the nursing process, the free-text electronic NCPs had a slightly lower quality score for nursing problem/diagnosis in comparison with the free-text paper-based NCPs (13.66 vs 14.22 out of 20, p<0.01). There was no difference in the
quality scores for goals, interventions and evaluation between the free-text paper-based and electronic NCPs. Figure 6-3 shows the comparison of scores for the four steps in the nursing process between the free-text paper-based and electronic NCPs.

![Comparison of quality scores for the steps in the nursing process between the free-text paper-based and electronic NCPs](image)

*Note: the bar on the top of each histogram is standard error*

**Figure 6-3.** Comparison of quality scores for the steps in the nursing process between the free-text paper-based and electronic NCPs

At individual question level, the free-text electronic NCPs had a significantly higher score on the instrument questions about the consistency between the NCP and the assessment forms (B1c), sign and symptoms (B1e), specific and detailed intervention (B3c), evaluation (B5a) and regularity of evaluation (B5d) (P<0.05). On the other hand, the free-text electronic NCPs had significantly lower scores on the instrument questions about problem/diagnosis statement (B1b), contributing factor (B1d) and resident outcomes (B5b) (P<0.01). Detailed information about the quality score for each assessment item between the paper-based and electronic NCPs is provided in Table 6-5.

### 6.4.4 The quality of documentation in standardized paper-based and electronic NCPs

The total mean quality score was 38.46 out of 64 for the standardized paper-based NCPs (SD 1.60, median 39, interquartile range 2) and was 43.55 out of 64 for the electronic NCPs (SD 2.55, median 44, interquartile range 3), showing a significantly
higher quality in the standardized electronic NCPs in comparison with the standardized paper-based NCPs (P<0.01). Figure 6-4 shows the summary of total quality scores of the standardized paper-based and electronic NCPs.

Table 6-5. Quality scores for free-text paper-based vs electronic NCPs judged by the assessment items

<table>
<thead>
<tr>
<th>Question Code</th>
<th>Free-text paper-based NCP (n=111)</th>
<th>Free-text electronic NCP (n=194)</th>
<th>Nonparametric Mann-Whitney Test</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean score (Standard deviation)</td>
<td>Median score (Interquartile range)</td>
<td>Mean score (Standard deviation)</td>
</tr>
<tr>
<td>B1a.</td>
<td>4 (0)</td>
<td>4 (0)</td>
<td>4 (0)</td>
</tr>
<tr>
<td>B1b.</td>
<td>3.37 (0.811)</td>
<td>4 (1)</td>
<td>2.26 (0.84)</td>
</tr>
<tr>
<td>B1c.</td>
<td>3.61 (0.54)</td>
<td>4 (1)</td>
<td>3.72 (0.54)</td>
</tr>
<tr>
<td>B1d.</td>
<td>3.01 (1.07)</td>
<td>3 (1)</td>
<td>1.46 (0.86)</td>
</tr>
<tr>
<td>B1e.</td>
<td>1.74 (1.06)</td>
<td>1 (2)</td>
<td>2.66 (0.70)</td>
</tr>
<tr>
<td>B2a.</td>
<td>3.86 (0.37)</td>
<td>4 (0)</td>
<td>3.89 (0.48)</td>
</tr>
<tr>
<td>B2b.</td>
<td>3.95 (0.23)</td>
<td>4 (0)</td>
<td>3.98 (0.27)</td>
</tr>
<tr>
<td>B2c.</td>
<td>2.32 (0.57)</td>
<td>2 (1)</td>
<td>2.21 (0.46)</td>
</tr>
<tr>
<td>B3a.</td>
<td>3.98 (0.13)</td>
<td>4 (0)</td>
<td>3.93 (0.30)</td>
</tr>
<tr>
<td>B3b.</td>
<td>3.97 (0.16)</td>
<td>4 (0)</td>
<td>3.92 (0.29)</td>
</tr>
<tr>
<td>B3c.</td>
<td>3.75 (0.50)</td>
<td>4 (0)</td>
<td>3.86 (0.39)</td>
</tr>
<tr>
<td>B3d.</td>
<td>2 (0)</td>
<td>2 (0)</td>
<td>2 (0)</td>
</tr>
<tr>
<td>B4a.</td>
<td>3.64 (1.13)</td>
<td>4 (0)</td>
<td>3.96 (0.36)</td>
</tr>
<tr>
<td>B4b.</td>
<td>0.89 (0.89)</td>
<td>1 (1)</td>
<td>0.37 (0.79)</td>
</tr>
<tr>
<td>B4c.</td>
<td>0.88 (1.10)</td>
<td>0.50 (2)</td>
<td>1.20 (1.74)</td>
</tr>
<tr>
<td>B4d.</td>
<td>3.31 (1.31)</td>
<td>4 (1)</td>
<td>3.92 (0.48)</td>
</tr>
</tbody>
</table>

For each step in the nursing process, the quality scores for nursing problem, intervention and evaluation were significantly higher in the standardized electronic NCPs in comparison with the standardized paper-based NCPs (P<0.01). There was no difference in the quality score of goals between the two types of NCPs. Figure 6-5 shows the comparison of the scores for each step in the nursing process between the standardized paper-based and electronic NCPs.

The quality scores for the 16 assessment items were compared between the standardized paper-based and electronic NCPs. The results showed significantly higher quality (P<0.01) in the standardized electronic NCPs in relation to nursing problem statements (B1b), contributing factors (B1d), signs and symptoms (B1e), specific and detailed interventions (B3c), resident outcomes (B4b), effectiveness of care (B4c) and regularity of evaluation (B4d). Detailed information about the quality scores for the standardized paper-based and electronic NCPs by instrument questions is shown in Table 6-6.
Note: These box plots show the distribution of total quality scores of paper-based versus electronic standardized NCPs from the minimum to the maximum score among the samples. The bottom and top of each box is the 25th and 75th percentile of total quality score respectively. The band in the middle of the box is the median of total quality score. Small circle is an outlier.

Figure 6-4. Comparison of total quality scores between standardized paper-based and electronic NCPs.

Note: the bar on the top of each histogram is standard error.

Figure 6-5. Comparison of quality scores for steps of the nursing process between standardized paper-based and electronic NCPs.
Table 6-6. Quality scores of standardized paper-based vs electronic NCPs by instrument questions

<table>
<thead>
<tr>
<th>Question Code</th>
<th>Standardized paper-based NCP (n=111)</th>
<th>Standardized electronic NCP (n=194)</th>
<th>Nonparametric Mann-Whitney Test P value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean score (Standard deviation)</td>
<td>Median score (Interquartile range)</td>
<td>Mean score (Standard deviation)</td>
</tr>
<tr>
<td>B1a. 4 (0)</td>
<td>4 (0)</td>
<td>4 (0)</td>
<td>4 (0)</td>
</tr>
<tr>
<td>B1b. 0 (0)</td>
<td>0 (0)</td>
<td>0 (0)</td>
<td>1.31 (1.14)</td>
</tr>
<tr>
<td>B1c. 3.68 (0.55)</td>
<td>4 (1)</td>
<td>3.55 (0.83)</td>
<td>4 (1)</td>
</tr>
<tr>
<td>B1d. 0 (0)</td>
<td>0 (0)</td>
<td>0 (0)</td>
<td>0.31 (0.47)</td>
</tr>
<tr>
<td>B1e. 0 (0)</td>
<td>0 (0)</td>
<td>0 (0)</td>
<td>1.55 (0.99)</td>
</tr>
<tr>
<td>B2a. 4 (0)</td>
<td>4 (0)</td>
<td>4 (0)</td>
<td>4 (0)</td>
</tr>
<tr>
<td>B2b. 4 (0)</td>
<td>4 (0)</td>
<td>3.86 (0.52)</td>
<td>4 (0)</td>
</tr>
<tr>
<td>B2c. 2 (0)</td>
<td>2 (0)</td>
<td>2 (0)</td>
<td>2 (0)</td>
</tr>
<tr>
<td>B3a. 4 (0)</td>
<td>4 (0)</td>
<td>4 (0)</td>
<td>4 (0)</td>
</tr>
<tr>
<td>B3b. 4 (0)</td>
<td>4 (0)</td>
<td>4 (0)</td>
<td>4 (0)</td>
</tr>
<tr>
<td>B3c. 2.29 (0.81)</td>
<td>2.5 (1)</td>
<td>3.28 (0.59)</td>
<td>3 (1)</td>
</tr>
<tr>
<td>B3d. 2 (0)</td>
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<td>4 (0)</td>
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<tr>
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<td>0 (0)</td>
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<tr>
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<td>0.48 (0.99)</td>
<td>0 (1)</td>
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<td>B4d. 3.64 (0.56)</td>
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<td>3.97 (0.19)</td>
<td>4 (0)</td>
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</tbody>
</table>

