ESSENTIAL ELEMENTS OF AN EXCELLENT NURSING PRACTICE ENVIRONMENT

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CHAPTER 1

GENERAL INTRODUCTION AND OUTLINE OF THE THESIS

GENERAL INTRODUCTION AND OUTLINE OF THE THESIS

Nurses have an important role in preserving, promoting and optimizing individuals' health and self-care abilities, prevention of disease and injury, facilitating healing, alleviation of suffering, detection of complications, and advocating the care of people (Dubois et al., 2017). Nurses enable people to adapt to their health status and to self-manage (Huber et al., 2011). Nurses' key tasks, for instance, include identifying, monitoring, treating, and caring for patients, in order to achieve the best outcomes. These outcomes can be safety (e.g. falls, intertrigo, medication errors, sepsis, depression, delirium, pain, malnutrition, dysphagia, incontinence, and pressure ulcers), stable functional status of the patient, and positive outcomes such as patient comfort, quality of life, and patient empowerment (Dubois et al., 2017).

These pivotal tasks are under pressure. Aging populations, societal developments towards more person-centered care, technological development, and new treatment and care options result in increasing complexity of health problems and healthcare delivery. Older people in particular, are more likely to suffer from multiple morbidities and chronic diseases, receiving a wide range of nursing interventions that potentially interact (Dubois, McKee, & Nolte, 2006; Sharma, Bamford & Dodman, 2015). Also, the average hospital length of stay is decreasing, more care is provided in community settings, and only patients with highly complex care needs are admitted to nursing homes. At the same time, constraints in health expenditure growth is a general important topic worldwide. Reducing the nursing staff is often seen as a cost containment strategy. As a result, the capacity in terms of numbers and qualifications of the nursing workforce in acute as well as long-term care is not increasing with the pace necessary to keep up with the developments in patient care. This concurrence of insufficient capacity and capability of the nursing staff and increased care complexity raises concerns about deteriorating quality and safety of patient care (Aiken, Sloane, & Bruyneel, 2014; Suhonen, Charamlambous, Stolt, Katajisto, & Pure, 2013).

An important prerequisite for enabling nurses to continue to deliver high quality and safety of patient care is an excellent nursing practice environment (Laschinger, 2008; Stimpfel, Rosen, & McHugh, 2014). The nursing practice environment is the aggregate of conditions, influences, forces, and cultural values that influence or modify an individual nurses' life on a specific unit. Nurses must be able to practice autonomously with control over their nursing practice, supported by their nurse manager. They must be able to innovate and to continuously engage in quality improvement. Physicians and nurses have to collaborate and use each other's knowledge and competences. Most importantly, a culture which prioritizes concern for the patient needs to be present.

The nursing practice environment has been linked to outcomes on patient, nurse, and organizational level. For instance, research shows that nursing sensitive patient outcomes that are associated with the nursing practice environment are readmission rate, 30-day mortality, length of stay in a hospital, failure to rescue, adverse events, catheter-associated urinary tract infections, and patient reported quality and safety (Aiken et al., 2014; Aiken et al., 2017; Bae, 2011; Griffiths et al., 2016; Stalpers, Van der Linden, Kaljouw, & Schuurmans, 2017). Furthermore, nurse outcomes such as burnout, job satisfaction, and intention to leave are associated with the nursing practice environment (Aiken et al., 2014; Blake, Leach, Robbins, Pike, & Needleman, 2013; Swiger et al., 2017; Zangaro & Soeken, 2007; Zhoe, He, & Wang, 2015). Additionally, organizational outcomes that are associated with the nursing practice environment are nurses' turnover, overall safety climate, overall value of care (lower mortality with similar costs), and for instance error reporting (Silber et al., 2016; Swiger et al., 2017; Coetzee, Klopper, Ellis, & Aiken, 2013). Therefore, it is important that health care organizations develop excellent nursing practice environments that attract, and retain well-qualified nurses to achieve the best patient, nurse, and organizational outcomes.

Magnet Hospitals

In the 1990s the nursing workforce in the United States was pressured but despite nursing shortages, some hospitals were able to attract, captivate, and retain well-qualified nurses and deliver excellent nursing care to patients. These hospitals were called Magnet Hospitals (McClure, Poulin, Sovie, 1983). The American Nurses Credentialing Center (ANCC) tried to learn from these hospitals, and developed the Magnet recognition program® to promote excellence in nursing.

Kramer and Schmalenberg (2002) studied Magnet Hospitals and developed a measurement instrument based on eight work-related processes and relationships essential to a healthy, productive practice environment that enables delivery of excellent patient care. This instrument is called the Essentials of Magnetism II© (EOMII). The EOMII is based on grounded theory generated through observations of nurses and interviews with almost a thousand nurses (Kramer & Schmalenberg, 2008). Kramer and Schmalenberg (2008) concluded that the EOMII is a valid and reliable measure of the work processes and relationships. The eight essential processes and relationships, the Essentials of Magnetism (EOM), are:

- Working with clinically competent peers
- Collaborative nurse-physician relationships
- Clinical autonomy
- Nurse manager support
- Control over nursing practice

- Perceived adequacy of staffing
- Support for education
- Culture in which concern for the patient is paramount

It is expected that health care organizations which excel on the eight essential elements of the nursing practice environment attract and retain nurses and deliver better quality of care. Mensik (2007) studied the EOM in home care, showing that it can also be relevant in settings other than hospitals. However, little research has been done to assess the applicability of the EOM to other healthcare settings than hospitals, and to non-US settings other than Turkey. Yildirim et al. (2012) concluded that the Turkish version of the EOMII is valid and reliable in assessing nurses' practice environment. Therefore, this dissertation specifically focusses on the practice environment of nurses within hospitals and nursing homes in the Netherlands.

Essentials of Magnetism

Donabedian's (1988) Structure-Process-Outcome Quality framework, used to assess the impact of organizational structures and professional practices on patient and organizational outcomes, guided the development of the Essentials of Magnetism. Structures can be seen as the policies, programs, standards and attributes that create an environment in which nurses can engage in the processes and practices that produce desired nursing sensitive outcomes (Kramer & Schmalenberg, 2002; Donabedian, 1988; Kramer & Schmalenberg, 2004a; Kramer & Schmalenberg, 2005; Schmalenberg & Kramer, 2004). The eight essential work processes and relationships mentioned above will be elucidated below and will be referred to as 'essentials'.

Working with clinically competent peers

Nurses consider working with other nurses who are clinically competent important in delivering quality care. Nurses regard specialty certification, educational degree, and both formal and informal peer review and reinforcement as proof of clinical competency. Overall competency, adequate rewards for competency, and the reinforcement of peers for delivering high-quality care are perceived as important elements of the essential process 'Working with clinically competent peers'. The absence of this essential not only inhibits quality patient care, but is also disadvantageous to nurse job satisfaction (Aiken et al., 2017; Kramer & Schmalenberg, 2004b; Stalpers et al., 2017).

Collaborative nurse-physician relationships

In order to be collaborative, nurse-physician relationships must be characterized by nurses and physicians working together with mutual respect and trust. The power

between those disciplines must be equal. Furthermore, nurses and physicians must be willing to teach and instruct each other (Kramer & Schmalenberg, 2004b). Interprofessional learning and collaboration is a prerequisite for patient safety (Klipfel et al., 2014). Collaborative and collegial nurse-physician relationships will increase retention of nurses and will lower stress levels for nurses. More importantly, the patient will benefit from those relationships (Kramer & Schmalenberg, 2004b; Klipfel et al., 2014; Tang, Chan, Zhou, & Liaw, 2013).

Clinical autonomy

Clinical autonomy is defined as the freedom to act on what you know, in order to make independent clinical decisions that exceed standard nursing practice, in the best interest of the patient (Kramer & Schmalenberg, 2008). Freedom concerns trust and sanctions of the organization related to autonomous practice. Accountability of nurses in a positive and constructive manner is seen as an important element of the nursing practice environment that enables high quality patient care (Mensik, 2007). Furthermore, clinical autonomy concerns acting in emergent situations in the best interest of the patient and being accountable for one's actions. Nurses consider evidence-based practice as an important source of knowledge to make autonomous decisions (Kramer & Schmalenberg, 2004c). Nurses' job satisfaction, levels of burn-out, intention to leave the organization, as well as teamwork have been linked to nurses' autonomy (Rafferty, Ball, & Aiken, 2001). Rao et al. (2017) even found that greater nurse autonomy at the hospital level was significantly associated with lower odds of 30-day mortality and failure to rescue.

Nurse manager support

Productivity, attracting and retaining nurses, and nurse job satisfaction, are all affected by the support of nurse managers. Support means that nurse managers meet the expectations of nurses and provide them with means to deliver their job professionally, while also meeting the expectations of their superiors. Strong leadership is an important driver of adequate staffing, collaborative interdisciplinary relationships, and nursing participation in governance and policy development which positively affect nursing sensitive outcomes (Goedhart, Van Oostveen & Vermeulen, 2017; Laschinger & Leiter, 2006). Nurse managers should be able to arr,ange access to information, support, resources and opportunities to learn, and develop the intrinsic motivation of nurses to deliver the best possible patient care (Armellino, Quinn Griffin & Fitzpatrick, 2010; Armstrong & Laschinger, 2006; Armstrong, Laschinger, & Wong, 2009). Nurse managers' leadership behaviors can empower nurses by fostering nurses' perceptions of autonomy, confidence and the importance of their work (Laschinger, 2008; Laschinger et al., 1999). Nurses see leadership behaviors as more supportive than managerial behaviors (Ducharme et al. 2017; Kramer, Schmalenberg, & Maguire, 2010; Kramer, Schmalenberg, & Maguire, 2004a).

Control over nursing practice

Control over nursing practice is a democratic process facilitated by a visible, organized, and supportive structure. The structure should give nurses input and involvement in decision making concerning clinical policies and problems in practice and personnel issues which have an effect on nurses. The essential 'Control over nursing practice' consists of control over nursing practice and personnel policies in terms of a structure that enables control, the input and decision making power, recognition of other professionals concerning the control over the nursing practice, and the extent to which there is shared decision making (Kramer & Schmalenberg, 2004c; Kutney-Lee et al., 2017). Control over nursing practice, for instance in the form of councils and committees, will only lead to the wanted outcomes if nurses have the authority to take control over their practice on a daily basis (Laschinger & Wong; 1999).

Perceived adequacy of staffing

Adequate nurse staffing is associated with lower mortality rates in hospitals in the US, Europe and other countries (Aiken et al. 2014; Griffiths, Ball, Murrels, Jones, & Rafferty, 2016; Twigg et al., 2010). Adequacy of staffing involves the number of nurses on a ward as well as the ability to deliver quality patient care. Nursing care which is left undone due to lack of time, is related to insufficient nurse staffing (Ausserhofer et al. 2014; Ball, Murrells, & Rafferty, 2014), mortality following common surgical procedures (Ball et al., 2018), lower nurse perceived patient safety (Ball et al., 2014), and more adverse events such as falls (Kalisch, Xie, & Dabney, 2013). Aspects such as the competence of co-workers, cooperation of staff, computerized order entry, the number of new graduates, the degree of autonomy permitted, adequacy of support, vision on quality of care, and type of care-delivery system affect the perceived adequacy of staffing (Silber et al., 2016; Stalpers et al., 2017; Kramer et al., 2004a; Van Oostveen, Mathijssen, & Vermeulen, 2015).

Support for education

Education includes continuing education and short courses, as well as on-and off-site degree programs. Educational support is valued highly with a view to attracting and retaining nurses, quality patient care, and job satisfaction (Stalpers et al., 2017; Schmalenberg & Kramer, 2008; Aiken et al., 2013). Support for education is considered essential for the autonomous practice of nurses and for positive nurse-physician relationships. Support for education consists of elements such as the availability of educational programs, financial assistance, others' valuation of education within the organization, and organizational rewards for education (Kramer & Schmalenberg, 2004c).

Culture in which concern for the patient is paramount

Organizational culture can be defined as a patterned, shared system of values guiding behavior in the work setting (Kramer, Schmalenberg, & Maguire, 2004b). Shared values and norms are the two elements of which an organizations' culture is composed. Each ward in an organization can have its own subculture. Attributes of a culture of excellence are concern for the patient, productivity, teamwork, and communicating cultural values to new nurses and other personnel. Also cost of care is relevant which can be a competing value with concern for the patient. Patient centered culture is an important element of the nursing practice environment to enable high quality patient care delivery (Kramer, Schmalenberg, & Maguire, 2004b; Stalpers et al., 2017).

Excellent Care (Excellente Zorg)

As not all elements of the Magnet Hospital concept are present in the Dutch health care organizations, such as the presence of chief nursing officer, the Magnet accreditation program is not fully applicable to these organizations. Yet a good practice environment for nursing staff remains equally relevant in settings where Magnet accreditation cannot be obtained. Therefore, the Dutch Nurses' Association (V&VN) developed "Excellent Care" to attract, captivate, and retain well qualified nurses and simultaneously improve quality patient care based on elements with a scientific foundation. Excellent Care stands for the best patient care, provided by nurses who work with passion according to the latest scientific evidence. Excellent Care is designed to stimulate nurses and organizations to improve nursing and their practice environment. Ever since 2008, the eight Essentials of Magnetism form the basis of Excellent Care; V&VN underlines the importance of these essential processes and relationships in order for nurses to be able to deliver the best possible patient care (V&VN, 2017).

Nursing wards

To implement improvements in the nursing practice environment in care institutions that lead to improved outcomes, the focus should be on nursing wards, as patients on different wards have specific characteristics and needs that require different nursing care (Kramer et al., 2014). Furthermore, within health care organizations, nursing wards can have very different nursing practice environments, defined by for instance their culture, educational levels of nurses, and nursing leadership and management.

Nurses defined

According to the Royal College of Nursing (Royal College of Nursing, 2014) a nurse is a professional who uses 'clinical judgement in the provision of care to enable

people to improve, maintain, or recover health, to cope with health problems, and to achieve the best possible quality of life, whatever their disease or disability, until death'. Moreover, nurses have an important advocacy task in the care of individuals, families, communities, and populations and perform basic care activities such as washing, bathing, toileting, feeding, and mobilizing (American Nurses Association, 2010; Zwakhalen, Hamers, & Metzelhin, 2018).

Nurse educational levels and years of training differ per country. Our studies were performed in The Netherlands. Here, nurses' educational levels vary from associate degree with four years of training and bachelor degree with four years of training, to master degree with six years of training. These educational levels can be classified according to the Netherlands Qualifications Framework (NLQF) as educational levels NLQF 5 to NLQF 7 (NLQF, 2017).

Aim of the thesis

Although the Essentials of Magnetism form the basis of Excellent Care, the usability, validity, and reliability of the EOMII has not been studied for the Dutch hospital setting. Also, little research has been done to assess the applicability of the EOM to other healthcare settings than hospitals and to non-US settings. Further, limited research has addressed the relationship between the Essentials of Magnetism and outcomes on nursing, patient or organizational level.

The purpose of this dissertation is to evaluate the qualities of the Dutch Essentials of Magnetism instrument in the assessment of nursing practice environments in hospitals and nursing homes in the Netherlands. Furthermore, the aim is to evaluate if the elements of the nursing practice environments are related to nursing sensitive outcomes.

Outline of the thesis

Following the general introduction, this thesis is subdivided in three main parts. Part I concerns the translation and validation of the Dutch Essentials of Magnetism II. Part II expands upon the relation of the EOM to processes (nursing care left undone), and patient outcomes (nursing sensitive outcomes). In part III, the findings of part I and II are summarized and discussed.

In **Part I, Chapters 2 to 4** cover the translation and validation of the Dutch Essentials of Magnetism II instrument in order to analyze whether the instrument can be used in the Dutch hospital and nursing home settings. Chapter 2 describes the translation process of the Essentials of Magnetism II© to the Dutch hospital setting and the assessment of its psychometric properties with a three-phased descriptive and correlational design encompassing a forward-backward translation process, a descriptive quantitative pilot study amplified with qualitative data, and psychometric evaluation.

Chapter 3 determines the construct validity of the Dutch Essentials of Magnetism II instrument in hospitals using hypotheses testing. Construct validity was determined by relating the Dutch Essentials of Magnetism II to the Dutch Practice Environment Scale of the Nursing Work Index in a cross-sectional, correlational study design.
Chapter 4 reports the psychometric properties of the Dutch Essentials of Magnetism II instrument for the nursing home setting. As this was the first study on the use of the Essentials of Magnetism II in nursing homes, in a preparatory phase, a cross-sectional survey study focused on face validity of the instrument in nursing homes. A second cross-sectional survey design was then used to further test the instrument's validity and reliability. Psychometric testing included evaluation of content and construct validity, and reliability.

In **Part II, Chapters 5 to 7** give insight into the extent to which the EOM are related to quality of care in terms of nursing sensitive outcomes. **Chapter 5** concerns a systematic literature review on the relationship between the nursing practice environment in hospitals and five nursing sensitive outcomes (i.e. pain, malnutrition, pressure ulcers, patient falls, and delirium). Included were quantitative studies published from 2004 to 2012.
Chapter 6 is a descriptive qualitative study, designed to comprehend the views of Dutch nurses on how nurses and their practice environment affect patient experiences of quality of care. Although we mainly focus on the hospital sector in this dissertation, we are interested in the wider application of the framework in all sectors. That is why in Chapter 6 nurses from different sectors are included. Focus groups in mental health care, hospital care, home care and nursing home care were conducted. Themes were deducted from transcribed data via open coding and categorization to organizing and structuring the categories and member check.
In **chapter 7**, we explored and assessed if the nursing practice environment influences nurse assessed quality of hospital nursing care using a cross-sectional correlational survey design. The purpose of this study was to gain understanding of which structural elements of the nursing practice environment impact nursing sensitive patient outcomes taking into account the process element of missed nursing care.

Finally, in **Part III, Chapter 8**, the results reported in this thesis are summarized and the findings are discussed, as are the methodological considerations, practical implications and recommendations for future research.

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I

PART I

TRANSLATION AND VALIDATION OF THE DUTCH ESSENTIALS OF MAGNETISM

2

CHAPTER 2

MEASURING THE NURSING WORK ENVIRONMENT: TRANSLATION AND PSYCHOMETRIC EVALUATION OF THE ESSENTIALS OF MAGNETISM

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ABSTRACT

Aim: Translate the Essentials of Magnetism II© (EOMII; Dutch Nurses' Association, Utrecht, The Netherlands) and assess its psychometric properties in a culture different from its origin.

Background: The EOMII, developed in the USA, measures the extent to which organizations/units provide healthy, productive and satisfying work environments. As many healthcare organizations are facing difficulties in attracting and retaining staff nurses, the EOMII provides the opportunity to assess the health and effectiveness of work environments.

Methods: A three-phased (respectively N = 13, N = 74 and N = 2542) combined descriptive and correlational design was undertaken for translation and evaluation validity and psychometric qualities of the EOMII for Dutch hospitals (December 2009–January 2010). We performed forward-backward translation, face and content validation via cross-sectional survey research, and semi-structured interviews on relevance, clarity, and recognizability of instruments' items. Psychometric testing included principal component analysis using varimax rotation, item-total statistics, and reliability in terms of internal consistency (Cronbach's α) for the total scale and its subscales.

Results: Face validity was confirmed. Items were recognizable, relevant and clear. Confirmatory factor analysis indicated that five of eight subscales formed clear factors. Three original subscales contained two factors. Item-total correlations ranged from 0.43 to 0.83. One item correlated weakly (0.24) with its subscale. Cronbach's α for the entire scale was 0.92 and ranged from 0.58 to 0.92 for eight subscales.

Conclusions: Dutch-translated EOMII (D-EOMII) demonstrated acceptable reliability and validity for assessing hospital staff nurses' work environment.

Implications for Nursing and Health Policy: The D-EOMII can be useful and ffective in identifying areas in which change is needed for a hospital to pursue an excellent work environment that attracts and retains well-qualified nurses.

Keywords: Instrument Development, Job Satisfaction, Nursing, Psychometric Evaluation, Recruitment and Retention, Workforce Issues

BACKGROUND

Nurses play an important role in patient care in hospital organizations. Their ability to provide excellent patient care is influenced by the health of the work environment, defined as the extent to which they can engage in professional practices identified as essential to quality patient outcomes. Many countries face difficulties in attracting and retaining nursing staff (Aiken, 2002; Aiken et al., 2001; Klein Breteler, Theeuwes, Bos, & Boereboom, 2009; Usher et al., 2013; Zhu, Rodgers, & Mella, 2013). A possible answer to the upcoming shortage is the creation of a productive and healthy work environment for nurses because relationships and work processes of work environments affect nurse job satisfaction, productivity, quality of patient care and turnover rates (Aiken, Clarke, Sloane, Lake, & Cheney, 2008, Aiken et al., 2011, 2012; Hall, 2005; Institute of Medicine, 2004). The Magnet hospital study has led to an increased emphasis on investigating nurses' work environment and implications of that environment for nurse and patient outcomes (McClure, Poulin, Sovie, & Wandelt, 1983; McHugh et al., 2013). Nurse executives, directors, managers and leaders are increasingly challenged to implement structures, systems and programs to improve unit work environments for clinical nurses in hospitals (Hess, Desroches, Doneian, Norman, & Nuerhaus, 2011; Kramer, Schmalenberg, Brewer, Verran, & Keller-Unger, 2009). However, little research has been done to assess the impact of structure on nurses' work processes and the impact of being able to engage in these work processes on patient and nurse outcomes. Nor has little research been done to assess the applicability of any of these relationships to non-US settings.

The Nursing Work Index (NWI) (Kramer & Hafner, 1989) was the first attempt to develop a process-measurement tool that could be used to study the impact of nursing practices on patient and nurse outcomes. The NWI requested respondents to: (1) indicate the importance of item/practice to job satisfaction, (2) being able to give quality patient care, and (3) perceive presence of item in the unit work environment. In 1990, the NWI was revised by Aiken & Patrician (1990) so that it measured 'perceived presence' only. The Nursing Work Index revised and all of its derivatives such as the perceived environment scale therefore measure structures or characteristics of units, but not work processes or nursing practices (Warshawsky & Havens, 2011). In 2001, the Essentials of Magnetism (EOM) was developed to measure the steps/components of work processes identified as essential by nurses practicing in Magnet hospitals. The only other clinical practice process-measurement instrument is the Nursing Audit developed by Phaneuf (1976). This tool is now infrequently used as it is based on extensive analysis of nurses' charting, and is very labour intensive, and with the increased use of computer technology is now outdated. The EOMII© instrument – tool of interest in this research – measures the extent to which steps/components of work processes

and relationships identified by nurses practising in Magnet hospitals as essential to quality patient care exist in nurses' hospital work environments (Kramer & Schmalenberg, 2002, 2008).

As with more general evidence, psychometric studies of the EOMII are USA based. Only one study tested the validity and reliability of a Turkish version of the Essentials of Magnetism Scale (Yildirim, Kisa, & Hisar, 2012). This study concluded that the

Turkish version of the EOMII scale is valid and reliable in assessing the nurses' work environment. However, more research is needed on the use and validity and reliability in other languages and cultures.

The objectives of this study reported here were to translate the EOMII© instrument and assess its psychometric properties in a culture different from its origin. Healthcare cultures and environments have unique features that differ by country. Although the EOMII has been translated into 14 languages, this is the second psychometric assessment including a harmonious back translation of the EOMII with a countrywide sample of clinical nurses. As such, it can serve as a model for other countries interested in establishing healthy work environments so that their citizenry is provided the best possible care.

METHODS

Instrument

In 1983, the American Academy of Nursing identified 14 organizational traits or structures (14 forces of magnetism) of Magnet hospitals. These hospitals consistently achieved four outcomes: attraction and retention of nurses; reported to be good places to work; and had reputations for delivering excellent patient care (Kramer & Hafner, 1989; Kramer et al., 2009; McClure et al., 1983). Donabedian's (1988) structure-process-outcome paradigm used in most of all professions to assess the impact of organizational structures and professional practices/ work processes on patient and organizational outcomes was used to guide the development of the EOM, the tool that is the focus of this study.

Structures are the policies, programs, standards and attributes that create an environment in which nurses can engage in the processes and practices – autonomous decision-making, collaboration with physicians, working with clinically competent peers – that produce desired outcomes such as decreased falls and medication errors, shortened length of stay, and decreased mortality. Structures, processes and outcomes are linearly and causally related. Most instruments measure structure and outcome, without assessing process. Of the three, process is the most important and is a step that should not be excluded (Donabedian, 1988; Kramer & Schmalenberg, 2002, 2004, 2005; Schmalenberg & Kramer, 2008). Process measurements give insight into what normally remains

a black box. The EOM is a process-measurement instrument that assesses the health of the unit work environment. A healthy, productive unit work environment is one that enables nurses to engage in the eight processes/professional practices identified by nurses in Magnet hospitals as most essential to delivery of quality patient care. The eight EOM depicted as functional processes that lead to desired patient and nurse outcomes are: (a) working with clinically competent peers, (b) collaborative nurse–physician relationships, (c) clinical autonomy, (d) nurse manager support (NMS), (e) control over nursing practice, (f) perceived adequacy of staffing (PAS), (g) support for education, and (h) a culture in which concern for the patient is paramount (Kramer & Schmalenberg, 2004; Kramer, Maguire, & Schmalenberg, 2006; Kramer & Schmalenberg, 2008; Schmalenberg & Kramer, 2008). Each construct is measured by one subscale. In 2006, two subscales of the EOM, 'perceived adequacy of staffing' and 'nurse manager support', were adjusted because it was found that the PAS measured some structures instead of processes and the NMS did not capture sufficient behaviours to obtain a complete and accurate measure of the construct (Kramer & Schmalenberg, 2005; Kramer et al., 2007). The EOM contains eight subscales and a total of 58 items with a 4-point Likert scale, ranging from 1 (strongly disagree) to 4 (strongly agree) (Kramer et al., 2009; Schmalenberg & Kramer, 2008).

Design

A three-phased combined descriptive and correlational design for the evaluation of validity and psychometric qualities of the translated Dutch version of the EOMII was planned. Principal phases of the study are: (i) scale translation, (ii) pilot testing for face validity, and (iii) psychometric evaluation to confirm validity and reliability.

Phase I: scale translation

Permission to translate and utilize the EOMII was obtained from Health Sciences Associates, Tahoe City, California. Systematic forward and backward translation of the English EOMII into Dutch involved five steps: forward translation, consensus meeting, interviews, backward translation, and back translation review (details in Box 1). During translation, three criteria were taken into account: (a) translation must replicate the meaning of original items as closely as possible, (b) should be sensitive to cultural differences (Brislin, 1986), and (c) had to account for educational differences across countries.

Phase II: pilot testing

Design

Although the original EOMII has well-supported validity and reliability (Kramer & Schmalenberg, 2004; Kramer & Schmalenberg, 2002, 2004, Kramer et al., 2007;

Schmalenberg & Kramer, 2008), translation required a validation process for the Dutch setting. Therefore, a descriptive quantitative pilot study amplified with qualitative data was performed. The explorative nature of the study was aimed at providing basis for accurate tool development by an in-depth description of the extent to which subscales and items are understandable, relevant, and recognizable in the Dutch hospital setting. The goal of the pilot test, thus, was to detect problems or differences in the translated and original instrument.

Sample

A general (*N* = 58) and specialized *(N* = 24) medical unit of one hospital participated. Eligible nurses were staff nurses, nursing trainees/students, and nurse practitioners working from March to April 2009 on the unit and for more than 6 months. Excluded were care assistants, nurse managers/administrative positions, temporary workers and nurses who were absent during the study period due to illness, maternity leave, etc.

Data collection

Eligible nurses (*N* = 84) received an instruction letter containing the purpose, duration, anonymity and description of procedures. After consent, respondents completed a web questionnaire indicating, per item, its clearness (1 = clear, 0 = not clear), relevance (1 = relevant, 0 = irrelevant), recognizability and possible omissions. Time taken to complete was 25–30 min. Subsequently semi-structured, in-depth, individual interviews with randomly selected respondents who completed the questionnaire were held on-site and were tape-recorded, until data saturation (*N* = 20) occurred. This tep was taken to further determine the content of items/ subscale quality and representativeness (clearness, relevance and recognizability).

Data analysis

Frequencies on clearness and relevance were computed and interviews were transcribed, coded, labelled, and structured by essential and item using NVivo software. Every step in data collection and analysis was made transparent and verifiable for peer debriefing with the research group.

Data were transferred from Excel to SPSS 15.0 software package for Windows (SPSS Inc., Chicago, IL, USA) and analysed in terms of frequencies. Face validity was determined by assessing content clearness and relevance of items with a congruency >80% as regarded acceptable.

Phase III: psychometric evaluation

Main validation procedures for further testing of psychometric properties were performed in phase III – specifically for component structure (confirmatory factor

Box 1

Phase I: Forward-backward translation

1. *Forward translation:* two researchers independently translated EOMII.
2. *Consensus meeting:* research group (an assistant professor nursing science, lecturer nursing science, senior policy advisor, two Master students in Health Sciences) checked translations and agreed on a first version best reflecting linguistic/conceptual content of original scale.
3. *Interviews:* semi-structured interviews with nurses (#13) to determine clarity, relevance and recognizability of items. Unclear items were adjusted.
4. *Backward translation:* to verify correctness of Dutch translation. Two native English-speaking translators (experience in nursing) employed by two different translation companies independently translated Dutch version back to English, and formed one version by comparing two versions/obtaining consensus.
5. *Back translation review:* translation was compared with original version by an English native-speaking EOM expert assessing semantic and conceptual equivalence.

Phase II: Pilot testing

1. *Instruction:* eligible nurses (#84) received instruction letter containing purpose, duration, anonymity and description of procedures.
2. *Web* questionnaire: after consent, respondents completed a web questionnaire indicating, per item, its clarity (1 = clear, 0 = not clear), relevance (1 = relevant, 0 irrelevant), recognizability and possible omissions. Time taken to complete was 25–30 min.
3. *Interviews:* semi-structured, in-depth, individual, tape-recorded, on-site interviews were held – with randomly selected respondents until data saturation N = 20 – concerning content of items/subscale quality and representativeness (clarity, relevance and recognizability).
4. *Data analysis:* frequencies on clearness and relevance were computed and interviews were transcribed, coded, labelled, and structured by essential and item using NVivo software. Every step in data collection and analysis was made transparent and verifiable for peer debriefing with the research group.

Phase III: Psychometric evaluation

1. *Instruction:* equal as in phase 2.
2. *Web questionnaire:* 4876 nurses met inclusion criteria, completing questionnaire scoring extent of agreement.
3. *Data analysis:*

   a. Component structure: EOMII measures work environment on unit level. Dataset was corrected for within-group variation to account for clustering; new dataset with unit averages per item (N = 184). EOMII measures eight different constructs. CFA per separate subscale was performed to test hypothesis: each subscale forms one factor in D-EOMII [eigenvalue ≥1.00, varimax rotation, listwise deletion of missing items, loading level >0.4 (De Vet, Terwee, Mokkink, & Knol, 2011)]. If CFA identified >1 factor, statistical (explained variances, item-total analysis, Cronbach's α, if-item-deleted) and interpretative reasoning to decide whether subscale should be split or items should be excluded/altered.

   b. Item–subscale correlations: item-total statistics assessing item–subscale correlations (Pearson's correlation coefficient). Coefficients <0.30 = weak correlations, 0.30–0.50 = moderate, >0.50 = strong. Items with no or low correlation (<0.30) were considered for deletion (De Vet et al., 2011; Nunnally & Bernstein, 1994).

   c. Reliability, internal consistency: Cronbach's α coefficient was computed for entire scale and each subscale. Cronbach's α ≥0.70 is acceptable (De Vet et al., 2011). Missing scores per item are considered not acceptable >15% (De Vet et al., 2011).Cronbach's α if-item-deleted was also computed per item. Items were considered fo,r deletion if two or more of the following criteria were not met: Pearson's correlation <0.30, Cronbach's α of subscale <0.70, and Cronbach's α if-item-deleted increases.

analysis (CFA)), item-subscale analyses and reliability (details in Box 1).
A cross-sectional design was used including all clinical units of a sample of six hospitals geographically spread throughout the Netherlands. Data were collected over a 2-month period (December 2009–January 2010). The six hospitals were comparable top clinical teaching hospitals. Target sample of this study was staff nurses working on clinical units of these hospitals for over 6 months. Exclusion criteria involved nursing auxiliaries, nurse managers/administrative positions, outpatient units, temporary workers, interns and nursing students.
Statistical analyses were conducted using SPSS 17.0 (SPSS Inc.). Negatively formulated questions were recoded to give all numerical values the same direction, that is, higher values correspond to a more positive perception of the construct.

Ethical considerations

In line with Dutch law (CCMO, 2011), no approval of an ethics committee was necessary as patient care was not affected or altered in any way and individuals were not subjected to invasive or burdensome regimes. All participants were informed both verbally and via an instruction letter. Participants were free to choose whether or not to participate and withdraw at any time.
Copyright on the original Essentials of Magnetism Scale means that the instrument can not be reprinted without the expressed written permission of Health Sciences Research Associates and, therefore, permission was obtained.

RESULTS

Phase I: translational phase

Semi-structured interviews indicated that items were recognizable. Most items were appropriately adjusted to linguistic and cultural context. However, 12 items were clarified due to linguistic difficulties. In six items synonyms were used, four were shortened, and two items amplified with examples.
Back translation review indicated that the Dutch-translated EOMII (D-EOMII) captured the original EOMII's content. Conceptual equivalence among back translation and EOMII was confirmed, replicating the meaning of original items, relevance of items, and no problems were detected concerning educational differences and thus sensitive to cultural differences.

Phase II: pilot testing for face validity

A total of 74 nurses (90.2%) completed the instrument. In total, 57 items were found to be understandable. One was considered not understandable by 27% [22: physicians, administrators, other nurses and other professionals (e.g. physical therapists) recognize that nursing in this organization controls its own

practice]. In interviews, nurses noted that 'own practice' caused confusion as it could concern patient care, practice standards or personnel policies.
One item was considered clear but irrelevant by more than 28% (24: representatives from other departments and disciplines such as occupational therapists and physical therapists participate in our shared decision-making activities on a regular basis). Interviews indicated that other disciplines mentioned normally did not participate in nurses' shared decision-making activities. The item was found relevant without examples and was therefore adjusted.
All 57 items were regarded recognizable. However, one item was interpreted negatively whereas it was positively interpreted in the original EOMII (52: high performance and productivity are expected of everyone). In interviews, nurses indicated that, in the Netherlands, expected productivity has a negative connotation as it is associated with factory culture where people become numbers, instead of delivering quality patient-centred care. Results from interviews indicated that item 52 was important and it was therefore not eliminated.

Phase III: psychometric testing

Respondents (N = 2542, 52.1%) were nested in 184 nursing units of six hospitals. Educational levels of respondents varied from vocational with 3 years of training (35.5%, *n* = 903) and bachelor with 4 years of training (47.9%, *n* = 1218) to nurses with bachelor degree and additional training (16.6%, *n* = 421). Years of nursing experience varied from 6 months to more than 30 years. In total, 19.6% had 0–10 years of nursing experience, 30.1% 11–20 years, 36.3% 31–30 years, and 13.9% more than 30 years of experience. Most nurses worked all shifts (79.7%), 15.4% only day shifts, 2.2% only evening shifts, 1.5% only night shifts, and 1.3% worked other combinations of shifts.

Psychometric characteristics

CFA with varimax rotation revealed that items belonging to five subscales each formed one factor or were very much in line with the original subscales of which the explained variances (EVs) ranged from 41.6 to 70.2% (Table 1). However, for three subscales the items loaded on two separate factors (Table 1):

1. Clinical autonomy: seven items loaded on factor 1 (EV = 39.9%), four on factor
2. (EV = 13.2%), and two on both. When considering content, however, two clear themes were not distinguishable from the items.
   2 Clinically competent peers: two items measuring clinical competence related to education loaded on factor 1 (EV = 45.3%), two items measuring level of clinical competence and organizational rewards for competency loaded on factor 2 (EV = 25.3%).

Patient-centred culture: all items except 1 loaded on factor 1 (EV = 44.5%). Item

52 loaded on factor 2 (EV = 11.4%). This was the item that was already spotted as receiving negative interpretations in phase 2.

Item–subscale correlations indicated that all items except item 52 had an item–total correlation coefficient <0.30 (Table 1). These results indicate that item 52 should probably be adjusted or excluded. Six items (4, 5, 13, 24 and 30) correlated moderately (0.43–0.49) with the total of their subscale and all other items had a correlation coefficient >0.50.

Internal consistency, Cronbach's α coefficient (α), for the total scale was 0.92 and varied between 0.58 and 0.92 for the subscales (Table 2). Five subscales showed satisfactory internal consistencies (α range: 0.70–0.91). 'Nurse–physician relationships' (α = 0.66) and 'Support for education' (α = 0.62) were slightly below guiding cut-off point. 'Clinically competent peers' showed the lowest α of 0.58. Missing scores per item ranged from 0 to 6%, which is considered acceptable (De Vet et al., 2011).

