THINKING BEYOND NUMBERS

Nursing Staff and Quality of Care in Nursing Homes

RAMONA BACKHAUS

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CHAPTER 1

GENERAL INTRODUCTION

In many countries, poor quality of care (QoC) in nursing homes is a concern of older people, care providers and governments.[1] Complaints and even false perceptions about nursing home QoC are frequently spread in the media. For example, in November 2016, 'pee contracts' were discussed in the Dutch media. This discussion was based on a rumor that nursing home residents in a nursing home had to sign a contract stating that they were allowed to visit the toilet on only three scheduled moments a day.[2] A 'black list' disseminated in July 2016 reporting the names of 150 Dutch nursing homes that were under increased supervision from the Healthcare Inspectorate received considerable public attention.[3] This negative publicity is nothing new to the Dutch nursing home sector, as a decade ago, 'pajama days'[4] or nursing homes as 'the waiting room for death'[5] were discussed in the media.

In moments of media attention, it is often claimed that 'more hands' are needed to improve QoC in nursing homes.[6] An increase in the number of staff is presumed to positively affect the QoC and quality of life of nursing home residents.[7] However, so far, research on the relationship between direct nursing care staffing levels has focused primarily on the hospital setting. Evidence from this sector suggests, for example, that an increase in better-educated staff (i.e., baccalaureate-educated registered nurses (BRNs)) leads to better QoC in hospitals.[8] However, compared to the hospital sector, direct nursing care staff in nursing homes tends to be less educated,[9] and nursing home organizations in many countries experience difficulties in attracting and retaining registered nurses.[10-12] Reasons for this are, for example, that working in nursing homes is associated with a low status career and inadequate salaries.[13,14] Differences in the workforce as well as in the care settings mean that evidence from the hospital sector cannot simply be translated to the nursing home sector. Therefore, more evidence on the relationship between direct nursing care staffing levels and QoC in nursing homes is needed.

The aim of this dissertation is to examine the influence of direct nursing care staff on QoC in nursing homes. In this chapter, the central concepts of this dissertation, i.e., 'nursing homes', 'direct nursing care staff' and 'quality of care' are introduced. At the end of this chapter, the aim and outline of this dissertation are presented.

NURSING HOMES

In many countries, only the most frail and dependent older adults enter nursing homes. This is related to the preference of older adults to live independently in their own home as long as possible, but also to governmental policies aimed at enabling 'aging in place' and avoiding nursing home admission, especially in European countries.[15] Although nursing homes exist worldwide, the definition varies within and between countries. To enable comparison across countries, the following international definition for 'nursing

homes' was presented in 2015 in the *Journal of the American Medical Directors Association*:

> *'A nursing home is a facility with a domestic-styled environment that provides 24-hour functional support and care for persons who require assistance with activities of daily living (ADLs) and who often have complex health needs and increased vulnerability. Residency within a nursing home may be relatively brief for respite purposes, short term (rehabilitative), or long term, and may also provide palliative/hospice and end-of-life care. In general, most nursing homes also provide some degree of support from health professionals, but [...] a small subset provide socialization activities and basic assistance with ADLs but have no trained health professionals on staff. Although post-acute rehabilitation may be provided in the nursing home (i.e., in the United States and The Netherlands), in many countries this is provided in separate facilities (i.e., geriatric or cottage hospitals) or in a geriatric unit of the acute hospital.'*[16]

This definition illustrates that, within and between countries, there is much variety regarding the care provided in nursing homes. In addition, the professions that work in nursing homes may vary by country.[16] In the Netherlands, long-term care for older adults is typically provided in somatic (for residents with physical disabilities) or psychogeriatric (for residents with dementia) wards.[17] Additionally, Dutch nursing homes provide short-term care for rehabilitation purposes (in rehabilitation wards), as well as crisis intervention and respite care services.[18-20] In this dissertation, only long-term nursing care wards will be considered. The goal of long-term care wards is to provide a supportive, safe and homelike environment for residents, while assisting them to maintain their functional abilities for as long as possible.[16] While the goal is the same for all Dutch long-term nursing home wards, the physical environment, however, varies, ranging from traditional large-scale wards, small-scale, homelike wards, to more innovative types like green care farms.[21] Unique for the Netherlands is that specifically trained nursing home medical specialists provide medical care for nursing home residents.[16,17] These specialists and all other health professionals (e.g., psychologists, physiotherapists) are employed by the nursing home organization. Most of the round-the-clock direct care in nursing homes is provided by direct nursing care staff, including registered nurses, certified nurse assistants and nurse aides.

Despite the heterogeneity across countries, nursing homes worldwide have to ensure the delivery of high QoC, while adequately staffing the homes remains a major concern in most countries. Direct nursing care staff vary in their educational level, thus it is a significant challenge to determine the numbers and type of staff as well as staff's competencies that are necessary to meet the complex needs of nursing home residents.[9]

DIRECT NURSING CARE STAFF

Worldwide, direct nursing care staff forms the largest group of employees in nursing homes. Across countries, the educational background of direct nursing care staff differs substantially. For example, in the United States, a minimum of 75 hours of initial training is required to become a certified nurse assistant.[22] In the Netherlands, in contrast, the educational program to become a nurse assistant is two years. Table 1 provides an overview about direct nursing care staff in Dutch nursing homes. In general, direct nursing care staff can be classified into registered nurses (RNs), licensed nurses or nurse assistants.[23]

In most reported studies, the educational background of RNs is not further clarified, while in most countries two types of RNs can be distinguished: those that hold a diploma or degree at the baccalaureate-level, and those that are vocationally trained. In the Netherlands, baccalaureate degrees can be achieved at universities of applied sciences, while in other countries, these degrees might be offered at various types of academic institutions. A new educational program in the Netherlands offers BRNs the opportunity to specialize in gerontology and geriatrics.[24] The program length to become a (B)RN in the Netherlands is four years. In Dutch, BRNs are called 'HBO-verpleegkundigen', and RNs are called 'MBO-verpleegkundigen'.