6.5 Discussion

To our knowledge, this is the first study investigating resident NCP documentation practice in Australian aged care homes. The quantity and quality of documentation of the paper-based and electronic NCPs were assessed and compared to identify how the paper-based and electronic formats of NCPs differ from each other in terms of recording care. Sixteen questions in the measurement instrument were used to address the presence and quality of each step of the nursing process as documented in the NCPs. The study results provide implications for nursing documentation practice and suggestions for further improvement in documentation quality.

6.5.1 Characteristics of paper-based and electronic NCPs

Varying practice over time and across organisations in the documentation of the NCPs has been identified in this study. This is reflected primarily in the use of different terminologies in various formats of paper-based and electronic NCPs for describing assessment results to indicate the residents’ problems in regard to care. A significant trend was the change of terminology from ‘nursing diagnosis’ to ‘nursing problem’ from ten years ago to ‘observation’ in the current electronic NCP. This
change is in contrast to the way the nursing process has developed: adding nursing problem into the nursing process between the steps of assessment and goal. It also moves away from the international tendency in increasingly applying standardized nursing language for recording care (Björvell et al. 2000, White 2002).

Such a change in documentation practice, however, may reflect issues with the use of nursing diagnosis in practical environments. Views of some registered nurses on this issue were sought. They believed that the change of the terms could allow the documentation of more individualized information about the residents, and was thus more useful for planning individualized care. They also mentioned that the NCP domain label already showed the nature of the resident problem, so there was no need to formulate a problem or diagnosis statement. In addition, some nurses considered that nursing diagnosis was too ‘medical’ and seen as technical jargon and very difficult for care-workers without adequate nursing knowledge and skills to understand. Further, it was thought that the nature of the aged care setting may not necessarily require the use of nursing diagnosis because the focus of care is different from that in hospital settings and nursing diagnosis may more fit acute care settings.

Language plays an important role in describing, communicating, organizing and defining nursing (Clark and Lang 1992 cited in Thoroddsen and Ehnfors 2007). The specific use of language in creating a message in the records reflects a choice made by the nurses in presenting a problem client needs for care. This choice is based on the nurse’s attitude, their assessment of the client, and their relationship to the recipient of the message. It is also related to a specific situation and context (Hellesø 2006). In addition, nursing documentation can reflect a nursing philosophy held by nurses for their practice (Urquhart et al. 2009). Despite a standardized nursing language as a tool representing nursing knowledge and a source of power (Thoroddsen and Ehnfors 2007), in our study setting, the changes of terms in the NCPs in the past decade reflect a process of leaving nursing diagnosis out of practice. Such a choice has implications for care practice, nursing standards, documentation and the relationships between these three factors in aged care.
6.5.2 The quantity and quality of free-text paper-based versus electronic NCPs

In general, there was quantitatively sufficient documentation of the steps of the nursing process in both the free-text paper-based and electronic NCPs (mean scores > 3.64 out of 4). Compared to numerous previous studies, which reported incomplete documentation of the nursing process (Gjevjon and Hellesø 2010, Ehrenberg et al. 2004, Törnvall et al. 2004, Darmer et al. 2006, Ehrenberg and Birgersson 2003, Gunningberg et al. 2009), the current study shows better results in this respect. However, several problems with quality of each step of the nursing process were noted with both paper-based and electronic NCPs. There were also differences between the two types of NCPs in this respect.

Nursing problem/diagnosis

Given that the terms ‘nursing diagnosis’ and/or ‘nursing problem’ were used in the previous paper-based NCPs and ‘observation’ is used in the current electronic NCPs, the latter had a greater number of statements (5.41 vs 2.17), but fewer problem/diagnosis statements formulated (score 2.26 vs 3.37) to describe the resident’s problems/care issues. Also ‘contributing factors’ were less frequently documented (score 1.46 vs 3.01), but ‘signs and symptoms’ were more frequently documented (score 2.66 vs 1.74). Such differences show a recent tendency of documenting care in the NCPs, that is, primary and more specific assessment data rather than a diagnostic statement are used to describe a resident’s problem for care. The following examples illustrate how a resident problem/care issue was described in the current free-text electronic and previous free-text paper-based NCPs.

Example 1 in the ‘observation’ section of an electronic NCP:

‘20-30 medium risk, she is post CVA and has weakness on her affected side that does affect her mobility; she is able to weight bear. When ambulating, she uses a rollator-frame. She does have a tendency to drag her affected leg; she uses a shower chair. She needs support with transferring into chair; 4) she has good dexterity and manages to use all utensils. She does need to have some meats cup up due to weakness in her affected arm. She can write. She can sew; she can do up bottoms and zips, need some assistance with shoe laces (‘Mobility’ domain).

Example 2 in the ‘observation’ section of a resident’s electronic NCP:
‘V cannot verbally express pain; V expresses pain through sad facial expressions; V expresses pain through facial frowning’ (‘Pain’ domain).

**Example 3** in the ‘nursing diagnosis/problem’ section of a resident’s paper-based NCP:

‘incontinent of urine and faeces related to cognitive impairments; unable to find toilet and urinating on the floor’ (‘Continence’ domain)

In Example 1, the nurse used very detailed and individualized information to explain the resident’s problem with his/her mobility without formally formulating a diagnosis statement. The phrases in Example 2 imply that the resident could be in pain. In comparison with Example 3 as a diagnosis statement, the first two examples did not contain any conclusive clinical judgment confirming the nature of the resident’s problem. Such practice is opposite to the development of the nursing process model from the original four steps to adding nursing problem and developing standardized language of nursing diagnosis. It may prevent nurses from building clinical reasoning skills in deriving a nursing diagnosis based on the result of assessment.

These issues relating to the documentation in the observation section of the free-text electronic NCPs were enabled by an automatic function of the electronic system. It was found that during the process of creating a NCP for a resident using the system, all of the information in the resident’s assessment forms appeared on the screen with a tick-box for a nurse to select, and then was posted into the ‘observation’ section. Based on this, the nurses could add information in the section to further explain the resident’s status or care needs. Therefore, the information in this section contained the primary data recorded in the resident’s assessment forms. However, such a function of the electronic system may reflect complex issues relating to the relationships between technology, the user and nursing professionalism. It has been indicated that technology is a tool to enhance clinical practice and not the driver of the practice (Jenkings 2004 cited in Oroviogoicoechea et al. 2008). In the case of this study, the system was designed to meet the needs of the aged care organisations for documentation. The issue raised in this study regarding how to express a resident problem in the new NCPs is decided by the aged care organisations, and then implemented by the vendor. Therefore, the aged care organisations requesting such
functions may need to evaluate whether the change supports or impedes nursing care decision making, and what are the optimal strategies to ensure the system design and implementation supports care.

The electronic NCP also had decreased documentation of contributing factors in relation to the nursing problem/diagnosis (score 1.46 vs 3.01 out of 4). Similar scarcity was found by Paans et al. (2010) and Florin et al. (2005). This was attributed to the complexity of forming a diagnosis and naming the contributing factors, the nurses’ lack of knowledge and skills, and the difficulties in accessing the information about contributing factors (Paans et al. 2010; Ehrenbergand Birgersson 2003). In our participating homes, the current format of the electronic NCP does not require the nurses to formulate diagnosis statements, thus further limiting the documentation of this element. Lack of such reference in a residents’ NCP might consequently impede the generation of appropriate and specific interventions.