Deletion of weakly or moderately correlated items had no major consequences for subscale α values. However, α increased slightly if the following items were deleted separately: 9 (+0.07), 24 (+0.03) and 52 (+0.02).

DISCUSSION

The purpose of this study was to translate the EOM and assess its psychometric properties in a culture different from its origin. The systematic process of forward-backward translation (phase I) resulted in a Dutch language version of the EOMII which was first tested for face validity in a pilot study (phase II). As no major problems or differences in the translated and original instrument were observed in both phases, the D-EOMII could be submitted to psychometric testing. Psychometric evaluation in phase III established its validity and reliability as results were largely satisfactory. CFA was used to assess suitability of original factors in the D-EOMII. Five subscales formed clear factors as indicated in the original EOMII. Subscales (#3) that identified more than one dimension are in need of further research.

CFA indicated two factors in the clinical autonomy subscale. Results for the original EOMII, however, indicated one clear factor (Schmalenberg & Kramer, 2008). As results indicated, we have insufficient ground for altering this subscale. In nursing literature, multiple definitions of autonomy exist (Fagin, 1992). Wide variations in conceptions and practice of clinical autonomy across organizations and units within an organization exist (Kramer et al., 2006). The EOMII measures clinical autonomy as defined by Fagin (1992) because this concept best reflected content of descriptions and examples of nurses (Kramer, Schmalenberg, & Maguire, 2004). Possibly, Dutch respondents used different definitions of autonomy which could have affected the way in which respondents answer the items. Item 13, namely, stated that nurses have to have permission before practising autonomously.

This includes the premise that a nurse is practising autonomously after having to ask for permission first. It depends on how you interpret the item as to whether you perceive the item positively or negatively. We therefore recommend further research on defining clinical autonomy by non-US nurses. Furthermore, item 14 contains two elements in one item: 'nurses make independent decisions within the practice sphere of nursing' and 'interdependent decisions in those spheres of practice where nursing overlaps with other disciplines'. This item was considered clear, but although items of this factor were considered clear in our study, we do suggest that items 13 and 14 are simplified in further research in consultation with nurses to avoid multiple interpretation.
CFA of 'clinically competent peers' also indicated two factors and α was relatively low. This is frequently seen in subscales composed of few items (Nunnally & Bernstein, 1994). Our rationale to not alter the subscale as yet is based on statistical as well as interpretative reasons. Correlations for this subscale were high and α did not increase by deleting items. All items considered clinical competence. However, half of the items considered education and the other half measured rewarding and recognition of clinical competence. Nurses noted that no awarding system for clinical competence exists in Dutch hospitals; for example, periodic salary increases are independent of competence. Absence of rewards does not mean it is not desirable as it can influence amenity of a work environment.

The subscale 'patient-centred culture' showed satisfactory α, but CFA indicated two factors. Item 52 did not meet the criteria Results from CFA of the original EOMII show that this item does load (loading = 0.639) well on this factor (Schmalenberg & Kramer, 2008). The item was relevant; however, expected productivity has a negative connotation. Based on these results, we believe item 52 must be eliminated in the D-EOMII.
Cronbach's alphas of the Turkish version were higher which can be explained by the different factor analyses that were performed. We chose to use CFA by which we tested whether the original subscales were reliable and valid for the Dutch hospital setting. Yildirim et al. (2012) choose to perform an exploratory factor analysis and reorganize the items in new subscales. This explains why the Cronbach's alphas were higher in the Turkish version.
Reliability of the D-EOMII in terms of internal consistency was high for the total scale. Psychometric evaluation of the original EOMII revealed a comparable, slightly higher α of 0.96 for the total scale (Schmalenberg & Kramer, 2008). Differences in results for the D-EOMII factor structure could have been caused by language differences and by differences in cultural issues (De Vet et al., 2011). However, results of this study did show that the constructs that are being measured with the EOMII are relevant for the Dutch hospital setting. Furthermore, most of the individual items constructing the eight EOM were considered relevant.

TABLE 1 Items, floor and ceiling effects, factor loadings, item–total correlation and Cronbach's α if-item-deleted

	Floor response (%)	Ceiling response (%)	Loadings factor 1	Loadings factor 2	Item-total correlation	Cronbach's α if-item-deleted
1: Student-teacher: MDs teach nurses	4.7	53.2	0.749		0.62*	0.61
2: Collaborative: willing cooperation based on mutual power	8.4	38.7	0.868		0.71*	0.56
3: Negative: frustrating and hostile	1.3	34.3	0.674		0.54*	0.63
4: Student-teacher: RNs teach/influence MDs	6.0	27.0	0.648		0.54*	0.64
5: Friendly stranger: formal, courteous, information exchange only	11.8	28.2	0.718		0.56*	0.66
6: Collegial: physicians treat nurses as equal	5.1	58.3	0.823		0.68*	0.58
7: Nurses' pursuing education is valued in organization	1.6	31.5	0.874		0.76*	0.48
8: Support to attend continuing education programs	1.1	30.0	0.829		0.73*	0.48
9: Few rewards for pursuing education	25.4	2.4	0.494		0.61*	0.70
10: Financial assistance or time off	4.4	8.6	0.697		0.68*	0.52
11: Autonomy is risky – nurses fear getting into trouble	2.0	8.5	0.528		0.59*	0.64
12: Know that nurse manager wants us to make decisions	1.9	10.5	0.666		0.67*	0.63
13: Must get permission before making independent or interdependent decisions	4.1	4.8		0.835	0.43*	0.69
14: Practice spheres decision-making	0.6	19.2		0.756	0.50*	0.66
15: Evidence-based practice provides knowledge base	1.7	3.7	0.628		0.47*	0.67
16: Bureaucratic rules inhibit	1.7	4.5	0.495	0.469	0.60*	0.65
17: Must do things against better judgment	3.1	9.9	0.618		0.49*	0.67
18: Positive accountability	3.5	2.9	0.833		0.59*	0.65
19: Administration sanctions staff nurse clinical autonomy	3.0	3.8	0.608	0.467	0.54*	0.66
20: Control over nursing practice structure in place	1.3	7.1	0.519		0.49*	0.68
21: Input and decision-making into practice issues/policies	3.6	7.3	0.672		0.66*	0.65
22: Recognition by MDs, administrators and others	1.2	6.6	0.722		0.61*	0.66
23: Structure is present but mostly 'talk'	9.9	1.0	0.834		0.65*	0.65
24: Structure is interdisciplinary	18.6	6.4	0.339		0.46*	0.73
25: Personnel policies and issues	12.0	1.6	0.666		0.62*	0.66
26: Can describe outcomes as a result of shared decision-making	5.6	1.4	0.529		0.47*	0.69
27: Management and others decide nursing issues	7.0	2.5	0.740		0.64*	0.65
28: Staffing is adequate for quality care	21.4	3.3	0.867		0.78*	0.75
29: Not enough competent nurses	7.4	12.6	0.828		0.75*	0.76
30: Must vary care delivery system because there is not enough staff	4.6	7.9	0.554		0.52*	0.81
31: Adequate for safe care	3.4	7.9	0.860		0.72*	0.76
32: Teamwork helps in staffing adequacy	3.5	111	0.852		0.74*	0.76
33: Not enough even if all positions filled	4.7	8.3	0.846		0.75*	0.75
34: Work with other nurses who are clinically competent	0.3	16.3		0.739	0.60*	0.58
35: High clinical competence is rewarded	13.3	1.6		0.758	0.69*	0.55
36: Degree education is evidence of competence	0.6	15.2	0.908		0.66*	0.45
37: Certification is evidence of competence	0.9	10.3	0.919		0.72*	0.42
38: Nurse manager represents unit	4.0	20.3	0.901		0.83*	0.90
39: Provides needed resources	2.8	8.3	0.559		0.50*	0.92
40: Resolves nurse–physician conflicts	2.6	17.0	0.893		0.80*	0.90
41: Nurse manager supports interdisciplinary team	1.7	13.6	0.871		0.78*	0.90
42: Nurse manager provides competent staff	2.5	8.7	0.759		0.70*	0.91
43: Nurse manager provides constructive feedback	2.3	10.1	0.881		0.77*	0.90
44: Nurse manager support facilitates teamwork	3.5	12.8	0.908		0.81*	0.90
45: Nurse manager is visible and approachable	2.4	22.4	0.839		0.77*	0.90
46: Nurse manager walks the talk	1.9	9.8	0.849		0.75*	0.90
47: Nurse manager asks for best practice evidence	1.6	8.6	0.861		0.72*	0.90
48: Try new things	1.3	8.6	0.627		0.59*	0.76
49: Concern for patient is paramount	2.8	11.2	0.693		0.64*	0.75

TABLE 1 *Continued*

	Floor response (%)	Ceiling response (%)	Loadings factor 1	Loadings factor 2	Item-total correlation	Cronbach's α if-item-deleted
50: Organization takes swift action	4.3	1.2	0.685		0.58*	0.76
51: People are enthusiastic	1.5	5.7	0.744		0.56*	0.76
52: High performance and productivity are expected	0.5	22.2		0.918	0.24*	0.80
53: Inter- and intra-disciplinary teamwork	1.1	12.0	0.695		0.59*	0.76
54: Cost is important, but the patient comes first	7.3	4.9	0.799		0.65*	0.75
55: Contributions of all are valued	1.5	11.5	0.632		0.57*	0.76
56: Proactive, anticipating changes	3.5	4.1	0.685		0.61*	0.76
57: Organization is value driven; values are known and shared	4.2	1.6	0.664		0.61*	0.76
58: Transmits cultural values	1.7	3.6	0.732		0.56*	0.76

*Correlation is significant at the 0.01 level (two tailed).
MD, medical doctor; RN, registered nurse.

TABLE 2 Subscales, range, floor and ceiling effects, and reliability

Subscales	Range	Floor response (%)	Ceiling response (%)	Explained variance for subscale (%)	Cronbach's α
Nurse–physician relationships	6–24	0.4	45.4	56.35	0.66
Support for education	4–16	1.4	22.4	54.54	0.63
Clinical autonomy	9–36	0.4	4.2	39.91 // 13.21 Cumulative = 53.21	0.70
Control over nursing practice	8–32	2.3	4.4	41.55	0.70
Adequacy of staffing	6–24	2.7	8.8	65.45	0.80
Clinically competent peers	4–16	0.4	14.0	45.29 // 25.30 Cumulative = 70.59	0.58
Nurse manager support	10–40	1.8	21.6	70.23	0.92
Patient-centred culture	11–44	0.5	8.1	44.47 // 11.40 = 55.87	0.78
Total					0.92

Yildirim et al. (2012) indicated that these work procedures and relationships also apply in Turkey. We did perform an accurate translation process as defined by De Vet et al. (2011). Possible impeding factors such as differences in healthcare organization and funding do not interfere too much with the EOM. In future research, hypotheses testing is recommended in order to further define construct validity. For example, on the hypotheses that there is a moderate to strong correlation between the EOM subscales and job satisfaction or perception on quality of care, and other instruments that measure structural elements of the work environment.

Strengths and limitations

The strength of this study was the explorative nature using quantitative and qualitative data, providing an in-depth description of the D-EOMII's validity mainly and reliability. Peer debriefing increased reliability of the methods. In addition, we performed a sizeable scale evaluation in multiple centres and units including many respondents. We did not perform a retest as Yildirim et al. (2012) did however. Further research on the reliability of the D-EOMII is recommended. De

Vet et al. (2011) state that in addressing reliability of an instrument next to internal consistency, test–retest is also a relevant parameter to determine instrument stability over time. This study was a cross-sectional study, and therefore assessing the correlation of measurements over time was not possible. However, we had a thorough first two phases before testing the Dutch EOM on a large scale. Despite promising results, there are some limitations. Results of Kramer & Schmalenberg (2008) confirm that there is a difference in EOMII performance from nurses in academic teaching hospitals and community hospitals. Further research is necessary comparing different types of hospitals. Finally, this was the first test of the Dutch EOM. Other forms of reliability and validity test could be used to strengthen evidence of its applicability in Dutch hospitals.

CONCLUSION

Results of this study provide evidence that psychometric properties of the D-EOMII were satisfactory. However, two subscales – clinical autonomy and clinically competent peers – deserve further evaluation because of mixed results in our evaluation. We propose removal of item 52 as this will improve the scale's validity and reliability.

Results from the D-EOM can be useful and effective in identifying areas in which change is needed in order for a hospital to pursue an excellent work environment that attracts and retains well-qualified nurses. Nurses, managers, health policy makers, hospitals and even governments can use this tool to assess the work environment and to address processes and relationships that are in need of improvement. More studies are needed to enrich evidence related to the impact of the D-EOMII upon improving the work environment of nurses outside the USA. Continued use of the scale will allow for further analysis, such as stability over time, test–retest reliability, known-group validity and hypotheses testing. It would also be beneficial to analyse reliability and validity for other occupational groups, for example, professional carers, as a shortage in this group is also expected (Smeets et al., 2010). In addition, future research could also address translating and using the instrument in other countries to collect comparative international data.

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AUTHOR CONTRIBUTIONS

BdB: Data collection. BdB, TvA and MJK: Design of the study, data analysis. BdB and TvA: Drafting of manuscript. CS and MK: Helped in interpretation of data. BdB, TvA, MJK, MK and CS: Revision of manuscript. All authors read and approved the final manuscript.

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3

CHAPTER 3

MEASURING HOSPITAL STAFF NURSES PERCEPTION ON QUALITY OF THE PROFESSIONAL PRACTICE ENVIRONMENT

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ABSTRACT

Aim: The purpose of this study was to determine construct validity of the Dutch Essentials of Magnetism II© instrument, designed to assess nursing practice environments, using hypotheses testing.

Background: Reduction in hospital length of stay and the number of inpatient beds increases care intensity. Educational levels and numbers of nursing staff in hospitals, however, do not match this increase, resulting in a strain on quality of care and patient safety. A possible answer to existing concerns about quality of care may be the creation of a productive and healthy practice environment, as this has an impact on the quality of care. Therefore, areas requiring improvement of the practice environment have to be defined.

Design: A cross-sectional, correlational study design.

Methods: We determined construct validity with hypotheses testing by relating the Dutch Essentials of Magnetism II to the Dutch Practice Environment Scale of the Nursing Work Index. We formulated 15 hypotheses prior to data-analysis; 10 related to convergent validity and five related to discriminant validity. Data were collected from qualified nurses (N = 259) on nine randomly selected hospital wards from March to April 2012.

Results: Response rate was 47% (n = 121). Total scores of both instruments are strongly correlated (r = 088). In total, 12 of 15 hypotheses (80%) were confirmed and three were rejected.

Conclusion: The D-EOMII has satisfactory construct validity for measuring thenursing practice environment in hospitals and can be used by nurses, managers, health policy makers, hospitals and governments to assess and identify processes and relationships that are in need of improvement.

Why is this research needed?

- Reduction in hospital length of stay and the number of inpatient beds increase care intensity for inpatients.
- The numbers and educational levels of nursing staff innhospitals do not match this increase in care intensity, resulting in a strain on quality of care and patient safety.
- Existing concerns about quality of care may be overcome by creating optimal practice environments for nurses and therefore areas of improvement have to be defined, requiring valid and reliable measures.
- The Essentials of Magnetism II is not extensively evaluated outside its original context of USA-based hospitals. Yet, such evaluations are necessary if we reliably want to assess the practice environment.

What are the key findings?

- The Dutch Essentials of Magnetism instrument has satisfactory construct validity for measuring the nursing practice environment in hospitals.
- Subscales of the Dutch Essentials of Magnetism instrument and the Practice Environment Scale of the Nursing Work Index are correlated, but not highly correlated, thus indicating that subscales do not measure the exact same constructs.

How should the findings be used to influence policy / practice / research / education?

- The Dutch Essentials of Magnetism instrument can be used to assess nursing practice environments in hospitals and to identify processes and relationships that are in need of improvement. A nursing practice environment that encompasses the essential elements measured by the D-EOMII, can help to attract and retain well qualified nurses.
- This study indicates that the Dutch Essentials of Magnetism and the Practice Environment Scale of the Nursing Work Index vary in measured constructs but, given the large overlap in what is captured, using both instruments is not worthwhile.
- Nursing education should include the essentials of magnetism as nurses need to know which elements enable them to deliver the best possible patient care.
- Further research is recommended to get insight about elements of the nursing practice environment are.

INTRODUCTION

The financial crisis in Europe resulted in constraints on health expenditure growth leading to, for instance, internal hospital restructuring and cutting costs (Karanikolos et al., 2013). Reduction in hospital length of stay and the number of inpatient beds increases care intensity for inpatients (Aiken et al., 2013, 2014). At the same time, there is no matching increase in either the numbers or educational levels of nursing staff in hospitals, resulting in a strain on quality of care and patient safety (Aiken et al., 2014).

The Organisation for Economic Co-operation and Development (OECD) reported that many European countries face shortages of nurses and the nursing workforce is ageing (OECD, 2012). Therefore, it is also not possible to simply increase the number and educational level of nursing staff.

Studies indicated that better practice environments in hospitals are significantly associated with better quality and safety of patient care and higher job satisfaction for nurses (Zangaro & Soeken, 2007; Cheung, Aiken, Clarke, & Sloane, 2008; Duvall & Andrews; 2010, Bae, 2011; Aiken et al., 2012, 2014; Djukic, Kovner, Brewer, Fatehi, & Cline, 2013). Optimally designed practice environments support nurses' delivery of care, enabling them to sustain or improve quality of patient care (Djukic et al., 2013). Furthermore, Aiken et al. (2012) noted that creating an optimal practice

environment can be a relatively low cost strategy. Thus, a possible answer to the existing concerns on quality of care may be the creation of a productive and healthy practice environment for nurses.

To be able to establish an optimal practice environment, areas of improvement have to be defined (Warshawsky & Havens, 2011). For this, managers in healthcare organizations need valid and reliable assessment tools to identify weaknesses and key strengths in their nurses' practice environments (Lake, 2007).

Organizational traits relevant for nurses' practice environment were identified by the American Academy of Nursing in several projects on the identification of 'excellent hospitals' with professionally and personally rewarding nursing practice environments; so-called Magnet Hospitals (McClure et al., 1983). An instrument was developed to measure eight attributes of the nursing practice environment defined by Magnet Hospital nurses as essential to quality care: the Essentials of Magnetism II© (EOMII) (Health Sciences Research Associates (HSRA), California). To be able to implement improvements in the work environment that lead to improved patient outcomes, measurement of processes in terms of steps and components of the nursing practice environment should be performed at nursing ward level as patients on different ward have specific characteristics and needs that require different nursing care (Kramer et al., 2014). The EOMII does measure steps and components of the nursing practice environment on ward level and focusses on contributing elements of the practice environment to quality of care. This is exactly the wanted combination for this study. In the Netherlands, no process measurement of the nursing practice environment existed and therefore the EOMII was translated and tested in Dutch hospitals (De Brouwer et al., 2014). However, further validation was suggested by De Brouwer *et* al. 2014.

BACKGROUND

The Essentials of Magnetism II© (EOMII) is a globally used instrument measuring processes and relationships of practice environment contributing to productivity and quality of patient care (Schmalenberg & Kramer, 2008). The EOMII measures functional processes leading to desired patient and nurse outcomes, called Essentials of Magnetism (EOM): Collaborative Nurse-Physician Relationships, Control over Nursing Practice, Nurse Manager Support, Adequacy of Staffing, Clinically Competent Peers, Support for Education, Patient Centred Culture, Clinical Autonomy (Schmalenberg & Kramer, 2008; De Brouwer, Kaljouw, Kramer, Schmalenberg, & Van Achterberg, 2014). De Brouwer et al. (2014) translated the EOMII into Dutch (D-EOMII) and showed acceptable reliability and validity. However, to ensure the D-EOMII is a valid and reliable measure the validation process should be amplified (De Brouwer, et al. 2014). Further insight in the D-EOMII's construct validity is necessary in this validation process. Construct validity refers to the extent to which scores of a questionnaire relate to other measures in a manner that is consistent with theoretically derived

hypotheses concerning the concepts that are being measured (Mokkink et al., 2010). Construct validity can be determined in terms of structural validity (degree to which questionnaire scores are an adequate reflection of the dimensionality of the construct), cross-cultural validity (degree to which performance of items of a translated instrument are an adequate reflection of that of the original version) and hypotheses testing (correlation between measures or expected differences in scores between 'known' groups) (Mokkink et al., 2010). Structural validity and cross-cultural validity have already been addressed for the D-EOMII (De Brouwer et al., 2014). However, hypotheses testing has not yet been done. In hypotheses testing, formulation of hypotheses, specified in advance, is important to overcome the risk of bias in determining whether the instrument is valid (Terwee et al., 2007). A positive rating for construct validity can be determined when at least 75% of the results are in correspondence with the hypotheses in (sub)groups of at least 50 respondents. Hypotheses testing can be split into testing for convergent (degree to which measures of constructs that theoretically should be related to each other are correlated) and discriminant (degree to which measures of constructs that theoretically should not be related to each other are correlated) validity (Elbers et al., 2012). To be able to test the convergent validity, we need to have measures of construct(s) that are theoretically related to the constructs measured with the D-EOMII. Several instruments have been developed to measure nurses' assessment of their practice environment. One example is the Practice Environment Scale of the Nurse Work Index-Revised (PES-NWI), which is a second globally used instrument measuring contributing elements of the practice environment to nursing job satisfaction (Lake, 2002; Warshawsky & Havens, 2011). The PES-NWI and the D-EOMII have a common ancestor, the Nursing Work Index (NWI), but the focus of both instruments differs to some extent due to a focus on structures facilitating a good work environment (PES-NWI) vs. actual processes in this work environment (EOMII) (Lake, 2002; Schmalenberg & Kramer, 2008; Kramer et al., 2014).

To date, no publication is found on validity and reliability of the Dutch PES-NWI in the Netherlands. However, there is a Dutch version available, tested in Belgian hospitals, with a structure that differs from the original PES-NWI. Cronbach's alpha coefficients of the three subscales of that version are 080 or higher (Van Bogaert, Clarke, Vermeyen, Meulemans, & Van de Heyninge, 2009). Nevertheless, in the 'RN4Cast' study, the original version is used in the Netherlands including 5 subscales (Sermeus et al., 2011) (Table 1). The reliability, in terms of Cronbach's alpha coefficients of the original (English language) PES-NWI subscales, ranges from 0.71–0.84 (Lake, 2002). Predictive validity estimates of the subscales for personnel stability and quality of hospital care are high (Aiken, Clarke, Sloane, Lake, & Cheney, 2008; Bruyneel, Van den Heede, Diya, Aiken, & Sermeus, 2009). The use of the instrument was reviewed by Warshawsky and Havens (2011) and they concluded that the PES-NWI can be used to assess the nursing practice environment. Lake (2007) compared the PES-NWI with other measures of the nursing practice environment and defined

the PES-NWI as the most useful instrument in comparison with the Nursing Work Index (Kramer & Hafner 1989), Revised Nursing Work Index (Aiken & Patrician 2000), Work Environment Scale (Moos & Insel, 1994), Job Characteristics inventory (Sims et al., 1976), Ward Organization Features Scale (Adams, Bond, Arber, 1995), Work Quality Index (Whitley & Putzier, 1994) and the Assessment of Work Environment Schedule (Nolan, Grant, Brown, & Nolan, 1998). Thus, although validity of the Dutch version of the PES-NWI is strictly not evaluated in the Netherlands, the PES-NWI was chosen as a useful measure to determine the construct validity of the D-EOMII.

TABLE 1 Subscales of the EOMII and PES-NWI, number of items, Cronbach's α

EOMII subscale (no. items, α*)	PES-NWI subscale (no items, α†)
Collaborative nurse–physician relationships (6, 0.79)	Collegial nurse-physician relationships (7, 0.88)
Control over nursing practice (8, 0.75)	Nurse involvement in hospital affairs (8, 0.77)
Nurse manager support (10, 0.92)	Nurse manager qualities (4, 0.82)
Adequacy of staffing (6, 0.83)	Adequacy of staffing and resources (4, 0.77)
Clinically competent peers (4, 0.55)	Item: Working with nurses who are clinically competent *(Nursing Foundations for Quality of Care)*
Support for education (4, 0.37)	Adequacy of staffing and resources (4) Item: Active staff development or continuing education programmes for nurses *(Nursing Foundations for Quality of Care)*
Patient centred culture (11, 0.85)	Item: A clear philosophy of nursing that pervades the patient care environment (*Nursing Foundations for Quality of Care*)
Item: Inter- and intra-disciplinairy teamwork *(Patient Centered Culture)*	Item: Enough time and opportunity for team consultation *(Adequacy of Staffing and Resources)*
Clinical autonomy (9, 0.72)	Nursing foundations for quality of care (9, 0.69)

*De Brouwer et al. (2014).
†α of the Dutch PES-NWI based on data from this study.

THE STUDY

Aim

The aim of this study was to determine construct validity of the D-EOMII, using hypotheses testing including a comparison of the Dutch PES-NWI and the D-EOMII.

Sample

The D-EOMII and PES-NWI were administered at nine randomly selected wards of a Dutch general hospital between March and April 2012. Nurses' participation was voluntary. After obtaining nurses' consent, all data were treated confidentially and anonymously. Qualified nurses with educational levels varying from associate to bachelor degree (4 years of training) employed by the hospital, independent of their contract, gender, education, years of employment and age, were included if they worked on the ward for more than 6 months (N = 259). We excluded nurse assistants, nurse managers, nurses with a merely administrative position and interns/students.

Instruments

D-EOMII consists of 58 items and eight constructs (Table 1) defined as functional processes leading to desired patient and nurse outcomes, called Essentials of Magnetism (EOM): Collaborative Nurse-Physician Relationships, Control over Nursing Practice, Nurse Manager Support, Adequacy of Staffing, Clinically Competent Peers, Support for Education, Patient Centred Culture, Clinical Autonomy (Schmalenberg & Kramer, 2008, De Brouwer et al., 2014). We used the Dutch version of the EOMII (D-EOMII). Before using this instrument, adjustments were made as suggested by De Brouwer et al. (2014). No items were removed. Items of subscales Collaborative Nurse-Physician Relationships (five items), Support for Education (one item) and Clinically Competent Peers (four items) have been shortened and simplified. Item 52 has been adjusted from high performance and productivity to high performance and good work ethic as productivity had a different connotation in the Netherlands as referred to in the original EOMII (De Brouwer et al., 2014). Permission of HSRA was obtained to reprint the original Essentials of Magnetism Scale.

The PES-NWI consists of 32 items and five subscales: Nurse Manager Qualities, Collegial Nurse-Physician Relationships, Nurse Involvement in Hospital Affairs, Nursing Foundations for Quality of Care, Adequacy of Staffing and Resources (Table 1) (Lake, 2002).

Both instruments target the hospital staff nurses. All participants who met the inclusion criteria received an instruction letter explaining the purpose of the research, duration of participation and a description of procedures. Participants were informed that results would be used for scientific research only and that none of the data would be reported at the level of individuals. The instruments were administered via a mailed survey. For both instruments respondents rate each item on a 4-point Likert scale, ranging from 1 (strongly disagree) – 4 (strongly agree), to indicate whether the item is present in their current practice environment (Lake, 2002; Schmalenberg & Kramer, 2008).

Ethical considerations

No approval of an ethics committee was necessary as patient care was not affected or changed in any way and individuals were not subjected to invasive or laborious regimes, which is in line with Dutch law (CCMO, 2011). All participants were informed verbally and via an instruction letter. Those who did not wish to take part did not return their questionnaires.

METHODOLOGY

We used a cross-sectional, correlational study design comparing results of the PES-NWI and the D-EOMII. We administered the D-EOMII in the hospital setting via a web application.

TABLE 2 Hypotheses

1. Very strong correlation* between total D-EOMII score and total PES-NWI score
2. Strong correlation Collaborative Nuse- Physician Relationships and Collegial Nurse-Physician Relationships
3. Strong correlation between Control over Nursing Practice and Nurse Involvement in Hospital Affairs
4. Very strong correlation between Nurse Manager Support and Nurse Manager Qualities
5. Strong correlation between Adequacy of Staffing and Adequacy of Staffing and Resources
6. Moderate correlation between Adequacy of Staffing and Resources and Patient Centered Culture
7. Moderate correlation between Nursing Foundations for Quality of Care and Clinically Competent Peers
8. Moderate correlation between Nursing Foundations for Quality of Care and Support for Education
9. Moderate correlation between Nursing Foundations for Quality of Care and Patient Centered Culture
10. Strong correlation between mean total ward scores on D-EOMII and PES-NWI
11. Collaborative Nurse–Physician Relationships correlates less with other subscales of the PES-NWI than with CollegialNurse-Physician Relationships
12. Control over Nursing Practice correlates less with other subscales of the PES-NWI than with Nurse Involvement in Hospital Affairs
13. D-EOMII subscale Nurse Manager Support correlates less with other subscales of the PES-NWI than with Nurse Manager Qualities
14. D-EOMII subscale Adequacy of Staffing correlates less with other PES-NWI subscales than with Adequacy of Staffing and Resources
15. PES-NWI subscale Adequacy of Staffing and Resources correlates less with other D-EOMII subscales than withPatient Centered Culture, except from Adequacy of Staffing.

*Correlation: <0.30 weak, 0.30–0.50 moderate, 0.50–0.80 strong, and >0.80 very strong.

Hypotheses testing

We formulated 15 hypotheses prior to data-analysis.

Convergent validity

Ten hypotheses were formulated with regard to convergent validity (Table 2). The first concerned the degree to which the measures total D-EOMII score and total PES-NWI scores are correlated. It was hypothesized that the total D-EOMII score is very strongly ($r > 0.80$) correlated with the total PES-NWI score as both instruments measure perception of the practice environment (hypothesis 1). Furthermore, three subscales of both instruments measure the same construct, namely Nurse-Physician Relationship, Control over Nursing Practice and Nurse Manager Support (Table 1). The D-EOMII subscale measures collaborative nurse–physician relationships, whereas the PES-NWI measures collegial nurse-physician relationships. Therefore, it was hypothesized that the correlation between subscale sum scores of both instruments concerning the nurse-physician relationship is strong ($r > 0.50$) but not above $r = 0.80$ (hypothesis 2). Control over Nursing Practice, a subscale of the D-EOMII, is hypothesized to correlate strongly ($r > 0.50$) with Nurse Involvement in Hospital Affairs of the PES-NWI. Most items of the D-EOMII's subscale are included in Nurse Involvement in Hospital Affairs. However, both subscales also differ at item level. Therefore, we hypothesized that the correlation between subscale sum scores of both instruments is strong ($r > 0.50$) but not above $r = 0.80$ (hypothesis 3).

The D-EOMII subscale Nurse Manager Support and the PES-NWI subscale Nurse Manager Qualities is hypothesized to correlate very strongly (r = 0.80) with each other as both constructs are very similar (hypothesis 4). D-EOMII subscale sum score of Adequacy of Staffing is hypothesized to correlate strongly (r > 0.50) to the PESNWI subscale sum score of Adequacy of Staffing and Resources (hypothesis 5) as three of the four items of the PES-NWI subscale measure the same elements as the D-EOMII subscale. The PES-NWI subscale Adequacy of Staffing and Resources contains one item about teamwork, which is also embedded in the D-EOMII subscale Patient Centered Culture. Therefore, the D-EOMII subscale Patient Centered Culture is hypothesized to correlate moderately (r > 0.30) with the PES-NWI subscale Adequacy of Staffing and Resources (hypothesis 6).

The PES-NWI subscale Nursing Foundations for Quality of Care contains elements of D-EOMII's subscales Clinically Competent Peers, Support for Education and Patient Centred Culture. We hypothesized that correlations between the subscale sum score of Nursing Foundations for Quality of Care correlates moderately (r > 0.30) with sum scores of Clinically Competent Peers, Support for Education and Patient Centred Culture (hypotheses 7–9).

As both questionnaires aim to measure the work environment on ward level, we finally hypothesized that wards with a high score on the D-EOMII would also score high (correlation of ranking ρ > 0.50) on the PES-NWI (hypothesis 10).

Discriminant validity

Five hypotheses were formulated with regard to discriminant validity: The D-EOMII subscale Collaborative Nurse–Physician Relationships correlates less (r < 0.74) with other subscales of the PES-NWI than with Collegial Nurse-Physician Relationships (hypothesis 11); D-EOMII subscale Control over Nursing Practice correlates less (r < 0.44) with other subscales of the PES-NWI than with Nurse Involvement in Hospital Affairs (hypothesis 12); DEOMII subscale Nurse Manager Support correlates less (r < 0.80) with other subscales of the PES-NWI than with Nurse Manager Qualities (hypothesis 13). D-EOMII subscale Adequacy of Staffing correlates less (r < 0.30) with other PES-NWI subscales than with PES-NWI subscale Adequacy of Staffing and Resources (hypothesis 14). PESNWI subscale Adequacy of Staffing and Resources correlates less (r < 0.49) with other D-EOMII subscales than with D-EOMII subscale Patient Centered Culture, except for D-EOMII subscale Adequacy of Staffing (hypothesis 15).

Data analysis

In line with the standard methods of HSRA, the institute that developed the EOMII, only sufficiently completed questionnaires were included, meaning that respondents with more than 25% missing items on two or more subscales were

excluded from this study.

All hypotheses, except for hypothesis 10, were tested calculating Pearson correlation coefficients, *r*, as we are analysing instruments that supposedly measure similar constructs. In these analyses, we used individual respondent scores on both instruments. We checked for potential clustering of nurse data at the level of wards by calculating Spearman's correlation coefficient, ρ, on ward averages. For hypothesis 10, we rank ordered wards' mean scores, derived from individual scores, on the total D-EOMII score and the total PES-NWI score and tested the hypothesis by calculating Spearman's correlation coefficient, ρ. This limits the random effects due to clustering of data in wards.

Sample size for hypotheses testing was considered adequate if $N > 1.00$ (Mokkink, et al. 2010). In all hypotheses, we used a one-tailed test with the following criteria: correlation coefficients <0.30 indicate weak correlations, 0.30– 0.50 imply moderate correlations, 0.50–0.80 represent strong correlations and >0.80 are very strong correlations (Nunnally & Bernstein, 1994; De Vet et al., 2011).

Construct validity was determined to be present if at least 75% of the results were in correspondence with the predefined hypotheses, thus for 11 of the 15 hypothesis (De Vet et al., 2011). However, hypothesis 1 was considered most important. If hypothesis 1 were to be rejected, it would indicate that the PES-NWI and the D-EOMII scores are not related and therefore further results on the hypothesis testing would not be as relevant.

RESULTS

Sample

Nine different nursing wards participated: internal medicine, paediatric medicine, neurology, cardiology, short stay surgery, gastroenterology and hepatology, neonatology, geriatrics and renal dialysis. A total of 158 (61% of n = 259) questionnaires were returned of which 37 were not sufficiently completed and therefore excluded. Respondents' (n = 121, 47%) age varied from 19-63 years with an average of 389 years. Most respondents were females (95.6%). The majority worked part time (45.6%). A third of the respondents had zero to 5 years of work experience (33.9%). Of the respondents, 29.8% had a bachelor degree in nursing (Table 3).

Hypotheses testing

Hypothesis 1 was confirmed (Table 4 for all subscale correlations) as the total D-EOMII score and total PES-NWI score were strongly correlated ($r = 0.88$). Hypotheses 2 and 4 were confirmed as Collaborative Nurse–Physician Relationships and Collegial Nurse-Physician Relationships were significantly and strongly correlated ($r = 0.74$), as well as Nurse Manager Support and Nurse Manager Qualities ($r = 0.81$).

TABLE 3 Respondents' characteristics (*n* = 121)

Demographics	
Age (years) (Mean; SD)	38.9; 12.2
Sex (%; *n*) – Women	95.8; 114
Contract (%; *n*) – full time	44.6; 54
Work experience (Mean; SD)	14.3; 11.1
Work experience (%; *n*)	
0–5 years	33.9; 40
6–10 years	12.7; 15
11–15 years	11.0; 13
16–20 years	12.7; 15
21–25 years	9.3; 11
26–30 years	8.5; 10
>30 years	11.9; 14
Bachelor's degree in nursing (%; *n*)	29.8; 36

However, hypothesis 3 was rejected as Control over Nursing Practice and Nurse Involvement in Hospital Affairs were significantly correlated but only moderately ($r = 0.44$).
Hypotheses 5 and 6 were confirmed as Adequacy of Staffing and Resources and Adequacy of Staffing were strongly correlated ($r = 0.73$) and Adequacy of Staffing and Resources and Patient Centered Culture were moderately correlated ($r = 0.49$). Nursing Foundations for Quality of Care was moderately correlated with Clinically Competent Peers ($r = 0.44$), Support for Education ($r = 0.46$) and Patient Centred Culture ($r = 0.63$), therefore, hypotheses 7–9 were confirmed. Hypothesis 10 was confirmed as mean total scores of the wards on both instruments correlated strongly ($\rho = 0.83$, $P = 0.003$).