Licensed nurses receive vocational training. In the United States, they are called 'licensed practical nurses' or 'licensed vocational nurses'. Other countries refer to 'certified nurse assistants' when talking about licensed nurses.[25] The program length to become a certified nurse assistant ('verzorgende' in Dutch), is two to three years. Different types of nurse assistants can be distinguished, who are all less educated than the licensed nurses. In the international literature, they are, for example, called 'nurse assistants', 'nurse aides', or 'direct care workers'. In the Netherlands, we can distinguish between nurse assistants ('helpende' in Dutch) and nurse aides ('zorghulp' in Dutch).

Table 1: Direct nursing care staff in Dutch nursing homes.

English title	Dutch title	Dutch qualification level*	Training length (in years)
Baccalaureate-educated registered nurse	HBO-verpleegkundige	6	4
Vocationally-trained registered nurses	MBO-verpleegkundige	4	4
Certified nurse assistant	Verzorgende	3	2-3
Nurse assistant	Helpende	2	2
Nurse aide	Zorghulp	1	0.5-1

Note: * According to Dutch qualifications framework (NLQF)

In addition to the registered nurses, licensed nurses and nurse assistants, other staff members may work in direct care in nursing homes, too. For example, nursing homes may employ trainees or untrained staff. In Dutch nursing homes, often, specifically trained feeding assistants are employed to work in direct resident care. While we will pay specific attention to the employment of BRNs in nursing homes, we will also refer to 'total direct care staff'. In this dissertation, direct care staff may consist of: BRNs, vocationally trained RNs, certified nurse assistants, nurse assistants, nurse aides, feeding assistants, trainees and untrained staff. The general belief is that not only a higher number of total staff hours per resident day (HPRD) is related to better QoC in nursing homes, but also a better staff mix (higher % registered nurses/total staff). Nevertheless, evidence for these hypotheses is scarce.[9,26,27]

QUALITY OF CARE

Quality of Care (QoC) is a multidimensional concept and several definitions of QoC exist.[6,28] According to the Institute of Medicine, QoC can be defined as 'the degree to which health services for individuals and populations increase the likelihood of desired health outcomes and are consistent with current professional knowledge'.[29] The World Health Organization defines six areas or dimensions of QoC: effectivity, efficiency, accessibility, acceptability/patient-centeredness, equitability, and safety.[30] Nowadays, the measurement of QoC in nursing homes is often based on Donabedian's quality paradigm.[31] In his structure, process, and outcome (SPO) framework, QoC is operationalized in three domains.[32] Structural attributes of QoC are, for example, related to human resources (e.g., staffing levels), the organizational structure (e.g., payment system) or material resources (e.g., technological equipment). Process denotes to what is actually done (e.g., working according to evidence-based protocols). Outcome refers to health status of patients or residents.[6,32] Assessment instruments like the resident assessment instrument (RAI) or minimum data set (MDS) cover Donabedian's SPO-domains, and are used in the United States and some European countries to assess the health status of nursing home residents.[6]

In the end, the choice of QoC indicators may influence the perception of nursing home quality, as nursing homes with good outcomes on some indicators may perform poorly on others.[6] While traditionally QoC is assessed based on clinical indicators measuring adverse events (e.g., pressure ulcers, fall incidents),[9] nowadays there is a tendency to consider staff-, family- or resident-reported QoC indicators as well.[6,33] Nevertheless, up until now, few studies exist that examine the relationship between staffing and staff-, family- or resident-reported QoC in nursing homes.[34]

AIM AND OUTLINE

Aim

The aim of this dissertation is to examine the influence of direct nursing care staff on QoC in nursing homes. Besides considering staffing levels, particular attention is paid to the competencies, tasks and employment of BRNs, as they are expected to serve as informal leaders with the ability to lead improvements and redesign practice environments in nursing homes. More specifically, this dissertation provides insight into 1) the relationship between direct nursing care staffing and staff-related work environment characteristics and QoC in nursing homes; 2) future desirable distinguishing competencies of BRNs nursing homes; and 3) how organizations employ BRNs in nursing homes and what is the added value they bring to practice.

Outline

Chapter 2 presents the results of a systematic review on longitudinal studies examining the relationship between nurse staffing and QoC in nursing homes. **Chapter 3** reports on a cross-sectional study on the relationship between the presence of BRNs and QoC conducted among 282 wards and 6,145 residents from 95 Dutch long-term care facilities. The results of a cross-sectional study assessing the relationship between HPRD and QoC in 55 Dutch nursing home wards are provided in **Chapter 4**. **Chapter 5** presents a cross-sectional study examining the relationship between direct care staffing levels (measured as HPRD), work environment characteristics and staff-perceived QoC in 55 Dutch nursing home wards. The aim of the study presented in **Chapter 6** was to reach consensus on competencies, which should in the future, distinguish BRNs from other nursing staff (e.g., vocationally trained registered nurses, certified nurse assistants) in nursing homes. **Chapter 7** reports on a qualitative study, aimed at obtaining insight into how organizations employ BRNs in nursing homes and what is the perceived added value in care practices that organizations experience from their employment. The final chapter (**Chapter 8**) summarizes the main findings of our studies, discusses methodological and theoretical considerations, and presents future directions for practice and research.

RESEARCH LINE 'NURSES ON THE MOVE: TOWARDS HIGH-QUALITY CARE IN NURSING HOMES' AND LIVING LAB IN AGEING & LONG-TERM CARE

This PhD project is part of the research line 'Nurses on the Move: Towards High-Quality Care in Nursing Homes' funded by ZonMw, the Netherlands Organization for Health Research and Development (project number: 520001003). The overall objective of this research line is to contribute to the improvement of QoC in nursing homes in general, by improving the functional status of and reducing disability in nursing home residents. The research line consists of three interrelated PhD projects. In project one, a care approach is developed to encourage physical activity and improve the functional status of residents. Project two aims to support nursing staff in implementing innovations. In project three (described in this dissertation), direct nursing care staffing and QoC in nursing homes are studied.