Despite decreased formulation of nursing problem/diagnosis statements and documentation of contributing factors in the current free-text format of electronic NCPs because they were not required, the relevant quality scores of the electronic system (2.26 for problem/diagnosis statements and 1.46 for contributing factors) showed that some nurses still insisted on using nursing diagnosis to describe a resident’s problem for care instead of only listing the assessment data in the observation section. This indicates that the nurses needed to use this standardized language to describe care and this may need to be facilitated by the systems.

In relation to the consistency between the nursing problem/diagnosis and the findings of the assessment, the electronic NCP had a higher score than the paper-based NCP (3.72 vs 3.62). It has been recognised that electronic systems provide caregivers’ access to more legible and accurate resident data for planning care (Larrabee et al. 2001, Oroviogoicoechea et al. 2008). The result of the current study may indicate that the implementation of the electronic system could help nurses to accurately identify resident problems from assessment data in order to plan appropriate care for the residents.

Goals
Although resident-centred goals were sufficiently documented in both the free-text paper-based and electronic NCPs for each problem/diagnosis/care need, many of them were abstract and not measurable or observable (score 2.21 and 2.32 out of 4 respectively). For example, the nurses wrote as a goal ‘to maintain optimum levels of nutrition and hydration’; or ‘to optimize health’. This shortcoming of documentation was also identified in Karlsen’s study (2007). Without setting clear and concrete goals, it would be difficult to evaluate the resident outcomes in terms of achieving the desired goals (Muller-Staub et al. 2009).

**Intervention**

In both paper-based and electronic documentation systems, there was no adequate documentation showing that the planned interventions were implemented (score 2 out 4). There could be a number of interventions proposed for each of the residents. It might not be necessary or feasible to document every implementation of these specific interventions (e.g., ‘provide stand-by assistance’ or ‘offer support to the resident while walking’). However, nurses need to be aware of the necessity for recording what has been done for the clients for continuity of care.

**Evaluation**

Both free-text paper-based and electronic NCPs contained information showing that evaluation of care was conducted. In the paper-based NCP, the nurses usually recorded this as ‘the care plan is reviewed’ in the relevant section. In the electronic NCP, the computer system automatically recorded the date on which the evaluation of the care plan was performed. Regarding the regularity of evaluation, the electronic system performed better (score 3.92 vs 3.31), showing its ability to facilitate the nurses in conducting and documenting care evaluation.

On the other hand, very limited information was available about resident outcomes and the effectiveness of the interventions in the two types of NCPs. The situation seemed worse in the electronic NCPs (0.37 vs 0.89). As resident outcomes are the changes in the resident’s health as a result of nursing interventions (Muller-Staub et al. 2007), they are the basis for determining whether the planned interventions achieved their goals and met the resident’s needs. The effectiveness of the planned care is the judgment made by a nurse based on the resident outcomes. Without the
documentation of such specific information in the NCPs, it is impossible to know how the nurses reach the conclusion about whether the interventions were appropriate and should continue to be used for the residents during the phase of evaluation.

6.5.3 The quality of standardized paper-based versus electronic NCPs

**Nursing problem/diagnosis**

Both the standardized paper-based and electronic NCPs had deficiencies in the documentation of ‘nursing problem/diagnosis statement, ‘contributing factors’ and ‘signs and symptoms’, though the electronic performed better than the paper-based NCPs. This was caused by the simplified format of the standardized NCP, which only contains a pre-defined problem label under each domain. The nurses were not required to formulate any problem/diagnosis statement. In the electronic NCP, however, the nurses sometimes wrote ‘problem/diagnosis’ statements, ‘contributing factors’ and ‘signs and symptoms’ in the free-text section of ‘action’, similar to the free-text electronic NCP. This may indicate that the nurses had a need or desire to use such language to express the nature and characteristics of resident’s problems or care issues. These information elements are the basis for their judgement about residents’ problems; however, the documentation of these elements was limited by the standardized format of the NCP.

**Goals, interventions and evaluation**

Similar to the free-text NCPs, problems with the standardized paper-based and electronic NCPs in general also included poor documentation of ‘observable and measurable goals’, ‘implementation of interventions’, ‘resident outcomes’ and ‘effectiveness of interventions’ (scores <2). As the intervention (action) section in the standardized electronic NCPs is free-text, it contained more specific and detailed interventions in comparison with the paper-based NCPs.

Evaluation was documented only in the free-text section in the standardized paper-based NCPs. However, no information was recorded about the resident outcomes and the effectiveness of the interventions. The nurses wrote sentences such as ‘the care plan is reviewed’ to record the fact that the evaluation was done. In the
standardized electronic NCPs, there was no ‘evaluation’ section. The evaluation of
the care plan was recorded in the progress notes in free-text style in the system,
which could contain information about resident outcomes and the effectiveness of the
planned care (score 1.24 and 0.48 respectively). These resident outcomes, however,
were general and unspecific without links to a particular problem, goal or
intervention. This documentation feature was also reported by Paans et al. (2010). As
discussed previously, these flaws in the documentation of the NCP indicate that care
was not fully and logically described in the nursing records.

A possible factor that might have led to insufficient documentation of resident
outcomes in the progress notes is the implementation of the documentation principle
‘charting by exception’ in the organisation. Unlike the common principle ‘not
charted, not done’, “charting by exception’ only requires significant findings or
abnormal data to be documented. This is based on an assumption that the resident has
manifested a normal response to all interventions unless an abnormal response is
charted (Crofton and Witney 2004, p70, Murphy 2003). Apart from saving nurses’
documentation time and making abnormal data more obvious, ‘charting by
exception’ reduces comprehensive and systematic documentation of the entire care
process, especially the evaluation information. The effect of such a documentation
style on provision of care is yet to be further investigated.

There are several limitations with the study. First, conveniently selected NCPs are
not fully representative of the documentation practice of the participating aged care
organisations (Bethany and Marcello 2011). Nevertheless, only a few registered
nurses in each home were responsible for documenting the NCPs. The bias caused by
the sampling technique could be diminished by this consistent practice. Second, we
measured the presence of data elements without pursuing whether these data were
complete and accurate in reflecting the actual care delivered to a resident and its
outcomes.

In addition, no consideration was given to the granularity of the concepts. During the
audit, we normally followed the dot points used by the nurses to determine the
presence of certain information elements such as problem/diagnosis, contributing
factors, signs/symptoms and interventions. We could not precisely map the
information concepts documented in the NCP to any established standardized
terminologies, as there was no standardized terminology required for practice in the study setting. For example, in the section on intervention, the number of interventions refers to the interventions perceived by the nurses rather than by the researchers. However, different nurses often described the nursing concepts of interventions with different levels of granularity. For instance, for a resident problem of ‘impaired communication’, one nurse might list ‘facial expression’, ‘eye contact’ and ‘body language’ as three interventions by three dot points. Another nurse might document only one intervention of ‘non-verbal communication strategies’, which covers the former three interventions. In our study, we only counted the number of dot points (or statements) as the number of interventions without considering their meaning. This could have caused bias in the study results.

Furthermore, in relation to the contributing factors of a nursing problem or diagnosis, in the current free-text electronic NCPs, the nurses often just listed the information element without clearly indicating the relationship by using ‘due to’ or ‘caused by’. This required the researcher to determine what information was in the context based on nursing knowledge. For this reason, the subjective nature of documentation auditing is an inevitable weakness of this study.