Hypothesis 11 was confirmed as other subscales of the PES-NWI were only low to moderately correlated (r ranged from 0.29–0.46) to Collegial Nurse-Physician Relationships. Hypothesis 12 was rejected as Control over Nursing Practice was more strongly correlated with Nursing Foundations for Quality of Care and Adequacy of Staffing and Resources, although Control over Nursing Practice did correlate less with Collegial Nurse-Physician Relationships and Nurse Manager Qualities. Hypothesis 13 was confirmed as the other subscales were correlated less with Nurse Manager Support ($r \leq 0.66$) than with Nurse Manager Qualities ($r = 0.81$).

Hypothesis 14 was confirmed as subscale Adequacy of Staffing and Resources correlates strongly ($r = 0.73$) to Adequacy of Staffing and low to moderately with the other D-EOMII subscales ($r \leq 0.49$) (hypothesis 14). Hypothesis 15 was

also confirmed as all other D-EOMII subscales, except for Adequacy of Staffing, correlate less with the PES-NWI subscale Adequacy of Staffing and Resources. In total, 13 of the 15 hypotheses (87%) were confirmed. The check for clustering generated the same results except for hypothesis 11. The analyses showed that the PES-NWI subscale Nurse Manager Qualities was more strongly correlated with the D-EOMII subscale Collaborative Nurse–Physician Relationships, which was not the case in the analyses on individual respondent scores.

DISCUSSION

The aim of this study was to determine construct validity of the D-EOMII, using hypotheses testing. Results of our study showed that 87% of the tested hypotheses were confirmed. Therefore, we conclude that the D-EOMII has satisfactory construct validity. Total scores on both D-EOMII as PES-NWI are strongly correlated as expected, which means that an organization scoring high on one of the two instruments will also score high on the other.

Correlations between subscales of both instruments are not so high that subscales measure the exact same constructs as none of the subscale correlations approaches 1 (all subscale correlations are significant but smaller than $r = 0.82$). If we, for instance, look at the subscales Collaborative Nurse-Physician Relationships (D-EOMII) and Collegial Nurse-Physician Relationships (PES-NWI) we see that $r = 0.74$, thus indicating some variation in what is assessed. Looking at the items of both instruments it seems that the PES-NWI measures the level of satisfaction on the nursephysician relationship, whereas the D-EOMII measures the type of nurse-physician relationship that is present. Two hypotheses were rejected. First, we expected a strong correlation between the subscales Control over Nursing Practice (D-EOMII) and Nurse Involvement in Hospital Affairs (PES-NWI). The correlation was $r = 0.44$, however, which indicates a moderate correlation. Second, we expected that Control over Nursing Practice (D-EOMII) would correlate less with other subscales of the PES-NWI than with Nurse Involvement in Hospital Affairs. We found, however, that Nursing Foundations for Quality of Care and Adequacy of Staffing and Resources of the PESNWI correlated more strongly. Based on the content of both subscales, this can be explained by the fact that Nurse Involvement in Hospital Affairs contains two items concerning the presence of a Chief Nursing Officer (CNO). This position does not exist in Dutch hospitals and can therefore lead to a wrongful score on this subscale. The CNO is not an aspect in the D-EOMII. Therefore, use of the D-EOMII rather than the PES-NWI could be more suitable in the Dutch situation.

An earlier study on the D-EOMII also showed that Control over Nursing Practice is a reliable subscale, which showed good estimates of face and content validity (De Brouwer et al., 2014).

TABLE 4 Correlations between EOMII subscales and PES-NWI in Pearson *r*

	PES-NWI					
EOMII	Staffing and resource adequacy	Collegial nurse-physician relationships	Nurse manager ability, leadership, support of nurses	Nurse involvement hospital affairs	Nursing foundations for quality of care	Total score
Perceived adequacy of staffing						
Correlation Coefficient r	0.728*	0.379*	0.496*	0.503*	0.378*	0.620*
P-value (1-tailed)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
N	116	114	109	112	103	99
Clinically competent peers						
Correlation Coefficient r	0.376*	0.287*	0.521*	0.565*	0.442*	0.557*
P-value (1-tailed)	<0.001	0.001	<0.001	<0.001	<0.001	<0.001
N	121	119	114	116	108	103
Nurse manager support						
Correlation Coefficient r	0.455*	0.343*	0.813*	0.658*	0.612*	0.726*
P-value (1-tailed)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
N	117	115	111	114	106	102
Patient centred culture						
Correlation Coefficient r	0.486*	0.510*	0.624*	0.746*	0.634*	0.786*
P-value (1-tailed)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
N	118	117	111	113	107	102
Control over nursing practice						
Correlation Coefficient r	0.452*	0.277*	0.403*	0.435*	0.569*	0.546*
P-value (1-tailed)	<0.001	0.001	<0.001	<0.001	<0.001	<0.001
N	116	114	111	112	105	100
Clinical autonomy						
Correlation Coefficient r	0.404*	0.386*	0.525*	0.373*	0.489*	0.531*
P-value (1-tailed)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
N	113	111	108	108	103	98
Collaborative nurse-physician relationships						
Correlation Coefficient r	0.437*	0.743*	0.455*	0.315*	0.293*	0.563*
P-value (1-tailed)	<0.001	<0.001	<0.001	<0.001	0.001	<0.001
N	120	118	113	115	107	102
Support for education						
Correlation Coefficient r	0.232*	0.266*	0.512*	0.428*	0.461*	0.508*
P-value (1-tailed)	0005	0002	<0001	<0001	<0001	<0001
N	120	118	113	115	107	102
Total EOMII score						
Correlation Coefficient r	0.661*	0.565*	0.805*	0.735*	0.710*	0.881*
P-value (1-tailed)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
N	100	99	96	97	93	89

*Correlation is significant at the .001 level (1-tailed).

Confirmation of the hypotheses indicates that the D-EOMII can be used to identify areas of improvement in the nursing practice environment. Although the D-EOMII and the PES-NWI both focus on the nursing practice environment and the correlations between both instruments are largely in accordance with what we hypothesized, this study also indicates that the individual instruments do vary in constructs being measured with subscale correlations below 0.82. Yet using both instruments is not recommended, because sum scores on both instruments are strongly correlated indicating a positive score on one instrument also leads to a high score on the other instrument. Depending on the learning objective of the organization or ward it is useful to see which instrument would fit best. The EOMII encompasses elements that are not present in the PES-NWI and gives a more thorough insight in areas of improvement in the nursing practice environment. Also, the PES-NWI encompasses an element that is not relevant for the Dutch healthcare system: presence of a Chief Nursing Officer. However, the PES-NWI is a shorter questionnaire which is therefore less of a burden to administer.

Limitations

One could argue that a limitation of this study is that we included only one hospital. Yet for this type of study, where results of two instruments are compared and not organizations or wards, a multi-centre study is not as necessary. We wanted to study the construct validity of the D-EOMII by analysing correlations between D-EOMII and another scale that presumes to measure corresponding constructs. To answer this question with hypotheses testing individual scores of nurses can be used to test the hypotheses. Ideally, more clusters should have been included in this study to optimally account for the effect of clustering of the data. To assess to what level this could have been problematic, we also checked all our hypotheses on the basis of rank ordering mean scores at ward level and found the same results except for one hypothesis. This indicates that conclusions would not be very different and therefore the individual scores can be used.

Hypotheses were stated as specific as possible including the magnitude of the expected correlation, which is a strength of this study (De Vet et al., 2011).
Finally, it can be questioned whether the PES-NWI is the best reference instrument for evaluation the validity of the EOMII. We chose to use the PES-NWI as a good translation of the instrument was available. Yet, no studies were found on the validity or reliability of the Dutch version of the PES-NWI, for which we had to refer to international literature. According to Lake's comparison of measures (2007), however, the PES-NWI is considered the most useful instrument for determining the construct validity of the D-EOMII.

CONCLUSION

We provided evidence that the D-EOMII has satisfactory construct validity for measuring the nursing practice environment. The EOMII is widely used to identify areas of improvement in the nursing practice environment. This study contributes to the body of knowledge on the construct validity of the D-EOMII and outside the USA-context of its development. The D-EOMII can be used by nurses, managers, health policy makers, hospitals and even governments to assess nursing practice environments and to identify processes and relationships that are in need of improvement. A nursing practice environment that positively encompasses the essential elements measured by the D-EOMII, can help to attract and retain well qualified nurses, as indicated by several studies (Kramer & Schmalenberg, 2002; Schmalenberg & Kramer, 2008; Bai, Hsu, Zhang, 2015). Given the discrepancy between the increasing care intensity in hospitals and the quality and quantity of nursing staff, creating excellent nursing practice environments is of great importance. Hospital managers can use the instrument to assess their work environment for nursing staff and receive feedback on possibilities for improvement. The essentials of magnetism are recommended to be included in the curricula of nursing education as nurses need to know which elements enable them to deliver the best possible patient care.

Research, including this study, supports the validity of the D-EOMII valid measure of the nursing practice environment. Further research is recommended to investigate which elements of the nursing practice environment are most strongly related to the quality of patient care and which effect sizes on the instrument can be expected as a result of actions taken to improve the work environment.

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Conflict of interest

This research was formed without any financial support and any conflict of interest. Copyright on the original Essentials of Magnetism instrument means that this instrument cannot be reprinted without the expressed written permission of Health Sciences Research Associates and, therefore, permission was obtained.

Author contributions

All authors have agreed on the final version and meet at least one of the following criteria [recommended by the ICMJE (http://www.icmje.org/recommendations/):

- substantial contributions to conception and design acquisition of data or analysis and interpretation of data;
- drafting the article or revising it critically for important intellectual content.

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4

CHAPTER 4

ESSENTIAL ELEMENTS OF THE NURSING PRACTICE ENVIRONMENT IN NURSING HOMES: PSYCHOMETRIC EVALUATION

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ABSTRACT

Aim and objectives: To develop and psychometrically test the Essentials of Magnetism II in nursing homes.

Background: Increasing numbers and complex needs of older people in nursing homes strain the nursing workforce. Fewer adequately trained staff and increased care complexity raise concerns about declining quality. Nurses' practice environment has been reported to affect quality of care and productivity. The Essentials of Magnetism II© measures processes and relationships of practice environments that contribute to productivity and quality of care and can therefore be useful in identifying processes requiring change to pursue excellent practice environments. However, this instrument was not explicitly evaluated for its use in nursing home settings so far.

Design: A In a preparatory phase, a cross-sectional survey study focused on face validity of the essentials of magnetism in nursing homes. A second cross- sectional survey design was then used to further test the instrument's validity and reliability.

Methods: Psychometric testing included evaluation of content and construct validity, and reliability. Nurses (N = 456) working at 44 units of three nursing homes were included.

Results: Respondent acceptance, relevance and clarity were adequate. Five of the eight subscales and 54 of the 58 items did meet preset psychometric criteria.

Conclusion: All essentials of magnetism are considered relevant for nursing homes. The subscales Adequacy of Staffing, Clinically Competent Peers, Patient Centered Culture, Autonomy and Nurse Manager Support can be used in nursing homes without problems. The other subscales cannot be directly applied to this setting.

Implications for practice: The valid subscales of the Essentials of Magnetism II instrument can be used to design excellent nursing practice environments that support nurses' delivery of care. Before using the entire instrument, however, the other subscales have to be improved.

Keywords: environment, factor analysis, nursing home care, psychometric testing, workforce issues

Why is this research needed?

- The Essentials of Magnetism II© instrument could be useful to identify processes requiring change to pursue excellent practice environments in nursing homes enabling high quality of care for older individuals.
- Results of this research support the validity and reliability of the subscales Adequacy of Staffing, Clinically Competent Peers and Nurse Manager Support of the essentials of magnetism in care for older people in nursing homes.
- Results from this study ask for some caution and suggest that perhaps the original structure of the Essentials of Magnetism II© instrument cannot be directly applied to other settings or cultures.

What are the implications of this new knowledge for nursing care with older people?

- The Essentials of Magnetism II© can be used to design excellent practice environments enabling nurses to sustain and even improve quality of care for older people.

How should the findings be used to influence policy / practice / research / education?

- Subscales Adequacy of Staffing, Clinically Competent Peers and Nurse Manager Support should be used to evaluate nurses' practice environments an policy in nursing homes to improve nurses' practice environments.
- Building on this research, future research can develop the Essentials of Magnetism II© to be entirely valid and reliable in the nursing home setting.

BACKGROUND

Increasing numbers and complex needs of older people in nursing homes and other long- term care organisations strain the nursing workforce. Educational levels of nurses in nursing homes vary from vocational with 3 or 4 years of education to nurses on bachelor level with 4 years of education and nurses on master level with 6 years of education. The quality and quantity of nurses in nursing homes are under pressure (Abbey et al., 2006; Kloster, Høie, & Skår, 2007; Suhonen, Charalambous, Stolt, Katajisto, & Puro, 2013). Also, there is an increasing trend to only admit individuals with highly complex needs to nursing home facilities. This combination of fewer trained staff and increased patient complexity raises concerns about declining quality of care (Suhonen et al., 2013).

Quality of care, job satisfaction, productivity and turnover rates have been reported to be influenced by nurses' practice environment (Aiken et al., 2014; Coetzee, Klopper, Ellis, & Aiken, 2013). However, research concerning work processes' impact on outcomes mostly focuses on acute care, and hospital care in particular. Research is needed to determine whether these relationships are consistent in other settings, such as nursing homes. An important prerequisite for testing such relationships

is being able to adequately assess quality of nurses' practice environment in this setting.

The American Academy of Nursing identified organisational traits of excellent hospitals with professionally and personally rewarding practice environments for nurses, the so called Magnet hospitals (McClure, Poulin, Sovie, & Wandelt, 1983). Excellently designed practice environments support nurses' delivery of care, enabling them to sustain and improve quality of patient care, which is a possible answer to the existing strains on quality of care in nursing homes (Djukic, Kovner, Brewer, Fatehi, & Cline, 2013). From studies in hospital settings, it is known that this can also be a relatively low- cost strategy for quality of care improvement (Aiken et al., 2012).

To be able to establish an excellent practice environment, areas of improvement have to be determined, which in turn require valid and reliable measures (Warshawsky & Havens, 2011). Several instruments have been developed to measure nurses' perceptions of their practice environment. An example is the Practice Environment Scale of the Nurse Work Index- Revised, which is a globally used instrument measuring contributing elements of the practice environment to nursing job satisfaction (Lake, 2002; Warshawsky & Havens, 2011). Another example is the Essentials of Magnetism II (EOMII)© instrument (Health Sciences Research Associates [HSRA], California), which is also used globally to measure processes and relationships of practice environments contributing to productivity and quality of patient care (Schmalenberg & Kramer, 2008). Both instruments have a common ancestor, the Nursing Work Index (Lake, 2002; Schmalenberg & Kramer, 2008). The Dutch version of the EOMII (D-EOMII) showed acceptable reliability and validity in the hospital setting (De Brouwer, Kaljouw, Kramer, Schmalenberg, & Van Achterberg, 2014). The Dutch Nurses' Association (V&VN) wants to be able to test differences and similarities of the nursing work environment of nurses in all settings and therefore aims to use the same instrument across settings, for which the D- EOMII was selected. As both the Dutch EOMII and the original EOMII are tested for hospital setting and home health care only, the researchers wanted to test whether the D- EOMII scale can be used in nursing homes (Mensik, 2007).

The EOMII was developed to measure eight attributes defined by Magnet hospital nurses as essential to quality care: Clinically Competent Peers, Collaborative Nurse–Physician Relationships, Clinical Autonomy, Nurse Manager Support, Control over Nursing Practice, Perceived Adequacy of Staffing, Support for Education and Patient Centered Culture (Schmalenberg & Kramer, 2008). The EOMII is a process measurement which is essential to understanding and improving nursing practice (Kramer et al., 2014). Using this instrument can help to identify processes requiring change to pursue excellent practice environments. Yet, whether this equally applies to nursing homes is unknown.

Purpose

The purpose of this research was to test the psychometric properties of the D-EOMII instrument for the nursing home setting, with a view to validity and reliability.

METHODS

Preparatory phase

The research team started with a preparatory phase to test the face validity of the EOMII. Thirteen randomly selected nurses (educational levels varied from 3 or 4 years on vocational level to 4 years on bachelor level) of two average sized nursing homes in the south of the Netherlands rated relevance and comprehensiveness of each EOMII item. All items were considered relevant and comprehensive with an average congruency percentage above 80% (De Vet, Terwee, Mokkink, & Knol, 2011). Interviews with these nurses further explored relevance of constructs and items, omissions and acceptance in terms of feasibility. Interviewees noted that five items (13, 14, 16, 17 and 52) were not as important because their practice environment met these requirements. However, the nurses explained that if the practice environment would not meet these requirements, this would be problematic, thus indicating the relevance of the items for other work settings than their own. Item 52 (high performance and productivity of nurses are expected) was the exception. Two nurses indicated that the client is important instead of production. To them, the term "production" had a negative connotation as they saw it as linked to quantity instead of quality. Five experts also discussed the results. These respondents considered the eight essentials of magnetism and the items both relevant and comprehensive. The nurses and experts declared no omissions.

Psychometric testing of the D-EOMII

In the second phase, described in this article, a cross- sectional survey design was used to test the validity and reliability of the D-EOMII in nursing homes. Validity was tested in terms of content (relevance, comprehensiveness and respondent acceptance) and construct validity (structural validity and hypothesis testing). Reliability was operationalised in terms of internal consistency.

Validity

The researchers used average congruency percentages above 80% to define the relevance and comprehensiveness of items (De Vet et al., 2011). Response rates per item determined respondent acceptance, fewer than 3% missing scores defined acceptance. The researchers operationalised construct validity in terms of structural validity (factor structure) and through hypothesis testing (subscale correlation with organisational job satisfaction). The research team used

confirmatory factor analysis (CFA). Principal component analysis with varimax rotation on items per subscale was conducted to confirm original factors (Eigenvalues >1 were included). The research team corrected for within- group variation to account for clustering using unit averages in the CFA ($N = 44$ units). Factor loadings ≥0.40 were considered significant (Sharma, 1996). Hypothesis testing was operationalised by investigating the relationships between D-EOMII and overall job satisfaction (OJS). The researchers calculated Spearman's correlation coefficients. Hypotheses were that correlations between total D-EOMII- score and OJS as well as between subscale scores and OJS would be moderately/strongly positive (>0.30), as a positive perception on practice environment is related to OJS (Kramer & Schmalenberg, 2005). In case of a correlation <0.30, the researchers rejected the hypothesis.

Reliability

Internal consistency in terms of subscale- total and item- subscale correlation, Cronbach's alpha, and Cronbach's alpha if- item- deleted determined reliability of the D- EOMII (De Vet et al., 2011). The researchers computed Cronbach's α coefficient for the entire scale and each subscale. Cronbach's α-if-item-deleted was computed per item, thus determining whether deletion of items leads to higher alphas of the subscales. Furthermore, the research team explored subscale-total and item-subscale correlations, using Pearson's correlation coefficients. Pearson's correlation above 0.30 indicated adequate subscaletotal correlations and item-subscale correlations (De Vet et al., 2011). Items were considered for deletion/ alteration if ≥2 of the following criteria were met: missing scores >3%, item-subscale Pearson's correlation <0.30, item within a subscale with Cronbach's α <0.70 and higher Cronbach's α for subscale if-item-deleted (De Vet et al., 2011). Subscales were considered for deletion/alteration if ≥2 of the following criteria were met: Hypothesis of specific subscale is rejected (correlation subscale with OJS <0.30), factor structure containing >1 factor per subscale, subscale- total Pearson's correlation <0.30, Cronbach's α of subscale <0.70.

Participants and setting

The research team distributed the D-EOMII on all units of three nursing homes geographically spread in the Netherlands by purposeful sampling from December 2009 to January 2010. Urban and suburban nursing homes in the west, middle and east of the country were included. A nursing home can be defined as an organisation that offers possibilities for residence, care and cure of older people with physical and cognitive impairments with three specific areas: (i) care and medical treatment of older people with dementia, (ii) care and medical treatment of older people with physical impairments and (iii) rehabilitation (prevention, reduction and cure of consequences for older people with permanent physical injury or

functional handicap) (Boumans, Berkhout, Vijgen, Nijhuis, & Vasse, 2008). There are 1,900 nursing homes in the Netherlands (Deuning, 2009). Purposeful sampling also included the selection of nursing homes that contained all three aspects of nursing home care. All nurses and carers with educational levels varying from vocational to bachelor (3–4 years) training were included when working on units for more than six months (*N* = 456). The researchers excluded assistants, managers, nurse administrators and interns/students.

Instrument

The Dutch EOMII (D-EOMII) measures eight constructs (EOM) using 58 items with a four- point Likert scale (1 = strongly disagree, 2 = disagree, 3 = agree, 4 = strongly agree) via a web application (De Brouwer et al., 2014). In addition, respondents had to score items as 0 = irrelevant, 1 = relevant, and 0 = unclear, 1 = clear. One question was added for overall job satisfaction (OJS) using a single- itemmeasure with a ten- point scale ranging from 0 (I hate my job) to 10 (I love my job).

Ethical considerations

In line with Dutch law (CCMO, 2009), the researchers did not need approval of an ethics committee as patient care was not affected or altered and no individuals were subjected to invasive or burdensome regimes. All participants were informed both verbally and via an instruction letter, and they were free to choose whether or not to participate and withdraw at any time.

RESULTS

Sample

Respondents (*N* = 276, response rate = 60.5%) were nested in 44 units of three nursing homes. Educational levels varied from carers on vocational level with 3 years of education (71.4%, *n* = 197), nurses on vocational level with 4 years of education (17.0%, *n* = 47) to nurses on bachelor level with 4 years of education (11.6%, *n* = 32). Years of nursing experience varied from 1 to >30 years (mean = 17.9 years). Most respondents worked all shifts (57.6%), 26.1% worked only day shifts, 5% and 8.3% worked only evening and night shifts respectively, and 2.9% worked in other combinations of shifts.

Psychometrics

Validity

Content validity was confirmed as all items were considered relevant (range: 82%–100%) and clear (range: 83%–99%). Results concerning respondent acceptance indicated that missing scores on items increased slightly towards the end of the D-EOMII (range: 0%–3%) (Table 1). CFA (Table 1) indicated that three subscales

formed clear factors, as in the original EOMII (Perceived Adequacy of Staffing, Clinically Competent Peers and Nurse Manager Support). Two subscales (Nurse–Physician Relationships and Support for Education) were spread over two factors, and three subscales (Clinical Autonomy, Control over Nursing Practice and Patient Centered Culture) were spread over three factors. No specific pattern could be determined for the factors in these subscales.

The total D- EOMII- score and five subscales (Clinical Autonomy. Perceived Adequacy of Staffing, Clinically Competent Peers, Nurse Manager Support and Patient Centered Culture) correlated moderately to strongly (>.30) with OJS. However, three subscales correlated weakly with OJS (Nurse–Physician Relationships r = .12, Support for Education r = .28 and Control over Nursing Practice r = .22) (all correlations in Table 2).

Reliability

Subscale- total correlations (see Table 1) showed moderate correlations for two subscales (Nurse–Physician Relationships r = .36 and Clinically Competent Peers r = .39) and strong correlations for six subscales (r ranged from .57–.89). Item-subscale correlations indicated that two items correlated lower than 0.30 with their subscale (items 14 r = .19 and 52 r = .22 of the subscales Clinical Autonomy and Patient Centered Culture), while five items correlated moderately (items 5 r = .40, 9 r = .47, 15 r = .46, 17 r = .41, 24 r = .33) and 51 items correlated strongly (r = .63) with their subscale.

Cronbach's α for the entire scale was 0.92, alphas of six subscales were above 0.70, while α was below 0.70 for two subscales (Support for Education and Clinically Competent Peers). Cronbach's α of different subscales increased by separately deleting seven items (items 5, 9, 14, 24, 30, 35, 52, see Table 1).

Four items violated ≥2 criteria (items 9, 14, 35 and 52 [Box 1]), and three subscales violated ≥2 criteria (subscales Support for Education, Nurse–Physician Relationships and Control over Nursing Practice).

DISCUSSION

This study aimed to assess whether the D-EOMII-instrument applies to nursing homes. Respondents' ratings on relevance and comprehensiveness as well as respondent acceptance were satisfactory, and similar to results of De Brouwer et al. (2014) testing the D-EOMII in hospitals. Although construct validity analysis further indicated that the subscales Adequacy of Staffing, Clinically Competent Peers, Patient Centered Culture, Autonomy and Nurse Manager Support can be used, construct validity analysis could not confirm similarity to the original scale for the three subscales Nurse–Physician Relationships, Support for Education and Control over Nursing Practice.

TABLE 1 Subscales, items, range, mean, relevance, clarity, factor loading, explained variance, item- subscale and subscale-to-total correlation and reliability

Subscales Items	Range scale (minimum–maximum)	Mean (SD)	Missing scores (% of 276)	Relevance (%)	Clarity (%)	Loadings factor 1 (EV***%)	Loadings factor 2 (EV***%)	Loadings factor 3 (EV***%)	Item-subscale and subscaletotal correlation	Cron-bach's α	α if- item-deleted
Nurse–Physician Relationships	9–24 (6–24)	18.61				40.22	23.95		.36*	.71	
1: Student–teacher: MD's teach nurses		3.20 (1.0)	0	94	93	.555			.69**		.66
2: Collaborative: willing cooperation based on mutual power		3.25 (0.88)	1	98	98	.846			.85**		.57
3: Negative: frustrating and hostile		3.29 (0.81)	1	93	98	.529	.601		.72**		.64
4: Student–teacher: RN's teach/influence MD's		2.89 (1.0)	1	95	93	.702			.58**		.70
5: Friendly stranger: formal, courteous, information exchange only		2.60 (1.2)	1	93	96		.895		.40**		.76
6: Collegial: physicians treat nurses as equals		3.40 (0.92)	2	99	99	.773			.64**		.67
Support for Education	7–16 (4–16)	11.67				52.98	25.65		.72**	.60	
7: Nurses' pursuing education is valued in organisation		3.28 (0.55)	2	100	99	.828			.71**		.47
8: Support to attend continuing education programmes		3.25 (0.60)	2	99	99	.844			.83**		.33
9: Few rewards for pursuing education		2.24 (0.77)	2	95	99		.992		.47**		.78
10: Financial assistance or time off		2.91 (0.59)	2	96	99	.849			.75**		.45
Clinical Autonomy	15–32 (9–36)	24.41				32.79	17.40	12.89	.62**	.75	
11: Autonomy is risky – nurses fear getting into trouble		2.65 (0.63)	2	100	99	.871			.79**		.67
12: Know that nurse manager wants us to make decisions		2.82 (0.58)	2	99	99	.854			.84**		.66
13: Must get permission before independent or interdependent decisions		2.39 (0.62)	2	95	99	.691			.56**		.73
14: Practice spheres decision- making		3.00 (0.61)	2	96	99			.897	.19		.77
15: Evidence- based practice provides knowledge base		2.64 (0.57)	2	82	85		.750		.46**		.74
16: Bureaucratic rules inhibit		2.67 (0.63)	2	87	94	.684			.68**		.70
17: Must do things against better judgment		2.93 (0.61)	2	94	96		.624		.41**		.75
18: Positive accountability		2.67 (0.60)	2	97	97	.667			.63**		.71
19: Administration sanctions staff nurse clinical autonomy		2.64 (0.60)	2	92	94		.625	–.427	.50*		.74

(Continues)

TABLE 1 (Continued)

Subscales Items	Range scale (minimum–maximum)	Mean (SD)	Missing scores (% of 276)	Relevance (%)	Clarity (%)	Loadings factor 1 (EV***%)	Loadings factor 2 (EV***%)	Loadings factor 3 (EV***%)	Item-subscale and subscaletotal correlation	Cron-bach's α	α if- item-deleted
Control over Nursing Practice	12–27 (8–32)	19.91				28.59	24.13	14.31	.63*	.70	
20: Control over Nursing Practice structure in place		2.65 (0.61)	2	92	92	.815			.54**		.67
21: Input and decision- making into practice issues/ policies		2.40 (0.61)	2	94	98	.479	.679		.81**		.59
22: Recognition by MDs, administrators and others		2.78 (0.50)	2	95	93	.682			.66**		.65
23: Structure is present but mostly "talk"		2.39 (0.60)	2	97	97	.672			.63**		.65
24: Structure is interdisciplinary		2.71 (0.65)	2	93	98			.946	.33**		.75
25: Personnel policies and issues		2.10 (0.60)	2	93	94		.733		.69**		.6
26: Can describe outcomes as a result of shared decision- making		2.30 (0.60)	3	89	90		.863		.50**		.70
27: Management and others decide nursing issues		2.57 (0.64)	3	95	92	.600			.52**		.69
Adequacy of Staffing	7–24 (6–24)	15.60				53.27			.57**	.82	
28: Staffing is adequate for quality care		2.10 (0.75)	3	100	99	.787			.79**		.78
29: Not enough competent nurses		2.70 (0.66)	3	98	99	.746			.75**		.79
30: Must vary care delivery system because not enough staff		2.72 (0.61)	3	90	90	.529			.54**		.83
31: Adequate for safe care		2.73 (0.63)	3	99	99	.692			.69**		.80
32: Teamwork helps staffing adequacy		2.63 (0.68)	3	100	99	.809			.81**		.77
33: Not enough even if all positions filled		2.72 (0.61)	3	97	98	.780			.76**		.78
Clinically Competent Peers	5–15 (4–16)	11.1				44.72			.39**	.53	
34: Work with other nurses who are clinically competent		2.93 (0.52)	3	99	98	.503			.51**		.53
35: High clinical competence is rewarded		2.32 (0.59)	3	96	95	.509			.70**		.57
36: Degree education is evidence of competence		3.02 (0.45)	3	95	99	.832			.71**		.34
37: Certification is evidence of competence		2.87 (0.50)	3	88	98	.766			.69**		.38
Nurse Manager Support	15–48 (10–40)	34.79				72.14			.89**	.96	
38: Nurse manager represents unit		2.93 (0.70)	3	100	98	.893			.90**		.95
39: Nurse manager represents unit		2.80 (0.56)	3	96	99	.720			.72**		.96
40: Nurse manager represents unit		2.87 (0.64)	3	98	99	.899			.90**		.95

(Continues)

TABLE 1 (Continued)

Subscales Items	Range scale (minimum–maximum)	Mean (SD)	Missing scores (% of 276)	Relevance (%)	Clarity (%)	Loadings factor 1 (EV***%)	Loadings factor 2 (EV***%)	Loadings factor 3 (EV***%)	Item-subscale and subscaletotal correlation	Cron-bach's α	α if- item-deleted
41: Nurse manager supports interdisciplinary team	2.90(0.55)	3	95	96	.750				.75**		.95
42: Nurse manager provides competent staff	2.75 (0.62)	3	100	99	.682				.68**		.96
43: Nurse manager provides constructive feedback	2.93 (0.62)	3	98	99	.898				.89**		.95
44: Nurse manager support facilitates teamwork	2.81 (0.68)	3	98	97	.877				.88**		.95
45: Nurse manager is visible and approachable	2.96 (0.71)	3	99	99	.908				.91**		.95
46: Nurse manager walks the talk	2.87 (0.61)	3	97	97	.916				.91**		.95
47: Nurse manager asks for best practice evidence	2.90 (0.57)	3	97	97	0.907				.90**		.95
Patient Centred Culture *19–41 (11–44)*	30.68				28.97	21.05	10.47		.84**	.79	
48: Try new things	2.95 (0.48)	3	92	96		.758			.54**		.77
49: Concern for patient is paramount	3.01 (0.55)	3	99	97		.635			.60**		.77
50: Organisation takes swift action	2.44 (0.57)	3	98	93		.759			.55**		.78
51: People are enthusiastic	2.80 (0.59)	3	99	99	.699				.63**		.76
52: High performance and productivity are expected	2.93 (0.56)	3	92	97			.909		.22		.82
53: Inter- and intradisciplinary teamwork	2.86 (0.58)	3	100	99	.832				.71**		.75
54: Cost is important, but the patient comes first	2.58 (0.71)	3	100	99		.786			.51**		.78
55: Contributions of all are valued	*2.92 (0.65)*	*3*	*99*	*97*	*.793*				*.75***		*.74*
56: Proactive, anticipating changes	2.73 (0.57)	3	91	92	.506				.55**		.77
57: Organisation is value- driven; values are known and shared	2.60 (0.56)	3	91	83	.642				.61**		.76
58: Transmits cultural values	2.85 (0.52)	3	96	95	.751				.62**		.76
Total											.92

***EV is explained variances.
*Correlation is significant at the .05 level (two- tailed).
**Correlation is significant at the .01 level (two- tailed).

TABLE 2 Correlation subscales and organisational job satisfaction

	Organisational job satisfaction		Organisational job satisfaction
Nurse–Physician Relationships		Clinically Competent Peers	
Pearson correlation	.166*	Pearson correlation	.310*
Sig. (two- tailed)	.007	Sig. (two- tailed)	.000
N	.266	*N*	266
Support for Education		Nurse Manager Support	
Pearson correlation	.282*	Pearson correlation .	.349*
Sig. (two- tailed)	.000	Sig. (two- tailed)	.000
N	.266	*N*	266
Clinical Autonomy		Patient Centred Culture	
Pearson correlation	.322*	Pearson correlation	.479*
Sig. (two- tailed)	.000	Sig. (two- tailed)	.000
N	266	*N*	266
Control over Nursing Practice		Total	
Pearson correlation	.221*	Pearson correlation	.451*
Sig. (two- tailed)	.000	Sig. (two- tailed)	.000
N	266	*N*	266
Adequacy of Staffing			
Pearson correlation .	.345*		
Sig. (two- tailed)	.000		
N	266		

*Correlation is significant at the .01 level (two- tailed).

Possible explanations for the results could firstly be found in the educational levels of nurses working in nursing homes. In this study, only 12% had a bachelor degree compared to 58%–65% in the hospital studies (De Brouwer et al., 2014; Yildirim, Kisa, & Hisar, 2012). It is possible that nurses with a lower educational level interpret the items differently from nurses with higher educational levels which can result in a different factor structure.

Secondly, it is notable that the factor structure for the subscale Nurse–Physician Relationship is different from the original structure. In practice, the nature of this relationship is different for nursing homes and hospitals, with a view to contact frequency and intensity. In nursing homes in the Netherlands, nurse–physician contact mostly occurs in weekly multidisciplinary consultations, as compared to daily and frequent contacts in hospitals. Nursing home physicians are also responsible for multiple units. This can explain why this subscale does not show the same results as in the hospital setting. Furthermore, the researchers noted that the two deviating items in this subscale are the negatively formulated items. This may be due to the difficulty of the items. It can also be possible that two different constructs are measured, namely two different types of nurse–physician relationships: the collegial relationship and the negative relationship. Thirdly, the factor structure of the subscale Control over Nursing Practice deviated from the original structure. The most notable item of this subscale was item 24 concerning

BOX 1 Items not meeting stated criteria

Four items do not meet two or more of the criteria:

Item 9: Few rewards for pursuing education Cronbach's α of subscale = .60, Cronbach's α if-itemdeleted increases with .18

Item 14: Practice spheres decision-making
Pearson correlation with subscale = .19, Cronbach's α if-item-deleted increases with .02

Item 35: High clinical competence is rewarded Cronbach's α of subscale = .53, Cronbach's α if-itemdeleted increases with .04)

Item 52: High performance and productivity are expected Pearson's correlation with subscale= .22, Cronbach's α if-item-deleted increases with .03

the interdisciplinary structure. This can be related to the results described above about the nurse–physician relationship. Control over Nursing Practice is considered important for delivering excellent patient care in nursing homes. However, it is possible that in the nursing home setting, the construct is better without item 24. To be certain of this conclusion, further research is necessary as the items are considered both relevant and clear. The last subscale that differed from the original factor structure was Support for Education. Results of this deviation lie in the results of item 9 concerning rewards for pursuing education. This item is the only negatively formulated item of this subscale which can lead to a difference in interpretation of the item and therefore also in a different factor structure. The subscale will improve if this item is deleted. However, the item is considered relevant by nurses for delivering highquality patient care. Further study on the formulation of the item is suggested before deleting this item. Furthermore, cultural differences across countries can result in different findings, which appear clearly in item 52. In the interviews, Dutch nurses mentioned that "expected productivity" has a negative connotation of labelling personal care as industrial productivity in the Netherlands, as opposed to the original version (Schmalenberg & Kramer, 2008). This item also fell out with the rest of the items in the Dutch validation study for hospitals (De Brouwer et al., 2014). It seems likely that more subtle cultural differences could influence scores on other items as well. Finally, other studies showed that all subscales are significantly correlated with OJS (Bai, Hsu, & Zhang, 2015; Schmalenberg & Kramer, 2008; Yildirim et al., 2012). This study also showed that all subscales are significantly correlated with OJS. However, a moderate–to–strong correlation with OJS was indicated for only five of the eight subscales. This shows that the constructs are related to the organisational job satisfaction. In total, however, 33% of the hypothesised correlations did not meet the set criterion. Therefore, construct validity is not fully confirmed for the nursing home setting. A strength of our study is the preparatory phase for content validity

in the new setting. This step, and the importance of its positive results, should not be underestimated. This phase showed that the eight essentials of magnetism and the items were confirmed in terms of relevance and comprehensiveness. Furthermore, the researchers ensured to take clustering of nurses in units into account, which was crucial to validly performing our analyses. The research team performed CFA on individual constructs instead of exploratory factor analyses on the entire scale as is often done, thus using the most adequate approach to test whether data fit hypothesised factor structures (De Vet et al., 2011). Also, this study included multiple methods to assess construct validity.