The research line is embedded in the Living Lab in Ageing & Long-Term Care. This is a formal, multidisciplinary network consisting of Maastricht University, Zuyd University of Applied Sciences and seven large long-term care organizations, all located in the southern part of the Netherlands. The aim of this network is to improve the quality of long-term care.

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CHAPTER **2**

NURSE STAFFING IMPACT ON QUALITY OF CARE IN NURSING HOMES: A SYSTEMATIC REVIEW OF LONGITUDINAL STUDIES

ABSTRACT

Background: The relationship between nurse staffing and quality of care (QoC) in nursing homes continues to receive major attention. The evidence supporting this relationship, however, is weak because most studies employ a cross-sectional design. This review summarizes the findings from recent longitudinal studies.

Methods: In April 2013, the databases PubMed, CINAHL, EMBASE, and PsycINFO were systematically searched. Studies were eligible if they (1) examined the relationship between nurse staffing and QoC outcomes, (2) included only nursing home data, (3) were original research articles describing quantitative, longitudinal studies, and (4) were written in English, Dutch, or German. The methodological quality of 20 studies was assessed using the Newcastle-Ottawa scale, excluding 2 low-quality articles for the analysis.

Results: No consistent relationship was found between nurse staffing and QoC. Higher staffing levels were associated with better as well as lower QoC indicators. For example, for restraint use both positive (ie, less restraint use) and negative outcomes (ie, more restraint use) were found. With regard to pressure ulcers, we found that more staff led to fewer pressure ulcers and, therefore, better results, no matter who (registered nurse, licensed practical nurse/licensed vocational nurse, or nurse assistant) delivered care.

Conclusions: No consistent evidence was found for a positive relationship between staffing and QoC. Although some positive indications were suggested, major methodological and theoretical weaknesses (eg, timing of data collection, assumed linear relationship between staffing and QoC) limit interpretation of results. Our findings demonstrate the necessity for well-designed longitudinal studies to gain a better insight into the relationship between nurse staffing and QoC in nursing homes.

INTRODUCTION

During the last 3 decades, there has been growing concern about nursing home quality in most industrialized countries,[1-4] with an apparent variability of quality among countries.[5] Poor quality of nursing home care has often been associated with insufficient staffing levels,[6] as staffing is presumed to affect the quality of care (QoC) and life of nursing home residents.[7] In the United States (US), since 1987, federal government regulations have mandated minimum staffing levels. In addition, some US states have introduced additional nurse staffing requirements for nursing homes.[7] Conspicuously, experts recommended higher staffing standards than those mandated for US nursing homes.[8] Inconsistent US findings on staffing and quality in nursing homes suggest that further research is needed.[9]

In recent years, the relationship between staffing and QoC in nursing homes has received considerable attention. Reviews of studies reveal only weak evidence about the association between nurse staffing and QoC in nursing homes.[6,10,11] For example, Bostick et al[10] describe the functional ability of residents, the prevalence of pressure ulcers, and residents' weight loss as the most nurse sensitive quality indicators with regard to staffing, but consensus on which quality indicators are most nursing sensitive is absent.[2] Spilsbury et al[11] concluded that the existing research evidence demonstrates inconsistent and contradictory findings about the relationship between nurse staffing and the QoC in nursing homes. They included 50 studies, predominantly from the US and with a cross-sectional design, demonstrating provisional evidence that total nurse, registered nurse (RN) and nurse assistant (NA) staffing influenced the QoC for nursing home residents. The authors[11] underscore the cross-sectional design as a major criticism of prior studies. Conclusions from cross-sectional studies are possibly biased because of unobserved factors that affect nursing home quality, correlating with the explanatory variables used in these studies.[12] As a result, these designs could account for the weak associations found in prior studies.[6,10-12]

More evidence is needed, especially from longitudinal studies. For this reason, the aim of this study is to review recent longitudinal studies focusing on nurse staffing and QoC outcomes in nursing homes. This will provide more reliable evidence about staffing and QoC in nursing homes, as we expect less inconsistent and contradictory results compared with those obtained in prior reviews.[6,10,11] The results of this study will contribute to the discussion about implementing minimum staffing standards and will help to determine optimal nurse staffing levels in nursing homes.

DEFINITIONS

In our study, 4 different categories of nursing staff will be distinguished: (1) total nurse staff including RNs, licensed practical nurses (LPN)s or licensed vocational nurses (LVN)s, and nurse assistants (NA)s; (2) RN staff; (3) LPN or LVN staff; and (4) NA staff.

Two staffing characteristics, namely 'nurse staffing levels' and 'professional staff mix' will be central in our analysis, as they are considered to influence QoC in nursing homes.[13] Studies assessing 'nurse staffing levels' focus on numbers of nurses. 'Nurse staffing levels' can be defined as the ratio of (1) nurse staff to residents or (2) nurse hours per resident.[10] In studies examining 'nurse staffing levels,' each category of nursing staff (total staff, RN staff, LPN/LVN staff, NA staff) is considered separately. However, 'professional staff mix' is measured as a ratio of different staff categories, for example the ratio of RN to total nurse staff or the ratio of RN to LPN and NA staff.