6.6 Conclusion
The paper-based and electronic resident NCPs contained specific information about the nursing process to a varying extent based on their individual formats and terminologies. The change of what is required to be documented in the electronic NCPs may indicate a range of factors behind the practice and calls for research to further investigate. Specific questions raised may also include whether nursing diagnosis is adequate to reflect extensive care needs of clients in aged care settings and whether documentation about ‘observation’ can meet such a need. A qualitative study on the nurses’ documentation about resident problems/care issues should provide specific understanding about how nurses express information about the resident’s needs and care process in the NCP. The impact of the different documentation practices and quality of the NCP on the care quality and resident outcomes needs to be emphasized. These proposed studies should provide indications for documentation and care practice and professional development in nursing.
Finally, the design of nursing documentation systems needs to take careful consideration of issues relating to nursing practice.
References


CHAPTER 7. COMPARISON OF THE QUALITY OF PAPER-BASED AND ELECTRONIC DOCUMENTATION: FORMAT, STRUCTURE AND PROCESS

7.1 Introduction

As a major information source in Australian residential aged care homes, resident nursing records facilitate care delivery by providing a communication platform for different caregivers to enter, update and share information about the residents’ conditions and the care planned and provided to them. Whether generated in written or electronic format, quality nursing documentation is vital in ensuring that the written communication can effectively facilitate the continuity of care and safety of clients (Saranto and Kinnunen 2009).

The quality of nursing documentation does not only relate to its content. The format and language of data are also important to make the information comprehensible and usable. Information presented in a concise and reliable manner can facilitate effective communication and the clinical decision-making process and fulfil legal and other purposes (Oroviogoicoechea et al. 2008, Wong 2009).

A systematic literature review on the quality of nursing documentation and its evaluation identified three quality attributes of nursing documentation: documentation format and structure, documentation process and documentation content (Wang et al. 2011). The first two attributes refer to data presentation and procedural issues of capturing the data such as quantity, language and legibility, use of abbreviations, signature, date and designation of the nurse who documented the note. These are important factors in determining whether the information is accessible and usable, and therefore should be considered when designing or evaluating a documentation system.

It is recognised that a paper-based nursing documentation system no longer meets the needs of modern health care organisations for increased communication and coordination between different caregivers (Oroviogoicoechea et al. 2008). It is often incomplete, inaccurate, illegible or lacking a signature (Ammenwerth et al. 2001, Tapp 1999, Cheevakasemsook et al. 2006). On the other hand, electronic documentation can provide greater legibility, availability and accessibility of client data (Ehrenberg and Ehnfors 2001, Larrabee et al. 2001). Specific benefits of
electronic documentation systems reported in previous studies are that data are more complete, accurate and up-to-date and that there is reduced redundancy (Oroviogoicoechea et al. 2008).

Following the recent implementation of electronic information systems in several aged care organisations in Australia, a nursing documentation audit study has been carried out. This chapter reports the results of the study that aimed at comparing the quality of documentation format, structure and process between the previously paper-based and the current electronic resident records.

7.2 Background
The quality of documentation structure, format and process has been evaluated by previous studies conducted in hospital settings by applying specific measurement criteria. For example, several studies focused on the quantity, legibility, language, signing and dating of the nursing records (Björvell et al. 2002, Ammenwerth et al. 2001, Mahler et al. 2007, Rykkje 2006). In comparison with paper-based systems, it was found that significant improvement was achieved in this regard using electronic systems (Ammenwerth et al. 2001, Mahler et al. 2007, Rykkje 2006).

Whyte (2005) focused on more detailed issues relating to the presentation of patient data. Shortcomings identified in the paper-based nursing records included illegibility, illegal alteration of content, use of inappropriate abbreviations or incomplete words, use of ink in a colour other than black, documentation in a wrong section and repeated information. In the electronic nursing records, documentation was legible and in chronological order without any alterations, blank spaces or gaps in the records. The electronic system also automatically stated the date, time and designation of the professional who made the entries. However, problems with the electronic documentation included the use of jargon and abbreviations, spelling mistakes, incorrect spacing between words, and meaningless phrases.

Wong (2009) assessed the quality of nursing documentation in respect to timeliness, clarity, chronology, appropriate abbreviations and terminology. The study identified problems with nursing documentation such as the use of different terminology and inconsistent timing of documentation among the nursing staff, but no detailed data were presented.
To our knowledge, there is a lack of systematic evaluation of the quality of documentation format, structure and process for nursing records. No such study has been conducted in an aged care setting. Therefore, our study fills this knowledge gap through the application of extensive measurement criteria based on Australian requirements.

7.3 Methods

7.3.1 Study design

This was a comparative nursing documentation audit study. A retrospective review of paper-based and electronic resident assessment forms, nursing care plans and progress notes was conducted.

7.3.2 Study sites

The study was conducted at nine residential aged care homes belonging to three not-for-profit aged care organisations in Australia where two commercial brands of electronic documentation systems were implemented at different times since 2005. The documentation audit was carried out between August 2010 and November 2011.

7.3.3 Participants

The study participants were residents whose nursing records were accessed by the researcher with the informed consent of the residents and/or their families.

7.3.4 Study sample

The study included a total of 151 paper-based and 248 electronic resident records, which were selected using convenience sampling. In each record, the resident assessment forms, care plan and progress notes were audited using various measures. The numbers of records assessed by the different measures varied depending on the availability of specific notes contained in the records. Specific sample sizes will be described in the measurement section and also presented in the results section of the chapter.
7.3.5 Measurement

First, the study compared the quantity of progress notes between the paper-based and electronic documentation systems. For paper-based progress notes, the number of entries during a randomly selected one month period was counted. For electronic progress notes, entries during the sixth, 12th and 18th month after the implementation of the electronic documentation systems were quantified. As the residents were admitted or died on different dates, the numbers of resident records with progress notes available for analysis during these time periods were 149, 116, 138 and 165.

Second, to measure and compare the quality of paper-based and electronic resident assessment forms, care plans and progress notes, all of the 151 paper-based and 248 electronic records were included in the audit. The study applied 10 assessment questions in the Section C of the QANDAC instrument, which was described in Chapter 3. These questions focus on the quality of documentation format, structure and process based on local documentation guidelines (Australian Department of Health and Ageing 1997). The questions used in this study are listed in Table 7-1.

The instrument used a five-point Likert scale for each of the questions, except for C10 which used yes/no options. For most of the questions in the instrument, the value of measurement on each individual question was graded on a scale from zero to four. Question C10 with yes/no options could be given either zero for a ‘no’ or one point for a ‘yes’ answer for each of the four items. Measurement on each of the resident records was made at two levels: a total score for the 10 questions and a score for each question in the instrument.

For question C1, C4, C5, C6, C7 and C9, a full score of 4 was given to the electronic records because these functions were automatically implemented in the electronic systems. For example, C1, C4, C5 and C9 refer to legibility, using the 24hr clock, using black ink and having resident identification, respectively, and these were all implemented automatically in the electronic systems. In relation to question C6 about crossing out errors with a single line, the systems allowed the nurses to delete unwanted information entered into the systems after it was saved, but the information still appeared on the screen, crossed out with a single line. A reason for the deletion had to be given under the information. For C7, the question about crossing out spaces
within entries in the progress notes using a single line to ensure the validity of the content, the electronic systems did not allow the nurses to enter new information into an already saved entry. If needed, an additional entry could be entered into the systems. Therefore, a full score of 4 was given to the record for these two questions. Question C10 asked about signing and dating. As the electronic systems date the records automatically and the nurses log in to the computer with a password, a full score is given to the electronic records.