The response rate was 60.5%. To validly and reliably aggregate data from individuals to group level, a ≥40% response rate on the D-EOMII is recommended (Kramer, Schmalenberg, Brewer, Verran, & Keller-Unger, 2009; Schmalenberg & Kramer, 2008). Although this recommended rate was clearly met, non- response can cause bias when the sample is not representative of the population. The almost 40% nonresponse could have been caused by our use of a web- based survey (Nulty, 2008). Also, a lack of time during shifts or the use of multiple surveys in a short time period could have caused non-response. Although we had no indications of systematic bias, we cannot fully rule this out. De Vet et al. (2011) recommend samples of over 100 for calculating correlation coefficients. For this, the sample size was acceptable.

A possible study limitation is that CFA was performed on data aggregated at the level of 44 units to account for clustering of data from nurses within the same wards. De Vet et al. (2011) propose a minimum of 4–10 cases per item. This criterion was satisfied for all but one subscale (PCC subscale: 11 items). In future studies, more units are preferred.

For practice, implications are that the essentials of magnetism can be used to evaluate nurses' practice environment and policy in nursing homes as all essentials of magnetism are considered relevant. Use of the D- EOMII instrument requires more caution. Subscales Adequacy of Staffing, Clinically Competent Peers, Patient Centered Culture, Autonomy and Nurse Manager Support can be used in this context without problems. However, further research on the other subscales and forming a more adequate comprehensive measure is necessary to determine areas requiring improvement.

The researchers suggest that the subscale Nurse–Physician Relationship should not necessarily be divided into two subscales. However, the subscale can be used in determining a negative or positive nurse–physician relationship. The subscale

Implications for practice

- The valid subscales of the Essentials of Magnetism II instrument can be used to design excellent nursing practice environments enabling nurses to sustain and even improve quality of care for older people.
- Before using the entire Essentials of Magnetism II instrument the subscales Collaborative Nurse-Physician Relationships, Control over Nursing Practice, and Support for Education have to be improved.

Support for Education should be improved.
The negatively formulated item "Few rewards for pursuing education" is significantly correlated to its subscale. However, it does load on a different factor and Cronbach's alpha increases 0.18 if the item is deleted. The researcher team suggests that this item should be altered into a positive formulation as the item is considered relevant. The researchers recommend that the subscale Control over Nursing Practice should be subjected to further research. Results of the factor and reliability analyses show that several items should be deleted; however, those items are considered relevant. Therefore, the researchers recommend a further content validity study on this subscale.

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Conflict of interest

This research was formed without other financial support and any conflict of interest. Copyright on the original Essentials of Magnetism instrument means that this instrument cannot be reprinted without the expressed written permission of HSRA, and therefore, permission was obtained.

Contributions

Data collection: BdB. Study design: BdB, MK, TvA. Data analysis and interpretation: BdB, MK, TvA, LS. Manuscript preparation and revision: BdB, MK, TvA, LS.

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II

PART II

ASSOCIATION BETWEEN THE ESSENTIALS OF MAGNETISM AND NURSING SENSITIVE OUTCOMES

5

CHAPTER 5

ASSOCIATIONS BETWEEN CHARACTERISTICS OF THE NURSE WORK ENVIRONMENT AND FIVE NURSE-SENSITIVE PATIENT OUTCOMES IN HOSPITALS: A SYSTEMATIC REVIEW OF LITERATURE

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ABSTRACT

Objective: To systematically review the literature on relationships between characteristics of the nurse work environment and five nurse-sensitive patient outcomes in hospitals. Data sources: The search was performed in Medline (PubMed), Cochrane, Embase, and CINAHL.

Review methods: Included were quantitative studies published from 2004 to 2012 that examined associations between work environment and the following patient outcomes: delirium, malnutrition, pain, patient falls and pressure ulcers. The Dutch version of Cochrane's critical appraisal instrument was used to assess the methodological quality of the included studies.

Results: Of the initial 1120 studies, 29 were included in the review. Nurse staffing was inversely related to patient falls; more favorable staffing hours were associated with fewer fall incidents. Mixed results were shown for nurse staffing in relation to pressure ulcers.

Characteristics of work environment other than nurse staffing that showed significant effects were: (i) collaborative relationships; positively perceived communication between nurses and physicians was associated with fewer patient falls and lower rates of pressure ulcers, (ii) nurse education; higher levels of education were related to fewer patient falls and (iii) nursing experience; lower levels of experience were related to more patient falls and higher rates of pressure ulcers. No eligible studies were found regarding delirium and malnutrition, and only one study found that favorable staffing was related to better pain management.

Conclusions: Our findings show that there is evidence on associations between work environment and nurse-sensitive patient outcomes. However, the results are equivocal and studies often do not provide clear conclusions. A quantitative meta-analysis was not feasible due to methodological issues in the primary studies (for example, poorly described samples). The diversity in outcome measures and the majority of cross-sectional designs make quantitative analysis even more difficult. In the future, well-described research designs of a longitudinal character will be needed in this field of work environment and nursing quality.

What is already known about the topic?

- Nurse work environment is an important contributor for nurse outcomes, such as job satisfaction and burnout.
- Previous research showed associations between nurse staffing and patient outcomes, such as mortality and length of stay.
- High quality systematic reviews in this research area indicate methodological issues of primary studies.

What this paper adds

- Focusing on a limited set of five nurse-sensitive patient outcomes revealed that there were no eligible studies on delirium and malnutrition.
- Shows more favorable nurse staffing is associated with fewer patient falls and better pain management and conflicting results in relation to pressure ulcers.
- Finds that higher levels of experience and education and good collaborative relationships of professionals have favorable effects on the nurse-sensitive patient outcomes of falls and pressure ulcers.

INTRODUCTION

In 2004, the Institute of Medicine (IOM) published the report *Keeping Patients Safe: Transforming the Work Environment of* Nurses, emphasizing the importance of work environment in relation to the quality of nursing care (Institute of Medicine, 2004). Nurses constitute the largest group of employees in hospitals and deliver most of bedside patient care. Therefore, research on work environment factors influencing nursing quality is highly relevant to the healthcare field. McClure et al. (1983) were the first to explicitly identify some of the major characteristics of the nursing work environment, such as nurse staffing, nurse autonomy and collaboration with physicians (McClure & Hinshaw, 2002). Since then, several studies have focused on the measurement of nursing work environments, for example the Nursing Work Index (Kramer & Hafner, 1989), the Practice Environment Scale (Lake, 2002) and the Essentials of Magnetism (Kramer and Schmalenberg, 2004). A healthy work environment is defined as 'one in which leaders provide the structures, practices, systems and policies that enable clinical nurses to engage in the work processes and relationships essential to safe and quality patient care outcomes' (Schmalenberg & Kramer, 2008).

Donabedian's Structure–Process–Outcome paradigm is often used as a framework for assessing work environments in relation to quality of care (Donabedian, 2003). Structural variables refer to those characteristics affecting the ability of hospital units to meet health care needs and include organizational characteristics (e.g., staffing, skill mix), nurses' characteristics (e.g., education, experience) and patients' characteristics (e.g., age, complexity). Process variables refer to activities of nurses in providing care and include nurses' perception and nursing interventions. Outcome variables

are the results of provided care. To date, the relationship between characteristics of nurse work environment and quality of nursing care has been thesubject of many studies that have been summarized in several reviews (e.g., Butler et al., 2011; Kane, Shamliyan, Mueller, Duval, & Wilt, 2007; Lake & Cheung, 2006; Lang, Hodge, Olson, Romano, & Kravitz, 2004; Lankshear, Sheldon, & Maynard, 2005; Shekelle, 2013). Yet, previous reviews have almost exclusively focused on structural characteristics regarding staffing levels, such as nurse staffing and skill mix. For example, the review of Lang et al. (2004) showed that higher levels of nurse staffing are associated with lower failure-to-rescue rates, lower inpatient mortality rates, and shorter hospital stays. Kane et al. (2007) performed a metaanalysis on staffing ratios between 1990 and 2006 and found that increased ratios of registered nurses were associated with decreased mortality rates, decreased length of stay and fewer adverse events. Although these reviews greatly contributed to insight in the effects of nurse staffing on patient outcomes, there is a need for information about characteristics other than nurse staffing. Therefore, in the present review, in addition to nurse staffing, we will focus on a broader set of characteristics of work environment and their effect on patient outcomes.

We aim to accumulate knowledge in addition to previous research referring to outcome measures such as mortality, length of stay and healthcare-associated infections (i.e., Aiken, Clarke, Cheung, Sloane, & Silber, 2003; Needleman et al., 2011; Stone et al., 2008). The main objective of the present study is to systematically review the literature and to provide an overview of associations between characteristics of the nurse work environment (e.g., nurse staffing, nurse– physician collaboration) and five nurse-sensitive patient outcomes (i.e., delirium, malnutrition, pain, patient falls, and pressure ulcers). Nurse-sensitive patient outcomes are defined as 'those outcomes that are relevant, based on nurses' scope and domain of practice, and for which there is empirical evidence linking nursing inputs and interventions to the outcome for patients' (Doran, 2003; Maas, Johnson, & Moorehead, 1996). Focusing on a limited set of outcomes enables the opportunity for closer scrutiny on these five nursesensitive patient outcomes. Pain, patient falls and pressure ulcers are among the most commonly used nurse-sensitive outcome measures for benchmarking purposes in many countries (e.g., Canada, UK, and USA) (Doran et al., 2011).

Additionally, delirium and malnutrition are less used in this context; however, their relevance is acknowledged, as in for example, the Netherlands it is mandatory for hospitals to publicly report these formal indicators of nursing quality (Dutch Health Care Inspectorate, 2012). We focus on articles published since 2004, which coincides with the release of the IOM-report mentioning the importance of quality of nursing care and the role of nurse work environments (Institute of Medicine, 2004).

METHODS

Search strategy and inclusion criteria

The following electronic databases were used to extract relevant studies: Medline (PubMed), Cochrane Library, Embase and CINAHL. First, search terms were determined by screening abstracts and reference lists of reviews on nurse work environment. Fig. 1 shows the final search strings. Second, two reviewers who are experts in the nursing field independently screened titles and abstracts of

PubMed

((((patient[tiab] OR patients[tiab] OR patient's[tiab]) AND outcome*[tiab]) AND ("Hospitals"[Mesh] OR hospital*[tiab] OR inpatient*[tiab] OR hospitali*[tiab]) AND ("Nursing"[Mesh] OR "Nurses"[Mesh]OR "Nursing Staff, hospital"[Mesh] OR "nursing"[Subheading] OR ((nurse[tiab] OR nurses[tiab] OR nursing[tiab]) AND (characteristic*[tiab] OR practice*[tiab] OR staffing[tiab] OR quality[tiab] OR ((work[tiab] OR working[tiab]) AND (environment[tiab])) OR (skills mix[tiab] OR skillmix[tiab])))))) AND ((("Pressure Ulcer"[Mesh] OR pressure ulcer*[tiab] OR bedsore*[tiab] OR pressure sore*[tiab] OR decubitus[tiab]) OR ("Delirium"[Mesh] OR delirium*[tiab]) OR ("Pain Measurement"[Mesh] OR pain measur*[tiab] OR pain assess*[tiab]) OR ("Accidental Falls"[Mesh] OR fall*[tiab]) OR ("Malnutrition"[Mesh] OR malnutrition[tiab] OR under nutrition[tiab] OR nutritional deficienc*[tiab])) OR ((adverseevent*[tiab] OR adverse occurrenc*[tiab])))) OR (nursesensitive[tiab] OR nursing sensitive[tiab]) OR ("Restraint,Physical"[Mesh] OR restraint*[tiab])

Embase

((patient* and outcome*).ti,ab. and (exp Hospital/ or hospital*.ti,ab. or inpatient*.ti,ab. or hospitali*.ti,ab.) and (exp Nursing/ or exp Nurse/ or ex p Nursing Staff/ or ((nurse or nurses or nursing) and (characteristic* or practice* or staffing or quality or ((work or working) and environment) or (skills mix or skillmix))).ti,ab.) and (exp decubitus/ or pressure ulcer*.ti,ab. or bedsore*.ti,ab.or pressure sore*.ti,ab. or decubitus.ti,ab. or (exp Delirium/ or delirium*.ti,ab.) or (exp Pain assessment/ or pain measur*.ti,a b. or painass ess*.ti,ab.) or (exp Falling/ or fall*.ti,ab.) or (exp Mal nutrition/ or malnutrition.ti,ab. or undernutrition.ti,ab. or nutritional deficienc*.ti, ab.) or ((adv erse event* or adverse occurrenc*).ti,ab.))) or (nurse sensitive or nursing sensitive).ti,ab or (restraint*):ti,ab

Cinahl

((patient* and outcome*) AND (MH "Hospitals+" or hospital* or inpatient* or hospitali*) AND ((MH "Nurses+") OR (MH "Nursing Staff, Hospital") OR (MH "Nursing Practice +") OR ((nurse or nurses or nursing) and (characteristic* or practice* or staffing or quality or ((work or working) and environment) or (skills mix or skillmix)))) AND (MH "Pressure Ulcer+" OR pressure ulcer* or bedsore* or pressure sore* or decubitus OR MH "Delirium+" OR delirium* OR MH"Pain Measurement" OR pain measur* or pain assess* OR MH "Accidental Falls+" OR fall* OR MH "Malnutrition+" OR malnutrition or undernutrition or nutritional deficienc* OR MH "Adverse Health Care Event+" OR adverse event* or adverse occurrenc*)) OR "nurse sensitive" or "nursing sensitive" OR (MH "Restraint, Chemical" OR MH "Restraint, Physical" OR restraint*)

FIGURE 1 Search query

studies on their relevance. The final sample was established after full text reading by the same reviewers using inclusion and exclusion criteria, which are described in detail below. In case of discrepancies, there was discussion until consensus was reached. The MOOSE guidelines were used to structure this systematic review (Stroup et al., 2000). We included studies that examined associations between work environment and nurse-sensitive patient outcomes in hospitals, had a quantitative study design, were written in English and were published from 2004 to 2012. In the literature search, we focused on delirium, malnutrition, pain, patient falls and pressure ulcers. These outcome measures are internationally used and acknowledged as benchmark indicators, for example in Scotland (NHS), UK (NHS), Sweden (CALNOC), Australia (CALNOC), Canada (C-HOBIC), USA (NDNQI), USA military (Milnod), USA veterans (VANOD), Belgium (B-NMDS), and the Netherlands (IGZ) (Doran et al., 2011). Two well-recognized indicator datasets of the Agency for Healthcare Research and Quality (AHRQ) and the National Database of Nursing Quality Indicators (NDNQI) allow these nursesensitive patient outcomes to be available and clearly defined (Montalvo, 2007).

To find as many applicable studies for work environment characteristics, we used broad definitions regarding the nurse work environment (see Figure 1). Then, to categorize the results we divided structural and process characteristics. For the structural characteristic of nurse staffing, we included the frequently used measures: (i) total nursing hours defined as 'total number of productive hours worked by all nursing staff with direct care responsibilities per number of days a patient stays in the hospital', (ii) registered nurses' hours (RN hours) defined as 'number of productive hours worked by a registered nurse (a nurse who holds a specific license with at least a three-year training certificate and holding post graduate qualifications) with direct care responsibilities per patient day', (iii) proportion of registered nurses (% RN) defined as 'proportion of productive hours worked by a registered nurse', (iv) temporary nurses defined as 'any licensed nurse who is providing service at the facility as an employee of another entity' and (v) turnover defined as 'the process whereby nursing staff leave or patients transfer within the hospital environment' (Institute of Medicine, 2004; Kane et al., 2007; Van den Heede, Clarke, Sermeus, Vleugels, & Aiken, 2007). In addition to nurse staffing, the structural characteristics of nurse experience and nurse education were added to the review, because these characteristics are potential influential factors (Schmalenberg and Kramer, 2008; West, Sanderson, Mays, Rafferty, & Rowan, 2009).

To categorize process characteristics of the work environment, we used the items of the Essentials of Magnetism (Schmalenberg and Kramer, 2008), including the eight factors which, according to nurses and experts in the field are essential for a healthy work environment and necessary for the provision of quality of care:

(i) clinically competent peers, (ii) collaborative nurse–physician relationships, (iii) clinical autonomy, (iv) support for education, (v) adequacy of staffing, (vi) nurse manager support, (vii) control of nursing practice and (viii) patient-centered cultural values. These items have shown to be reliable and valid indicators regarding the quality of the nurse work environment (Kramer et al., 2010).

Exclusion criteria

This review concerns hospital care; studies examining healthcare settings other than hospitals (e.g., nursing homes, homecare, and rehabilitation clinics) were excluded. Initially, we wanted to perform a quantitative evaluation of previous research by presenting a meta-analysis of studies using objective outcome measures (e.g., clinical reported medical records from hospital databases). Therefore, study designs in which analysis was limited to only subjective perception measures (e.g., surveys) and articles on staffrelated or organization-related outcomes (e.g., nurse satisfaction studies, economic evaluations) were excluded. An exception was made for the outcome measure of pain; ratings of pain express a subjective measure as pain is experienced by patients. Dissertations, reviews and studies initiated in developing or non-Western countries were excluded to enable valid comparison.

Quality appraisal

To determine methodological quality of selected studies we used the Dutch version of Cochrane's critical appraisal instrument, addressing randomized controlled trials (RCTs), cohort studies, and cross-sectional studies (Dutch Institute for Healthcare Improvement, 2007). The criteria of validity (e.g., well-described design, appropriate methods, definition of research participants, and selection bias), reliability (e.g., follow up, confounders, outcome data, and statistical methods) and applicability (e.g., generalizability, relevance within health care) were assessed for each study. The criteria were scored as the following: fully met (1 point), partly met (1/2 point) or not met (0 point). The total scores give an indication of study quality. Specifically, studies of low quality scored 1/2–1 point, studies of moderate quality 1½–2 points and studies of high quality 2½–3 points. Subsequently, the levels of evidence, ranging from A2 to D status, were determined. The A2-level constitutes RCTs and prospective cohort studies with sufficient sample sizes and follow-up. Observational studies (i.e., cohort and patient control) that did not meet the criteria of A2-level were labeled level B. Level C includes studies with a descriptive design (i.e., cross-sectional studies) and level D includes experts' opinion.

RESULTS

Description of studies

The initial search yielded 1120 references of which 989 remained after removing duplicates (Fig. 2). After screening the titles, 298 studies were selected for further examination. Based on the abstracts, the two reviewers independently decided that 57 studies met the inclusion criteria. After full text reading, the final sample included 29 studies (Kappa's coefficient: .74). Table 1 represents the characteristics of these studies. Most studies originated from North-America (20 from the USA and three from Canada). Two studies were conducted in Australia and New-Zealand, one in the UK and one in Belgium. Two studies compared data from the USA with data from other countries (Sweden and Canada). The studies differed in their level of analysis; five studies described results at the hospital-level and 24 studies at the unit-level. The unitlevel analysis mainly focused on intensive care, surgical and medical/surgical units.

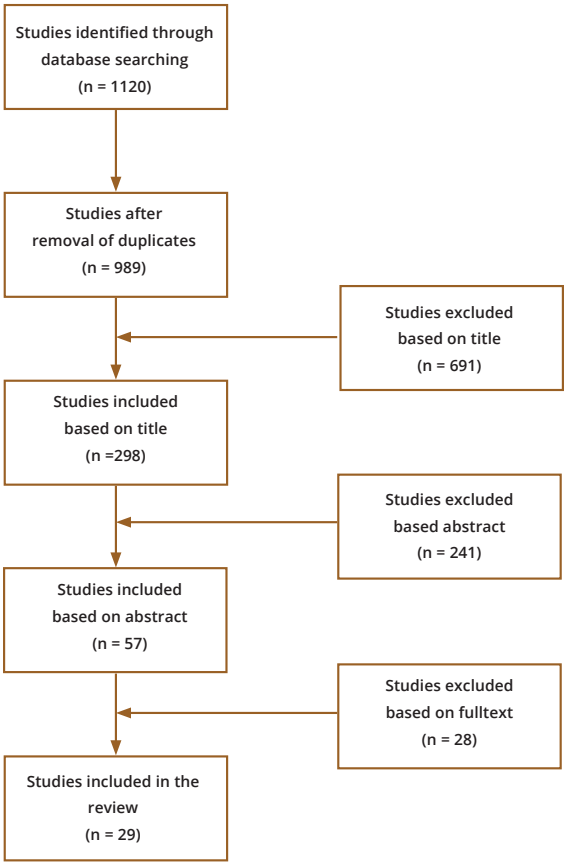

FIGURE 2 Flowchart of the inclusion process

TABLE 1 Characteristics of included studies

Author, year, and country	Design	Sample	Independent variables	Outcome variables	Factors controlled for	Key findings
Bae et al., 2010a, USA	Cross-sectional Retrospective 2003–2004	*N* = 277 medical/surgical units of 142 hospitals	**Skill mix** % External temporary nurse hours/RN % Internal temporary nurse hours/RN % Total temporary nurse hours/RN	**Patient falls** Incidence/1000 patient days	Work complexity Support services Nurse age Educational level	Significant more falls in units with high levels of total temporary nurse hours RR = 1.188, p = .05
	Staff nurse survey N	*N* nurses = 4954 *N* patients = not described			Unit tenure RN hours Unit size Magnet certification	No significance for external or internal temporary nurse hours
Bae et al., 2010b, USA	Cross-sectional Retrospective 2003–2004	*N* = 268 medical/surgical and general units of 141 hospitals	**Nurse staffing** Turnover rates/ six months	**Falls** Patient falls/1000 patient days	Work complexity Unit size and tenure Hospital size	Significant fewer falls in units with low levels of turnover compared to units without turnover β = -.297, p = .02
	RN survey	*N* nurses = not described *N* patients = not described	**Mediating variables** Workgroup process (cohesion, learning, relational coordination)		Technological status Teaching status Nurse education level Care hours Patient age Patient health status Prior hospitalizations	No significant mediating effect of workgroup process on falls
Breckenridge-Sproat et al., 2012, USA	Longitudinal cohort Retrospective 2003–2006	*N* = 23 medical/surgical, step-down and critical care units of 4 Military hospitals	**Nurse staffing** NHPPD Reserve nurses (temporary nurses)	**Falls** Incident reporting	Unit type Acuity Staff category Study duration	No significant associations nurse staffing and falls
	Staff nurse survey	*N* nurses = 506 *N* patients = not described	**Skill mix** % RN/total nursing hours % LPN/total nursing hours % Nurse aid/total nursing hours			Significant increase of falls in step down units associated with increase of reserve nurses β = 4.921, p < .05
			Mediating variables Daily patient acuity			Significant positive effect acuity in medical/surgical units on falls β = .328,< .05

TABLE 1 (Continued)

Author, year, and country	Design	Sample	Independent variables	Outcome variables	Factors controlled for	Key findings
Burnes Bolton et al.,2007, USA	Longitudinal cohort Prospective Predata 2002 Postdata 2004/2006	*N* = 187 medical/surgical units *N* = 65 step down units of 108 hospitals N patients = 11,740	**Nurse staffing** RN hours/patient day LPN hours/patient day Unlicensed hours/ patient day Total hours/patient day **Skill mix** % RN hours/skill mix % LPN hours/skill mix % Unlicensed hours/ skill mix % Contracted hours/ skill mix	**Falls** Incidence falls/ 1000 patient days Falls with injury/ 1000 days **Pressure ulcers** Prevalence pressure ulcers Prevalence HAPU	Hospital size	Significant increases in staffing hours and ratios pre/ post Significant inverse relation falls and %RN step down units β = -.029, *p* = .008 Significant positive relation total hours of care on > stage 2 pressure ulcers in stepdown units β = .928, p = .004 Significant inverse effect contracted staff on falls with injury in medical/ surgical units β = -.003, p = .006
Chang et al., 2006, USA	Cross-sectional Retrospective RN survey Patient survey	*N* = 222 medical/surgical units of 126 hospitals *N* nurses = not described *N* patients = not described	**Other variables** Workgroup diversity (e.g. education, RN experience) Workgroup performance (e.g. team-work) Intervening process variables (workgroup cohesion, workgroup initiative)	**Falls** Incident reporting	Patient age Unit size	Significant inverse effect of workgroup initiative on falls β = -.18, p < .01 No significant effect of intervening process variables, workgroup diversity and performance on falls
Donaldson et al., 2005, USA	Longitudinal cohort Retrospective Predata 2002 Postdata 2004	**For patient falls** *N* = 200 medical/surgical units *N* = 68 stepdown units of 68 hospitals **For pressure ulcers** *N* = 119 medical/surgical units	**Nurse staffing** NHPPD RN Hours/patient day LVN Hours/patient day Non RN + LVN caregiver hours/ patient day	**Falls** Incidence/1000 patient days **Pressure ulcers** Prevalence pressure ulcers Prevalence HAPU	Hospital size Hospital system	Increases nurse-patient ratios of staffing and skill mix in medical/ surgical units NHPPD increased with 7.4% *p* = .0024 No significant changes of nurse-patient ratios of staffing and skill mix in step down units

TABLE 1 (Continued)

Author, year, and country	Design	Sample	Independent variables	Outcome variables	Factors controlled for	Key findings
		N = 43 stepdown units of 38 hospitals *N* patient days = #196,000	**Skill mix** % RN/total nursing hours % LVN/total nursing hours % Non RN/total nursing hours Contracted hours/ patient day			No significant changes of falls and pressure ulcers after mandated staff ratios
Frith et al., 2010, USA	Cross-sectional Retrospective 2005–2007	*N* = 11 medical/surgical units of 4 hospitals	**Nurse staffing** RN hours/patient day LPN hours/patient day	**Adverse events** One of them: pressure ulcers Prevalence/1000 patient days	Patient age Complication index	No significant relationships between nurse staffing and adverse events
	Patient survey	*N* patients = 34,838	**Skill mix** % RN/skill mix % LPN/skill mix			Significant relation between %RN in skill mix and adverse events An increase of RN by 1% reduced adverse events with 3.4%
Goode et al., 2011, USA	Cross-sectional Retrospective 2005	*N* = 35 Non-Magnet hospitals *N* = 19 Magnet hospitals General and intensive care units *N* patients = not described	**Nurse staffing** NHPPD RN/patient day LPN/patient day CNA/patient day **Skill mix** % RN/staffing mix	**Pressure ulcers** Rate observed and expected risk	Patient characteristics Patient condition Hospital casemix	Significantly less NHPPD in general units of Magnet hospitals Significantly lower %RN in general and intensive care units of Magnet hospitals Less pressure ulcers Magnet hospitals Significant inverse association pressure ulcers and NHPPD in intensive care units b = -.022, p < .10
Gunningberg et al., 2012, USA, Sweden	Cross-sectional Retrospective 2009	*N* = 33 medical/surgical units of a university hospital in Sweden *N* patients = 630 *N* = 14 medical/surgical units of a general hospital in Sweden *N* patients = 253 *N* = 1100 medical/surgical units of 207 hospitals in the USA *N* patients = 16,427	**Nurse staffing** NHPPD % Patient (bed) turnover % Voluntary turnover **Skill mix** % RN/staff mix **Mediating variables** Patients per RN	**Pressure ulcers** Prevalence pressure ulcer Prevalence HAPU	Hospital size	In USA higher total staff and %RN In USA higher patient (bed) turnover In USA less patients/RN In USA lower prevalence pressure ulcers and HAPU

TABLE 1 (Continued)

Author, year, and country	Design	Sample	Independent variables	Outcome variables	Factors controlled for	Key findings
Jiang et al., 2006, USA	Cross-sectional Retrospective 2001	*N* = 372 acute hospitals *N* patients = not described	**Nurse staffing and skill mix** *AHA:* FTE/adjusted patientday Ratio of FTE to average daily census *OSHPD:* Paid hours RN/ adjusted patient day Paid hours LPN/ adjusted patient day % RN/licensed nurses Total paid hours/ adjusted patient day % RN % LPN, % nurse aid/total nurses	**Decubitus ulcers** Risk adjusted rates	Casemix Severity illness Hospital ownership Size Teaching status Urban vs. Rural	Significant inverse relation RN hours/patient days and decubitus ulcers ANA: ϐ =-.001, *p* < .001 OSHPD: β = -.002, *p* < .001 Significant inverse relation %RN/licensed nurses and decubitus ulcers ANA: ϐ =-.044, *p* < .001 OSHPD: β = ".053, *p* < .001
Kendall-Gallagher and Blegen, 2009, USA	Cross-sectional Retrospective 2000	*N* = 48 intensive care units of 29 hospitals *N* patients = not described	**Nurse staffing** NHPPD **Skill mix** % RN/staff mix **Other variables** % Staff nurses with speciality certification % Staff nurses with at least a Bachelor degree Mean years of experience Organizational characteristics	**Falls** Rate of falls/1000 patient days	Patient risk	No significant effects of staffing and skill mix Inverse association between unit proportion of certified staff nurses and rate of falls β = -.06, *p* < .04 No significant effects of experience, bachelor degree or organizational characteristics
Krapohl et al., 2010,USA	Cross-sectional Retrospective	*N* = 25 intensive care units of 8 hospitals	**Other variables** % Certified nurses Workplace empowerment (opportunity, information, support, resources)	**Pressure ulcers** Prevalence	Not described	No significant effect of proportion certified nurses or workplace empowerment on pressure ulcers

TABLE 1 (Continued)

Author, year, and country	Design	Sample	Independent variables	Outcome variables	Factors controlled for	Key findings
	Staff nurse survey	*N* nurses = 450 *N* patients = not described				Significant positive association nurses' perception of workplace empowerment and certification (r = .397, p = .05)
Mallidou et al., 2011, Canada	Cross-sectional Retrospective 1998–1999	*N* = 12 hospitals (medical, surgical, emergency, intensive care units)	**Other variables** Informal practices (autonomy, control over practice nurse–physician relationships)	**Falls** Adverse event	Not described	Inversed effect of experience on adverse events in medical units β = -.104 and emergency departments β = -.136
	RN survey	*N* nurses = 1937 *N* patients = not described	Formal practice (satisfactory salary, education, quality assurance program, preceptorship, experience)			Significant inverse effect RN/physician relationship on adverse events in medical units β = -.115 Significant inverse effect of fulltime/parttime on adverse events in surgical units (β = -.104) and emergency units (β = -.178) Significant inverse effect preceptorship on adverse events in intensive care units β = -.164 No significance regarding education, autonomy and control over practice
Manojlovich et al., 2009, USA	Cross-sectional Retrospective 2005	*N* = 25 intensive care units of 8 hospitals	**Other variables** Perception of communications Characteristics of the Practice environment	**Pressure ulcers** Prevalence > stage 2	Patient severity	No significant relation communication on any adverse events
	Staff nurse survey	*N* nurses = 462 *N* patients = 1090				No significant effect of Practice Environment as mediator
Manojlovich et al., 2011, Canada, USA	Cross-sectional Retrospective 2007	*N* = 14 medical/surgical units of 1 hospital in Canada *N* = 12 medical/surgical units of 1 hospital in USA *N* patients = not described	**Other variables** Level of RN needed to provide care (Active ingredient: skill mix, education, experience) (Intensity: FTE's, RNPatient Ratio, RN worked hours/patient day)	**Falls** Rate of falls/1000 patient days	Not described	Significant inverse effect of active ingredient on falls r = -.44, p = .03 Significant inverse effect of intensity on falls r = -.44, p = .03

TABLE 1 (Continued)

Author, year, and country	Design	Sample	Independent variables	Outcome variables	Factors controlled for	Key findings
Mark et al., 2004, USA	Longitudinal cohort Retrospective 1990–1995	*N* = 422 hospitals *N* patients = not described	**Nurse staffing** RN FTE/1000 inpatient days LPN FTE/1000 inpatient days Non-nurse FTE/1000 inpatient days	**Decubitus ulcers** Risk-adjusted observed and expected decubitus ulcers	Hospital heterogenity Historical circumstances	Significant inverse effect of RN FTE on decubitus ulcers β = -.017, *p* = .01 Significant inverse marginal effect of RN FTE on decubitus in all quartiles 25th: β = -.050, *p* = .001 50th: β = -.045, *p* = .001 75th: β = -.040, *p* = .01 After controlling for hospitalspecific effects, results are insignificant
McCloskey and Diers, 2005, New Zealand	Longitudinal cohort Retrospective 1993–2000 Staff nurse survey	*N* = medical and surgical units of 85 hospitals N nurses RN and EN = 65,221 N patients = #3.3 million	**Nurse staffing** FTE/1000 patient days FTE/1000 discharges Total nursing hours/ 1000 patient days Total nursing hours/ 1000 discharges **Skill mix** % RN/total FTE	**Decubitus ulcers** Rate of decubitus ulcers	No risk adjustment, other than cohort	After mandated staffing ratios 36% decrease of total nursing hours and FTE/1000 discharges and 18% increase of %RN skill mix After mandated ratios increase of decubitus ulcers 88%(medical units) and 258%(surgical units) Significant correlations between decubitus ulcers and total nursing Hours, %RN and FTE (p < .05)
McGillis Hall et al., 2004, Canada	Cross-sectional Retrospective Year= not described	*N* = 77 medical, surgical and obstetric units of 19 hospitals *N* patients = not described	**Nurse staffing** % Professional staffing **Other variables** Average nurse experience	**Falls** Rate of falls	Patient complexity Age	No significant effects of nurse staffing on falls No significant relations between level of experience and patient outcomes
Patrician et al., 2011, USA	Longitudinal cohort Prospective 2003–2006	*N* = 31 medical/surgical units *N* = 8 step-down units *N* = 18 critical care units of 13 Military Hospitals *N* patients = 111,522	**Nurse staffing** NCHPPS **Skill mix** % RN/skill mix per shift	**Falls** Incidence reporting **Falls with injury** Incidence reporting	Patient census Patient acuity Hospital size Shift time	With every 1 h decrease of NCHPPS significant increase of falls (with injury) in all units (15–51%) With every 10% decrease in %RN increase of falls with injury critical care (36%) and medical/surgical units (30%)

TABLE 1 (Continued)

Author, year, and country	Design	Sample	Independent variables	Outcome variables	Factors controlled for	Key findings
			Other variables Worked hours by staff category (civilian vs. military)			Every 10% decrease of civilian nurses associated with 36% (critical care) and 48% (medical/surgical units) increase of falls Significant positive association between patient acuity/census and falls in medical/surgical and stepdown units
Purdy et al., 2010, Canada	Cross-sectional Retrospective Staff nurse survey Patient survey	*N* = 61 medical and surgical units of 21 hospitals *N* nurses = 679 *N* patients = 1005	**Other variables** Group level: Group processes (teamwork) Structural empowerment (workplace factors) *Individual level:* Psychological empowerment Empowerment behavior	**Falls** Falls/1000 patient days	Length of stay Nursing experience Nursing care hours	Significant inverse effects on falls on the group level: group processe β =-.19, *p* = .05 and structural empowerment β = -.12, *p* = .05 No significant effects of nurse empowerment on the individual level
Seago et al., 2006, USA	Longitudinal cohort Retrospective 1999–2002 Patient survey	*N* = 3 medical/surgical units of 1 universitary hospital *N* patients = not described	**Nurse staffing** Total RN Hours/patient day Non-RN Hours/patient day NHPPD **Skill mix** % RN/total nursing hours	**Falls** Incidence/1000 patient days **Decubitus ulcers** Incidence/1000 patient days **Pain management** Patient satisfaction	Casemix Work intensity	Significant positive effect NHPPD on perception pain management β = 2.44, *p*< .01 Significant positive effect %RN on perception pain management β = 13.63, *p* < .01 No significant effect of RN or non-RN hours on pain, falls or decubitus
Shuldham et al., 2009, UK	Cross-sectional Retrospective 2006-2007	*N* = 2 hospitals **Low dependency units:** wards (cardiology, cardiothoracic surgery, respiratory)	**Nurse staffing** NHPPD	**Pressure sores** Prevalence	Not described	No significant effects of NHPPD on falls and pressure ulcers

TABLE 1 (Continued)