With regard to QoC outcomes, we will distinguish between clinical (eg, pressure ulcers, infections), process-related (eg, restraining, hospitalization), and administrative outcomes (ie, deficiency citations). Nursing home deficiency citations have been widely used as quality indicators in US nursing home studies.[14] In the US, nursing home deficiency citations are given to those nursing homes that failed to meet at least 1 federal or state QoC requirement.[15]

METHODS

Search Strategy

In April 2013, a literature search was performed. The search strategy included terms related to staffing, quality of care, and the place of residence. Search terms with respect to staffing (Staffing OR "Staff mix" OR "RN mix" OR "RN ratio" OR "Skill mix" OR "Staff utilization") were combined using the Boolean operator 'AND' with search terms relating to QoC ("Quality of care" OR "Patient outcomes" OR "Resident outcomes") and terms referring to the place of residence (nursing homes OR residential facilit* OR Long term care facilit* OR "Assisted living" OR "Residential care" OR "Housing for the elderly" OR care homes OR "Long term care setting" OR institutional* OR "Homes for the aged" OR Special care unit*). Articles published between January 2007 and April 2013 were retrieved by searching PubMed, CINAHL, EMBASE and PsycINFO. Longitudinal studies prior to 2008 were extracted from the review conducted by Spilsbury et al,[11] as they have selected and reviewed 50 out of 13,411 potential studies published from 1980 to 2007. To obtain all relevant articles published in 2007, we decided to include studies published in 2007 in our own search as well. Furthermore, all the bibliographies of included articles were searched for additional references.

Eligibility Criteria

Studies were eligible if they (1) examined the relationship between nurse staffing and QoC outcomes, (2) included only nursing home data, (3) were original research articles describing quantitative, longitudinal studies, and (4) were written in English, Dutch, or German.

Study Screening and Data Extraction

The retrieved articles were managed in an Endnote library (version X6). Two researchers (RB, HV) independently screened titles and abstracts for relevance. After reaching consensus on the results of the independent screening of abstracts, full-text articles were obtained for potentially relevant studies. In addition, the principal author (RB) searched the review by Spilsbury et al[11] for longitudinal studies. Two members of the research team independently screened the full-text articles and scored them as 'include,' 'possibly include,' or 'exclude.' To reach consensus about the final list of included studies, disagreement between the researchers was discussed and resolved.

The principal researcher (RB) extracted data from all relevant articles using a standardized form specifically developed for the current study. For all included articles, data on the following items were collected: publication type, aims of the study, study method, independent staffing variables, covariates, findings of the study, and potential limitations and recommendations. The extracted data were discussed within the research team.

Methodological Quality

The methodological quality of included studies was assessed using the Newcastle-Ottawa scale for assessing the quality of nonrandomized studies[16] (Table 1). The scale consists of 9 items covering 3 domains: selection (representativeness of the cohort), comparability (controlling for confounders), and outcomes (assessment and follow-up). Two researchers (RB, HV) independently rated the quality of each included study on a scale from 0 stars to 9 stars. Studies were classified into groups of low (less than 6 stars), moderate (6–7 stars), or high (8–9 stars) quality studies.[17,18] Disagreement between the researchers was discussed to reach consensus. Table 2 shows the final assessments of all included studies.

Table 1: Tailored Newcastle Ottawa Scale for Assessing the Quality of Nonrandomized Studies

Domain	Item
Selection	(1) Representativeness of the exposed cohort (1 star) • truly representative of the average person living in an institutional long-term care setting ☼ • somewhat representative of the average person living in an institutional long-term care setting ☼ • selected group of persons living in an institutional long-term care setting • no description of the derivation of the cohort (2) Selection of the non-exposed cohort (1 star) • drawn form the same community as the exposed cohort ☼ • drawn from a different source • no description of the derivation of the non-exposed cohort (3) Ascertainment of exposure (staffing) (1 star) • secure record (eg, medical record) ☼ • structured interview ☼ • written self-report • no description or ascertained in some other way (4) Demonstration that outcome of interest was not present at baseline (1 star) • yes ☼ • no
Comparability	(5) Comparability of cohorts on the basis of the design or analysis (2 stars) • study controls for resident characteristics ☼ • study controls for facility characteristics ☼
Outcomes	(6) Assessment of outcome (1 star) • independent or blind assessment ☼ • record linkage ☼ • self-report • no description or ascertained in some other way (7) Was follow-up long enough for outcomes to occur (1 star) • yes (select an adequate follow up period for outcome of interest) ☼ • no (8) Adequacy of follow-up of cohorts (1 star) • complete follow-up – all subjects accounted for ☼ • subjects lost to follow-up unlikely to introduce bias – small number lost: >80% follow-up, or description of those lost ☼ • no description of those lost • no statement

Data Synthesis and Analysis

Because of the heterogeneity in studies regarding their assessment of nurse staffing characteristics and QoC data, we did not conduct a meta-analysis. Instead, the findings of included studies were summarized in a systematic way. Low-quality studies (n = 2) were excluded from analysis. While summarizing the findings, we distinguished studies

examining 'nurse staffing levels' and 'professional staff mix.' For both categories, the results of included studies were grouped per QoC outcome (eg, pressure ulcers, infections, restraint use). Per QoC outcome, the results were categorized into 4 different groups on the basis of whether they examined (1) total staff, (2) RN staff, (3) LPN/LVN staff, or (4) NA staff. In presenting our findings, we distinguished between studies that found a positive and statistically significant relationship between staffing and QoC outcomes, a negative and statistically significant relationship or no statistically significant association.

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RESULTS

Figure 1 presents the flowchart of the inclusion process. In total, 20 articles were included (Table 2).

General Characteristics of Included Studies

Table 2 presents an overview of the general characteristics of all included studies. All studies were US-based,[13,19-36] except 1 study that was conducted in Italy.[37] Sixteen studies were published from 2002 onwards, 3 studies in 1998 or 1999[25,29,30] and 1 in 1987.[31]

In all included studies, covariates were considered to control for other variables that could potentially affect QoC outcomes. Broadly speaking, these can be grouped into resident (eg, age, sex, disease status), facility (eg, ownership, facility size), and market/economic characteristics (eg, occupancy rates, Medicaid reimbursement rates).

Methodological Differences and Quality of Included Studies

The included studies differed in the level of analysis used. Six studies[23,30-32,36,37] conducted analyses on resident-level and 11 studies[13,20-22,24,26-28,33-35] on facility level. Three studies[19,25,29] performed multilevel analyses.