Table 7-1. Questions in the QANDAC instrument used to measure the quality of nursing documentation format, structure and process

<table>
<thead>
<tr>
<th>Question code</th>
<th>Instrument question</th>
<th>Quality attributes assessed</th>
</tr>
</thead>
<tbody>
<tr>
<td>C1</td>
<td>Is the writing of all records legible?</td>
<td>Format and structure</td>
</tr>
<tr>
<td>C2</td>
<td>Are statements made by nurses using clear and succinct language?</td>
<td>Format and structure</td>
</tr>
<tr>
<td>C3</td>
<td>Are statements factual or objective?</td>
<td>Format and structure</td>
</tr>
<tr>
<td>C4</td>
<td>Do all entries use 24hr clock?</td>
<td>Format and structure</td>
</tr>
<tr>
<td>C5</td>
<td>Are all entries written in black ink?</td>
<td>Format and structure</td>
</tr>
<tr>
<td>C6</td>
<td>Is/are error(s) crossed out with a single line and signed?</td>
<td>Format and structure</td>
</tr>
<tr>
<td>C7</td>
<td>Are all spaces between entries in progress notes crossed out with a single line?</td>
<td>Format and structure</td>
</tr>
<tr>
<td>C8</td>
<td>Are abbreviations officially recognized?</td>
<td>Format and structure</td>
</tr>
<tr>
<td>C9</td>
<td>Are all pages labelled with the resident’s identification?</td>
<td>Format and structure</td>
</tr>
<tr>
<td>C10</td>
<td>Are all documents are signed?</td>
<td>Process</td>
</tr>
<tr>
<td></td>
<td>dated?</td>
<td></td>
</tr>
<tr>
<td></td>
<td>with the nurse’s printed name?</td>
<td></td>
</tr>
<tr>
<td></td>
<td>with the nurse’s designation?</td>
<td></td>
</tr>
</tbody>
</table>

7.3.6 Data analysis

Raw data was entered into an Excel spread sheet and then imported to an SPSS (1.8 version) file for statistical analysis. As the data collected was not normally distributed, the non-parametric Mann-Whitney U test was employed to identify any differences between the two types of nursing records. A p-value less than 0.05 was considered statistically significant.
7.4 Results

7.4.1 Comparison of quantity of progress notes between the paper-based and electronic systems

The mean number of entries during a randomly selected one month period in the paper-based progress notes in each resident record was 27.97 (SD 16.43). For the electronic records the values were 26.53 (SD 21.74) during the sixth month, 26.78 (21.84) during the 12th month and 23.2 (16.20) during the 18th month post-implementation. However, a statistically significant difference in the number of entries was only found between the paper–based notes and the 18th month post–implementation records. Figure 7-1 shows the mean and median numbers of entries in the two types of progress notes at different measurement points.

Figure 7-1. Mean and median numbers of entries in paper-based and electronic progress notes at different measurement points

Note: the bar on the top of each histogram is standard error

7.4.2 Comparison of quality of documentation structure, format and process between paper-based and electronic nursing records

Given that a full score was 40, the mean total score for each record was 37.31 (SD 1.23) for the electronic nursing records and 33.01 (SD 1.05) for the paper-based records, indicating better quality of the electronic systems in terms of documentation format, structure and process (p<0.01). Figure 7-2 displays the distribution of the total mean scores for the two types of records.
Note: These box plots show the distribution of total quality scores of paper-based versus electronic resident records from the minimum to the maximum score among the samples. The bottom and top of each box is the 25th and 75th percentile of total quality score respectively. The band in the middle of the box is the median of total quality score.

Figure 7-2. Comparison of distribution of total quality scores for documentation format, structure and process between paper-based and electronic resident records.

The electronic records had statistically significantly higher quality scores than the paper-based records for questions C1, C4, C6, C7, C9 and C10 (P<0.01). In contrast, there were statistically significantly lower scores in the electronic records compared to the paper-based records for questions C2 and C3 (P<0.01). For questions C5 and C8, no statistically significant differences in scores were found between the types of systems. Detailed information about the quality scores for each question between the two types of records is displayed in Table 7-2.

7.5 Discussion
This study compared the quantity of progress notes following implementation of the electronic documentation systems. It also applied a series of quality criteria based on local guidelines to measure and compare the quality of nursing documentation of the paper-based and electronic resident records in regard structure, format and process features. These measures reflect the ability of both the paper-based and electronic
systems in storing and presenting resident data according to the format, structure and process required by the local organisations. If the rationale for the study is to provide a valid reference for nursing care and achieve effective written communication between different care-givers, the content of nursing documentation needs to be presented in the system in a way that permits messages to be received without any ambiguity. By doing this, effective written communication can be achieved and the continuity of care and safety of the residents can be ensured.

It was expected that the electronic documentation systems which were implemented would have collected richer resident data, however the study results showed no improvement when comparing the quantity of progress note entries in the paper-based records with that in the electronic records during the sixth and 12th month after implementation. A statistically significant decrease was found during the 18th month after implementation of the systems. Several previous studies reported both positive and negative effects of electronic systems on the quantity of documentation of the nursing care process (Mahler et al. 2007, Daly et al. 2002, Gunningberg et al. 2009, Larrabee et al. 2001). There is, however, a lack of research, particularly on the number of progress notes. As key documents in the resident records, progress notes record the ongoing care of residents and the residents’ responses to the care (Australian Government Department of Health and Ageing 1997). In the participating homes all of the nurses, including personal care staff who provide direct care to the residents on the floor, were responsible for documenting resident and care information in the progress notes during their shift. This means that the quantity of the progress note entries can sensitively reflect the ability of the documentation systems in collecting resident data on a daily basis.

The unfavourable results concerning the quantity of progress notes in the electronic systems may have been caused mainly by the simultaneous introduction of a new aged care funding model and the electronic documentation systems. The previous resident classification scale (RCS) appraisal process was driven by extensive documentation in various assessment forms and progress notes. This had led to increasing dissatisfaction expressed by aged care organisations and their staff due to the perceived burden from ‘excessive’ documentation (Aged Care Evaluation and Management Advisors 2003). The new aged care funding instrument (ACFI) however, focuses primarily on resident assessment forms. It reduces the amount of
documentation needed to justify funding (Australian Government Department of Health and Ageing 2011). This change in the documentation requirement would considerably affect the number of progress notes recorded in the electronic systems.

Table 7-2. Comparison of mean and median scores of the quality of documentation format, structure and process between paper-based and electronic resident records in total and by each assessment

<table>
<thead>
<tr>
<th>Assessment question</th>
<th>Paper-based</th>
<th>Electronic</th>
<th>Mann-Whitney P value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>C1. Is the writing of all records legible?</strong></td>
<td>Mean (SD)</td>
<td>Median (IQR)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td></td>
<td>2.05 (0.25)</td>
<td>2.00 (0)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>4.00 (0)</td>
<td>4.00 (0)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>&lt;0.001</td>
</tr>
<tr>
<td><strong>C2. Are statements made by nurses using clear and succinct language?</strong></td>
<td>Mean (SD)</td>
<td>Median (IQR)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td></td>
<td>3.64 (0.48)</td>
<td>4.00 (1.00)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3.30 (0.70)</td>
<td>3.00 (1.00)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>&lt;0.001</td>
</tr>
<tr>
<td><strong>C3. Are statements factual or objective?</strong></td>
<td>Mean (SD)</td>
<td>Median (IQR)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td></td>
<td>3.76 (0.43)</td>
<td>4.00 (0)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3.20 (0.89)</td>
<td>4.00 (2.00)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>&lt;0.001</td>
</tr>
<tr>
<td><strong>C4. Do all entries us 24hr clock?</strong></td>
<td>Mean (SD)</td>
<td>Median (IQR)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td></td>
<td>2.85 (0.96)</td>
<td>3.00 (0)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>4.00 (0)</td>
<td>4.00 (0)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>&lt;0.001</td>
</tr>
<tr>
<td><strong>C5. Are all entries written in black ink?</strong></td>
<td>Mean (SD)</td>
<td>Median (IQR)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td></td>
<td>3.99 (0.12)</td>
<td>4.00 (0)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>4.00 (0)</td>
<td>4.00 (0)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>0.070</td>
</tr>
<tr>
<td><strong>C6. Is/are error(s) crossed out with a single line and signed?</strong></td>
<td>Mean (SD)</td>
<td>Median (IQR)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3.48 (0.68)</td>
<td>4.00 (1.00)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>4.00 (0)</td>
<td>4.00 (0)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>&lt;0.001</td>
</tr>
<tr>
<td><strong>C7. Are all spaces between entries in progress notes crossed out with a single line?</strong></td>
<td>Mean (SD)</td>
<td>Median (IQR)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td></td>
<td>3.48 (0.64)</td>
<td>4.00 (1.00)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>4.00 (0)</td>
<td>4.00 (0)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>&lt;0.001</td>
</tr>
<tr>
<td><strong>C8. Are abbreviations officially recognized?</strong></td>
<td>Mean (AD)</td>
<td>Median (IQR)</td>
<td>0.443</td>
</tr>
<tr>
<td></td>
<td>3.01 (0.46)</td>
<td>3.00 (0)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2.97 (0.60)</td>
<td>3.00 (0)</td>
<td></td>
</tr>
<tr>
<td><strong>C9. Are all pages labelled with the resident’s identification?</strong></td>
<td>Mean (SD)</td>
<td>Median (IQR)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td></td>
<td>3.85 (0.43)</td>
<td>4.00 (0)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>4.00 (0)</td>
<td>4.00 (0)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>&lt;0.001</td>
</tr>
<tr>
<td><strong>C10. Are all documents are signed and dated with the nurse’s printed name and designation?</strong></td>
<td>Mean (SD)</td>
<td>Median (IQR)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td></td>
<td>2.90 (0.57)</td>
<td>3.00 (1.00)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3.85 (0.35)</td>
<td>4.00 (0)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>&lt;0.001</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>Mean (SD)</td>
<td>Median (IQR)</td>
<td>0.001</td>
</tr>
<tr>
<td></td>
<td>33.01 (1.95)</td>
<td>33.40 (2.00)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>37.31 (1.23)</td>
<td>37.00 (2.00)</td>
<td></td>
</tr>
</tbody>
</table>