Author, year, and country	Design	Sample	Independent variables	Outcome variables	Factors controlled for	Key findings
		High dependency units: critical and intensive care unit	**Skill mix** % Permanent hours/ total hours % Permanent hours/ permanent and temporary internal hours	**Patient falls** Incidence reporting		Significant positive effect %permanent hours/ permanent and temporary hours on pressure sores in low dependency units OR = 1.092 p = .026
		N adult patients = 23,192 *N* child patients = 2315				Significant positive effect %permanent hours/total hours on pressure sores in low dependency units OR = 1.070, p = .019 No significant effects %permanent hours in high dependency units
Stone et al., 2007, USA	Cross-sectional Retrospective 2012	*N* = 51 intensive care units of 31 hospitals	**Nurse staffing** RN hours/patient day Ratio overtime/regular RN hours	**Decibiti** Incidence	Patient severity Patient co-morbidity Patient demographics Patient socioeconomics Hospital size	Significant inverse effect of RN hours on decubiti OR = .69 p < .001 (third quartile vs. first quartile)
	Staff nurse survey	*N* nurses = 1095	**Other variables**			Significant positive effect of overtime on decubiti OR = 1.91 p < .001 (fourth quartile vs. first quartile)
		N patients = 15,902	Average RN wage Organizational climate		Teaching status Nurse casemix ICU-type	No significant relations decubiti and wages or organizational climate
Taylor et al., 2012, USA	Cross-sectional Retrospective 2004–2005	*N* = 29 medical/surgical and rehabilitation units of 1 trauma hospital	**Nurse staffing** RNHPPD Unit turnover rate	**Falls** Incidence **Decubitus ulcers**	Patient complexity	Every additional hour RNHPPD associated with 9% decrease odds patient falls Significant association teamwork and decubitus ulcers OR = .56 p < .001
	Staff nurse survey	*N* nurses = 723 *N* patient discharges = 28,876	**Other variables**	Incidence		No significant association of unit turnover on decubitus ulcers or falls
Titler et al., 2011, USA	Longitudinal cohort Retrospective 1998–2002	*N = 1 hospital*	**Nurse staffing** Average RN/hour	**Falls** Incident reporting	Patient characteristics Clinical conditions	Fall group N = 481 Non-fall group N = 9706
		N patients = 7851 *N* hospitalizations = 10,187	**Skill mix** % RN/skill mix		Co-morbidities Interventions	With every 10% increase of %RN odds of falling decreased with 18,8%

TABLE 1 (Continued)

Author, year, and country	Design	Sample	Independent variables	Outcome variables	Factors controlled for	Key findings
						No significant effect average RN/hour
Twigg et al., 2011, Australia	Longitudinal cohort Retrospective 2000–2004 2 time series pre/post mandated staffing in 2002	*N* = 52 units of 3 hospitals *N* patients = 236,454	**Nurse staffing** NHPPD	**Pressure ulcers** Incidence rate	Time period Season Patient group	No significant increase of RN hours and NHPPD pre/post (58420–69327) No significant relation between staffing and pressure ulcers Significant decrease of pressure lcers in individual hospitals pre/post
Unruh and Zhang, 2012, USA	Longitudinal cohort 1996–2004 Staff nurse survey	*N* = 124 hospitals *N* nurses = not described *N* patients = not described	**Nurse staffing** RN FTE RN FTE/adjusted patient day	**Decubitus ulcers** Incidence/1000 patients Patient safety indicators (decubitus ulcers, infections, sepsis)	Patient turnover Hospital size Hospital casemix Urban vs. rural Payer mix Ownership	Significant positive effect of initial levels of RN FTE/adjusted on initial level of decubitus β = .996, p = .05 Significant inverse effect of initial levels of RN FTE/adjusted on decubitus over time β = ".001, *p* = .05 No significance regarding RN FTE and decubitus
Van den Heede et al., 2009, Belgium	Cross-sectional Retrospective 2003	*N* = 1403 general acute care and intensive care units of 115 hospitals *N* patients = 260,923	**Nurse staffing** NHPPD Standardized NHPPD **Other variables** % Nurses with Bachelor's degree	**Pressure ulcers** Incidence	Co-morbidity Patient age Patient gender Admission type Hospital size Technology status	No significant associations between nurse staffing and patient outcomes No significant effect Bachelor's degree
Wolf et al., 2008, USA	Randomized Controlled trial 2006–2007 Patient survey	*N* = 1 unit of a Bariatric Center *N* control group = 58 *N* intervention group = 58	**Other variables** Nurses trained in patient-centered are vs. usual care	**Falls** Absence of falls	Demographics nurse Demographics patient Co-morbidity	No significant differences between control and intervention groups regarding falls

TABLE 2a Quality appraisal of included studies (exclusively nurse staffing)

Author/date	Validity	Reliability	Applicability	Total	Level of evidence
Seago 2006	1	1	1/2	2½	A2
Burnes Bolton 2007	1	1	0	2	A2
Mark 2004	1/2	1	1	2½	B
Titler 2011	1	1	0	2	B
Mc Closkey 2005	1/2	1/2	1	2	B
Unruh 2012	0	1/2	1	1½	B
Breckenridge-Sproat 2012	1	1/2	0	1½	B
Twigg 2011	1/2	1/2	0	1	B
Donaldson 2005	1/2	1/2	0	1	B
Bae 2010a	1	1	1	3	C
Bae 2010b	1	1/2	1	2½	C
Stone 2007	1/2	1	1	2½	C
Jiang 2006	1	1	0	2	C
Frith 2010	1/2	1/2	1	2	C
Goode 2011	1/2	1/2	1/2	1½	C
Gunningberg 2012	1/2	1/2	0	1	C
Shuldham 2009	1	0	0	1	C

In terms of the nurse-sensitive outcomes, 12 studies examined pressure ulcers and 11 examined patient falls. Six studies analyzed both pressure ulcers and patient falls, among which one also elaborated on pain management. The search did not yield any applicable studies referring to delirium or malnutrition. Regarding work environment characteristics, 17 studies exclusively focused on nurse staffing; five of these studies were appraised as high quality studies, eight studies as moderate quality studies and four studies were rated low quality (Table 2a). A total of 12 studies also reported on characteristics other than nurse staffing; three of these studies were appraised as high quality studies, seven studies as moderate quality studies and two studies were rated low quality (Table 2b).

Patient falls

Nurse staffing

Only one of the six studies on patient falls and total nursing hours reported significant relationships. In this study, Patrician et al. (2011) found that significantly more falls occurred in various units of military hospitals if total nursing hours were lower. However, the study provided no description of the width of confidence intervals. Another cohort study on military hospitals (Breckenridge-Sproat et al., 2012) did not find any significant associations between nursing hours and patient falls. Additionally, Burnes Bolton et al. (2007), Kendall-Gallagher and Blegen (2009), McGillis Hall et al. (2004) and Shuldham et al. (2009) did not find evidence regarding total nursing hours. A similar trend occurred for RN hours; one of six studies found small and inversed associations with patient falls. The cross-sectional study

of Taylor et al. (2012) showed significant inversed effects, as an additional hour of care by RNs was associated with a 9% decrease in the odds to fall. Yet, five other studies did not find any significant associations (Burnes Bolton et al., 2007; Donaldson et al., 2005; Frith et al., 2010; Seago et al., 2006; Titler et al., 2011). Three of four studies on the proportion of RNs reported significant effects. The three cohort studies showed that higher proportions of RNs were significantly related to lower numbers of patient falls. More specifically, small effect sizes were reported for medical/surgical and critical care units (Patrician et al., 2011) and for step down units (Burnes Bolton et al., 2007). Titler et al. (2011) evaluated the reported fall incidences in one hospital and found that with every 10% increase in the proportion of RNs, the odds of falling decreased by approximately 19%. There was one cross-sectional study showing no significant associations with patient falls (Kendall-Gallagher and Blegen, 2009). Regarding temporary nurses, Burnes Bolton et al. (2007), Bae et al. (2010a) and Breckenridge-Sproat et al. (2012) all showed significant positive associations between patient falls and temporary nurses (i.e., more patients fall in units with higher levels of temporary nurses). Two studies reported nurse turnover; Bae et al. (2010b) found that, compared to units without nurse turnover, fall rates in medical/surgical units with low turnover rates (< 3.3%) were significantly lower. Taylor et al. (2012) did not find any significant associations between falls and unit turnover.

In sum, most studies on nurse staffing and patient falls did not show significant associations. However, the studies that did report significant effects were labeled as moderate to high quality and found inversed effects, indicating that a more favorable staffing is associated with a lower number of patient falls.

TABLE 2b Quality appraisal of included studies (exclusively nurse staffing)

Author/date	Validity	Reliability	Applicability	Total	Level of evidence
Wolf 2008	1/2	0	1	1½	A2
Patrician 2011[a]	1/2	1/2	1/2	1½	B
Kendall-Gallagher 2009[a]	1	1	1/2	2½	C
Chang 2006	1/2	1	1	2½	C
Van den Heede 2009[a]	1	1	1/2	2½	C
Purdy 2010	1/2	1/2	1	2	C
Krapohl 2010	1/2	1/2	1	2	C
Manojlovich 2009	1/2	1/2	1	2	C
Mallidou 2011	1/2	0	1	1½	C
Taylor 2012[a]	1	1/2	0	1½	C
Manojlovich 2011	1/2	1/2	0	1	C
McGillis Hall 2004[a]	1	0	0	1	C

[a] Studies which also analyzed nurse staffing and/or skill mix.

Education

Two of four studies found significant associations between patient falls and education. Manojlovich et al. (2011) showed that higher levels of education were related to lower rates of patient falls. Another study found that a higher proportion of certified nurses were associated with fewer patient falls (Kendall-Gallagher and Blegen, 2009). However, this study did not find evidence in regard to nurses with at least a Bachelor's degree. Two studies (Chang et al., 2006; Mallidou et al., 2011) did not find effects of nursing education.

Experience

Three of six studies on experience found significant associations with patient outcomes. Patrician et al. (2011) found that decreasing the numbers of civilian nurses, who on average have more experience, was associated with more fall incidences. Similar inversed associations were reported by Mallidou et al. (2011) and Manojlovich et al. (2011). Chang et al. (2006), Kendall-Gallagher and Blegen (2009) and McGillis Hall et al. (2004) did not find significant effects of experience.

Collaborative nurse–physician relationships

Two out of three studies on collaboration with physicians in relation to patient falls reported significant associations. Specifically, positively appreciated communication was associated with fewer adverse events (i.e., patient falls, medical errors, and nosocomial infections) (Mallidou et al., 2011) and lower number of patient falls (Purdy et al., 2010). Chang et al. (2006) did not find significant associations.

Patient-centered values

The only randomized controlled trial that was available addressed the relationship between patient-centered care (PCC) and the absence of falls. No significant differences were found between 58 patients who received care from PCC trained nurses and 58 patients who received usual care (Wolf et al., 2008).

Pressure ulcers

Nurse staffing

Regarding total nursing hours of care, three of nine studies found significant effects on pressure ulcers. In their New-Zealand study, McCloskey and Diers (2005) reported a 36% decrease in total nursing hours after health care reengineering policies between 1993 and 2000. During these years, the rates of pressure ulcers increased and associations with staffing hours were significant. Goode et al. (2011), using a significance level of $p < .10$, found the following significant inversed associations: higher total nursing hours and fewer pressure ulcers in intensive care units in the USA. Burnes Bolton et al. (2007) unexpectedly found that in 65

step-down units, higher levels of nursing hours were significantly related to higher prevalence of pressure ulcers between 2002 and 2006 (b = .928, p = .004). These types of associations were, however, not found for the same study sample in the period from 2002 to 2004 (Donaldson et al., 2005). Five studies in different countries (i.e., England, Australia, Belgium, and USA) did not find significant associations with pressure ulcers (Gunningberg et al., 2012; Kendall-Gallagher and Blegen, 2009; Shuldham et al., 2009; Twigg et al., 2011; Van den Heede et al., 2009). Regarding the hours of care performed by registered nurses (RN hours), four of six studies reported significant relationships. Jiang et al. (2006) compared two databases, the American Hospital Association (AHA) and the Office of State-wide Health Planning and Development (OSHPD). Both databases agreed on the small inversed effects of higher numbers of RN hours on pressure ulcers. Stone et al. (2007) and Mark et al. (2004) found similar significant inverse relationships between RN hours and pressure ulcers. In the study by Mark et al. (2004), associations were no longer significant after controlling for hospital-specific effects (e.g., patient case mix and hospital size). Stone et al. (2007) also found that higher rates of pressure ulcers were significantly related to more overtime hours by RNs. Unruh and Zhang (2012) found contrasting results regarding pressure ulcers; higher levels of RN hours were associated with higher incidences of pressure ulcers (b = .996, p = .05). Two studies did not find any associations between RN hours and pressure ulcers (Frith et al., 2010; Taylor et al., 2012). Regarding the proportion of registered nurses (%RN) in relation to pressure ulcers, three of six studies found significant associations. One cohort study reported counterintuitive, yet significant positive associations; higher proportion of RNs in the skill mix related to higher rates of pressure ulcers (McCloskey and Diers, 2005). However, two cross-sectional studies that used retrospective analysis found significant inversed associations (Frith et al., 2010; Jiang et al., 2006). It is important to note that the results of Frith et al. (2010) are difficult to interpret as they used a large category of adverse events as the outcome variable, which included pressure ulcers, but they did not differentiate the effects of each adverse event. Three crosssectional designs did not find any significant associations (Goode et al., 2011; Gunningberg et al., 2012; Kendall-Gallagher and Blegen, 2009). One study examined pressure ulcers in relation to temporary and non-temporary nurses and found that higher levels of permanent nurses (i.e., nontemporary nurses) led to higher pressure ulcers rates (Shuldham et al., 2009). The two studies on turnover did not find significant associations; Taylor et al. (2012) investigated unit turnover and Gunningberg et al. (2012) investigated several variables, such as patient turnover, staff voluntary turnover and patients per registered nurse. In sum, contradicting results were shown for measures of nurse staffing in relation to pressure ulcers. Most studies found inversed effects; more favorable staffing was associated with fewer pressure ulcers. However, these

effect sizes were small in contrast to the large effect sizes of the three cohort studies that revealed high staff numbers were related to high levels of pressure ulcers.

Education

Both studies on education in relation to pressure ulcers did not find significant associations; Van den Heede et al. (2009) with regard to nurses with at least a Bachelor's degree and Krapohl et al. (2010) did not show significant effects in relation to certified nurses.

Collaborative nurse–physician relationships

Positively appreciated communication was associated with a lower number of pressure ulcers in the study by Taylor et al. (2012). However, Manojlovich et al. (2009) did not find significant associations.

Pain

The only study to report on the outcome measure of pain showed that patients were more satisfied with pain management if favorable staffing existed. Moreover, a higher number of total nursing hours and higher proportion of RNs in the skill mix improved pain management (Seago et al., 2006).

DISCUSSION

The aim of the present study was to systematically review the literature on the relationship between characteristics of nurse work environment and five nursesensitive patient outcomes (i.e., delirium, malnutrition, pain, patient falls, and pressure ulcers) in hospitals. We considered a broad set of work environment characteristics, thereby potentially adding to existing knowledge in this area. Regarding the articles in this study, we originally intended to report on five nurse-sensitive patient outcomes; however, the literature search revealed that there were only eligible studies on pressure ulcers and patient falls and one study on pain assessment. This finding is informative, because it suggests that future work should be conducted to identify relationships between work environment and outcome measures such as malnutrition and delirium. Otherwise, one may want to reconsider whether or not these patient outcomes should be used as indicators of nursing quality. For example, in the Netherlands malnutrition and delirium are part of a mandatory set of quality indicators, determined by the Health Care Inspectorate. Health care policy makers should ask whether these types of data are useful as benchmark indicators for nursing quality. Initially, we wanted to perform a quantitative metaanalysis; however, comparing study results proved to be problematic due to the lack of relevant statistical information in many of

the primary studies. For example, some articles missed clear information about sample sizes. In other articles the information on statistical analysis was incomplete (e.g., p-value or confidence interval not reported). Additionally, large differences in outcome measures compromised the possibility of conducting a meta-analysis. We consider it imperative to note these issues, because it may hinder the accumulation of knowledge about optimal nurse work environments. Based on the findings of this review, there are two overall conclusions. First, there were mixed results regarding the association between nurse staffing and the outcome measures of patient falls and pressure ulcers. Second, we found indications that specific work environment characteristics other than staffing are related to nurse-sensitive outcomes. We will discuss these findings in more detail in the following paragraphs.

Nurse staffing

Overall, regarding the structural characteristic of nurse staffing in relation to nurse-sensitive patient outcomes, we found that the studies that were labeled low quality were also the studies that were unable to show significant effects. Significance was found in studies of moderate or high quality, including the only study to report on pain, showing that patients were more satisfied with pain management if favorable staffing levels existed. Most studies were based on North American data and to prevent an underestimation of effects in other areas, it would be useful to examine nurse work environments and nursing quality in various continents (e.g., Europe, Australia). Regarding nurse staffing in relation to patient falls, most studies did not report significant effects. However, the evidence is rather consistent and shows that higher staffing numbers are associated with fewer patient falls. This finding is consistent with previous reviews (e.g., Kane et al., 2007). Most studies that found significant effects used a longitudinal cohort design (i.e., level of evidence A2 or B). The major preponderance of cross-sectional designs (level C) in this research field, with a high risk of contamination of confounders and bias makes it difficult to generate explanatory results. Randomized controlled trials would be the preferred research design, yet as mentioned by Clarke and Donaldson (2008), it is almost impossible to use these designs in the present research area, because it requires randomization of interventions that cannot be controlled. In our review, one randomized controlled trial (Wolf et al., 2008) was included; the small sample size of 58 patients could be a possible explanation for the lack of significant effects. In future research on work environment and nursing quality, longitudinal observational designs would be preferred. These types of designs allow for descriptions of trends over time and therefore provide more robust evidence on associations (Dunton et al., 2007).

For pressure ulcers, the findings indicate that there are mixed outcomes in this area. Most studies found that more favorable staffing, such as more nursing hours or higher proportions of registered nurses (RNs), is related to lower levels of pressure ulcers. However, there were a few cohort studies in the dataset that found contradictory results, in which higher staffing numbers were associated with higher levels of pressure ulcers. As a possible explanation for these counterintuitive effects, McCloskey and Diers (2005) referred to work prioritization; more emphasis on the importance of adverse events, such as pressure ulcers may have led to increased reporting on these adverse events. Furthermore, the influence of patient acuity might have played a role. It may be useful to systematically examine the possible role of this factor in future studies. According to Kramer et al. (2010), conflicting results may reflect methodological errors related to finding relationships between structure variables (e.g., staffing, skill mix) and outcomes (e.g., pressure ulcers) without including an analysis of process variables (i.e., nursing interventions) that mediate the relationship. The safest conclusion that can be drawn is that evidence on nurse staffing and pressure ulcers is inconclusive and more research is necessary.

Characteristics other than nurse staffing

Analysis of the 12 studies on characteristics of the work environment other than staffing showed significant effects for collaborative relationships, education and experience. To appreciate these findings several aspects need to be considered. We found evidence that positively appreciated nurse–physician collaboration and a more experienced and higher-educated staff were significantly associated with lower rates of pressure ulcers and fewer patient falls. Effective collaboration is already acknowledged to be an important work environment factor by the Institute of Medicine (2004). The findings of the present study support this view. Nevertheless, it was the only process characteristic that was linked to pressure ulcers and falls. This finding implicates a gap in literature concerning a lack of evidence regarding the relationship between process variables of the work environment and patient outcomes. Regarding structural nurse characteristics, our findings regarding the favorable effects of higher nursing education are consistent with ongoing insights in the relevance of this work environment factor. For example, two recently published articles showed that higher levels of nurses with (at least) a Bachelor's degree are significantly associated with lower in-hospital mortality (Aiken et al., 2014) and with lower failure to rescue, shorter length of stay, and lower decubitus ulcer rates (Blegen et al., 2013). Additionally, experience is considered to be a highly relevant factor in work performance in general performance literature as well as in studies on nurse performance. For example, it is well known that experience is associated with the accumulation

of job knowledge and automation of procedures, which allow an employee to conduct the job more effectively and efficiently (Schmidt and Hunter, 2004). This factor is also true for nurses (DeLucia et al., 2009; McCloskey and McCain, 1988). The findings of the present review confirm that nursing experience and education (structure) are influential factors and play a role in determining nursing quality (outcome), potentially through knowledge and competencies on the job (process).

Quantitative analysis

We have discussed some fundamental problems with assessing and comparing data from primary studies that prevented us from conducting an adequate quantitative meta-analysis of the literature. There is an ongoing debate regarding the robustness of quantitative meta-analyses of observational studies. Previous reviews, including Lake and Cheung (2006) and Lankshear et al. (2005) suggested that improvements in measurements and methods in this research field have not been achieved. However, in the absence of evidence from randomized controlled trials, there is growing evidence from observational studies in this research area. Meta-analyses could provide a pooled summary of effects from individual studies and highlight topics in which findings are limited (Stroup et al., 2000). Therefore, in addition to increasing the number of studies in this area, future research should also consider that individual studies may eventually be data-points for quantitative reviews and therefore should provide sufficient levels of statistical information (e.g., clear description of sample and effect sizes).

Limitations

The present review reveals the relationship between nurse work environment and nurse-sensitive patient outcomes. Nevertheless, there are several limitations that should be considered in interpreting the results. First, due to methodological issues as described in the previous paragraph, we were unable to perform a quantitative meta-analysis on the study results. Second, our aim was to analyze patient outcomes that are specifically related to nursing quality. We focused on a limited set of nursesensitive patient outcomes, whereas other outcomes were excluded (e.g., medication errors, and nosocomial infections). Nevertheless, we emphasize that the present review gives us the opportunity to draw clear conclusions on the quality of nursing care regarding the five nurse-sensitive patient outcomes. Third, although a full description of study results is provided, there were primary studies that did not report on confounding factors (e.g., patient and organizational characteristics) which may have affected patient outcomes.

CONCLUSION

In the present systematic review scientific evidence was found on the effects of nurse staffing and other characteristics of the work environment (i.e., collaborative relationships, experience, and education) on falls, pain management and pressure ulcers. These findings complement the knowledge from previous reviews on staffing in relation to patient outcomes such as mortality and length of stay, in providing evidence that more favorable work environments contribute to improved patient outcomes. Contemporary health care requires that the quality of nursing care is excellent, and therefore, understanding the relationship with nurse work environment is imperative. Our findings emphasize the need for longitudinal research with well-defined outcome measures and comparable samples of hospitals or hospital units.

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6

CHAPTER 6

HOW NURSES AND THEIR WORK ENVIRONMENT AFFECT PATIENT EXPERIENCES OF THE QUALITY OF CARE: A QUALITATIVE STUDY

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ABSTRACT

Objective: Healthcare organisations monitor patient experiences in order to evaluate and improve the quality of care. Because nurses spend a lot of time with patients, they have a major impact on patient experiences. To improve patient experiences of the quality of care, nurses need to know what factors within the nursing work environment are of influence. The main focus of this research was to comprehend the views of Dutch nurses on how their work and their work environment contribute to positive patient experiences.

Methods: A descriptive qualitative research design was used to collect data. Four focus groups were conducted, one each with 6 or 7 registered nurses in mental health care, hospital care, home care and nursing home care. A total of 26 nurses were recruited through purposeful sampling. The interviews were audiotaped, transcribed and subjected to thematic analysis.

Results: The nurses mentioned essential elements that they believe would improve patient experiences of the quality of nursing care: clinically competent nurses, collaborative working relationships, autonomous nursing practice, adequate staffing, control over nursing practice, managerial support and patient-centred culture. They also mentioned several inhibiting factors, such as cost-effectiveness policy and transparency goals for external accountability. Nurses feel pressured to increase productivity and report a high administrative workload. They stated that these factors will not improve patient experiences of the quality of nursing care.

Conclusions: According to participants, a diverse range of elements affect patient experiences of the quality of nursing care. They believe that incorporating these elements into daily nursing practice would result in more positive patient experiences. However, nurses work in a healthcare context in which they have to reconcile cost-efficiency and accountability with their desire to provide nursing care that is based on patient needs and preferences, and they experience a conflict between these two approaches. Nurses must gain autonomy over their own practice in order to improve patient experiences.

Keywords: Patient experiences, Quality improvement, Nurses, Nursing work environment

BACKGROUND

In countries throughout the world, patient experiences are being monitored in order to obtain information about the delivery and quality of healthcare (World Health Organization, 2000). Patient experiences can be defined as a reflection of what actually happened during the care process and therefore provide information about the performance of healthcare workers (Jenkinson, Coulter, Bruster, Richards, & Chandola, 2002); it refers to the process of care provision (Suhonen et al., 2012). In the United States (Giordan, Elliott, Goldstein, Lehrman, & Spencer, 2010) and many European countries (Delnoij, 2009), assessing patient experiences is part of a systematic survey programme. In the Netherlands, the government has implemented a national performance framework for comparing the quality of healthcare. This framework contains a set of quality indicators that include patient experiences. The Consumer Quality Index (CQI) is used as the measurement standard (Framework for quality indicators).

Assessing patient experiences of the quality of care not only provides information about the actual experiences, but also reveals which quality aspects patients regard as most important (Rademakers, Delnoij, & De Boer, 2011). Many studies have been performed to analyse what patients consider essential within healthcare (Damman, Hendriks, & Sixma, 2009; Bridges, Flatley, & Meyer, 2010; Attree, 2001). For example, a study by the Picker Institute Europe revealed eight general quality aspects:

1. Involvement in decisions and respect for preferences
2. Clear, comprehensible information and support for self-care
3. Emotional support, empathy and respect
4. Fast access to reliable health advice
5. Effective treatment
6. Attention to physical and environmental needs
7. Involvement of, and support for, family and carers
8. Continuity of care and smooth transitions

The quality aspects are mostly reflected in questionnaires used to monitor patient experiences, such as the CQI (Zuiddijk, 2011) or the Consumer Assessment of Healthcare Providers and Systems (CAHPS) (Giordano et al., 2010). Patients are asked which aspects in receiving care are of importance and about their actual experiences (Triemstra, Winters, Kool, & Wiegers, 2010).

Patient experiences have been identified as an indicator for evaluating and improving the quality of care (Suhonen et al., 2012; Mainz, 2003). When healthcare organisations assess patient experiences, professionals can use the results for internal quality improvements. Professionals use patient experiences and preferences to adjust their own practice and to make visible their contribution to

patient outcomes (Hendriks, Spreeuwenberg, Rademakers, Delnoij, 2009). Because nurses spend a lot of time with patients (Westbrook, Duffield, Li, & Creswick, 2011), they affect patient experiences of care (Teng, Hsia, & Chou, 2010). Research has shown that the nursing work environment is a determining factor.

It seems that when patients have positive experiences of nursing care, nurses also experience a good and healthy work environment (Kutney-Lee, et al., 2009; McHugh, Kutney-Lee, Cimiotti, Sloane, Aiken, 2011; Aiken et al., 2012). A healthy work environment can be defined as a work setting in which nurses are able to both achieve the goals of the organisation and derive personal satisfaction from their work (Disch, 2002). A healthy work environment fosters a climate which nurses are challenged to use their expertise, skills and clinical knowledge. Furthermore, nurses who work in such an environment are encouraged to provide patients with excellent nursing care (Disch, 2002). Research by Kramer and Schmalenberg (2002) revealed that several aspects are related to the work environment. The researchers used grounded theory to identify eight 'essentials of magnetism' that define the nursing work environment and influence the quality of nursing care. From the perspective of nurses, the following eight 'essentials' are crucial in a work environment to the provision of high quality nursing care (Kramer & Schmalenberg, 2002):

- Clinically competent nurses
- Adequate staffing
- Good nurse–physician relationships
- Autonomous nursing practice
- Nurse manager support
- Control over nursing practice
- Support for education
- A culture that values concern for patients

Relation between nursing work environment and patient experiences of the quality of care

The American Nurses Credentialing Center (ANCC) started the Magnet Recognition Program in the early 1990s. This programme was built upon the study carried out in 1983 by McClure et al. (McClure, Poulin, Sovie, 2002). It is focused on improving patient care, patient safety and patient experiences by creating a good and healthy work environment for nurses. Research has shown that patient experiences in healthy work environments are significantly better (Aiken, Sloane, Lake, Sochalski, Weber, 1999; Aiken, 2002; Gardner, Thomas-Hawkins, Fogg, Latham; 2007). The relationship between the nursing work environment and patient experiences

was also investigated in a cross-sectional study carried out in 430 hospitals by (Kutney-Lee et al., 2009). The researchers used data on patient experiences from the national CAHPS survey. The nursing work environment was measured with the PES-NWI tool, which includes items on nursing leadership and nurse–physician relationships. Data on 20,984 staff nurses were used in the study. The nursing work environment had significant relations with all ten CAHPS measures, indicating that the quality of the work environment has an influence on patient experiences of the quality of care. This finding corresponds with the cross-sectional study by (McHugh et al., 2011) in which 428 hospitals and 95,499 registered nurses participated. The researchers used data from the PES-NWI and the CAHPS. They concluded that nurses' dissatisfaction with their work environment was associated with a significantly lower quality of patient experiences. In the RN4Cast project (Aiken et al., 2012), 61,168 hospital nurses and more than 131,000 patients in Europe and the United States were questioned in a cross-sectional survey. The aim of this immense study was to determine whether the nursing work environment affected patient care. The PES-NWI was used to measure the nurses' perceptions of their work environment. Patients' overall satisfaction was measured with the national CAHPS survey. The perceptions of nurses and those of patients were found to be consistent, indicating that both patients and nurses had more positive experiences in hospitals with better work environments.

Although there is a relationship between the nursing work environment and patient experiences of the quality of care, it is not clear how this relationship is formed and characterised from the perspective of Dutch nurses, and which aspects in daily practice influence patient experiences. Could these aspects somehow be linked to the 'essentials of magnetism'? Little is known about the underlying mechanisms and how these result in better patient experiences. In 2006, the Dutch government started to move towards a healthcare model of responsible consumer choice and care services competition (Enthoven & Van de Ven, 2007). Because of this entrepreneurial approach, healthcare organisations transformed their policy towards a cost-efficiency and productive care system (e.g. a shorter length of stay per patient) (Helderman, Schut, Van der Grinten, & Van de Ven, 2005). Furthermore, today's patients tend to suffer from multiple disorders or illnesses, which results in a higher complexity of care and an increased nursing workload. The increasing complexity of patient care requires well-trained nurses who are capable of creating a safe and patient-centred environment (Velden, Francke, & Batenburg, 2011). In 2011, the Netherlands Institute for Health Services Research conducted a literature study to investigate the roles and positions of nurses in Belgium, Germany, the United Kingdom, the United States and Canada, and found

differences in levels of education and nursing job profile or job description in all five countries (Mitstiaen, Kroezen, Triemstra, & Francke, 2011).
Given the circumstances and changes with which Dutch nurses are confronted, it is important and relevant to examine and comprehend their views on how their work and work environment contribute to positive patient experiences.

METHODS

Aim of study

The aim of this study was to understand from the perspective of nurses how the nursing work environment is related to positive patient experiences.

Research question

The central research question was: According to nurses, which elements of their work and work environment influence patient experiences of the quality of nursing care?

The sub-questions were:

- Are these elements related to the eight essentials of magnetism?
- What is the mechanism by which these elements lead to better patient experiences?

Research design

A phenomenological approach was applied to explore areas about which little is known or to gain an understanding of specific areas. Phenomenology is the study of subjective experience, feelings and behaviours of people (Holloway & Wheeler, 2002; Creswell, 2003).

Sample size, composition and data collection

To gain a deeper understanding of the influence of the nursing work environment on patient experiences, we conducted four focus groups. The purpose was to elicit ideas, thoughts and perceptions from nurses (Holloway & Wheeler, 2002) about patient experiences and how nurses can improve those experiences. We recruited participants by purposeful sampling, using the following criteria:

- Participants must be employed as registered nurses or certified nursing assistants.
- Participants must have worked as nurses for at least two years.
- Participants must be operative in mental health care, hospital care, home care or nursing home care.

Nurses are active in various settings and every setting has its specific dynamics. By

gaining insight into their perspectives, we were able to compare possibly different views. In addition, we obtained an overall view of the total healthcare system. The organisations we recruited are participating in a Dutch programme called Excellent Care. The programme is based on the eight essentials of magnetism and focuses on creating a dynamic, inspiring and innovative nursing work environment in order to improve the quality of care. We asked the programme director of each organisation to recruit nurses for the focus groups. A total of 26 registered nurses participated.

TABLE 1 Toplist

Questions	Topics
Which elements in daily nursing practice influence patient experiences?	Clinically competent nurses
In what way do nurses effect experiences of patients?	Adequate staffing
What are inhibiting or facilitating factors?	Nurse-physician relationship Autonomous nursing practice Nurse manager support Control over nursing practice Support for education A culture that values concern for patients

Each focus group consisted of 6 or 7 registered nurses in mental health care, hospital care, home care and nursing home care, respectively. The nurses described their perceptions and views with respect to their own areas of expertise. Each focus group discussion was led by two researchers.
One researcher facilitated the interview, and the other had an observing role and monitored the process. After each focus group, the researchers evaluated and critically reflected on the process in order to examine the quality of the meetings. This investigator triangulation allowed the dissection of possibly different views. The researchers used an interview guide with predefined topic areas (Table 1, topic list). The sequencing of questions depended on the process of the group and the responses of the informants.

Each focus group lasted two hours. The researchers explained the procedures and introduced the topic to be debated. When the informants were discussing certain topics, the researchers applied a non-directive approach because of the dynamics of the group and the different perspectives that were being examined. When certain views were polarised, the researcher stimulated the discussion by introducing a new question or topic. All conversations were digitally recorded and then transcribed to improve transferability.

Ethical considerations

This was a qualitative study in competent subjects without any intervention. It did not involve any form of invasion of the participant's integrity, and in such cases no approval by an ethics committee is required in the Netherlands (according to the Medical Research Involving Human Subjects Act; see ccmo-online.nl). All respondents received written and verbal information about the aim and content of the study. Study participation was voluntary. Data were analysed in an anonymous way and the results were non-traceable to individual participants.

Data analysis

The transcribed data were open coded and categorised. Several themes were extracted by organising and structuring the categories. During the analytical process, interview fragments were constantly compared. The literally transcribed interviews were reviewed several times to check whether elements might have been overlooked. The final analysis was presented to the participants and they were asked to comment on the contents. This member check helped to determine whether we had adequately understood and interpreted the data. The analytical procedure and findings were discussed within the research team to improve the quality of analysis. MaxQDA software was used to support the coding ordering analyses.

TABLE 2 Demographics of the participants

Focus group	Age (mean)	Gender	Length of nursing experience (mean)
Hospital care	34 years	3 male, 3 female	13 years
Mental health care	36 years	2 male, 4 female	16 years
Nursing home care	51 years	8 female	19 years
Home care	46 years	6 female	22 years

RESULTS

The sample consisted of 26 registered nurses (6 male and 20 female nurses). The mean age of the participants and the mean length of nursing experience varied per focus group, as shown in Table 2 below. Participants formulated several facilitating elements that they consider fundamental to improving patient experiences of the quality of care. They also mentioned such inhibiting factors as cost-effectiveness and transparency and accountability goals. These factors prevent them from improving patient experiences (Table 3). Both facilitating elements and inhibiting factors are elaborated below.

Facilitating elements

Clinically competent nurses Participants stated that in order to act in a professional manner, nurses need to have certain competencies, namely social skills, expertise & experience, and priority setting.

Social skills

Participants stated that social skills are an important competency to create a trustful care relationship. They indicated correct behaviour and attitude, composure, making time for patients, and listening and having empathy as essential nursing competencies. According to participants, these social skills convey a sense of commitment to the patient and play a major role in meeting patient expectations.

Nurses must have the ability to develop and maintain good relationships with patients. For patients, nursing care is about being heard and seen. Knowing that you're in safe hands. You allay their fear and uncertainty. You give patients confidence and hope in return. You offer them several options from which they can choose. Someone who is dependent, and does not know what will happen, is more suspicious and anxious. (Respondent 21, hospital focus group)

Expertise & experience

Participants mentioned three key aspects related to expertise, namely knowledge, technical skills and communicative capabilities. According to participants, the first key aspect means that nurses must have substantive knowledge related to the nursing profession. They indicated that nurses should maintain and follow both existing developments and new insights. According to participants, nurses must continually invest in nursing knowledge and education. In their view, nurses ought to offer state-of-the-art interventions or activities that are in line with the agreed nursing policy.

TABLE 3 Facilitating and inhibiting elements

Facilitating elements	Inhibiting factors
Clinically competent nurses	Cost-effectiveness policy
Collaborative working relationships	Transparency and
Autonomous nursing practice	accountability goals
Adequate staffing	
Control over nursing practice	
Managerial support	
Patient-centred care	

As a second key aspect related to expertise, participants indicated that nurses must have technical skills in order to provide effective and safe care. The third aspect mentioned by participants is that nurses must have communicative capabilities. Participants said that nurses serve as spokespersons for patients who are often in vulnerable positions. They stated that nurses are easily accessible and can act as a link between the patient and other professions. According to participants, nurses can use the right substantive arguments on behalf of a patient's interests or needs. Participants mentioned that this expertise is important for patients because it is related to the quality of care.