Moreover, the included studies differ in the way the staffing-quality relationship was examined. Ten studies[13,19,21-24,26-28,31] focused specifically on the staffing-quality relationship. The other 10 studies[20,25,29,30,32-37] used staffing as a control variable. In most included studies, a linear relationship between staffing and QoC outcomes was assumed; the more nursing staff available, the better the quality.

The methodological quality scores of studies ranged from 3 to 9. Two studies[19,31] were of low quality, 14[20,22-30,32,34,35,37] of moderate quality and 4[13,21,33,36] of high quality. The 2 low-quality articles were excluded from analyses.[19,31]

Search in databases (n=320)
- PubMed (n=98)
- Cinahl (n=87)
- Embase (n=88)
- PsycInfo (n=47)

Duplicate publications excluded (n=157)

Potential relevant publications (n=163)

Publications excluded (n=144)

Potential relevant publications after screening abstracts (n=19)

Publications excluded (n=9)
- cross-sectional design (n=3)
- non-empirical research (n=1)
- not examining relationship between nurse staffing and QoC outcomes (n=3)
- no nursing homes (n=1)
- conference abstract (n=1)

Relevant publications after screening full-texts (n=10)

Longitudinal studies included by Spilsbury et al.[11] (n=13)

Publications excluded (n=2)
- not matching our outcome measure (n=1)
- not matching our staffing measure (n=1)

Sum of relevant publications (n=21)

Relevant publications (n=11)

Relevant publications after duplicates removed (n=20)
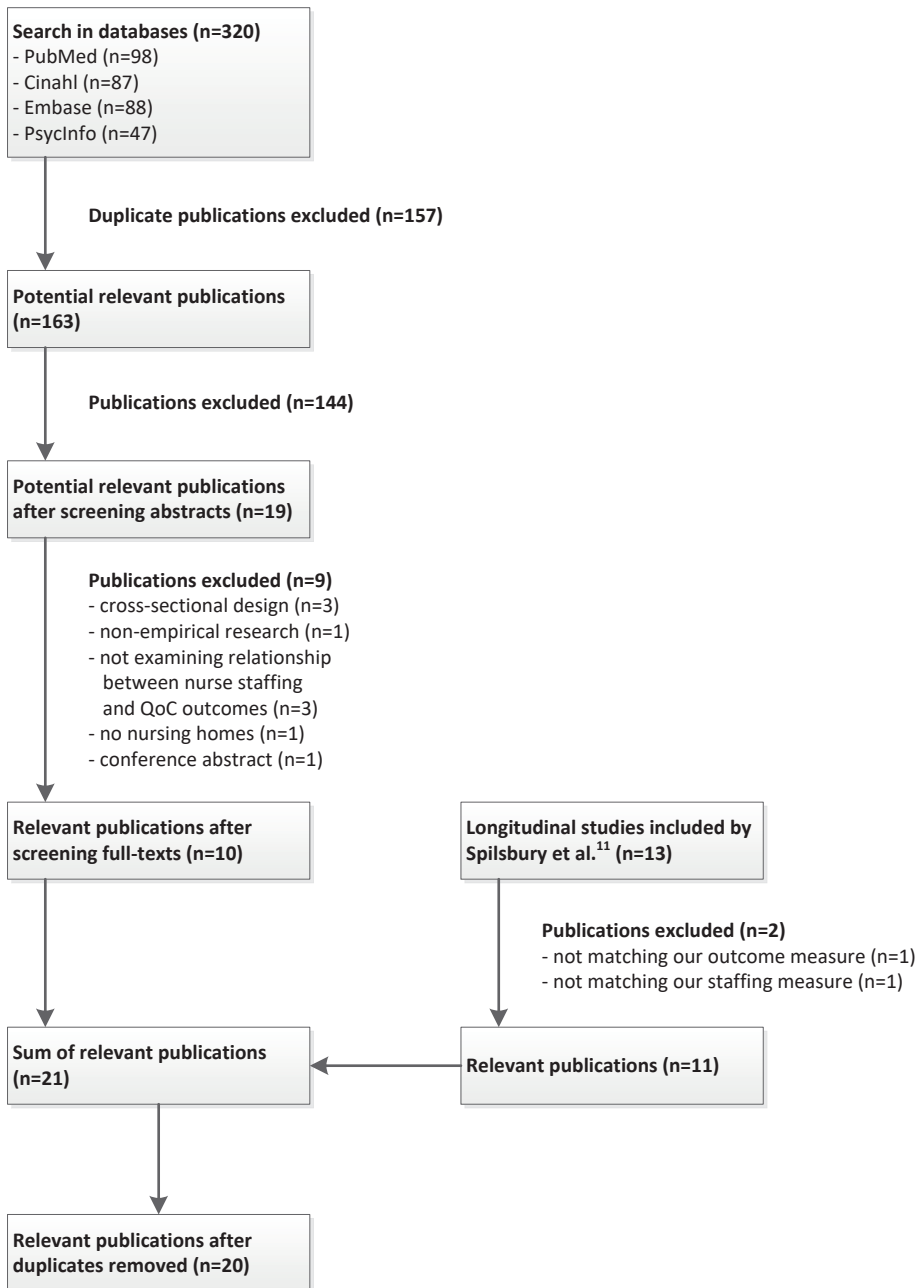
Figure 1: Flow diagram of the search process