Several potential problems with the use of the electronic systems by the nurses identified in the previous studies could cause the decrease in documentation in the progress notes. For example, nurses’ poor computer literacy or heavy workload, the
unavailability of computers for access and the slow running speed of computers affected the nurses’ use of electronic systems (Keenan et al. 2005, Darbyshire 2000, Yu and Comensoli 2004, Cherry et al. 2011, Ammenwerth et al. 2003). In our study setting, these factors need to be considered for improvement in the implementation of the electronic systems.

The study identified a higher overall quality in the electronic records. This indicates that the requirements for documentation structure, format and process were better met by the electronic compared to the paper-based systems. With respect to each measurement item, the paper-based records scored statistically significantly lower with the items about legibility (C1), using a single line to correct errors (C4) crossing out spaces between entries (C6) and resident identification on every page (C7) in comparison with the electronic records, which were given a full score on these items. This was attributed to the functions of the electronic system in automatically producing legible data that meet those requirements relating to crossing out errors and spaces and resident identification.

The electronic records also had a higher quality score than the paper-based records (3.85 vs 2.90 respectively) regarding signing with the nurse’s designation and dating, because of the automatic processing of these items by the systems: the nurse was logged in with her own password and each data entry was dated automatically. Noticeably, the electronic records did not achieve a full score for these items. This was caused by a lack of the nurses’ designation in a few resident records because the staff’s profiles were not set up completely in the electronic systems. These study findings are consistent with the results of the previous studies (Björvell et al. 2002, Whyte 2005, Rykkije 2006). The improvement in the quality of documentation format and process in the electronic systems implies that the resident information was more clearly presented, so should better support the communication functions of the records for various purposes.

Both paper-based and electronic records contained illegitimate abbreviations. There was no statistically significant difference in the quality score for this assessment item between the two types of systems. This showed that the nurses’ documentation habits were not changed by using the new documentation systems. In addition, electronic progress notes had a statistically significant lower quality score on the measurement
items regarding clear and succinct language (C2) (3.30 vs 3.64 respectively) and factual or objective statements (C3) (3.20 vs 3.76 respectively). This indicates that nurses’ descriptions of care were not necessarily changed with the electronic systems.

With respect to clear and succinct language, when auditing the records, it was found that nurses tended to document redundant data in the electronic nursing care plan (NCP), causing low grading for the records. For example, in a nursing care plan it was found that 64 short phrases were used to describe a resident’s problem for care and most of these phrases repeated what was recorded already. Over-documentation with non-purposeful and superfluous data was also reported in the literature as a risk associated with the introduction of electronic systems (Oroviogoicoechea et al. 2006). In our study setting, there were two reasons for the redundant resident data: during the creation of the NCP, one of the electronic systems automatically posted primary assessment data to the observation section, resulting in information in the assessment forms being repeatedly listed in the NCP without being summarized into a problem or diagnosis statement; moreover, this function of the electronic system sometimes caused the nurses to click the submission button repeatedly when converting assessment data to the care plan due to poor computer skills. This caused the same sentences to be posted into the care plan multiple times.

The lower score for the measurement item about factual or objective statements (C3) was caused by the change of documentation practice in a participating organisation at the same time that the electronic system was introduced. This organisation started to require the nurses to use first person to write in the care plan. This way of phrasing was believed to reflect the organisation’s mission of providing resident-centred care, but it was very artificial and often could not accurately reflect what the residents might say, given that more than half of them are cognitively impaired. This study result was not caused in any way by the electronic system, but rather was a reflection of other issues.

Some limitations of the study need to be noted. This is a descriptive study, which was intended to identify advantages and shortcomings with paper-based and electronic resident nursing records. The study could not determine a causal relationship between the implementation of the systems and the improvement or
decline of quality of nursing documentation. In addition, the study was conducted in natural environments where many confounding factors such as organisational change with the use of first person in the records could not be effectively controlled. Another issue is the use of convenience sampling in the study in order to readily obtain valid consent from the residents or their families. This may affect the study’s representativeness of documentation practice among the participating organisations, though documentation practice within each home could be consistent (Hedt and Pagano 2011). In addition, given the nature of some items such as those about legibility (C1), clear and succinct language (C2) and use of factual and objective language (C3), grading of the records on these items depended on the auditor’s subjective judgment, though of course this is inevitable with auditing patient records (Björvell et al. 2000). In this study, one auditor conducted the audit for all of the resident records, so the consistency of the study results is guaranteed.

7.6 Conclusion

The study provides evidence about the quality of nursing documentation in regard to its structure, format and process and specifies which areas can be improved by using the electronic documentation systems. There are some aspects of documentation quality such as the nurses’ expression or language style which could not be positively affected by the use of the electronic systems. The study findings should give insights useful for the design of electronic systems in supporting written communication between users. It can also provide implications for quality improvement in electronic documentation practice in the participating aged care organisations.

Further studies may be needed in order to understand the nurses’ perceptions of their description of care in the records and the impact of the usage of unauthorized abbreviations on communication between different users. In order to understand the reasons causing redundancy of assessment data in the observation section of the care plan, direct observation of the nurses’ behaviour of conducting a care plan may be required. This may provide evidence for the design of an effective training program to improve nurses’ skills in electronic documentation.
Reference


CHAPTER 8. CONCLUSION AND RECOMMENDATIONS

The aim of this research was to present evidence to demonstrate the effect of the electronic documentation systems on the quality of nursing documentation in a number of residential aged care homes in Australia. The study investigated nursing documentation practice in the homes and compared the quality of paper-based and electronic nursing documentation in respect of various components of resident records. The aims and objectives of the research have been met by conducting a set of individual studies specific to each of these components, using various audit approaches. This chapter presents a summary of the study findings, the contributions of this research and its implications. It also provides suggestions for future research.

8. 1 Summary of study findings

The research started with a systematic literature review to obtain an overall understanding of the context of the research topics and to build a theoretical basis for the study. A nursing documentation audit instrument was then developed. Using the instrument, a set of documentation audit studies was carried out to evaluate a number of components of resident records. These studies yielded interesting findings which reflect how well nursing care was recorded in the paper-based and electronic nursing documentation systems.

The systematic literature review presented in Chapter 2 explored the operational definitions of the quality of nursing documentation and approaches to its evaluation. Three attributes of nursing documentation quality were summarised from a review of the measurement criteria of previous documentation audit instruments. These attributes are: structure and format, process and content of nursing documentation. The review reported various audit approaches, which provided guidance for the rest of the study in terms of what and how to examine the quality of paper-based and electronic nursing documentation.

Chapter 3 describes the development of a nursing documentation audit instrument. The instrument contains three sections with 34 questions addressing the three attributes of nursing documentation quality identified in Chapter 2. The questions in the instrument are sequenced according to the steps of the nursing process: assessment, nursing problem/diagnosis, goal, intervention and evaluation and these
are consistent with the components of the resident records in the study setting. The quality criteria used in the instrument were derived from two sources: 1) relevant Australian governmental, organisational and professional requirements and recommendations so that the instrument would fit into the study setting and 2) published nursing documentation audit studies. The instrument was validated in a pilot study and its validity and reliability were tested. This instrument set up a framework for the conduct of the empirical evaluation study.