If you can answer a care-related question, it gives the patient a certain peace of mind. It signals: she knows what she's talking about. I notice that patients really appreciate it when I share knowledge and offer them information that at the time they don't yet have. Only then can patients make decisions about their own care. (Respondent 15, nursing home focus group)

In addition to substantive expertise, participants stated that nursing experience is also of influence. According to them, a junior nurse has too little experience to respond creatively to sometimes complex care situations. However, according to participants, junior and senior nurses can learn from each other: they should work as a team and collectively pursue their common objectives. In their view, experience is gained through practice. According to participants, this can be characterised as 'expertise'.

When you suspect someone is contemplating suicide, you need to know how serious this is. Is it just a cry of "I'm not feeling well" or are these serious thoughts? Has the patient already made plans, does the patient have a death wish, or is it an impulsive thought? In that sense you need to reflect on the signals very carefully. You can only learn this from practice. (Respondent 1, mental health care focus group)

Priority setting

As stated by participants, various activities can occur simultaneously during the daily care of patients. According to them, nurses should assess what care is needed and then flexibly coordinate diverse actions with each other. In the view of participants, prioritisation is about the organisation of nursing care. Patients need nurses who have clinical experience in order to coordinate care. Nurses must decide what choices to make, what is urgent and what is important. Those choices influence patient experiences.

Prioritisation is very important. It means that you have to coordinate the daily care

and decide which activities have priority. Patients sometimes have to wait for help. If you're in a hasty mood, you transmit that feeling to patients. It shows immediately. The restlessness affects the other patients. (Respondent 18, nursing home focus group)

Participants said that patients sometimes have to wait before they are taken care of, or that nurses are not immediately available to answer questions or deal with problems. According to participants, patients do not always obtain the right and needed care, especially when the nurses' workload is high.

Collaborative working relationships

According to participants, it is important to develop and maintain collaborative working relationships with professionals, including those in their own field. In the view of participants, collaborative working relationships exist when all the involved professionals interact and operate in a complementary manner, and show mutual respect that is based on knowledge and expertise. Participants stated that all professionals need to discuss and influence patient care on the basis of their own expertise. Participants believe that problems will be solved sooner when ideas and thoughts are exchanged. In their view, it is about sharing information and communication. As stated by participants, communication and aligning with each other is needed so that no conflicting information is given and uniformity in care or treatment is provided. This generates, according to the participants, composure and clarity towards patients.

Participants believe that collaboration and communication affect how patients experience the quality and effectiveness of care.

We have a patient who is very compulsive. We made agreements about how to approach and handle this patient. We continually need to communicate with each other, physicians, psychologists, nurses. Clear communication is so important, and I miss that sometimes. When you have good relationships it is easier to review and discuss the treatment administered. It will not only increase your knowledge, but also be helpful in the communication with the patient and his family. It's easier to explain why the specific treatment is being deployed. (Respondent 5, mental health care focus group)

Autonomous nursing practice

Participants in all four focus groups stated that the scope of practice for which they are accountable influences patient experiences. The scope of practice, according to them, means that nurses can control their own work related to patient care and can make independent decisions about patient outcomes based on clinical judgements. Participants therefore believe it is essential to monitor and measure

outcomes, as long as the monitoring is directly related to patient care. However, participants indicated that they did not have insight into care results obtained from assessments.

We participate in an annual national prevalence survey. We have to fill out a lot of forms. It's an administrative burden and takes a lot of time – time we can't spend on patient care. We get a pile of papers, screen patients and register them. It doesn't contribute to the quality of care because we never get any feedback. And what does one measurement tell us? It doesn't inform us whether we are doing well or not. I do not believe that. (Respondent 12, home care focus group)

According to participants, there is no policy to improve patient experiences on the basis of the information derived from assessments. Participants could not indicate whether the interventions deployed are actually leading to desired nursing care results, including patient experiences. Participants feel they have insufficient autonomy to influence this process.

Adequate staffing

Participants stated that the number of nurses available influences how patients experience the quality of care. Although they could not indicate what number they consider sufficient, they think that a sufficient nurse staffing level is linked to team composition or staff mix. For instance, participants indicated the proportion of registered nurses to student nurses, or the number of different nurse qualification levels in one team. Participants stated that several tasks and assignments have been transferred to nurses with a lower qualification in order to work as efficiently as possible and to achieve higher productivity. As a result, participants believe that nursing care is, in general, increasingly developing in the direction of task-centred care in which different working methods are applied. According to them, this affects patient experiences of the quality and effectiveness of nursing care.

Nurses provide care within certain theoretical frameworks that are designed to increase the selfreliance and self-management of the patient. Nurse assistants have a more practical focus and take over patient care at a point when they should not. These two ways of working are confusing for patients. And we think 'How come the patient is made to feel so nervous?' and afterwards we notice two contradictory ways of working. (Respondent 3, mental health care focus group)

As stated by participants, a sufficient nurse staffing level determines whether patient wishes and needs are met. According to participants, an insufficient deployment of

nursing staff has a direct negative impact on patient experience.

I work alone in a group. For example, when I'm in the bathroom with a patient, the other patients are alone. So I have to keep my eyes and ears open and must respond to what occurs. And that is not always easy. I constantly think: I must check if everything is all right. Because I'm responsible for the other patients. I always leave the bathroom door partly open, so I can see and listen to what is going on in the living room. I provide patient care too hastily. My patients obviously feel that. (Respondent 17, nursing home focus group)

Control over nursing practice

The participants stated that control over nursing practice means that nurses are involved in nursing policy or nursing issues. In their view, nurses are not always in charge and cannot always make their own decisions about nursing issues. Participants feel that this affects the quality of nursing care.

In the past, I always made my own schedule. Now we have planners and they don't have any experience with care. Efficient planning is more important than patient-centred planning. It doesn't matter whether it suits the patient. The patient should be scheduled later if it fits better in the planned route. (Respondent 9, home care focus group)

The participants stated that if nurses were more involved in the development of nursing policies, this would have a positive influence on patient care. According to them, they would be able to reflect upon and discuss nursing issues related to the quality of patient care, which would improve the quality of care.

Managerial support

Participants indicated that a manager should pay attention to the team spirit and unity. In their view, a manager must be able to handle conflicts, and also be visible and approachable. Participants said that they believe that a manager should ask the opinion of nurses; therefore, in their opinion, regular contact is important. A manager, according to the participants, must be able to create the right conditions and have the logistical ability to ensure continuity of care. In their view, this means arranging sufficient personnel, replacement staff and succession planning. Participants find that managers critically examine the deployment of personnel. According to them, the nursing staff mix has drifted towards a model whereby highereducated nurses are replaced with lower-educated ones. They noted that management is tied to a system that is dominated by controlling costs. Thus in their view, nurses may want to provide a patient with a specific form of care, while management limits care to a maximum number of minutes based on budgetary

considerations. According to participants, nurses regularly experience a tension with management in shaping care that meets patient expectations.

We want to provide certain care, but that's at the expense of something else. If we do one thing, we can't do another. For instance, we plan 30 minutes for patient care. When a patient wants to go outside for a walk, this will cost him 10 minutes of this total time. So we really have to negotiate with the patient or his family. This leads, of course, to lots of misunderstandings. I understand that feeling. (Respondent 13, nursing home focus group)

Patient-centred care

According to participants, the focus of nurses is the provision of patient-centred care. They define this as nursing care that is focussed on patient needs and preferences and is intended to increase patient self-management and encourage improved health and recovery.

As participants stated, nurses are the first points of contact for patients. In the participants' view, they are often with the patient for 24 hours/7 days a week (except for home care) and gather large amounts of information about them. They think that direct contact with patients is crucial to building and maintaining a relationship of trust. The participants believe that high quality nursing care is achieved when patients feel heard and understood, consider themselves to be in safe hands and know that their care problems have been noticed. This, according to the participants, results in positive patient experiences.

We listen to the patient and talk to him. We immerse ourselves in his background. What is important, how he copes and handles care problems. Based on this knowledge, we present the patient with a number of options so that he can decide upon a solution for his care problems. (Respondent 8, home care focus group)

Inhibiting factors

The participants talked about two inhibiting factors that prevent them from improving patient experiences: cost-effectiveness and transparency & accountability goals.

Cost-effectiveness

Participants stated that organisation policy is focused on the efficient and effective deployment of people and resources. They mentioned the transfer of tasks to less well qualified nurses in order to work as efficiently as possible and to achieve higher productivity. In their view, care is more and more standardised. At the same time, they noted that care has become increasingly complex. According to them, patients

are generally older and have multiple age-related comorbidities. The participants experience an increasing workload and work-associated pressure.

In recent years, patient turnover has increased. It means that patients are discharged quicker. As soon as they recover, they're sent home. However, patients sometimes also have chronic disorders. I sometimes think it is irresponsible [to send these patients home so quickly]. Patients get less attention because the work pressure is high. (Respondent 22, hospital focus group)

Transparency & accountability goals

Participants reported an increasing administrative workload to account for the quality and costs of care.

So many forms. Entering the data means a double administrative workload. We use different programs. We first have to register in program X. Then we have to register our measurements and enter all kinds of codes in another program. Log in and log out. The registrations and coding are needed for the government and health insurers. It is not always patient related and does not inform us about the health status of patients. (Respondent 23, hospital focus group)

The administrative workload is, according to participants, out of balance. They said that this means that monitoring and registration is aimed not at improving nursing care, but at serving an external accountability goal to inform health insurers and the government. The participants stated that they have little autonomy to change this policy. According to them, monitoring care results should help nurses to improve their own practice. For them, it means that nurses can reflect upon and discuss nursing issues related to quality of patient care, including the results of patient experiences.

DISCUSSION

We interviewed 26 nurses working in various Dutch healthcare settings in order to ascertain their views on how their work and their work environment contribute to positive patient experiences. Using an open approach, we obtained insights into their perceptions and noted what they said. Participants stated that a diverse range of elements are essential to providing high-quality nursing care. When these elements are incorporated into daily nursing practice, the participants expect it will result in more positive patient experiences of nursing care. The elements are: clinically competent nurses, collaborative relationships, autonomous nursing practice, adequate staffing, control over nursing practice, managerial support and patient-centred care.

One of the sub-questions was whether the identified elements are related to the eight essentials of magnetism defined by Kramer and Schmalenberg (2002). We found that they are. The essential of magnetism 'nurse–physician relationships' is, in our opinion, not totally applicable in a modern healthcare system. Although physicians are represented in all settings, also other professionals, such as psychologists, social workers or physical therapists, are part of a healthcare team. The participants stated that a good relationship must be based on collaboration and clear communication not only with physicians, but with all involved healthcare workers. The participants stated that patient wellbeing must be the common aim of all the involved professionals and that communication and collaboration must support this shared goal. We therefore replaced 'nurse–physician relationships' with 'collaborative working relationships'.

Competing policies in the nursing setting

The other sub-question concerned mechanisms by which these elements lead to better patient experiences. By analysing the data it became clear that nurses operate in a complex healthcare context. These different views control the manner in which nurses can practise their profession. We noticed that nurses are confronted with organisation policies that are focussed on cost-efficiency, transparency and accountability goals. According to participants, this has led to a more productive care system. It also became clear that nurses flourish within a patient-centred care system. Such a system supports individual patients in their need to make decisions and participate in their own care. This means that organisations should facilitate a culture where nurses can professionally support patients by practising high-quality nursing care (Shaller, 2007). Each view is defendable on its own, but collectively they contradict each other. The context in which nurses work is almost paradoxical: they have to offer patient-centred care in a standardised and productive care system. In the Dutch context, healthcare insurers, the government and healthcare providers are responsible and accountable for providing good quality care. However, these parties have different foci. Each year, healthcare insurers make agreements with healthcare providers about which care will be delivered. These agreements are defined in a healthcare procurement contract (Helderman et al., 2005). Individuals who legally live in the Netherlands are obliged to take out individual health insurance (Enthoven & van de Ven, 2007). In order to make well-considered choices, individuals need to be informed about the quality of care provided by healthcare workers. Healthcare insurers are therefore driven by accountability goals, because they need to determine whether healthcare organisations or professionals meet the minimum standard of performance, as

agreed upon in the healthcare procurement contract (Tawfik-Shukor, Klazinga, & Arah, 2007). The government is the supervisory authority that ensures the proper functioning of the healthcare system and is therefore responsible for the transparency process (Ara, Klazinga, Delnoij, Ten Asbroek, & Custers, 2003). In the Netherlands, a national performance framework for comparing the quality of healthcare is implemented under the supervision of the government (Ten Asbroek, 2004). This framework contains a set of quality indicators and related measures, including patient experiences (Lauriks, Buster, De wit, Arah, & Klazinga, 2004). Healthcare insurers and the government collect data for external accountability goals (Delnoij, Rademakers, Groenewegen, 2010). Healthcare providers and professionals themselves are also responsible for the quality of care. Their aim is more internally driven, namely to improve the quality of care and to make visible their contribution to patient outcomes (Zuidgeest, Delnoij, Luijkx, De Boer, & Westert, 2012; Zuidgeest, Strating, Luijkx, Westert, & Delnoij, 2012). However, our research showed that nurses do not receive feedback on their scores and they are not aware that they could – and even should – use these data to monitor and improve the quality of their work.

It could be argued that the dominance of cost-effective policy and transparency determines the manner in which nurses can practise their profession and that this influences patient experiences of care. Ancarani et al. (2009) showed that patient satisfaction was negatively associated with management-controlled wards that are under pressure to produce. Open, collaborative, innovative wards and wards that are focused on the welfare and involvement of nurses and that provide supervisory support and training were positively associated with patient satisfaction. This confirms that the environment in which nurses operate influences patient experiences of the quality of care. This corresponds with the findings of our research, in which participants stated that the dominance of policies focussed on cost-effectiveness and transparency lead to more pressure to produce and a high administrative workload. The participants feel that they have insufficient autonomy to influence this policy.

Strong nursing practice

To incorporate the identified elements into nursing practice, cost-effectiveness, transparency and patient-centred care policy need to be connected. For example, the registration and monitoring of outcomes should be used not only to quantify achievements against transparency goals, but also for overall nursing quality improvement. Nurses should be able to decide which issues are of importance to improve patient care.

Connecting the different policies requires the participation and commitment of both nurses and nursing management. Nurses need to be challenged to shape

their own environment and create a strong nursing practice (Mensik, Martin, Scott, & Horton, 2011) which will result in more positive patient experiences (Donahue, Piazza, Griffin, Dykes, & Fitspatrick, 2011).

Limitations of this study

We conducted four focus groups, one each with nurses in mental health care, hospital care, home care and nursing home care. Although we gained a broader insight into the perspectives of nurses, every sector has its specific dynamics and context. Therefore, one focus group per sector might have been insufficient. However, we reached data saturation as new information did not appear and similar themes emerged within the focus groups. This study was limited to nurses, but to fully understand the nuances of this relation, it might be interesting to analyse patients' views.

CONCLUSION

The knowledge obtained from this research has resulted in a better understanding of how nurses regard their role in achieving positive patient experiences. From the viewpoint of the interviewed nurses, several elements are essential in relation to patient experiences of the quality of nursing care: clinically competent nurses, collaborative working relationships, autonomous nursing practice, adequate staffing, control over nursing practice, managerial support and patient-centred culture. These elements correspond to the eight 'essentials of magnetism'. If these elements are incorporated into the nursing practice, it will most likely result in more positive patient experiences of nursing care. This research revealed several factors that nurses find inhibiting when it comes to improving patient experiences of the quality of nursing care. Current nursing policy is heavily focussed on cost-effectiveness and transparency for external accountability, which creates a high administrative workload and pressure to increase productivity. However, despite all the registrations that take place for external accountability, the participating nurses stated that they do not monitor care results to improve their own practice. They felt they insufficient autonomy to influence this. They believe it is important to reflect upon and discuss nursing issues related to the quality of patient care, including patient experiences.

Recommendation

Further research is recommended to examine whether the elements of a healthy work environment are statistically related to patient experiences in the Dutch healthcare setting. In the Netherlands, patient experiences are measured with the Consumer Quality Index (CQI) [6]. Nurses' perceptions of their work environment are measured using the Essentials of Magnetism Tool II (EOMII) questionnaire

(De Brouwer, Kaljouw, Kramer, Schmalenberg, & Van Achterberg, 2014). Further research should focus on the statistical relations between CQI and EOMII.

Abbreviations

ANCC: American Nurses Credentialing Center; PES-NWI: Practice environment scale of the nursing work index; EOMII: Essential of magnetism tool II; CQI: Consumer quality index; CAHPS: Consumer assessment of healthcare providers and systems.

Competing interests

The authors declare that they have no competing interests.

Authors' contributions

RK participated in the design of the study, conducted the focus groups and analyses, and drafted the manuscript. BdB participated in the data collection (two focus groups) and revised the manuscript. DD participated in formulating the research questions, designing the study, and collecting and analysing the data (two focus groups), and helped to draft the manuscript. ALF participated in the design of the study and helped to draft the manuscript. All authors read and approved the final manuscript.

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7

CHAPTER 7

THE ASSOCIATION BETWEEN THE NURSING PRACTICE ENVIRONMENT, NURSING CARE LEFT UNDONE AND NURSE PERCEIVED QUALITY OF CARE: CROSS-SECTIONAL CORRELATIONAL SURVEY DESIGN

Submitted

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ABSTRACT

Purpose: The purpose is to gain further understanding of the structure – process – outcome path from nursing practice environment to nursing sensitive patient outcomes, by exploring which structural elements of the nursing practice environment affect nursing sensitive outcomes, while taking the process element of care that is left undone into account.

Design: Cross-sectional correlational survey design. Nurses working in 110 nursing units of four general hospitals situated at seven locations in The Netherlands, who were employed for more than six months, with training varying from associate to bachelor degree, were invited to complete a questionnaire (N=3422).

Methods: Nurses were the unit of analysis. Key variables of the study were the nursing practice environment with the Dutch Essentials of Magnetism (structure), nursing care left undone (process), and three nursing sensitive outcomes (nurse-perceived patient safety, overall quality of nursing care on nursing unit, and incidents). Multiple linear multilevel models were conducted to test hypotheses amplified with correlational analyses.

Findings: 1910 nurses (55.8%) of 105 units (95.5%) participated in this study. The nursing practice environment as perceived by nurses is associated with nursing sensitive outcomes (explained variances: patient safety=15%, overall quality of care=16%, mean perceived incidents rate=1%). Nursing care left undone is associated with nursing sensitive outcomes, however, the amount of care that was left undone only explains 2% of the variance in patient safety and the perceived incidents rate, and 5% of the variance in the overall quality. The association between nursing practice environment and nursing sensitive outcomes is only slightly mediated by the extent to which nursing care is left undone as perceived by nurses (explained variance ranges from 2% to 5%). Professional characteristics slightly moderate the association between the nursing practice environment, nursing care left undone and nursing sensitive outcomes.

Conclusions: Nurse staffing is an important element of the nursing practice environment, however merely focusing on staffing maybe not enough to improve quality and safety of patient care. To be able to attract and retain nurses other structural elements should be in place, such as a patient centered culture, collaborative nurse-physician relationships, and nurse manager support.

Clinical relevance Merely focusing on staffing maybe not enough to improve quality and safety of patient care and therefore attract and retain nurses

Key words: Hospital Care, Hypotheses Testing, Care left undone, Nursing, Practice Environment, Quality of Care, Workforce Issues, Nurse Staffing.

CONTRIBUTION OF THE PAPER

What is already known about this topic?

- Nursing practice environments have been associated with nurse attraction and retention, nurses' job satisfaction, burnout and health at work.
- Nursing practice environments, especially the element of nurse staffing, have been associated with quality of care, nursing sensitive patient outcomes and nursing care that is left undone.

What this paper adds

- In the structure-process-outcome path, variance in nurses perceived nursing sensitive outcomes, patient safety and overall quality of care on the unit is primarily explained by the practice environment.
- Nursing care left undone only slightly mediates the association between the practice environment and nursing perceived sensitive outcomes.
- The moderating effect of the professional characteristics on the structure-process-outcome path is limited.
- Staffing and person centered culture are the PE domains that most strongly correlate with nursing sensitive outcomes.

INTRODUCTION

The nursing practice environment (PE) in hospitals has been studied extensively, showing that a good PE is positively related to nurse outcomes, organizational outcomes, and nursing sensitive patient outcomes (Aiken et al., 2014; Aiken et al., 2017; Stalpers, De Brouwer, Kaljouw, Schuurmans, 2015; Swiger, 2017; Van Bogaert et al., 2014). Nurse staffing is most often studied indicating that higher numbers of patients per nurse, and lower educational levels of nurses, are both associated with the occurrence of negative patient outcomes (Aiken et al., 2011, 2014, 2017; Cho et al., 2015; Van den Heede et al., 2009). Furthermore, nurse staffing has been related to nursing care that has been left undone (Ausserhofer et al., 2014; Kalisch, Tschannen, & Lee, 2011) which in turn is associated with increased odds of patient mortality after common surgical procedures and mediates the relationship between nurse staffing and risk of patient mortality (Ball et al., 2017). Nevertheless Recio-Saucedo et al. (2017) suggest that more research is needed to strengthen the evidence base concerning the assertion that nurse staffing levels and skill mix are associated with nursing sensitive patient outcomes and nursing care that is left undone.

Even so, increasing evidence on the relevance of the nurse-patient ratio and the educational level of nurses, has started to positively impact policy development internationally concerning safe and adequate nurse staffing (NICE, 2014; V&VN, 2016). However, there are not as many bachelor and master prepared nurses

available as needed whilst care intensity increases resulting in pressures on quality of nursing care (Aiken et al. 2013, 2014; Capaciteitsorgaan, 2016). Therefore, it is important to attract and retain well-qualified nursing staff, while also focusing on improving the quality and safety of patient care through other strategies than merely staffing. Other important factors within the nursing PE can also impact nursing sensitive outcomes, such as leadership, teamwork, educational opportunities, clinical autonomy, and culture (Dubois, 2017; Lalleman, Smid, Lagerwey, Shortridge-Baggett, & Schuurmans, 2016).

Nevertheless, Kramer et al. (2010) noted that it is difficult to relate structural elements such as the nursing PE to nursing sensitive outcomes because processes in the individual care for patients can mediate the relationship before a patient's condition deteriorates. Structure, process and outcomes are often studied separately, without considering the linkages between the components (Dubois, D'Amour, Pomey, Girard, & Brault, 2013). There is a need to further comprehend the path from structures and processes to outcomes, through which elements of the nursing PE are linked to nursing sensitive outcomes other than merely staffing. In this study, an attempt to clarify this path is made. Here, in line with Donabedian's Quality Framework (1988), nursing PE is seen as a structural element, nursing care left undone as process, and patient safety, incidents, and overall quality on the nursing unit are seen as outcomes.

BACKGROUND

Structure

Hospital structures impact the occurrence of medical errors and patient safety. Therefore, managerial strategies have emerged to establish safe structures (McHugh et al., 2013). High-reliability Organizations (HROs) are an example of organizations committed to safety at the highest level and have been on the rise in health care organizations since the last decade (Schulman, 2004). Taylor et al. (2015) determined factors fundamental to high performing hospitals: (1) Positive organizational culture, (2) Management support, (3) Effective performance monitoring, (4) Building and preserving proficient staffing, (5) Effective leadership, (6) Expertise-driven practice, and (7) Interdisciplinary collaboration. Equivalent elements are incorporated in Magnet Hospitals; hospitals with nursing PEs that are professionally and personally rewarding, were able to attract and retain well qualified nurses and delivered excellent nursing care (Bekelis, Missios, & MacKenzie, 2017; Friese, Xia, Ghaferi, Birkmeyer, & Banerjee, 2015; Kutney-Lee et al., 2015; McClure, 1983; McHugh et al., 2013).

Following the Magnet Hospital concept, an instrument was developed – Essentials of Magnetism (EOM) II© – based on the most important processes and relationships of the nursing PE, as defined by nurses working in these Magnet Hospitals

(Schmalenberg & Kramer, 2008). The EOMII uses nurses' assessment of the PE to identify elements requiring change in order to pursue excellent nursing PEs that enable organizations to retain and attract well-qualified nurses (Ausserhofer et al., 2014). Nurses' assessment of their PE has been linked to nursing sensitive outcomes (e.g. readmission rate and 30-day mortality) emphasizing the potential to use nurses' assessment to improve the PE and nursing sensitive outcomes (Hansen, Williams, & Singer, 2011).

Process

Effective nursing interventions, informed by evidence for their effects, result in positive nursing sensitive outcomes, such as patient comfort and quality of life, patient empowerment, patient safety, and improved functional status (Dubois et al., 2013). Whether nurses perform all necessary effective nursing interventions can therefore be a relevant process indicator, and possibly mediate the relationship between the nursing PE and nursing sensitive outcomes. Knowing which care processes were not delivered is essential for both rearranging how nursing care is provided and reorganizing nursing resources (Dubois et al., 2013). The term 'care left undone' will be used to refer to nursing care that is left undone, missed care, rationed care, or incomplete care.

Studies suggest that in organizations with lower rates of well qualified nurses, nursing care is more likely to be left undone (Ausserhofer et al., 2014; Ball, Murrells, Rafferty, Morrow & Griffiths, 2014), the more nursing care that is left undone, the higher the increase in number of adverse events sensitive to nursing care (Kalisch, Xie, Dabney, 2014), the lower the nurse-reported quality, and the less patients rate the hospital highly (Bruyneel et al., 2015). Care left undone may be a key mechanism through which nurse staffing has an effect on nursing sensitive patient outcomes. However, care left undone might also be a mediating factor for the effect of other elements of the nursing PE than staffing on outcomes. If essential care left undone is a mediator it might be that reports of care left undone could provide an important quality indicator of nursing related safety (Ball et al., 2017; Reci – Saucedo et al., 2017).

Outcomes

Nursing sensitive patient outcomes can be defined as "outcomes that are affected, provided, and/or influenced by nursing personnel (IOM, 2004; NQF, 2004), although nursing may not be exclusively responsible for them" (cited from Dubois et al. 2013, p. 15). In this study, the focus is on nurse reported quality of care for several reasons: (1) evaluating hospital documented nursing sensitive outcome indicators (e.g. pain, medication error, falls, infections, pressure ulcers) is not entirely reliable because of variance in initial risks and complexity of patients,

combined with a broad difference in measuring those outcomes among hospitals and units (Coleman, Smith, Nixon, Wilson, & Brown, 2016; Dealey et al., 2012; Smith, Nixon, Brown, Wilson, Coleman et al., 2016; Stalpers, Kieft, Van der Linden, Kaljouw, & Schuurmans, 2016); (2) nurses are in a good position to evaluate quality of care as they oversee patient care experience in all aspects of care (e.g. direct care giving, surveillance and monitoring of health status, emotional support for patients and families, assistance with activities of daily living, inter professional team collaboration, and patient education) 24 hours a day; (3) nurse reported quality is associated with alternative assessments of nursing sensitive outcomes (e.g. mortality, failure to rescue, and patients' experiences with care) (McHugh & Stimpfel, 2012). Thus, nurses' perceptions of quality are built on more than an isolated encounter or single process—they are developed over time through a series of interactions and direct observations of care (McHugh & Stimpfel, 2012). Therefore, nurse perceived quality of care can be used as a proxy for nursing sensitive outcomes indicators.

THE STUDY

Aims

The purpose of this study was to gain further understanding of the structure – process – outcome path from nursing PE to patient outcomes, by exploring which structural elements of the nursing PE impact nursing sensitive outcomes, while taking the process element of care that is left undone into account. Hypotheses were tested: (1) Nursing PE as perceived by nurses is associated with nursing sensitive outcomes. (2) Nursing care left undone as perceived by nurses is associated with nursing sensitive outcomes. (3) The association between nursing PE as perceived by nurses and nursing sensitive outcomes is mediated by the extent to which nursing care is left undone as perceived by nurses. (4) Professional characteristics do not moderate the association between the nursing PE as perceived by nurses, nursing care left undone as perceived by nurses and nursing sensitive outcomes. Finally, we explored which elements of the nursing PE are most strongly related to nursing sensitive outcomes.

Design

A cross-sectional correlational survey design was applied.

Participants

Nurses working in 110 nursing units of four general hospitals situated on in total seven locations in The Netherlands, who were employed for more than six months, and with training varying from associate to bachelor degree (both four years of education) were invited to complete a questionnaire via email based on

nursing lists from the human resource department (N=3422). Nurses with merely administrative tasks, nurse assistants, managers, and interns/students were excluded.

Data collection

Data were collected with an online questionnaire from September 2015 to December 2016. The first hospital started in September 2015, the second in October 2015, the third in May 2016 and the fourth in December 2016. All nurses, meeting the inclusion criteria, received an email with instruction letter explaining the purpose of the study and a link to access the questionnaire. Weekly response updates were sent to the nurse managers who stimulated nurses to complete the questionnaire. Two reminders were sent via email at two weekly intervals to all individuals.

Ethical considerations

Participation was voluntary and respondents could withdraw at any time. Approval of an ethics committee was not necessary as patient care was not affected/changed in any way and individuals were not subjected to invasive/burdensome regimes, which is in line with Dutch law (CCMO, 2011).

Variables and measurement

Key study variables were: nursing PE (structure), care left undone (process), and three nursing sensitive outcomes (nurse-perceived patient safety, nurse-perceived incidents, nurse-perceived overall quality of nursing care on nursing unit) (represented in Figure 1 in the square boxes). Control variables were organization and unit to account for potential clustering of the data.

Nursing PE was assessed using the Dutch Essentials of Magnetism II (D-EOMII) © which measures eight elements of the work environment: Collaborative nurse–physician relationships; Control over nursing practice; Nurse manager support; Perceived adequacy of staffing; working with Clinically competent peers; Support for education; a Patient centered culture; and Clinical autonomy (Schmalenberg & Kramer 2008, De Brouwer, Kaljouw, Kramer, Schmalenberg, & Van Achterberg, 2014). The D-EOMII consists of 58 items to which respondents declare various degrees of agreement on a four-point Likert scale (1=strongly disagree, 2=disagree, 3=agree, 4=strongly agree). This instrument was used as it is a valid and reliable measure for the Dutch hospital setting (De Brouwer et al., 2014, De Brouwer, Fingal, Schoonhoven, Kaljouw, & Van Achterberg, 2017). The mean scores on the eight elements of the work environment were calculated, with a high score representing favorable description of the particular attribute. An overall composite score, the professional job satisfaction, was calculated by using the sum of the mean

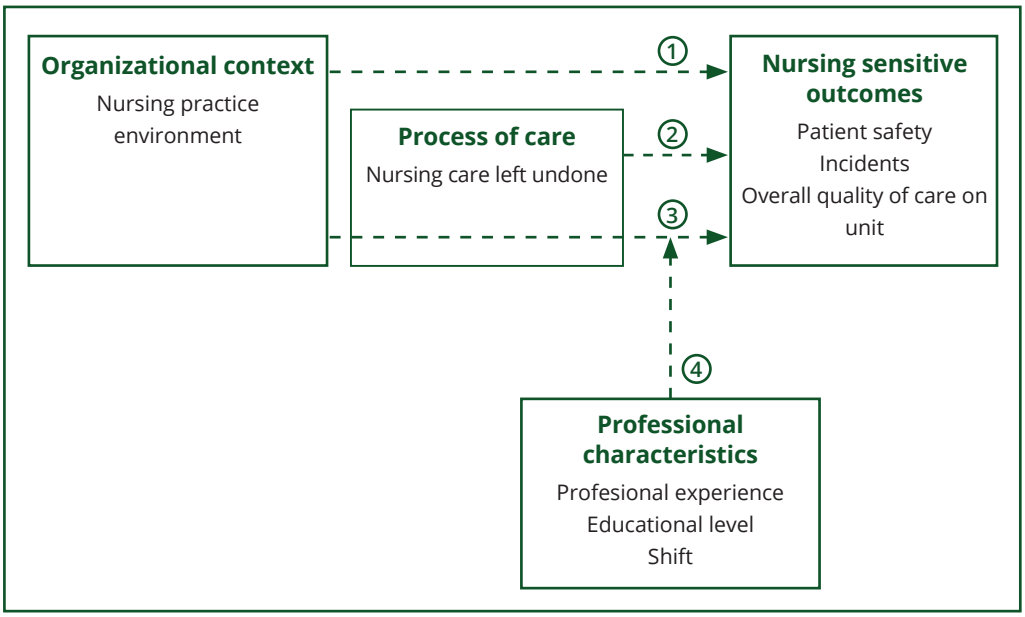

FIGURE 1 Hypotheses tested: structure, process, and outcome path (numbers in figure refer to the corresponding hypotheses)

scores on the eight elements (theoretical ranges for each element and the overall a favorable description of the particular attribute. An overall composite score, the professional job satisfaction, was calculated by using the sum of the mean scores on the eight elements (theoretical ranges for each element and the overall composite score are shown in Table 5). The overall US Magnet Hospital Mean (MHM) is used as a reference value (Schmalenberg & Kramer, 2008; Kramer et al., 2007). *Care left undone* was measured with one question where nurses had to mark which activities were necessary during their most recent shift but could not be executed due to lack of time. Activities concerned core components of nursing work and were surveyed using an existing instrument encompassing 13 nursing care activities (Schubert, Clarke, Aiken, & De Geest, 2012) on the dimensions of direct physical care and monitoring, psychosocial care, education, and planning and documenting care (Ball et al., 2014). The measure has been used widely and is considered to be an important indicator of nursing care process (Aiken et al., 2011a, 2013; Ausserhofer et al., 2014; Ball et al., 2014; Schubert et al., 2012). Two measures were computed: (1) prevalence of any care being left undone used as a binary measure (one or more activities versus no activities), and (2) amount of care left undone determined by sum score per nurse, indicating how many of the nursing care needs were left undone in the nurses' most recent shifts (varying from 0 to 13). *Incidents* were measured with seven single questions that nurses had to answer

per type of incident (medication errors in terms of the wrong medication, wrong moment or incorrect doses, pressure ulcers, falls, infections, and complaints from patients and/or their family), by indicating how often incidents occurred, using a seven-point scale (varying from 'never' to 'every day'). A mean perceived incident rate was calculated.

Patient safety was established by means of a single question (general evaluation of nurses of patient safety on the unit) with a five-point scale ('failing', 'poor', 'acceptable', 'very good' or 'excellent') administered by all nurse respondents as used in the Agency for Healthcare Research and Quality's hospital survey on patient safety culture (Sorra & Nieva, 2004). Both nurse-perceived *incidents* and *patient safety* were treated as continuous measures taking into account that based on the central limit theorem, irrespective of the distribution of the variable, its mean will have a normal distribution in a large sample.

Overall quality of care on the unit was assessed by using a valid and reliable single question (general evaluation of quality of nursing care to patients on the unit) scored on a Visual Analogue Scale ranging from 'Dangerously low' to 'Very high quality' (Schmalenberg & Kramer, 2008).

Professional characteristics were nursing education (defined as bachelor or higher degree versus lower than bachelor), professional nursing experience in years, and type of shifts worked defined as 'all shifts', 'only day shifts', 'only evening shifts', 'only night shifts', 'other types of shifts'.

Data analyses

Nurses were the unit of analysis. After data entry, data was screened for normality, outliers and missing scores. Descriptive statistics were used to describe professional characteristics, nursing PE, prevalence and amount of care left undone, and the nurses assessed patient safety, incidents rate, and overall quality (means, SDs, frequencies, and percentages). Multiple linear multilevel models were conducted using SPSS Version 22. The data was treated as multilevel data as nurses were nested in units (random factor). Nursing sensitive outcomes (patient safety, mean perceived incidents rate, and overall quality on the unit) were the dependent variables. Nursing PE, Care left undone, and Professional nursing experience were continuous independent variables (covariates). Nursing education was a dichotomous independent variable (covariates). Organization was a categorical independent variable of the organizational context (fixed factor). Type of shifts was a categorical independent variable (fixed factor).

Multiple linear multilevel models were tested to gain insight in the structure – process – outcome path by subsequently analyzing each hypothesis displayed in Table 1 (each arrow in Figure 1 is numbered corresponding with hypothesis number). Per arrow the proportion of variance for each nursing sensitive patient outcome

TABLE 1 Hypotheses

Number	Hypothesis	Hypothesis	Nursing sensitive outcomes[1]
1	The nursing PE[1] is associated with nursing sensitive outcomes.	1A	Patient safety
		1B	Mean incidents rate
		1C	Overall quality
2	Nursing care left undone[1] is associated with nursing sensitive outcomes.	2A	Patient safety
		2B	Mean incidents rate
		2C	Overall quality
3	The association between nursing PE[1] and nursing sensitive outcomes is mediated by the extent to which nursing care is left undone[1].	3A	Patient safety
		3B	Mean incidents rate
		3C	Overall quality
4	Professional characteristics do not moderate the association between the nursing PE[1], nursing care left undone[1] and nursing sensitive outcomes[1].	4A	Patient safety
		4B	Mean incidents rate
		4C	Overall quality

[1]As perceived by nurses

explained by the potential predictor was computed, resulting in 9 models (see models 1A to 3C in Table 2). The proportion of variance was determined by the pseudo R-squared based on the maximum log likelihood for the model compared to the maximum log likelihood for the baseline model. The following formula was used to calculate the pseudo R2=1-exp(- χ2/n).