Table 2: General Characteristics of Included Studies

Author, Year, Country	Sample Population	Data Collection	Nurse Staffing Variables	Patient-Related Quality of Care Measures and Level of Analysis	Methodological Quality of the Study
Arling et al 2007[19], US	105 nursing homes 156 units 5,314 residents Follow-up: 90 days	Staffing: Self-report staff Outcomes: MDS assessments	Unit-level direct care hours/day: - avg. RN - avg. LPN - avg. unlicensed Resident level direct care hours/day: - RN - LPN - Aid	- ADL decline - Mobility decline - Worsening behavior problems Level of analysis: Resident and unit level (multilevel)	Total: 5 - Selection: 2 - Comparability: 2 - Outcomes: 1
Castle 2011[20], US	16,745 nursing homes (10% drop-out) Follow-up: 7 years	OSCAR data	- FTE RN per resident - FTE LPN per resident - FTE NA per resident	Deficiency citations for abuse - any citation for abuse (F-223, 224, 225, or 226) - F-223: abuse - F-224: neglect, staff treatment of residents - F-225: Criminal screening investigating and reporting - F-226: Abuse prevention and policy development and implementation Level of analysis: Facility level	Total: 6 - Selection: 1 - Comparability: 2 - Outcomes: 3

Author, Year, Country	Sample Population	Data Collection	Nurse Staffing Variables	Patient-Related Quality of Care Measures and Level of Analysis	Methodological Quality of the Study
Castle and Anderson 2011[13]; US	2,839 nursing homes Follow-up: 4 years	Staffing: Surveys of staff Outcomes: OSCAR data, Nursing Home Compare	- FTE RN per 100 residents - FTE LPN per 100 residents - FTE NA per 100 residents	- Restraints - Catheters - Pain - Pressure ulcers Level of analysis: Facility level	Total: 8 - Selection: 3 - Comparability: 2 - Outcomes: 3
Castle et al 2011[21]; US	16,745 nursing homes (10% drop-out) Follow-up: 7 years	OSCAR data	- FTE RN per resident - FTE LPN per resident - FTE NA per resident	Deficiency citations for safety - Environmental safety - Care safety - All safety issues (K-tags for safety) Level of analysis: Facility level	Total: 8 - Selection: 3 - Comparability: 2 - Outcomes: 3
Cherubini et al 2012[37]; Italy	31 nursing homes 1,466 residents Follow-up: 1 year	Staffing: Ad-hoc designed questionnaire Outcome: Self-report staff	- Nurse hours per resident per week	Hospitalization Level of analysis: Facility level	Total: 6 - Selection: 2 - Comparability: 2 - Outcomes: 2
Hickey et al 2005[22]; US	35 Departments of Veterans Affairs nursing homes Follow-up: 1 year	Staffing: Document analysis, structured telephone interviews Outcome: PAF from Department of Veteran Affairs database	- RN HPRD - Total staff HPRD	Pressure ulcers Level of analysis: Facility level	Total: 7 - Selection: 4 - Comparability: 1 - Outcomes: 2

Author, Year, Country	Sample Population	Data Collection	Nurse Staffing Variables	Patient-Related Quality of Care Measures and Level of Analysis	Methodological Quality of the Study
Horn et al 2005[23], US	82 long-term care facilities 1,376 residents Follow-up: 12 weeks	Staffing: Self-report staff for NPULS data Outcomes: NPULS data (abstracted from residents' medical records)	- RN time spent on direct care - LPN time spent on direct care - NA time spent on direct care	- Deterioration in ability to perform ADL - Pressure ulcers - Hospitalizations - Urinary tract infections - Weight loss - Catheterization Level of analysis: Resident level	Total: 7 - Selection: 4 - Comparability: 1 - Outcomes: 2
Hyer et al 2011[24], US	663 nursing homes Follow-up: 3 years	Staffing: Florida Nursing Home Staffing Report (self-report facilities) Outcomes: OSCAR data	- LPN HPRD - CNA HPRD	- Total deficiency score - QoC deficiency score	Total: 7 - Selection: 3 - Comparability: 2 - Outcomes: 2
Intrator et al 1999[25], US	253 nursing homes 2,080 residents Follow-up: 6 months	Staffing: OSCAR Outcome: MDS assessments	- FTE RN per 100 beds - FTE LPN per 100 beds - FTE NA per 100 beds	Hospitalization Level of analysis: Resident and facility (multilevel)	Total: 7 - Selection: 3 - Comparability: 2 - Outcomes: 2
Kim et al 2009a[26], US	Two groups: 201 and 210 nursing homes Follow-up: 4 years	Staffing: California Long-Term Care Annual Cost Report Data Outcomes: ACLAIMS	- Total staffing hours - RN hours - RN/total staff - RN/LVN	- Total deficiencies - Serious deficiencies Level of analysis: Facility level	Total: 6 - Selection: 2 - Comparability: 2 - Outcomes: 2

2

Author, Year, Country	Sample Population	Data Collection	Nurse Staffing Variables	Patient-Related Quality of Care Measures and Level of Analysis	Methodological Quality of the Study
Kim et al 2009b[27], US	1,099 skilled nursing homes Follow-up: 4 years	Staffing: California Long-Term Care Annual Cost Report Data Outcomes: ACLAIMS	- Total HPRD - RN HPRD - LPN HPRD - NA HPRD	- Total deficiencies - Quality of care deficiencies - Serious deficiencies Level of analysis: Facility level	Total: 7 - Selection: 3 - Comparability: 2 - Outcomes: 2
Konetzka et al 2008[28], US	1,366 nursing homes Follow-up: 3 years	Staffing: OSCAR data Outcomes: MDS assessments	- RN HPRD - Skill mix (% of total hours provided by RNs)	- Pressure ulcers - Urinary tract infection Level of analysis: Facility level	Total: 7 - Selection: 3 - Comparability: 2 - Outcomes: 2
Ooi et al 1999[29], US	70 nursing homes 5,518 residents Follow-up: minimum 6 months	National Health Care, LP Inc. chain of nursing homes database	- Avg. licensed staff time (min.) - Avg. non licensed staff time (min.)	- Pressure ulcers - Disruptive behavior Level of analysis: Resdient and facility level (multilevel)	Total: 6 - Selection: 2 - Comparability: 2 - Outcomes: 2
Porell et al 1998[30], US	59,407 residents Follow-up: minimum 3 months	Management Minutes Questionnaire	- Avg. FTE total staff HPRD - RN staff expenses - LPN staff expenses	- ADL - Better mental status - Incontinence Level of analysis: Resident level	Total: 7 - Selection: 3 - Comparability: 2 - Outcomes: 2