Chapter 4 describes the results of the study which explored the documentation practice and evaluated the quality of documentation of resident background information in the paper-based and electronic admission forms. The study focused on the documentation quality within the domains of documentation structure and format and documentation content. Seven versions of admission forms were identified in the nine participating aged care homes. The study qualitatively described the scope of information defined in the forms by establishing a checklist with items from each of. These items were classified into 10 information categories. The completion of items in each form was measured against both the total items in the form and the full range of items in the checklist, to derive the completeness and the comprehensiveness rate. The results showed that the electronic versions of admission forms had better completeness and comprehensiveness rates than the paper-based forms. The study also identified frequently and infrequently documented data items in both paper-based and electronic admission forms. A correlation analysis at each information category level showed a negative association between the number of items included in a form and the completeness rate of the items, but a positive association between the number of items and the comprehensiveness rate.

Chapter 5 reported the results of the study focusing on the comparison between the paper-based and electronic documentation systems in the quality of documentation of nursing assessment. The study identified varying practices in documenting nursing assessments and in the format of assessment forms among the nine residential aged care homes. The evaluation applied several measures which mainly addressed the structure and format of assessment forms without detailed assessment of their content. The results showed a higher quantity of documented assessment forms in each resident record in the electronic than in the paper-based systems. These electronic assessment forms also covered a wider range of care needs compared with
paper-based forms. By using a five point Likert scale, the completeness and timeliness of assessment forms was measured and compared between the two types of systems. The results showed similar level of completeness of admission assessment forms in the two types of the systems and a lower score for the completeness of ongoing assessment forms and for the timeliness of documentation of admission assessment in the electronic compared with the paper-based systems.

Chapter 6 reports the results of evaluating the resident nursing care plan (NCP) for both electronic and paper-based systems. Different versions of free-text and standardized NCPs with various terminologies were identified in the previously-used paper-based and the current electronic documentation systems. The study found that there had been a significant change in terminology from ‘nursing diagnosis’ to ‘nursing problem’ in the paper-based systems about 10 years ago and to ‘observation’ in the current electronic NCPs. Sixteen assessment items were used to evaluate the quality of documentation of the NCPs using a five point Likert scale. Of the 16 questions in the instrument, 14 questions addressed the content and two questions assessed the process of nursing documentation. The electronic free-text NCPs had a lower total score than the free-text paper-based NCPs (47.34 vs 48.30, p<0.01). In contrast, the standardized electronic NCPs had a higher total score than the standardized paper-based NCPs (43.55 vs 38.46, P<0.01). In terms of individual assessment items, the electronic free-text NCPs obtained a lower score for the formulation of a problem/diagnosis statement and documentation of contributing factors and resident outcomes (P<0.01). The electronic standardized NCPs had a better score for all of the measurement items than their paper-based standardized counterparts (P<0.01).

Chapter 7 describes the measurement of the quality attributes of documentation structure, format and process for various nursing notes including assessment forms, NCPs and progress notes. No difference in the quantity of entries was found between the paper-based and the electronic progress notes at 6 and 12 months after the implementation of the electronic systems. There was a slight decrease in the number of entries at 18 month after the electronic systems implementation. The electronic resident records had a higher total score than the paper-based records being assessed by 10 instrument questions (37.31 vs 33.01, P<0.01). For individual items, the paper records achieved a better score on the use of abbreviations and clear and objective
language. The electronic systems had a higher score than the paper for legibility, drawing a single line to correct errors or to cross out any spaces between entries in progress notes, resident identification on every page and signing and dating the records.

8. 2 Previous knowledge in the topic area
The quality of nursing documentation has multiple attributes, which were assessed in the previous documentation audit studies using various quality measures, though a single study may have only focused on individual aspect. The development of nursing documentation practice is in accordance with the introduction of the nursing process model into nursing practice. This has led to the establishment and use of standardized nursing terminology. The evaluation of quality of documentation content has, therefore, been centred on the recording of the steps of the nursing process and the use of the terminology. A range of other issues have also been considered in determining the quality of nursing documentation. These refer to data quality being measured by criteria such as the quantity, completeness, legibility and use of abbreviations, signing, dating and the accuracy of documentation in relation to what actually occurred. Accordingly, flaws in nursing documentation were identified in these areas.

It is evident from previous studies that electronic nursing documentation systems are able to produce somewhat better quality data in comparison with paper-based systems, in certain respects depending on the characteristics of the systems and the practice of the various study settings. The common benefits of electronic documentation systems include the improvement of comprehensiveness in documenting the nursing process, the use of standardized language and the recording of specific items about particular patient issues and relevance of the message. In addition, electronic systems can improve legibility, dating and signing in nursing records.

8. 3 The contribution of the research
To our knowledge, this is the first nursing documentation audit study conducted in the Australian residential aged care setting. The study contributes to the body of knowledge about nursing documentation practice in this setting and the quality of
paper-based versus electronic nursing documentation. Specifically, the study provides an overview of existing knowledge about nursing documentation quality and approaches to its evaluation through conduct of a systematic literature review. It classifies various attributes of the quality of nursing documentation as measured by the previous documentation audit studies in three aspects of documentation: structure and format, process and content. Various measurement approaches used by different audit studies addressing these three quality attributes are summarized. The review establishes a theoretical framework for the evaluation of the quality of nursing documentation, which can provide a reference for other researchers to develop evaluation approaches in different health care settings.

The study develops systematic approaches to measure the quality of nursing documentation in paper-based and electronic resident records. It illustrates methods of measuring the quality of various types of nursing notes such as admission forms, assessment forms and NCPs. The study presents a nursing documentation audit instrument with a set of criteria which fit the documentation practice of residential aged care homes in Australia and has the potential to be used in other settings for quality improvement and research purposes. The instrument addresses different aspects of nursing documentation quality and can be used for the assessment of both paper-based and electronic documentation systems.

The study produces significant findings which demonstrate the benefits of the electronic systems in terms of producing quality data about residents and care. The benefits are found in several areas in respect of different components of the resident nursing records. In relation to the resident admission form, the electronic documentation systems were able to improve the completeness and comprehensiveness of documentation. For the documentation of nursing assessment, the electronic systems significantly increased the quantity and comprehensiveness of documented assessment forms in each record. In regard to the NCP, the electronic standardized NCPs were graded with a higher total quality score than its paper-based counterpart. In addition, in comparison with the paper-based documentation systems, the electronic systems, due to their automatic functions, were able to improve the format, structure and process features of documentation quality such as legibility, signing, dating, crossing out error and space with a single line and resident identification on every page.
On the other hand, the study identifies several aspects of nursing documentation which are not obviously optimized by the use of the electronic systems. These include completing the items in the assessment forms and documenting assessment forms within the required timeframe. Based on the change of terminology in the electronic free-text NCPs, the electronic systems did not lead to better documentation of the steps of the nursing process according to the criteria we have applied. The language used by the nurses in describing care and the use of abbreviations in the records did not improve with the use of the electronic systems.

8.4 Implications for practice
The study provides insight into the documentation practice in Australian aged care and the effect of electronic documentation systems on the quality of nursing documentation. From the study findings, the following implications for documentation practice, system design and professional development can be drawn.

The results of the study provide feedback on the performance of the new electronic documentation systems in managing resident information. The study provides a benchmark for evaluation of the quality of electronic systems in other settings. The recognition of difficulties with the electronic systems may lead to improvement in the quality of nursing documentation in the participating aged care homes.

Electronic systems are expected to enable better practice, but may not technically lead to better documentation in every aspect, such as documentation content, if it is beyond the functional scope of the system. Nursing documentation practice is influenced by complex factors. The vendors designed the systems to meet the users’ requirements. Desire for better documentation needs different stakeholders to work together to ensure the system performs effectively to meet clinical and management needs.