Subsequently, the model fitting included testing the possible moderating effect of professional characteristics on the relationships between the three key

TABLE 2 Models tested using linear multilevel analyses

Model	Outcome variable	Covariates	Random factor	Fixed factor
1A	Patient safety	Nursing PE	Unit	Organization
1B	Mean perceived incidents rate	Nursing PE	Unit	Organization
1C	Overall quality of care on unit	Nursing PE	Unit	Organization
2A	Patient safety	Care left undone	Unit	
2B	Mean perceived incidents rate	Care left undone	Unit	
2C	Overall quality of care on unit	Care left undone	Unit	
3A	Patient safety	Nursing PE, Care left undone	Unit	Organization
3B	Mean perceived incidents rate	Nursing PE, Care left undone	Unit	Organization
4A	Patient safety	Nursing PE, Care left undone, Professional nursing experience, Nursing education	Unit	Organization, Type of shifts
4B	Mean perceived incidents rate	Nursing PE, Care left undone, Professional nursing experience, Nursing education	Unit	Organization, Type of shifts
4C	Overall quality of care on unit	Nursing PE, Care left undone, Professional nursing experience, Nursing education	Unit	Organization, Type of shift

PE = Practice environment

variables. Therefore, the proportions of variance for each nursing sensitive outcome explained by all structural and process variables in model 4 (including professional characteristics) were calculated and compared to the results of model 3 (without professional characteristics). Subsequently, to be able to test the fourth hypothesis the proportion of variance explained by each nursing sensitive outcome associated with professional characteristics was computed to analyze to what extent professional characteristics determine the variance in nursing sensitive outcomes.

Finally, to explore which elements of the nursing PE are most strongly related to nursing sensitive outcomes correlational analyses (Pearson r) were performed on the eight elements of the work environment and the nursing sensitive outcomes controlled for the hospital unit using the unit mean. The following criteria were used: correlation coefficients <0.30 indicate weak correlations, 0.30–0.50 moderate, 0.50-0.80 strong, and >0.80 very strong correlations (De Vet, Terwee, Mokkink, Knol, 2011, Nunnally & Bernstein 1994).

RESULTS

Sample characteristics

In total, 1910 nurses of four general hospitals participated in this study, resulting in an overall response rate of 55.8% (see Table 3). Out of the 110 nursing units, respondents from 105 units (95.5%) participated. Response rates of the units ranged from 35.0% to 100%.

TABLE 3 Respondents per organization

Organization	Eligible nurses	Nurses included	% response within hospital	% of total sample
1	1045	679	65.0	35.5
2	547	181	33.0	9.5
3	1230	662	53.8	34.7
4	600	388	64.7	20.3
Total	3422	1910	55.8	100

Professional characteristics

Respondents worked on the following units: surgical, non-surgical, pediatric care, maternal care, critical care, emergency care, psychiatric care, outpatient care, and same day treatment (see Table 4). In total 30.2% of the nurses have a bachelor degree in nursing. Professional experience ranges from 0.5 years to 47 years (median=19.0; IQR= 9.0 to 30.0 years). In total 92% of the respondents are females.

TABLE 4 Characteristics of nurses (N=1910) and units (N=105)

Characteristics	N	Value
Nurses	1910	
Mean years professional experience (SD)	1910	20.1 (12.04)
Gender	1910	
Female	1757	92.0%
Male	153	8.0%
Educational level	1815	
Bachelor degree in nursing or higher	577	30.2%
Lower than bachelor degree in nursing	1238	64.8%
Type of shifts worked	1910	
All shifts	1462	76.5%
Only day shifts	342	17.9%
Only evening shifts	61	3.2%
Only night shifts	13	0.7%
Other combination of shifts	32	1.7%
Unit	105	
Surgical	57	54.3%
Non-surgical	16	15.2%
Pediatric Care	7	6.7%
Maternal Care	7	6.7%
Critical Care	7	6.7%
Emergency Care	4	3.8%
Psychiatric Care	4	3.8%
Outpatient Care	2	1.9%
Same Day Treatment	1	1.0%

n = population size
SD = Standard deviation

Most respondents work all shifts (76.5%), 17.9% work only day shifts, 3.2% only evening shifts, 0.7% only night shifts, and 1.7% work other combinations of shifts. Characteristics of the nurses and units are shown in table 4.

Nursing PE

The mean score for the Nursing PE is 282.4 (SD=29.5), ranging from 130.0 to 434.4. Table 5 shows the mean reference scores of the US MHM. Scores on all essentials of magnetism are below the MHM (Schmalenberg & Kramer, 2008; Kramer et al., 2007).

Care left undone

Of all the respondents, 61.7% reported that at least 1 of the 13 care activities were left undone during their last shift, due to lack of time although those activities were necessary. On average nurses missed 27.8% of the care activities. Comfort/talk with patients (43.8%) and Develop or update nursing care plans/care pathways (42.5%) are care activities that were most frequently identified as missed. Least likely to be missed are Pain management (18.9%) and Frequent changing of patient position (19.8%).

TABLE 5 Descriptive results for key variables

Key variables	Mean	SD	MHM (SD)	Theoretical range (minimum-maximum)
Nursing PE (n=1910)	282.4	29.48	300.7 (9.17)	117-456
Collaborative nurse–physician relationships	41.64	6.25	45.18 (1.49)	14-72
Control over nursing practice	67.88	9.66	70.58 (3.92)	27-108
Nurse manager support	33.73	5.23	36.78 (7.39)	20-64
Adequacy of staffing	14.82	2.60	16.24 (2.64)	6-24
Clinically competent peers	11.02	1.37	11.97 (.46)	4-16
Support for education	10.36	1.65	11.82 (.43)	4-16
Patient centered culture	29.04	3.47	31.75 (1.04)	11-44
Clinical Autonomy	73.80	9.53	76.38 (3.09)	31-112
Care left undone (n=1815)				
Prevalence any care left undone	0.62	.49		0-1
Sum score care left undone	3.62	3.91		0-13
Mean perceived incidents rate (n=1707)	2.37	.85		1-7
Medication errors	2.70	1.22		1-7
Pressure ulcers	2.09	1.08		1-7
Falls	1.95	0.92		1-7
Urine tract infection	2.46	1.30		1-7
Sepsis	2.19	1.20		1-7
Pneumonia	2.47	1.35		1-7
Complaints	2.73	1.20		1-7
Patient safety (n=1813)	3.38	.64		1-5
Overall quality (n=1910)	6.8	1.3		0-10

SD = Standard deviation
MHM = Magnet Hospital Mean
PE = Practice environment
n = population size

Nursing sensitive outcomes

The total score on patient safety ranges from 1 to 5 and the mean score is 3.38 (SD=.64). The mean perceived incidents rate is 2.37 (SD=.85), ranging from 1.0 to 6.0. Most commonly reported incidents were complaints (mean=2.73) and medication errors (mean=2.70). Least commonly reported incidents were falls (mean=1.95). Overall quality of care on unit is on average perceived by nurses with a 6.8 (SD=1.3), ranging from 0.3 to 9.7. In total 289 (15.7%) nurses assess the quality of care on the unit with a score of 8.0 or higher, 632 (34.3%) nurses scored a 7.0 to 7.9, 573 (31.1%) nurses scored a 6.0 to 6.9, 348 (18.9%) nurses scored lower than 6.0.

Hypotheses testing

The nursing PE explains the variance in patient safety and overall quality of care as hypothesis 1A and 1C are confirmed. The nursing PE and organization together explain 15% of the variance in patient safety and 16% of the variance in the overall quality (Table 6). However, only 1% of the variance in the mean perceived incidents rate is explained by the nursing PE, which means that hypothesis 1B is rejected.

Care left undone is significantly correlated with nursing sensitive outcomes (patient safety: r=-.214, p<.0001; overall quality of care: r=-.259, p<.0001; mean perceived incidents rate: r=.164, p<.0001). The second hypothesis is rejected, however, as the multiple linear multilevel model analyses indicates that the amount of care that was left undone only explains 2% of the variance in patient safety and mean perceived incidents rate, and 5% of the variance in overall quality.

TABLE 6 Multiple linear multilevel models

Model	(2LLA)	(2LLB)	χ2	N	Pseudo r2
1A Organization and PE with Patient safety	8818.16	8531.14	287.03	1800	0.15
1B Organization and PE with Mean perceived incidents rate	3780.47	3760.52	19.95	1697	0.01
1C Organization and PE with Overall quality	5881.89	5566.56	315.33	1826	0.16
2A Care left undone with Patient safety	7222.66	7189.90	32.76	1464	0.02
2B Care left undone with Mean perceived incidents rate	3274.49	3239.86	34.63	1449	0.02
2C Care left undone with Overall quality	4912.47	4842.08	70.40	1513	0.05
3A Organization, PE and Care left undone with Patient safety	7390.32	7112.29	278.03	1501	0.17
3B Organization, PE and Care left undone with Mean perceived incidents rate	3252.71	3205.68	47.04	1437	0.03
3C Organization, PE and Care left undone with Overall quality	4845.94	4501.25	344.69	1498	0.21
4A Organization, PE, Care left undone and Professional Characteristics with Patient safety	7017.81	6742.41	275.40	1426	0.18
4B Organization, PE, Care left undone and Professional Characteristics with Mean perceived incidents rate	3068.57	2955.19	113.37	1364	0.08
4C Organization, PE, Care left undone and Professional Characteristics with Overall quality	4574.88	4221.77	353.11	1424	0.22

PE = Practice environment
n = Population size
LL= Loglikelihood

The third hypothesis is confirmed. However, the mediating effect is small as percentages of the explained variance of the nursing PE on the nursing sensitive outcomes increases by 2% (patient safety and mean perceived incidents rate) to 5% (overall quality).
The fourth hypothesis is rejected, however, the moderating effect of professional characteristic is small as the explained variance only increases 1% (patient safety and overall quality) to 5% (mean perceived incidents rate).

Correlational analyses

Correlational analyses indicate that all elements are correlated to the nursing sensitive outcomes (see Table 7). In this table, positive relationships indicate that the more positive nurses are about the element of their PE, the more positive nurses perceive the overall quality and/or safety of care on the unit. The negative correlations in table 7 indicate that the more positive nurses are about the element of their PE on the unit, the fewer incidents they observe on their unit. Out of the eight elements,

TABLE 7 Correlational analyses of the elements of the nursing PE and nursing sensitive outcomes

Elements of the nursing PE	Patient safety *r*	Mean perceived incidents rate *r*	Overall quality *r*
Collaborative nurse–physician relationships	.184	-.081	.20
Control over nursing practice	.271	-.129	.344
Nurse manager support	.324	-.110	.367
Perceived adequacy of staffing	.453	-.205	.590
Working with clinically competent peers	.266	-.157	.259
Support for education	.229	-.071	.245
Patient centered culture	.386	-.116	.460
Clinical autonomy	.284	-.100	.332

the perceived adequacy of staffing is most strongly correlated to nursing sensitive outcomes. Subsequently, patient centered culture and nurse manager support are most strongly correlated to nursing sensitive outcomes.

In addition, mean perceived incidents rate is only weakly correlated to the eight elements of the nursing PE (r ranges from -.07 to -.21). Patient safety correlates weakly to moderately with the eight elements (r ranges from .18 to .39). Nurse assessed quality of care correlates weakly to strongly with the eight elements (r ranges from .20 to .59).

DISCUSSION

The aim of this study was to gain further understanding of the structure – process – outcome (SPO) path from the nursing PE to nursing sensitive patient outcomes, by exploring which structural elements of the nursing PE impact nursing sensitive outcomes as perceived by nurses, while taking the process element of care left undone into account. Our study revealed that variance in the nursing sensitive outcomes as perceived by nurses is primarily explained by the perception of nurses on their PE, and to a much lesser extent by the process of care (perceived nursing care left undone). Structural elements of the nursing PE are mainly associated with nurses' perceived patient safety and overall quality of care on the unit, and to a considerably lesser extent with the mean perceived incidents rate. Furthermore, our study showed that perceived nursing care left undone only slightly mediates this association and that the moderating effect of the professional characteristics is limited.

This study thus confirms that structure, in terms of the nurses' perceived PE, is associated with nursing sensitive patient outcomes as perceived by nurses, as is shown in literature (Griffiths et al., 2018; Hansen, Williams, & Singer, 2011). Most studies are focused on one element of the PE: staffing. While our study also shows that perceived adequacy of staffing has the strongest correlation with perceived nursing sensitive outcomes, the other seven elements of the perceived nursing

PE also correlate with perceived nursing sensitive outcomes. This indicates that merely focusing on staffing maybe not enough to improve quality and safety of patient care. Moreover, due to nursing shortages other strategies are necessary to ascertain safe patient care. Nursing PEs should be optimally designed to include collaborative nurse-physician relationships, control over nursing practice, nurse manager support, clinical competence, support for education, clinical autonomy, and a patient centered culture are realized.

Literature also emphasizes that the more care is left undone, the higher the odds are of adverse patient outcomes (Lucero Lake, & Aiken, 2010; Schubert et al., 2008) which is not entirely supported by this study. Results of our study indicate that nursing care left undone as perceived by nurses is not an optimal indicator for nursing sensitive patient outcomes, as was suggested by other authors (Ausserhofer et al., 2014; Ball et al., 2014; Ball et al., 2016). Our results are more in line with the review of Recio-Saucedo et al. (2017) showing a modest evidence base for the link between care that was left undone and patient outcomes. Nonetheless, our findings can also be caused by the analytical approach taking clustering of data in units into account, the size and composition of our data set. Our study was based on data from 1910 nurses from 105 units in four hospitals on seven locations, which is substantial but small in comparison to the RN4Cast study in which over 26.000 nurses were included (Aiken et al., 2014). Yet the percentage of nurses with a bachelor degree as well as the gender distribution in our sample were comparable to those in earlier samples of hospital nurses in The Netherlands (Aiken et al., 2014; Heinen, et al., 2013). However, the percentages of respondents that reported that at least 1 of the 13 care activities was left undone was much lower in our sample (61.7%) in comparison with the hospital-based study of Ball et al. (2014) (86%). The care left undone sum score found in our study was the same as in Ausserhofer et al. (2014), but lower than in the study of Ball et al. (2014). Yet our sample had the largest standard deviation, which can be caused by the different types of units included in our study as compared to Ausserhofer et al. (2014), who only included adult general medical, surgical or mixed medical-surgical units. The same nursing care activities were most frequently left undone as in literature: comforting or talking with patients and developing or updating nursing care plans/ care pathways. Pain management and skin care were least likely to be missed, which is again comparable to what is reported in literature (Aiken et al., 2013; Ball et al, 2014; Ausserhofer et al., 2014). Ausserhofer et al. (2014) discuss that activities related to immediate physical needs of patients receive highest priority.

Practice implications

Research findings showed that merely focusing on staffing may not be enough to improve quality and safety of patient care and therefore attract and retain nurses.

The nursing shortage also pleads for innovative strategies to attract, captivate, and retain nurses. Results of this study strengthen literature in the importance of a patient centered culture to enable high quality patient care (Francis, 2013; Kirkup, 2015; Rafferty, Philippou, Fitzpatrick, Pike, & Ball, 2017; Stalpers et al., 2017; Walshe & Shortell, 2004). Shared beliefs, norms, values, and routines form the hospitals' culture (Kramer, Schmalenberg & Maguire, 2004; Schein, 2010). However, each unit in a hospital can have its particular subculture. And, therefore, it is a strength of our study that we accounted for clustering of the data on unit level instead of clustering on hospital level or no clustering at all, as is mostly done (Aiken et al., 2012; Ball et al., 2017; Cho et al., 2015). Rafferty et al. (2017) discusses that an optimal culture of care is only possible if nurses feel appreciated, respected and supported with good relationships with other staff, management, and other units. Our research confirms this as the cultural aspect, collaborative nurse-physician relationships and nurse manager support are all significantly correlated with the nursing sensitive outcomes. Assessing the culture of care may therefore be meaningful for hospitals, and enable them to address possible improvements.

As mentioned above, nurse manager support is another element of the nursing PE that should be well arranged in hospitals as our findings indicate. Moreover, according to Lalleman et al. (2017) the presence of nurse middle managers on the unit with the patients instead of in their offices contributes to patient centered care. Literature also shows that strong leadership is an important stimulator of adequate staffing, collaborative interdisciplinary relationships, and nursing participation in governance and policy development which positively affects nursing sensitive outcomes (Goedhart, Van Oostveen, & Vermeulen, 2017; Lalleman, Smid, Dikken, Lagerwey, & Schuurmans, 2017; Laschinger & Leiter, 2006; NICE, 2014). But also productivity, nurse attraction, retention, and job satisfaction, are all affected by the support of nurse managers. Nurses see leadership behaviors as more supportive than managerial behaviors (Ducharme, Bernhardt, Padula, Adams, 2017).

It is, furthermore, recommended that when hospitals want to improve the nursing sensitive outcomes and therefore assess the organizational context, also professional characteristics are taken into account. Dubois et al. (2013) explained that factors such as workload, scheduling, employment status reflect the ability to create conditions that may attract nurses and ensure their stability in the workforce. This can indicate that, for instance, the employment status and schedule of the nurses should also be included in the measurement.

Research implications

Further research on the impact of care left undone on for instance patient experiences with nursing care, quality of life, and the occurrence of adverse events is needed to determine whether neglecting these activities decreases patient safety and quality of

care. Also, research is needed on the impact of care left undone on intention to leave, job satisfaction or burnout, as not being able to complete all essential tasks before going home can cause frustration or emotional exhaustion. It is recommended that future research is aimed at exploring more effective strategies in the organizational context to reduce the amount of care that is left undone by nurses as Jones et al. (2015) showed that only one intervention to reduce the level of care left undone has been evaluated in literature by Kalisch et al. (2013).

Furthermore, future research should focus on strategies to positively influence the nursing PE based on the results of measurements such as the D-EOMII. For instance, if the adequacy of staffing and clinical competence of peers is perceived negatively, working methods to balance care demand and nurse staffing should be studied. Strategies that also should be studied are (1) stimulation of inter and intra-disciplinary teamwork and communication, (2) creation of a cohesive patient centered culture and safety climate throughout the entire hospital, (3) implementing effective structures that enable nurses to have control over their nursing practice, and (4) improving the image of nursing. In addition, future research should inform effective strategies to deploy nurse managers in such a way that they support the nursing staff and contribute to high quality and safe patient care.

Additionally, as our study shows that the organizational context, in terms of the perceived nursing work environment, explains respectively 15% and 16% of the variance in patient safety and overall quality of care respectively, we suggest that more integrated measurements of the nursing PE are necessary to fully understand the structure – process – outcome path.

Furthermore, we did account for clustering of the data in units, which is most often omitted or not reported in literature (Dubois et al., 2013) and a strength of our study. We recommend future studies to also account for clustering as the nursing PE of units is diverse with various subcultures, skill-mixes, local decisions, and moreover different patient populations.

Limitations

While this study includes a relatively large sample of nurses and different nursing units, some limitations should be noted. Firstly, hospitals in our study were all from The Netherlands. Although the key descriptive statistics of our study showed comparable results to studies performed in many different countries, as described above, it is recommended that future research incorporates different countries with a wide range in nursing PE's to be able further clarify the SPO path. Secondly, perceived quality of care was used as an outcome measure while ideally outcome indicators such as incidence of for instance pain, medication error, falls, infections, pressure ulcers or hospital stay and readmission should have been used. However, earlier research revealed that the quality of these indicators can be improved and the

perceived quality of care may be a good alternative (Coleman et al., 2016; Dealey et al., 2012; McHugh & Stimpfel, 2012; Smith et al., 2016; Stalpers et al., 2016).
Thirdly, the cross-sectional study design limits the possibility to make causal links in the SPO path. A replication study of the same hospitals over time, could give further insight in the SPO path. Also, relevant other process indicators, such as the execution of non-nursing tasks, can be incorporated in future research to gain a more in depth insight in the SPO path.
Finally, this study only focused on hospitals. It is recommended to also study the SPO path in other settings, such as nursing homes and home health care.

CONCLUSIONS

The variance in perceived nursing sensitive outcomes is primarily explained by the practice environment. Structural elements of the nursing PE are mainly associated with perceived patient safety and perceived overall quality of care on the unit, and to a considerable lesser extent with the mean perceived incidents rate. Furthermore, nursing care left undone only slightly mediates this association and the moderating effect of the professional characteristics is limited.

Conflict of interest statement

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III

PART III

SUMMARY AND DISCUSSION

8

CHAPTER 8

OVERALL SUMMARY AND DISCUSSION

INTRODUCTION

The purpose of this dissertation was to evaluate the qualities of the Dutch Essentials of Magnetism instrument which is a potentially relevant instrument to design positive and innovative nursing practice environments (PE) that enable nurses to deliver excellent patient care in hospitals and nursing homes (Part I). Furthermore, the aim was to evaluate the extent to which the elements of the nursing PE are associated with nursing sensitive outcomes (Part II). The outline and aims of this thesis are further described in chapter 1.
The final chapter of this dissertation summarizes and discusses the main research findings of this study. Subsequently, this chapter reviews relevant methodological issues and implications for practice, education, and future research.

SUMMARY OF MAIN RESEARCH FINDINGS

Part I Translation and validation of the Dutch Essentials of Magnetism

Chapter 2 describes a three-phased combined descriptive and correlational design for the evaluation of psychometric qualities of the translated Dutch Essentials of Magnetism II © (D-EOMII) in hospitals. Principal phases of the study were: (i) scale translation (N=13), (ii) pilot testing for face validity (N=74), and (iii) psychometric evaluation (N= 2542) to confirm validity and reliability. Face validity was confirmed. Items were recognizable, relevant and clear. All constructs included in the D-EOMII were considered relevant for the Dutch hospital setting. Confirmatory factor analysis indicated that five of eight subscales formed clear factors. Three original subscales contained two factors. Item-total correlations ranged from 0.43 to 0.83. One item correlated weakly (0.24) with its subscale and was recommended to be altered before further use of the D-EOMII. This item (number 52) concerned productivity and had a negative connotation in the Dutch context (i.e. a focus on 'production' rather than quality or person centeredness), contrary to the positive meaning of the original item (i.e. a focus on combining quality with efficiency). Cronbach's α for the entire scale was 0.92 and ranged from 0.58 to 0.92 for eight subscales. We concluded that overall the D-EOMII demonstrated acceptable reliability and validity for assessing hospital staff nurses' PE.

Chapter 3 presents a cross-sectional, correlational study in which construct validity of the D-EOMII in hospitals was assessed using hypothesis testing by relating the D-EOMII to the Dutch Practice Environment Scale of the Nursing Work Index (PES-NWI). We formulated fifteen hypotheses prior to data-analysis of which ten were related to convergent validity and five were related to discriminant validity. Data were collected from qualified nurses (N=259) at nine randomly selected hospital wards. In total 121 nurses participated. Thirteen out of fifteen hypotheses (87%) were confirmed and two were rejected showing that the total scores on

the D-EOMII and the PES-NWI were strongly correlated, and that subscales of the D-EOMII and equivalent subscales of the PES-NWI correlated as expected. Control over Nursing Practice (D-EOMII) and Nurse Involvement in Hospital Affairs (PES-NWI) were significantly correlated but the strength of the correlation was only moderate (r=0.44), whereas a stronger correlation was expected. Furthermore, Control over Nursing Practice (D-EOMII) was more strongly correlated to Nursing Foundations for Quality of Care and Adequacy of Staffing (PES-NWI) and Resources than to the expected Nurse Involvement in Hospital Affairs (PES-NWI).

In comparison with the Practice Environment Scale of the Nursing Work Index (PES-NWI), the D-EOMII gives a more thorough insight in areas of the nursing PE in need of improvement. However, the PES-NWI is a shorter questionnaire which is therefore less of a burden to administer but does contain some elements that are not applicable in the Dutch hospital setting. We concluded that the D-EOMII has satisfactory construct validity for measuring the nursing PE in hospitals.

Results of chapter 2 and 3 showed that the D-EOMII can be used by nurses, managers, health policy makers, hospitals and governments to assess and identify processes and relationships that are in need of improvement as it demonstrated satisfactory validity and reliability.

Chapter 4 describes the development and psychometric evaluation of the D-EOMII in nursing homes. In the preparatory phase a cross-sectional survey study amplified with semi-structured interviews focused on face validity of the D-EOMII in nursing homes. Thereafter, content validity, construct validity, and reliability were tested with a cross-sectional survey design. Respondents' ratings on relevance (range: 82%–100%), clarity (range: 83%–99%), and comprehensiveness (no omissions reported) as well as respondent acceptance (range: 0%–3%) were satisfactory for nursing homes. All subscales of the D-EOMII were significantly correlated with organizational job satisfaction (OJS). However, a moderate to strong correlation with OJS was found for only five of the eight subscales. Confirmatory factor analyses indicated that three subscales formed clear factors (Perceived Adequacy of Staffing, Clinically Competent Peers and Nurse Manager Support), two subscales (Nurse–Physician Relationships and Support for Education) were spread over two factors, and three subscales were spread over three factors (Clinical Autonomy, Control over Nursing Practice and Patient Centered Culture).

In total, two-thirds of the hypothesized correlations did meet the predefined criteria. Thus, construct validity was not fully confirmed for the nursing home setting. Subscale-total correlations were acceptable. Item-subscale correlations showed that two items correlated below 0.30 with their subscale (items 14 and 52), while five items correlated moderately (items 5, 9, 15, 17, 24) and 51 items correlated strongly. Cronbach's α for the entire scale was 0.92, α of six subscales were above 0.70, and below 0.70 for two subscales (Support for Education and

Clinically Competent Peers). Cronbach's α of different subscales increased by separately deleting seven items (items 5, 9, 14, 24, 30, 35, 52). This indicates that the subscales Adequacy of Staffing, Clinically Competent Peers, Patient Centered Culture, Autonomy and Nurse Manager Support can be used in nursing homes without problems. The other subscales should be used with more caution and should be adjusted to improve the scale for the nursing home setting.

Overall, item 52 was interpreted differently from its original meaning in both the hospital and nursing home setting (**chapter 2 and 4**). 'Productivity' has a negative connotation of labelling personal care as industrial productivity in the Netherlands, whereas it is positively interpreted in the USA (Schmalenberg & Kramer, 2008). For both the hospital and the nursing home setting it is suggested that this item should be altered or removed. Possible other terms that could be applied in this item in the D-EOMII are 'effort', 'endeavor', or 'dedication'.

Part II Association between the Essentials of Magnetism and nursing sensitive outcomes

Chapter 5 presents the results of a systematic review on relationships between characteristics of the nurse PE and five nurse-sensitive patient outcomes (delirium, malnutrition, pain, patient falls and pressure ulcers) in hospitals. A total of 29 studies were included in the review. Included studies examined pressure ulcers and/or patient falls, but no eligible studies were found concerning delirium and malnutrition. Of the characteristics of the nursing PE, most included studies focused on nurse staffing. More favorable staffing hours were associated with fewer fall incidents. Mixed results were shown for nurse staffing in relation to pressure ulcers. Characteristics of the nursing PE other than nurse staffing that showed significant effects were:

- collaborative relationships; positively perceived communication between nurses and physicians was associated with fewer patient falls and lower pressure ulcers rates,
- nurse education; higher levels of education were related to fewer patient falls and
- nursing experience; lower levels of experience were related to more patient falls and higher rates of pressure ulcers.

A quantitative meta-analysis was not feasible due to methodological issues in the primary studies. The diversity in outcome measures and the majority of cross-sectional designs make quantitative analysis even more difficult. Although the results are ambiguous and studies often do not provide clear conclusions this systematic review showed that there is evidence on associations between the nursing PE and nurse-sensitive patient outcomes.

Chapter 6 reports the results of a descriptive qualitative research design to get

more insight in how the nursing PE is related to positive patient experiences from the perspective of Dutch nurses in different sectors (i.e. mental health care, hospital care, home care and nursing home care). Four focus groups were conducted, each one with 6 or 7 registered nurses with in total 26 nurses recruited through purposeful sampling. Results indicated that seven essential elements of the PE were considered to be related to improved patient experiences of quality of nursing care: clinically competent nurses, collaborative working relationships, autonomous nursing practice, adequate staffing, control over nursing practice, nurse manager support, and patient-centered culture. Support for Education was not mentioned in relation to outcomes at the level of patients, however. Furthermore, the concept of collaborative working relationships expanded upon the relationship with physicians. Participants considered the interaction and complementary manner in which they operate with mutual respect with all professionals necessary to achieve positive patient experiences. Inhibiting factors of positive patient experiences were: cost-effectiveness policy, pressure to increase productivity, transparency goals for external accountability and a high administrative workload. The study showed that nurses work in a healthcare context in which they have to combine cost-efficiency and accountability with their desire to provide nursing care that is based on patient needs and preferences. Nurses experience conflict between these two paradigms.

Chapter 7 describes the results of a cross-sectional correlational survey design to gain further understanding of the structure – process – outcome path from nursing PE to nursing sensitive patient outcomes, by exploring which structural elements of the nursing PE are associated with nursing sensitive outcomes, while taking the process element of care that is left undone into account. In total 1910 nurses from 105 units participated in this study. This study showed that the nursing PE as perceived by nurses is associated nursing sensitive outcomes as perceived by nurses (explained variances: patient safety=15%, overall quality of care=16%, mean perceived incidents rate=1%). Process of care, in terms of nursing care that is left undone, is associated with nursing sensitive outcomes. However, the amount of care that was left undone only explains 2% of the variance in patient safety and the perceived incidents rate, and 5% of the variance in the overall quality. The association between nursing PE and nursing sensitive outcomes is only slightly mediated by the extent to which nursing care is left undone as perceived by nurses (explained variance ranges from 2% to 5%). Professional characteristics somewhat moderate the association between the nursing PE, nursing care left undone and nursing sensitive outcomes, which corresponds with the findings in chapter 5 in which we found mixed results on the association between nurse characteristics such as educational level and years of experience and fall incidence. All eight Essentials of Magnetism are significantly correlated with patient safety, mean

perceived incidents rate, and overall quality of care on the unit. Out of the eight elements, the Perceived adequacy of staffing is most strongly correlated with the nursing sensitive outcomes followed by Patient centered culture, and Nurse manager support.

DISCUSSION OF FINDINGS

Validity of the Dutch Essentials of Magnetism

Our studies demonstrate that the D-EOMII can, for the largest part, be translated to a different language, culture, and context. The percentage of missing data did slightly increase in times at the end of the D-EOMII but the maximum percentage of missing data was 3%, which is adequate. However, our results did show some differences in the interpretation of the D-EOMII in comparison to the original meaning of the scale items. These differences can be caused by linguistic or cultural differences between countries, and by contextual differences between hospitals and nursing homes.

An example of the linguistic and cultural difference is the above mentioned interpretation of the term 'productivity'. More subtle cultural differences could possibly influence scores on other items as well. Contextual differences were found as the psychometric evaluation showed a different factor structure in the nursing home context, as compared to the hospital context. The different factor structure could for instance be due to a different relationship between nurses and physicians in nursing homes, different career opportunities, and the lower educational level of nursing home staff compared to hospital staff. Further research on the interpretation of the different educational levels is necessary to draw conclusions about this difference in factor structure.

Yildirim et al. (2012) also showed that the EOMII can be translated to a different language and culture in Turkey. However, Oshodi et al. (2017) found that mainly the constructs 'Nurse manager support' and 'Patient centered culture' were similar to the original scale, while other items were distributed differently across several constructs. Therefore, when the EOMII is translated to another country, cultural differences need to be taken into account, just as discrepancies in the way in which nursing care is arranged.

Differences in findings from our study compared to Oshodi et al. (2017) and Yildirim et al. (2012) can be explained by the way in which we performed the factor analyses, as we applied confirmatory factor analyses as opposed to exploratory factor analyses, which is further explained in the methodological reflection paragraph.

Associations between nursing practice environment and nursing sensitive outcomes

Our research enlarged the body of knowledge on the association between the nursing PE and outcomes (chapter 4, 5, 6, and 7). We showed that the nursing PE is associated with nursing sensitive outcomes. Moreover, all eight Essentials of Magnetism are significantly correlated to patient safety, overall quality of care, and mean perceived incidents rate. Perceived adequacy of staffing is most strongly correlated to these outcomes, followed by Patient centered culture and Nurse manager support (chapter 7). Our systematic review (chapter 5) showed that nurse staffing, clinical competence, and collaborative nurse-physician relationships were associated with nursing sensitive outcomes. No literature was found on the association between the nursing sensitive outcomes (delirium, malnutrition, pain, patient falls and pressure ulcers) and the other Essentials of Magnetism. Our focus group study (chapter 6) highlighted the importance of the eight Essentials of Magnetism on patient experiences and not only incidents, only Support for education was not mentioned as relevant in this respect. Also, Support for education did not specifically emerge from our systematic review (chapter 5) as an aspect of the nursing PE that has been studied in relation to the nursing sensitive outcomes. However, this does not mean that Support for education is irrelevant. There was a significant correlation between Support for education and perceived patient safety, overall quality of care, mean perceived incidents rate (chapter 7), and job satisfaction (chapter 4) which is also confirmed by other studies (Aiken et al., 2013; Schmalenberg and Kramer, 2008; Stalpers, Van der Linden, Kaljouw, & Schuurmans, 2017). The latter is in line with literature which also showed that continuous education is associated with higher patient safety, higher job satisfaction and nurse turnover, and it is conducive to continuous improvement. (Penz et al., 2007; Lalonde et al., 2013; Sholl et al. 2017). Thus, Support for education is an important attribute of the nursing PE.

The first aspect of the nursing PE that was most strongly correlated with the nursing sensitive outcomes was Adequacy of staffing, which is also confirmed in most studies (Audet, Bourgault, & Rochefort, 2018; Covell & Sidani, 2013; Griffiths et al., 2014; Griffiths et al., 2016). The perception on the adequacy of staffing can be influenced by team composition or staff mix. Our research showed that the clinical competence of the available nursing staff is associated with nursing sensitive outcomes (chapters 5, 6, and 7). Just as Blegen et al. (2013) and Covell & Sidani (2013) exposed, chapter 5 demonstrates that the educational level of nurses partially mediated the relationship between high nurse staffing levels and better outcomes in patients. Literature also indicates that the educational level of nurses is related to, for instance, patient mortality (Aiken et al., 2011; Aiken et al., 2014;

Aiken et al., 2017; Blegen et al., 2011; Cho et al., 2015; Kutney-Lee, Sloane, & Aiken, 2013). This means that the nursing staff should have the educational possibilities to enable them to deliver the care that their patients need and should be clinically competent.

Secondly, Patient centered culture was one of the Essentials of Magnetism that was most strongly correlated with the nursing sensitive outcomes. This implies the need for a culture in which ongoing efforts are made to improve processes and nursing sensitive outcomes, values and norms are shared of which concern for the patient is the dominant value above cost of care, and the contribution of every team member is important (chapter 5, 6, and 7). The context in which nurses work is almost contradictory as they have to offer patient centered care in a standardized and productive environment (chapter 6). This is strengthened by the notion that several tasks and assignments have been transferred to nurses with lower educational levels over time, thus moving more towards task-centered care (chapter 6). Donahue et al. (2008) concluded that in order for nurses to deliver patient centered care it is necessary that nurses receive feedback on the nursing sensitive outcomes to enable them to practice autonomously and to control their nursing practice. However, our research showed that nurses do not obtain feedback on their nursing sensitive patient outcomes and they are not aware that they could – and even should – use these data to monitor and improve the quality of their work (chapter 5).

The third Essential of Magnetism that was most strongly correlated with the nursing sensitive outcomes was Nurse manager support. Nurse manager support is an important driver of adequate staffing by creating the right conditions and the logistical ability to ensure continuity of care (chapter 6). The support of the nurse manager also contributes to a patient centered culture in which nurses do not perceive that costs are the main driver (chapter 6). Moreover, our systematic review confirmed the importance of collaborative nurse-physician relationships as a positively perceived relationship was associated with a lower number of pressure ulcers, fewer patient falls, and less perceived adverse patient events (chapter 5). One addition to the essential elements of the nursing PE was the importance of interprofessional collaboration and communication with all professionals, not merely physicians (chapter 5).

Autonomy is an Essential of Magnetism that appeared in only one study in our systematic review; this study could not confirm that autonomy was a strong factor affecting quality of care in terms the five nursing sensitive outcomes. Rao et al. (2017), however, did find a clear association between greater nurse autonomy and lower odds of 30-day mortality and failure to rescue. Also, chapter 6 indicated that nurse autonomy influences patients' experiences of quality of care. Literature

shows that nursing PEs in which well-educated nurses have the autonomy and time to exercise their professional competences excellently, are important to provide safe, high quality patient care (Aiken et al., 2011; Aiken et al., 2012; McHugh et al., 2013).