2

Author, Year, Country	Sample Population	Data Collection	Nurse Staffing Variables	Patient-Related Quality of Care Measures and Level of Analysis	Methodological Quality of the Study
Rohrer and Hogan 1987[31], US	2 Veteran Affairs nursing homes 290 residents Follow-up: 3 months	Staffing: Self-report staff Outcome: Survey data from Veterans Administration Health Services Research and Development Field Program	- RN time spent on direct care - LPN+NA time spent on direct care	Improvement in physical functioning Level of analysis: Resident level	Total: 3 - Selection: 1 - Comparability: 1 - Outcomes: 1
Spector et al 2007[32], US	2,711 residents Follow-up: 1 year	Staffing: MEPS Outcome: Medical records	- FTE RN per 100 residents - FTE LPN per 100 residents - FTE CNA per 100 residents	Fractures Level of analysis: Resident level	Total: 7 - Selection: 3 - Comparability: 2 - Outcomes: 2
Wagner et al 2013[33], US	16,745 nursing homes (10% drop-out) Follow-up: 7 years	OSCAR data	- FTE RN per resident - FTE LPN per resident - FTE NA per resident	Restraint/Side Rail Related Deficiencies Level of analysis: Facility level	Total: 8 - Selection: 3 - Comparability: 2 - Outcomes: 3
Wan et al 2006[34], US	11,197 nursing homes Follow-up: 6 years	OSCAR data	- Total staff HPRD	Weighted index of improved resident outcomes (pressure ulcers, physical restraints, indwelling catheters) Level of analysis: Facility level	Total: 7 - Selection: 3 - Comparability: 2 - Outcomes: 2

Author, Year, Country	Sample Population	Data Collection	Nurse Staffing Variables	Patient-Related Quality of Care Measures and Level of Analysis	Methodological Quality of the Study
Zhang and Grabowski 2004[35]; US	5,092 nursing homes Follow-up: 6 years	MMACS data, OSCAR data	- RN HPRD - LPN HPRD - NA HPRD	- Pressure ulcers - Physical restraints - Catheters Level of analysis: Facility level	Total: 7 - Selection: 3 - Comparability: 2 - Outcomes: 2
Zimmerman et al 2002[36], US	59 nursing homes 2,015 residents Follow-up: 2 years	Staffing: Interviews, Health Care Financing Administration Form 671 Outcomes: Medical record abstraction	- FTE RN/100 beds - FTE LPN/100 beds - FTE NA/100 beds	- Infection - Hospitalization for infection Level of analysis: Resident level	Total: 9 - Selection: 4 - Comparability: 2 - Outcomes: 3

Note: ACLAIMS, Automated Certification and Licensing Administrative Information and Management System; ADL, activities of daily living; CNA, certified nurse assistant; FTE, full-time equivalent; HPRD, hours per resident day; LPN, licensed practical nurse; LVN, licensed vocational nurse; MDS, Minimum Data Set; MEPS, Medical Expenditure Panel Survey; MMACS, Medicare/Medicaid Automated Certification System; NA, nurse assistant; NPULS, National Pressure Ulcer Long-Term Study; OSCAR, Online Survey, Certification, and Reporting; PAF, patient assessment file; RN, registered nurse; QoC, quality of care.

Relationship Between Staffing Levels and QoC Outcomes

Sixteen studies[13,20-25,27,28,30,32-37] explored the relationship between nurse staffing levels and QoC outcomes. We distinguish between clinical, process-related, and administrative outcomes for reporting the results. Table 3 summarizes our findings.

Clinical Outcomes

Nine studies[13,22,23,28,30,32,34-36] examined the relationship between staffing levels and one or more clinical outcomes. In 1 study,[34] more total staffing was associated with better clinical outcomes. Three studies[13,23,28] concluded that more RN staff positively contributed to clinical outcomes, whereas 2 studies[30,35] found a negative effect of more RN staff. With regard to LPN/LVN staffing, 2 studies[13,23] associated more staff with better outcomes and 2[35,36] with worse clinical resident outcomes. In 6 studies,[13,23,29,32,35,36] more NA staffing was associated with fewer clinical problems.

Pressure Ulcers
Five studies[13,22,23,28,35] investigated whether there was a relationship between nurse staffing level and the prevalence of pressure ulcers. In general, more RN staff,[13,23,28] LPN/LVN staff[13,23] and NA staff[13,23,35] were associated with a decrease in pressure ulcer prevalence. Contrary, another study[35] reported that more RN and more LPN staff were associated with an increase in pressure ulcer prevalence. In 1 study,[22] a significant relationship between more total staff and the pressure ulcer prevalence was absent.

Infections
The relationship between staffing levels and infections was assessed in three studies.[23,28,36] Accordingly, more RN staff was linked to fewer urinary tract infections,[23,28] whereas a significant relationship for LPN/LVN or NA staff was absent.[23] One study,[36] which did not focus on a specific type of infections, showed that more LPN/LVN staff was related to a higher occurrence of infections, whereas more NA staff was associated with fewer infections.

Activities of Daily Living Decline
More RN staff was associated with a decrease in[23] or no significant effect[30] on the likelihood of activities of daily living decline. For total staff,[30] LPN/LVN,[23,30] and NA staff,[23] no significant relationships were observed.

Other Clinical Outcomes
In a study[32] investigating the relationship between more NA staff and the occurrence of fractures, more NA staff was associated with fewer fractures. In another study,[30] more

RN staff was associated with a higher likelihood of urinary incontinence, whereas a significant relationship with regard to LPN/LVN staff was not found. Another study[13] showed that higher RN, LPN/LVN, and NA staffing levels were linked to less reported complaints of pain. In another study,[23] more RN staff was associated with fewer residents losing weight, whereas LPN/LVN and NA staff were not significantly related. One study[29] found an association between more NA staff and less disruptive behavior of residents. Another study[34] reported that increasing total staff was associated with an improvement of resident outcomes, measured by weighing the incidents of pressure ulcers, physical restraints, and catheter use.