The change of the terminology in the NCPs is subject to debate referencing the nursing process model for nursing practice and documentation. The question is whether the nursing diagnosis/problem is appropriate to describe a resident’s problems or care needs in aged care. As nursing terminology is being standardised more and more internationally, the decision made by the participating organisations
to leave out the step of ‘Nursing Problem’ or ‘Nursing Diagnosis’ from the nursing process documentation need further consideration.

8.5 Recommendations for future research

Although the study attempts to conduct a comprehensive evaluation of the quality of nursing documentation in the paper-based and electronic documentation systems, the quality of nursing documentation may not be adequately assessed due to the complexity of nursing documentation and difficulties with the limited timeframe of the research. For example, although various versions of assessment forms were used in different nursing homes at different times, the quality of content of these forms was not assessed by this study. Such a study would be beneficial to ensure that nursing documentation practice supports care delivery and should be conducted in the near future. The conformance of nursing documentation to the nursing practice on the floor is a basic requirement of nursing documentation, but examination of this was not possible in this retrospective documentation audit study. This is another area for future research.

The study identified a number of flaws in different components of the records. Factors causing the flaws and the impact of the flaws on resident outcomes need to be further investigated to improve documentation practice and outcomes. The change of terminology describing resident problems in the NCPs was identified. The adoption of the nursing process model and standardized nursing language in the aged care setting would contribute to the development of the nursing profession. An investigation of nurses’ interest in this area needs to be undertaken. Qualitative analysis of existing NCPs and mapping of NCPs with standardized nursing terminology may further improve documentation of the NCPs and development of standardized nursing terminology. Furthermore, assessment of the approaches to the evaluation of nursing documentation quality should be continued.

8.6 Conclusion

This study takes the first step toward understanding nursing documentation practice in Australian residential aged care and the effect of electronic systems on the quality of nursing documentation. The study provides evidence showing that documentation practice is generally structured under the same legal and governmental requirements,
but can vary in different aged care organisations with respect to issues such as use of
different documentation systems, distinct organisational requirements for
documentation and various formats of forms and terminologies. The implementation
of electronic documentation systems can standardize documentation practice across
organisations. The electronic documentation systems can also produce more quality
resident data than the traditional paper-based systems within the dimensions of
documentation structure, format and process. The quality of nursing documentation
content may not be improved with the use of the electronic systems due to complex
underlying factors including legal, organisational and professional challenges. The
identification of deficiencies with nursing documentation in the both paper-based and
electronic documentation systems provides implications for improvement in current
documentation practice. More and more electronic documentation systems will be
introduced in health care settings in the future. Different stakeholders need to work
together to improve the design of documentation systems and develop better
documentation practice. Efforts should be made to ensure that the electronic systems
can produce quality data about the clients and their care which are useful for
effective management and delivery of aged care services.
### APPENDIX 1. QUALITY OF AUSTRALIAN NURSING DOCUMENTATION IN AGED CARE (QANDAC) INSTRUMENT

Record ID: _____ Facility ID: _______ Name of Auditor: _______ Date: _______

Care unit: high care / low care / dementia/respite Documentation type: Paper/electronic

Admission Date __________

(Please circle the number on the descriptive scale based on your professional judgment)

#### Section A. Completion of Nursing History and Nursing Assessment

(Refers to the resident’s admission form and applicable assessment forms)

<table>
<thead>
<tr>
<th></th>
<th>Always</th>
<th>Usually</th>
<th>Neutrally</th>
<th>Sometimes</th>
<th>Never</th>
</tr>
</thead>
<tbody>
<tr>
<td>A1</td>
<td>Is the resident’s nursing history complete?</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>A2</td>
<td>Is the resident’s admission assessment complete?</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>A3</td>
<td>Is the resident’s ongoing assessment complete?</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>A4</td>
<td>Are the assessments carried out by appropriate staff (RN)?</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>A5</td>
<td>Are those assessment forms completed in a timely fashion according to the residential aged care home’s defined protocol?</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>A6</td>
<td>Are the assessments conducted using assessment tools?</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
</tbody>
</table>

Score (section A) = Sum (A1 – A6) = (  )
## Section B. Description of Nursing Process

(Refers to the resident nursing care plan and progress notes)

<table>
<thead>
<tr>
<th></th>
<th></th>
<th>Always</th>
<th>Usually</th>
<th>Neutrally</th>
<th>Sometimes</th>
<th>Never</th>
</tr>
</thead>
<tbody>
<tr>
<td>B1a</td>
<td>Is/are nursing problem(s) identified?</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>B1b</td>
<td>Is/are there clear nursing problem statement(s) describing the type and nature of the resident’s current and/or potential problem(s)/risk(s)/care needs?</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>B1c</td>
<td>Is/are nursing problem(s)/risk(s)/care needs identified consistent with the findings of assessment?</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>B1d</td>
<td>Does/do the statement(s)/risk(s)/care needs indicate one or more contributing factors?</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>B1e</td>
<td>Is/are sign(s) and/or symptom(s) stated in relation to the nursing problem(s) identified?</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>B2a</td>
<td>Is/are goal(s) set up in relation to the problem(s)/risk(s)/care needs?</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>B2b</td>
<td>Is/are the goal(s) resident-centred?</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>B2c</td>
<td>Is/are the goal(s) measurable or observable?</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>B3a</td>
<td>Is/are nursing intervention(s) planned to address the nursing problem(s)/risk(s) identified?</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>B3b</td>
<td>Is/are nursing interventions appropriate or suitable to the goals?</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>B3c</td>
<td>Is/are the intervention(s) specific and detailed?</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>B4</td>
<td>Has/have intervention(s) been</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>0</td>
</tr>
</tbody>
</table>
### Section B. Evaluation of the Quality of Care Provided

<table>
<thead>
<tr>
<th>Question</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Is/are there nursing evaluation(s) conducted in relation to planned care?</td>
<td>4 3 2 1 0</td>
</tr>
<tr>
<td>Is/ are resident outcomes in relation to planned care documented in the care plan?</td>
<td>4 3 2 1 0</td>
</tr>
<tr>
<td>Does/do evaluation(s) show the effectiveness of care provided in terms of achieving the goals?</td>
<td>4 3 2 1 0</td>
</tr>
<tr>
<td>Is/are nursing evaluation(s) conducted regularly?</td>
<td>4 3 2 1 0</td>
</tr>
<tr>
<td>Is/are care plan(s) made by an appropriate nurse?</td>
<td>4 3 2 1 0</td>
</tr>
<tr>
<td>Is/are the resident’s temporary problem(s) or condition change(s) noticed in progress notes addressed by a care process as documented?</td>
<td>4 3 2 1 0</td>
</tr>
</tbody>
</table>

Score (section B) = Sum (B1 – B7) = ( )

### Section C. Meeting Requirements of Data Entry

(Refers to resident assessment forms, the nursing care plans and progress notes)

<table>
<thead>
<tr>
<th>Question</th>
<th>Excellent</th>
<th>Sound</th>
<th>Neutral</th>
<th>Less good</th>
<th>Poor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Is the writing of all records legible?</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Are statements made by nurses using clear and succinct language?</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Are statements factual and objective?</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Do all entries use 24hr clock?</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>Question</td>
<td>Score</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>---</td>
<td>-------------------------------------------------------------------------</td>
<td>-------</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>C5</td>
<td>Are all entries written in black ink?</td>
<td>4 3 2 1 0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>C6</td>
<td>Is/are error(s) crossed out with a single line and signed?</td>
<td>4 3 2 1 0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>C7</td>
<td>Are all spaces between entries in progress notes crossed out with a single line?</td>
<td>4 3 2 1 0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>C8</td>
<td>Are abbreviations officially recognized?</td>
<td>4 3 2 1 0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>C9</td>
<td>Are all pages labelled with the resident’s identification?</td>
<td>4 3 2 1 0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>C10</td>
<td>Are all documents signed and dated with printed name and designation?</td>
<td>4 3 2 1 0</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Score (section C) = Sum (C1 - C10) = ( )

Total score = Sum (section A - C) = ( )