Furthermore, our studies demonstrated that if nurses were more involved in the development of nursing policies, this would have a positive influence on patient care (chapter 6). Also, more experienced control over nursing practice was significantly correlated with patient safety and overall quality of care, and lower incidents rates (chapter 7). These findings are well in line with current insights as research on Magnet Hospitals also emphasize the importance of the involvement of nurses throughout the organization in decision-making contributing to good outcomes (Aiken et al., 2013; McHugh et al., 2013) and lack of control can hinder nurses to request for improvements in their PE (Van Oostveen, Mathijssen, & Vermeulen, 2015).

METHODOLOGICAL DISCUSSION

A strength of this dissertation is its combined explorative and confirmative nature, using quantitative and qualitative data, providing an in-depth description of the D-EOMII's validity mainly, and, to a lesser extent, its reliability. However, we did not use all methods that could have added to assessing validity and reliability. We did not perform a test-retest as Yildirim et al. (2012) did to determine instrument stability over time. Continued use of the scale will allow further analysis, such as testing stability over time, and other aspects of validity and reliability (e.g. Known-groups validity).

A strength of our approach is that we chose to use confirmatory factor analyses, whereas Yildirim et al. (2012) and Oshodi et al. (2017) performed exploratory factor analyses and reorganized the items in new subscales based on the results. However, if the aim of the study is to confirm the existing factor structure of the original instrument based on a prior hypothesis regarding the dimensionality, as was the purpose in our study, confirmatory factor analysis is most appropriate (De Vet, Adèr, Terwee, & Pouwer, 2005).

In general, participating organizations in our studies were not randomly selected, but signed up to participate as they wanted to improve the nursing PE. This could have led to selection bias which could have resulted in floor and ceiling effects if only very highly performing or low performing organizations participated. However, floor and ceiling effects were not found. It can, however, limit the generalizability of the results to other types of hospitals, such as university medical centers.

Sample sizes on nurse level in our studies could be seen as large enough to be able to make statements about the validity and reliability of the D-EOMII. However, as we had to account for clustering of the data in units, sample sizes were only

just adequate. Thus, larger numbers of participating units would be preferable in further studies on the validity and reliability of the D-EOMII. Taking clustering of data from nurses in patient care units and in hospital into account is a strength of our studies though, as dealing with intra-correlations within such data is often forgotten in similar studies (Yildirim, Kisa, & Hisar, 2012; Oshodi, Crockett, Bruneau, & West, 2017).

Response rates in our studies varied from 52.1% to 90.2%. The non-response could have influenced our results on the nursing PE if the non-respondents were nurses with for instance low involvement in the organization, or a negative perception on their PE. However, as we did not investigate that, we cannot confirm that this really applies. Nevertheless, Kramer (2009) indicates that the response rate should be at least 40% to adequately assess the PE which is achieved in our studies.

We applied different methodological strategies, such as a systematic review, focus groups, and cross-sectional correlational research, to get more insight in the associations between the nursing PE and nursing sensitive outcomes. In literature, though, authors frequently link structures directly to nursing sensitive outcomes without taking the process of care into account, which we attempted in chapter 7. However, we only used care left undone to assess the process of care. More in depth analysis of the structure – process – outcome (SPO) path is necessary to fully understand how the elements of the nursing PE are linked to nursing sensitive outcomes.

Furthermore, our cross-sectional, qualitative, and correlational designs limit statements about causality. To be able to investigate causality of relationships between the elements of the nursing PE, care processes, and nursing sensitive outcomes, longitudinal and (quasi-) experimental research is needed. Longitudinal research can also enable testing the responsiveness of the D-EOMII when the nursing PE is altered.

Finally, we operationalized nursing sensitive outcomes in terms of nurses' perception on the patient outcomes as opposed to evaluating hospital and nursing home documented nursing sensitive outcomes. In the years in which we conducted our research the variation in methods with which those outcomes were measured and the variance in initial risks and complexity of patients obstructed the use of these indicators (Coleman, Smith, Nixon, Wilson, & Brown, 2016; Dealey et al., 2012; Smith, Nixon, Brown, Wilson, & Coleman, 2016; Stalpers, Kieft, Van der Linden, Kaljouw, & Schuurmans, 2016). Kieft et al. (2018) also specifically state that the methodological quality of these nursing sensitive outcomes in Dutch hospitals is less than optimal. The Dutch Nurses' Association (V&VN) recently started the development of a subset of nursing sensitive patient outcomes for The Netherlands with links between different classifications, which in the future will increase comparability of data throughout the healthcare sector (Kieft et al., 2017). Other European countries as

well as Australia, Canada, and the United States of America already have a nursing minimum data set. Nursing sensitive indicators can be relevant when they are reliable. Nurses oversee patient experiences in all aspects of care 24 hours a day which brings them in a good position to evaluate quality of care. Moreover, nurses' perception on quality of care was reported to be associated with nursing sensitive outcomes such as. mortality, failure to rescue, and patients' experiences with care (McHugh et al., 2013). Thus, using nursing perceived quality of care is a relevant alternative to get insight in nursing sensitive patient outcomes.

IMPLICATIONS FOR MANAGEMENT, PRACTICE, AND EDUCATION

In times of current and predicted shortages of nurses, it is recommended to design the nursing PE in such a way that the available nurses can optimally practice nursing and improve their work life. Care for the provider is required to be able to care for the patient. This also underlines the importance of creating an excellent nursing PE incorporating the essential elements measured by the D-EOMII. Our research showed that the D-EOMII is a valid and reliable tool for the hospital setting. Nurses, managers, health policy makers, hospitals and even governments should use the D-EOMII tool to assess the nursing PE and to address processes and relationships that are in need of improvement.

With a view to nurse managers, we recommend that they use the D-EOMII if they want to attract and retain well-qualified nursing staff or if they want to improve quality of nursing care. We recommend that nurse managers use the D-EOMII to assess the nursing PE and receive feedback on which elements are in need of improvement or to evaluate the effectiveness of strategies to improve the nursing PE. The D-EOMII can indicate which specific elements of the nursing PE need to be improved, which can be further analyzed in depth with other instruments.

Furthermore, our research, in line with Oshodi et al. (2017), showed that nurse managers have an essential role in developing and maintaining a good PE. It is therefore recommended that current and future nurse leaders receive training in the essential elements of the nursing PE.

The D-EOMII can be used as a stand-alone instrument, however it is recommended to simultaneously assess the structural preconditions that are present in the nursing PE, and the actual observed nursing sensitive outcomes for patients. A prerequisite for the latter is that nursing sensitive outcomes are measured in a valid and reliable manner.

Integrating individual Essentials of Magnetism in the nursing practice environment is useful, however, the Essentials of Magnetism are intercorrelated and Norman and Sjetne (2017) found 34 instruments that measure nurses' perception of the work environment in different settings in literature in their scoping review. Whether the

D-EOMII or other instruments should be used depends on the setting, population of interest, and the purpose of the organization. The D-EOMII measures functional processes and relationships of practice environment contributing to productivity and quality of patient care, whereas the PES-NWI for instance measures structural elements of the nursing PE contributing to nursing job satisfaction (Kramer et al., 2004; Schmalenberg and Kramer, 2008, Warshawsky & Havens, 2011).
We plea for not making the D-EOMII a compulsory nationwide instrument. We recommend to use the D-EOMII when driven by the motivation to deliver the best possible patient care and not as a mandatory checklist that could become an end in itself. A possible guideline, initiated by V&VN, for shaping optimal nursing PEs would be supportive for Dutch organizations aiming to improve their work environment.

Lastly, the Essentials of Magnetism are recommended to be included in nursing curricula, as nurses need to know what enables them to deliver the best possible patient care. Furthermore, we recommend that nurses learn the relevance of nursing sensitive patient outcomes and how to use these outcomes to monitor and improve the quality of their work.

IMPLICATIONS FOR FUTURE RESEARCH

Further research on the reliability of the D-EOMII in both hospitals and nursing homes is recommended. The instrument may still benefit from further psychometric testing and development. For instance, although physicians are represented in all settings, other professionals, such as psychologists, social workers or physical therapists, may or may not be part of a healthcare team. Possibly the construct of the 'collaborative nurse-physician relationship' should be adjusted or amplified to incorporate other interprofessional collaborations. Furthermore, it is recommended to analyze reliability and validity for other occupational groups within the caring professions as the essential elements may also be applicable to those groups. In addition, future research could also address translating and using the instrument in other languages to collect comparative international data whilst taking the specific culture into account.

Nowadays, the Magnet program is extended to other settings, such as long-term care organizations, in the Pathway to Excellence program® (American Nurses Credentialing Center, 2017). Future research in home care, mental and psychiatric health care is necessary to assess whether the Essentials of Magnetism are also relevant beyond the hospital and nursing home setting.

It is expected that when health care organizations excel on the eight essential

elements incorporated in the EOMII, those organizations attract and retain nurses and deliver better quality of care. Future research is recommended to assess whether this holds up using for instance known group techniques. Furthermore, future research should move beyond the study of the association between the nursing PE and patient, nurse, and organizational outcomes. Mechanisms by which the nursing PE impacts these outcomes should be studied, so that nurse leaders will have strategies they can apply to advance the PE and outcomes (Swiger et al., 2017). In addition, future research on effective strategies to deploy nurse managers in such a way that they are able to fulfill their role in the best manner is needed. Additionally, it is recommended to investigate whether the D-EOMII can be used to give nurse managers performance feedback based on the nurse manager support as perceived by nurses.

More longitudinal and intervention research is recommended to reveal strategies, interventions, and mechanisms that actually improve the nursing PE. To determine whether improving the practice environment results in improved nursing sensitive outcomes it is necessary that future research also focusses on monitoring and documenting patient problems in an unambiguous manner (Kieft, 2017). Further exploration to assess the association between the D-EOMII and patient outcomes can then be done by using a split-sample technique and adding data about nursing sensitive patient outcomes.

CONCLUSION

Our research showed that the EOMII can, for the largest part, be translated to a different language and culture, specifically into Dutch. With some more caution, the D-EOMII could also be used in the nursing home context. Further evaluation of the D-EOMII in nursing homes is necessary to use the instrument as a whole.

Furthermore, we conclude that the elements of the nursing practice environments are associated to nursing sensitive outcomes. All eight Essentials of Magnetism are significantly correlated to patient safety, overall quality of care, and mean perceived incidents rate. Perceived adequacy of staffing is most strongly correlated to these outcomes, followed by Patient centered culture and Nurse manager support.

We can conclude that the D-EOMII is a is a relevant instrument to design positive and innovative nursing practice environments as it is valid and reliable tool that can be used in the hospital setting and has promising results for the nursing home context.

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9

CHAPTER 9

NEDERLANDSE SAMENVATTING

INTRODUCTIE

Het doel van dit proefschrift was om de kwaliteiten van het Nederlandse Essentials of Magnetism instrument te evalueren. De Nederlandse Essentials of Magnetism is een potentieel relevant instrument om een positieve en innovatieve verpleegkundige werkomgeving te ontwerpen die verpleegkundigen en verzorgenden in staat stelt om excellente patiënten- en cliëntenzorg te leveren in ziekenhuizen en verpleeghuizen (Deel 1). Daarnaast was het doel om te evalueren in hoeverre de elementen van de verpleegkundige werkomgeving geassocieerd zijn met verpleeg-sensitieve resultaten (Part II). De opzet en doelen van dit proefschrift zijn verder toegelicht in hoofdstuk 1.
In dit onderdeel van het proefschrift wordt een samenvatting gegeven van de belangrijkste onderzoeksresultaten van deze studie.

SAMENVATTING VAN DE MEEST BELANGRIJKE ONDERZOEKSRESULTATEN

Deel I Vertaling en validering van de Nederlandse Essentials of Magnetism
Hoofdstuk 2 betreft een onderzoek bestaande uit drie fases waarin zowel beschrijvend als correlatie onderzoek werd gecombineerd om de psychometrische kwaliteiten van de naar het Nederlands vertaalde Essenatials of Magnetism II © (D-EOMII) te evalueren in ziekenhuizen.

De belangrijkste fases van de studie waren: (i) schaalvertaling (N = 13), (ii) pilottesten naar face validiteit (N = 74), en (iii) psychometrische evaluatie (N = 2542) om de validiteit en betrouwbaarheid te bevestigen. Face validiteit werd bevestigd. Items waren herkenbaar, relevant en duidelijk. Alle constructen in de D-EOMII werden relevant geacht voor de Nederlandse ziekenhuissector. Bevestigende factoranalyse gaf aan dat vijf van de acht subschalen duidelijke factoren vormden. Drie originele subschalen bevatten twee factoren. Item-totaalcorrelaties varieerden van 0,43 tot 0,83. Eén item correleerde zwak (0,24) met de subschaal en werd daardoor aanbevolen te worden gewijzigd vóór verder gebruik van de D-EOMII. Dit item (nummer 52) had betrekking op de productiviteit en had een negatieve connotatie in de Nederlandse context (namelijk een focus op 'productie' in plaats van kwaliteit of persoonsgerichtheid), in tegenstelling tot de positieve betekenis van het oorspronkelijke item (namelijk een focus op het combineren van kwaliteit met efficiëntie). Cronbach's α voor de hele schaal was 0,92 en varieerde van 0,58 tot 0,92 voor acht subschalen. We concludeerden dat de D-EOMII over het algemeen acceptabel betrouwbaar en valide was voor het beoordelen van de verpleegkundige werkomgeving in ziekenhuizen.
Hoofdstuk 3 presenteert een cross-sectionele, correlatie studie waarin de

constructvaliditeit van de D-EOMII in ziekenhuizen werd beoordeeld aan de hand van hypothesetesten door de D-EOMII te relateren aan de Nederlandse Practice Environment Scale of the Nursing Work Index (PES-NWI). We hebben vijftien hypotheses geformuleerd voorafgaand aan de data-analyse, waarvan er tien betrekking hadden op convergente validiteit en vijf hadden betrekking op discriminante validiteit. Gegevens werden verzameld bij gekwalificeerde verpleegkundigen (N = 259) op negen willekeurig geselecteerde ziekenhuis-afdelingen. In totaal hadden 121 verpleegkundigen deelgenomen. Dertien van de vijftien hypotheses (87%) werden bevestigd en twee werden afgewezen. Het onderzoek toonde aan dat de totale scores op de D-EOMII en de PES-NWI sterk gecorreleerd waren en de subschalen van de D-EOMIII en equivalente subschalen van de PES-NWI correleerden zoals werd verwacht.
Zeggenschap over de beroepsuitoefening (D-EOMII) en Deelname van verpleegkundigen aan het ziekenhuisbeleid (PES-NWI) waren significant gecorreleerd, maar de sterkte van de correlatie was matig (r = 0,44), terwijl een sterkere correlatie werd verwacht. Bovendien was Zeggenschap over de beroepsuitoefening (D-EOMII) sterker gecorreleerd aan Verpleegkundige visie op Kwaliteitszorg (PES-NWI) en Personeelsinzet (PES-NWI) dan aan de verwachte subschaal Deelname van verpleegkundigen aan het ziekenhuisbeleid (PES-NWI).
Het onderzoek toonde dat in vergelijking met de PES-NWI de D-EOMII grondiger geeft inzicht in de gebieden van de verpleegkundige werkomgeving die verbetering behoeven. De PES-NWI is echter een kortere vragenlijst die daardoor minder registratielast oplevert bij het afnemen, maar deze vragenlijst bevat sommige elementen die niet van toepassing zijn in de Nederlandse ziekenhuis setting. We concludeerden dat de D-EOMII de construct validiteit voor het meten van de verpleegkundige werkomgeving in ziekenhuizen voldoet.
De resultaten van hoofdstuk 2 en 3 toonden dat de D-EOMII gebruikt kan worden door verpleegkundigen, managers, gezondheidszorg beleidsmakers, ziekenhuizen en overheden om processen en relaties te beoordelen en verbetermogelijkheden te identificeren aangezien het instrument in termen van validiteit en betrouwbaarheid voldoet.
Hoofdstuk 4 beschrijft de ontwikkeling en psychometrische evaluatie van de D-EOMII in de verpleeghuizen. In de voorbereidende fase werd een cross-sectionele vragenlijst studie uitgevoerd aangevuld met semi-gestructureerde interviews gericht op het onderzoeken van de face validiteit van de EOM-II in verpleeghuizen. Daarna werden de content validiteit, construct validiteit en betrouwbaarheid getest met een cross-sectioneel vragenlijst onderzoeksopzet.
De beoordelingen van respondenten op relevantie (bereik: 82%-100%), duidelijkheid (bereik: 83%-99%), en volledigheid (geen omissies gemeld) en

de acceptatie door respondenten (bereik: 0%-3%) waren acceptabel voor verpleeghuizen. Alle subschalen van de D-EOMII waren significant gecorreleerd met organisatorische arbeidstevredenheid. Een matige tot sterke correlatie met organisatorische arbeidstevredenheid werd echter gevonden voor slechts vijf van de acht subschalen. Bevestigende factoranalyses gaven aan dat drie subschalen duidelijke factoren vormden (Voldoende personeel, Werken met vakbekwame collega's en Support van de direct leidinggevende), twee subschalen (Goede relaties met de artsen en Opleidingsmogelijkheden) waren verdeeld over twee factoren en drie subschalen waren verspreid over drie factoren (Autonomie, Zeggenschap over de beroepsuitoefening en Patiëntgerichte cultuur).
In totaal voldeden twee derde van de gehypothetiseerde correlaties aan de vooraf gestelde criteria. De constructvaliditeit was dus niet volledig bevestigd voor de verpleeghuissector. Subschaal-totaalcorrelaties waren acceptabel. Item-subschaal correlaties toonden aan dat twee items lager dan 0,30 correleerden met hun subschaal (items 14 en 52), terwijl vijf items matig correleerden (items 5, 9, 15, 17, 24) en 51 items sterk. Cronbach's α voor de hele schaal was 0,92, α van zes subschalen was hoger dan 0,70 en onder 0,70 voor twee subschalen (Opleidingsmogelijkheiden en Werken met vakbekwame collega's). Cronbach's α van verschillende subschalen nam toe door afzonderlijk zeven items te verwijderen (items 5, 9, 14, 24, 30, 35, 52). Dit geeft aan dat de subschalen Voldoende personeel, Werken met vakbekwame collega's, Patiëntgerichte zorgcultuur, Autonomie en Support van de direct leidinggevende zonder problemen in verpleeghuizen kunnen worden gebruikt. De andere subschalen moeten met meer voorzichtigheid worden gebruikt en moeten worden aangepast om de schaal voor de verpleeghuis sector te verbeteren.
Over het geheel genomen werd item 52 anders geïnterpreteerd dan de oorspronkelijke betekenis in zowel het ziekenhuis als het verpleeghuis (hoofdstuk 2 en 4). 'Productiviteit' heeft een negatieve connotatie door het labelen van persoonlijke zorg als industriële productiviteit in Nederland, terwijl het positief wordt geïnterpreteerd in de VS (Schmalenberg & Kramer, 2008). Voor zowel de ziekenhuis- als de verpleeghuis sector wordt voorgesteld dit item te wijzigen of te verwijderen. Mogelijke andere termen die in dit item in de D-EOMII kunnen worden toegepast, zijn 'inzet', 'inspanning' of 'toewijding'.

Deel II De associatie tussen de Essentials of Magnetism en de verpleeg-sensitieve resultaten

Hoofdstuk 5 toont de resultaten van een systematisch literatuuronderzoek naar de relaties tussen de kenmerken van de verpleegkundige werkomgeving en vijf verpleeg-sensitieve patiëntuitkomsten (delier, ondervoeding, pijn, vallen van de patiënt en decubitus) in ziekenhuizen. In totaal zijn 29 studies opgenomen

in de beoordeling. Geïncludeerde studies onderzochten doorligwonden en/of vallen van patiënten, maar er werden geen in aanmerking komende studies gevonden met betrekking tot delier en ondervoeding. Van de kenmerken van de verpleegkundige werkomgeving, de meeste geïncludeerde studies waren gericht op verpleegkundige personeelssamenstelling. Meer gunstige arbeidstijden werden geassocieerd met minder valincidenten. Gemengde resultaten werden gevonden voor verpleegkundig personeel in relatie tot decubitus. Andere kenmerken van de verpleegkundige werkomgeving los van de verpleegkundige personeelssamenstelling met significante effecten waren:

1. Samenwerkingsrelaties; positief ervaren communicatie tussen verpleegkundigen en artsen was geassocieerd met minder vallen van patiënten en minder decubitus,
2. Verpleegkundige opleiding; hogere opleidingsniveaus waren gerelateerd aan minder valpartijen van patiënten en
3. Werkervaring; mindere werkervaring was gerelateerd aan meer valpartijen bij patiënten en meer decubitus.

Een kwantitatieve meta-analyse was niet haalbaar vanwege methodologische problemen in de primaire onderzoeken. De diversiteit in uitkomstmaten en de meerderheid van cross-sectionele onderzoeksopzetten maken kwantitatieve analyse nog moeilijker. Hoewel de resultaten dubbelzinnig zijn en onderzoeken vaak geen duidelijke conclusies opleveren, bleek uit dit systematisch literatuuronderzoek dat er aanwijzingen zijn voor associaties tussen de werkomgeving van verpleegkundigen en verpleeg-sensitieve uitkomsten voor de patiënt.

Hoofdstuk 6 rapporteert de resultaten van een beschrijvend kwalitatief onderzoeksontwerp om meer inzicht te krijgen in hoe de verpleegkundige werkomgeving is gerelateerd aan positieve patiëntervaringen vanuit het perspectief van Nederlandse verpleegkundigen in verschillende sectoren (d.w.z. geestelijke gezondheidszorg, ziekenhuiszorg, thuiszorg en verpleeghuiszorg). Vier focusgroepen werden uitgevoerd, elk met 6 of 7 verpleegkundigen met in totaal 26 verpleegkundigen geselecteerd via doelgerichte sampling. De resultaten wezen erop dat zeven essentiële elementen van de werkomgeving werden geacht betrekking te hebben op verbeterde patiëntervaringen ten aanzien van de kwaliteit van de verpleegkundige zorg: werken met vakbekwame collega's, collaboratieve samenwerkingsrelaties, autonomie, voldoende personeel, zeggenschap over de beroepsuitoefening, support van de direct leidinggevende en patiëntgerichte zorgcultuur. Opleidingsmogelijkheden werd echter niet genoemd in relatie tot patiëntresultaten. Bovendien breidde het concept van collaboratieve samenwerkingsrelaties zich uit over de relatie met artsen. Deelnemers beschouwden de interactie en complementaire manier waarop ze werken met

wederzijds respect met alle professionals noodzakelijk om positieve patiëntervaringen te bereiken. Remmende factoren van positieve ervaringen van patiënten waren: kosteneffectiviteitsbeleid, druk om de productiviteit te verhogen, transparantiedoelstellingen voor externe verantwoordelijkheid en een hoge administratieve last. De studie toonde aan dat verpleegkundigen werken in een gezondheidszorg context waarin ze kostenefficiëntie en verantwoordelijkheid moeten combineren met hun wens om verpleegkundige zorg te bieden die is gebaseerd op de behoeften en voorkeuren van de patiënt. Verpleegkundigen ervaren conflicten tussen deze twee paradigma's.

Hoofdstuk 7 beschrijft de resultaten van een cross-sectioneel correlatieonderzoek om een beter begrip te krijgen van de structuur – proces – uitkomst pad van verpleegkundige werkomgeving tot verpleeg-sensitieve patiëntuitkomsten. Het pad is onderzocht door te bestuderen welke structurele elementen van de verpleegkundige werkomgeving geassocieerd zijn met verpleeg-sensitieve patiëntuitkomsten, terwijl het proceselement van noodzakelijke zorg die niet geleverd kon worden meegenomen werd. In totaal namen 1910 verpleegkundigen van 105 afdelingen deel aan deze studie. Deze studie toonde aan dat de verpleegkundige werkomgeving, zoals waargenomen door verpleegkundigen, verband houdt met verpleeg-sensitieve resultaten zoals gepercipieerd door verpleegkundigen (verklaarde varianties: patiëntveiligheid = 15%, algehele kwaliteit van zorg = 16%, gemiddelde waargenomen incidentenpercentage = 1%). Proces van zorg, in termen van noodzakelijke verpleegkundige zorg die ongedaan wordt gelaten, werd geassocieerd verpleeg-sensitieve resultaten. De hoeveelheid zorg die ongedaan is gelaten, verklaart echter slechts 2% van de variantie in patiëntveiligheid en het percentage waargenomen incidenten en 5% van de variantie in de algehele kwaliteit. De associatie tussen verpleegkundige werkomgeving en verpleeg-sensitieve resultaten wordt slechts in geringe mate gemedieerd door de mate waarin verpleegkundige zorg ongedaan wordt gelaten zoals gepercipieerd door verpleegkundigen (verklaarde variantie variantie varieert van 2% tot 5%).

Kenmerken van de professionals modereren enigszins de associatie tussen de verpleegkundige werkomgeving, verpleegkundige zorg die niet geleverd kon worden en verpleeg-sensitieve resultaten. Deze resultaten komen overeen met de bevindingen in hoofdstuk 5 waarin we gemengde resultaten hebben gevonden over het verband tussen verpleegkundige kenmerken zoals opleidingsniveau en jarenlange ervaring en valincidentie. Alle acht Essentials of Magnetism zijn significant gecorreleerd met patiëntveiligheid, gemiddelde waargenomen incidentiecijfers en algehele kwaliteit van zorg op de afdeling. Van de acht elementen is de Voldoende personeel het sterkst gecorreleerd met de verpleeg-sensitieve resultaten, gevolgd door de Patiëntgerichte cultuur en de Support van de direct leidinggevende.

CONCLUSIE

Uit ons onderzoek bleek dat de EOMII voor het grootste deel kan worden vertaald naar een andere taal en cultuur, specifiek naar het Nederlands. Met wat meer voorzichtigheid zou de D-EOMII ook in de context van het verpleeghuis kunnen worden gebruikt. Verdere evaluatie van de D-EOMII in verpleeghuizen is noodzakelijk om het instrument als geheel te gebruiken.

Verder concluderen we dat de elementen van de verpleegkundige werkomgeving verband houden met verpleeg-sensitieve patiëntresultaten. Alle acht Essentials van Magnetism zijn significant gecorreleerd aan patiëntveiligheid, algehele kwaliteit van zorg en gemiddelde waargenomen incidenten. Voldoende personeel is het sterkst gecorreleerd aan deze uitkomsten, gevolgd door Patiëntgerichte cultuur en Support van de direct leidinggevende.

We kunnen concluderen dat de D-EOMII een relevant instrument is voor het ontwerpen van positieve en innovatieve verpleegkundige werkomgeving omdat het een valide en betrouwbare tool is die kan worden gebruikt in de ziekenhuis-omgeving en veelbelovende resultaten biedt voor de verpleeghuis context.

A

APPENDICES

DATA MANAGEMENT

For each study of this PhD involving participant data, the research protocol was discussed with the local Medical Ethics Committee CMO Arnhem□Nijmegen. All studies were declared exempt from ethical approval for human subjects research. All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee, and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

The survey and questionnaire data described in chapters 2, 3, 4 and 7 were collected via a secure data collection program, especially designed for Excellente Zorg which was only available for V&VN. The contact details of the nurses that completed the survey in chapters 2, 3, 4 and 7 have been discarded. Identifying information of the participants of focus groups and interviews held for this thesis were stored separately from the data, in a secured folder to which only the main researcher. The identifying information was deleted after finishing the respective studies. Recordings of the focus groups and interviews were deleted, only the anonymised transcripts/summaries are saved.

Until chapter 7 of this PhD has been published, the raw and processed data and accompanying files (descriptive files, syntaxes, etc.) will be stored in a folder on which is accessible only by the main researchers of this project. Thereafter, the data will be stored on the secured V&VN archive server in a folder called "Excellente Zorg" for 10 years, which is accessible only by the program manager of Excellente Zorg. Since the participants of the studies in this PhD did not give informed consent for sharing their data publicly, requests for data can be made via receptie.iqh@radboudumc.nl. A suitable way to share the data will then be sought.

PHD PORTFOLIO

Name PhD candidate: B.J.M. de Brouwer Department: IQ Health Care Graduate School: Radboud Institute for Health Sciences	PhD period: 01-01-2011 – 28-08-2019 Promotor: Prof. Prof. dr. L. Schoonhoven, Prof. dr. T. van Achterberg, Prof. dr. H. Vermeulen Co-promotor: Dr M.J. Kaljouw

	Year(s)	ECTS
TRAINING ACTIVITIES		
Courses & Workshops		
- NCEBP Introduction course	2011	1.75
- Wetenschapsjournalistiek	2011	3.0
- Management voor promovendi	2012	2.0
- Klinimetrie: het ontwikkelen en evalueren van meetinstrumenten. VU MC	2012	3.0
- Basiscursus Regelgeving en Organisatie voor Klinisch onderzoekers (BROK)	2018	1.5
Seminars & lectures		
- ANCC Magnet Conference	2013	3.0
- Preconference Leadership: European Nursing Congress	2016	1.0
- ANCC Magnet Conference	2018	3.0
Symposia & congresses		
- European Nursing Congress (oral).	2010	0.5
- Verpleegkundig Symposium VU MC (oral)	2010	0.5
- Care4 International Scientific Nursing and Midwifery Congress (oral)	2014	0.5
- European Nursing Congress (oral)	2018	0.5
Other		
- Board member European Nursing Congress	2015-2017	3.0
- Consortium Member SIA RAAK: Leadership as blended care	2012-2018	3.0
- Board committee Science, Dutch Nurses' Association (secretary)	2012-2017	3.0
- Journal Reviewer 'Journal of Nursing Scholarship'	2018-heden	0.1
- Journal Reviewer 'Journal of Tissue Viability'	2017-heden	0.1
TEACHING ACTIVITIES		
Lecturing		
- Workshop Excellente Zorg, VARstudiemiddag 'de rode draad in de zorg ben jij' GGZ Friesland.	2010 2010	0.5 0.5
- Workshop: Excellente zorg beter voor cliënten, verpleegkundigen en verzorgenden. Congres De V staat voor..., IGZ.	2011	0.5
- Workshop: Zo willen we graag werken... aan Excellente Zorg, Lustrumcongres V&VN	2015-2019	1.5
- Training Methodisch werken		
Supervision of internships / other		
- Supervisor systematic literature review Master Nursing Science: de relevantie van de Essentials of magnetism in de justitiële setting.	2012	1.5
- Supervisor systematic literature review Master Sociology: Wie zorgt voor u, als u straks ziek wordt? Een onderzoek naar de invloed van zeggenschap over de beroepsuitoefening op het behouden van verpleegkundigen	2011	1.5
- Thesis co-supervisor from V&VN Master Nursing Science: Het creëren van een aantrekkelijke werkomgeving voor verpleegkundigen: een kwalitatieve studie naar de bijdrage van human resource managers in ziekenhuizen.	2012	0.5
- Thesis co-supervisor Master Communication and Master Business Administration: De invloed van de communicatie tussen de arts en verpleegkundige op de arts-verpleegkundige relatie en arbeidstevredenheid	2012	1.0
- Thesis supervisor from V&VN Master Nursing Science: Wanted: Attractive hospitals for nurses in the Netherlands, aiming for excellent patient care! Descriptive quantitative research about: Measuring the staff nurses' perception of the quality of their professional practice environment in a Dutch hospital, by using the EOMII and the PES-NWI and comparing their results.	2012 2014	1.5 1.5
- Thesis supervisor from V&VN Master Nursing Science: The Dutch Essentials of Magnetism II; an adapted instrument for Correctional Nurses		
TOTAL		39.95

CURRICULUM VITAE

Na het VWO, profiel Natuur & Gezondheid, te hebben afgerond in Tilburg heeft Brigitte de Brouwer een jaar Diergeneeskunde gestudeerd aan Universiteit Antwerpen. Toch bleek haar passie in de gezondheidszorg te liggen en wilde ze terug naar Nederland. Ze is gezondheidswetenschappen gaan studeren aan Universiteit Maastricht (Bachelor: Major – Beleid & Management, Minor – Zorgwetenschappen; Master: Public Health – Health Policy Economics and Management). Tijdens haar studie raakte Brigitte geïnteresseerd in de kwaliteit van de verpleegkundige en verzorgende zorg, wat werd versterkt door het aankomende tekort aan deze zorgprofessionals. Brigitte deed in haar eerste stage een cliënttevredenheidsonderzoek op afdeling Voedingsvoorlichting en Dieetadvisering van Thuiszorg Midden Limburg. Haar bacheloronderzoek deed ze naar de Essentials of Magnetism, als potentieel interessant instrument voor het aantrekken en behouden van verpleegkundigen en verzorgenden. Ze vertaalde het instrument en testte deze in de verpleeghuissetting. In haar masteronderzoek zette ze haar onderzoek naar het instrument voort in de ziekenhuissector. De eerste resultaten van de testen waren positief en de zorgprofessionals waren enthousiast over de mogelijkheden die het instrument hen bood om de werkomgeving te verbeteren. Tijdens haar studie heeft Brigitte verschillende banen gehad, als Thuishulp A bij ZuidZorg Veldhoven, Supply Chain Manager bij Philips, tutor (Innovatie van Complexe Zorg; Training Presenteren; Training Onderhandelen, Training) bij Universiteit Maastricht.

Na haar afstuderen werd Brigitte gevraagd om bij V&VN te komen werken als projectmedewerker aan de pilot Excellente Zorg. Tegelijkertijd startte ze een promotietraject aan de Universiteit Maastricht bij prof. dr. De Wit naar het vertalen en testen van de Essentials of Magnetism naar de Nederlandse situatie. Na afloop van de pilot werd Brigitte Beleidsmedewerker bij V&VN en groeide door naar Adviseur Excellente Zorg. Na beëindiging van de functie van prof. dr. De Wit heeft ze haar promotietraject voorgezet aan de medische faculteit, NCEBP, IQ Health Care van het Radboud UMC onder begeleiding van prof. dr. Van Achterberg.

Vanuit haar gecombineerde rol bij V&VN en het Radboud UMC is Brigitte Consortium lid geweest voor Sia Raak, hogeschool Utrecht (Pieterbas Lalleman), heeft ze afstudeerstages en literatuuronderzoeken begeleid. Tevens zat Brigitte in de stuurgroep V&VN Academie, Stuurgroep Excellente Zorg, Bureauoverleg IGZ en was ze secretaris van de Bestuurscommissie wetenschap bij V&VN. Ze heeft een bestuurstraineeship gevolgd bij Koninklijke Kentalis en is bestuurslid geweest van het Europees Verpleegkundig Congres.

Na het vertrek van prof. dr. Van Achterberg naar KU Leuven heeft Brigitte haar promotietraject voortgezet vanuit het Radboud UMC en KU Leuven onder begeleiding van prof. dr. Schoonhoven, prof. dr. Vermeulen en prof. dr. Van Achterberg. Intussen heeft Brigitte Accuralis Zorgoptimalisatie opgericht waar

zij als co-founder samen met Jan de Brouwer zich inzet om de zorgstandaard in Nederland te verhogen. Ze voert verschillende verbetertrajecten, onderzoeken en systeemwijzigingen uit in alle sectoren van de zorg met name gericht op het verbeteren van de verpleegkundige en verzorgende zorg. Als nevenfunctie zet Brigitte zich als vrijwilliger in als algemeen bestuurslid van Stichting Peuterspeelboerderij Hummelhoef.

In de toekomst, zal Brigitte actief blijven in onderzoek naar de verpleegkundige werkomgeving en kwaliteit van zorg. Daarnaast zal zij de opgedane kennis uit de wetenschap in organisaties integreren en werken aan het verhogen van de zorgstandaard in Nederland.

ACKNOWLEDGEMENTS

Dit proefschrift is het resultaat van jarenlang onderzoek, wat mogelijk is gemaakt door de medewerking, steun, betrokkenheid en vertrouwen van zoveel mensen. Graag zou ik een aantal mensen in het bijzonder willen bedanken.

Allereerst wil ik alle **verpleegkundigen en verzorgenden** bedanken voor de medewerking aan de onderzoeken. Dankzij de tijd die zij genomen hebben om de vragenlijsten in te vullen, interviews te geven en me te voorzien van input over de belangrijke elementen in de werkomgeving en kwaliteit van de zorg hebben we een instrument kunnen ontwikkelen dat hen verder kan helpen om de verpleegkundige werkomgeving te verbeteren.

Promotoren prof. dr. T. van Achterberg, prof. dr. L. Schoonhoven en prof. dr. H. Vermeulen en copromotor dr. M.J. Kaljouw

Professor dr. T. van Achterberg, beste Theo, in 2010 ontmoette we elkaar bij een bijeenkomst over de RN4Cast studie. We raakten met elkaar aan de praat waarna ik met Johan Lambregts in Nijmegen met je in gesprek ging over de mogelijkheden om het onderzoek van Excellente Zorg voort te zetten bij de Radboud Universiteit. Je had daar vertrouwen in. Bedankt voor dat vertrouwen. Bedankt voor je enorme kennis op het gebied van de verpleegkunde en onderzoek, je rust en je betrokkenheid. Bedankt dat je me bent blijven begeleiden, ook toen je naar Leuven vertrok. Bedankt voor, naast je goede voorbeeld als onderzoeker, je prettige persoonlijkheid en je fijne gesprekken.

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