Process-Related Outcomes

Six studies[13,23,25,35-37] examined the relationship between staffing levels and process-related resident outcomes. More RN staffing was associated with better[13,23,37] and poorer[35] process-related outcomes. More LPN/LVN staff led to better[13,37] or poorer[35] resident outcomes. Three studies[13,35,37] reported that more NA staff seemed to be associated with better process-related outcomes.

Restraints
More RN staff was associated with both more[35] and less[13] restraint use. More LPN/LVN staff was associated with less physical restraint use in 1 study,[13] whereas the other study[35] did not find a significant relationship. In both studies,[13,35] it was assumed that in homes with more NA staff, physical restraints were used less often.

Catheterization
In 3 studies,[13,23,35] less catheterization was considered as a proxy for a better urinary incontinence status of residents. More RN staff was associated with less[13,23] as well as with more[35] catheterizations. One study[35] reported that catheterization was more likely to occur with more LPN/LVN staff; 2 studies[13,23] did not find a significant relationship. All 3 studies[13,23,35] did not find a significant relationship for NA staff.

Hospitalization
In 4 studies,[23,25,36,37] hospitalization was considered a proxy for poor overall health. Two studies[23,37] found that more RN staff was associated with a lower number of hospitalizations, whereas a significant relationship could not be found in another study.[25] More LPN/LVN staff was associated with fewer hospitalizations in 1 study[37]; in 3 studies,[23,25,36] no significant relationship was found. More NA staff was associated with a decrease in hospitalization in 1 study,[37] whereas 3 studies[23,25,36] did not find a significant relationship.

Administrative Outcomes

Five studies[20,21,24,27,33] focused on the relationship between staffing levels and deficiency citations as QoC outcomes. One study[27] found that more total staff resulted in fewer deficiency citations. Four studies[20,21,27,33] reported that more RN staff was associated with fewer deficiency citations, whereas 1 study found a contrary result.[20] More LPN/LVN staff was associated with more deficiency citations,[21,27] whereas 1 study[33] reported the opposite result. Depending on the study analyzed, more NA staff was associated with more[21,33] or fewer[24,27] deficiency citations.

In 1 study,[27] more total staff was associated with a decrease in the amount of total deficiency citations, citations for serious deficiencies and for QoC. Inconsistent results were found for each of the other 3 staffing categories. In another study,[21] focusing on deficiency citations for safety, more RN staff was associated with a decrease in the number of deficiency citations (adjusted odds ratios: 0.95–0.97), whereas the findings for second-level nurse and NA staff were inconsistent. One study[20] assessed the relationship between RN, second-level nurse, NA staff and 5 different classifications of deficiency citations for abuse. With regard to RN staff, 3 relationships were not significant, whereas 1 citation for abuse (citation F-225: 'Criminal screening investigating and reporting') was less likely, and another (citation F-226: 'Abuse prevention and policy development and implementation') was more likely to occur. For LPN/LVN and NA staff, no significant relationships were found. Another study[33] reported that more RN and more LPN/LVN staff were associated with a decrease in the number of deficiency citations for restraints or side rails, whereas more NA staff was associated with an increase.

Relationship Between Professional Staff Mix and QoC Outcomes

Three studies[13,26,28] examined the relationship between professional staff mix and QoC outcomes.

Clinical Outcomes
An association between a higher RN/total staff ratio[28] and a higher RN/NA+LPN staff ratio[13] and the prevalence of pressure ulcers could not be found. A higher RN/total staff ratio was associated with fewer urinary tract infections,[28] whereas no significant relationship for mood decline[24] was found. One study[13] reported that a higher RN/NA+LPN ratio was associated with fewer reports of pain.

Process-Related Outcomes
One study[13] examined the relationship between professional staff mix and process-related resident outcomes. A higher RN/NA+LPN ratio was associated with a lower

likelihood of catheterization,[13] whereas for the use of physical restraints[13] no significant relationship could be found.

Administrative Outcomes

One study[26] examined the relationship between RN/total staff or RN/LVN ratios and the number of total and serious deficiencies (Table 2). For nursing homes meeting California's minimum standard for total nurse staffing level [3.2 or more total hours per resident day (HPRD)] during the 5-year period under consideration, a higher RN/total staff ratio was associated with fewer serious deficiencies, whereas a significant relationship with total deficiencies was not found. For nursing homes not meeting the state standard, a higher RN/total staff ratio was associated with fewer total deficiencies, but a significant relationship for serious deficiencies was not explored. For both nursing homes meeting and not meeting the state standard, a higher RN/LVN ratio was associated with fewer total as well as fewer serious deficiency citations.[26]

Table 3: Relationship Between Nurse Staffing and QoC in Nursing Homes

	More Total Staff	More RN staff	More LPN/LVN staff	More NA staff
Less likely to occur	Clinical: - Process: - Weighted incidence of pressure ulcers, physical restraints, and catheter use[34f] Administrative: Total deficiencies[27f] Serious deficiencies[27f] QoC deficiencies[27f]	Clinical: Pressure ulcers[23r,13,28f] Infections[23r,28f] ADL decline[23r] Pain[13r] Weight loss[23r] Process: Restraints[13f] Catheterization[23r,13f] Hospitalization[23,37r] Administrative: Total deficiencies[27f] QoC deficiencies[27f] Deficiencies for safety - Environmental safety[21f] - Care safety[21f] - All K-tags[21f] Deficiencies for abuse: - F-225[§,20f] Deficiencies for restraints or restrictive side rails[33f]	Clinical: Pressure ulcers[23r,13f] Pain[13f] Process: Restraints[13f] Administrative: Deficiencies for restraints or restrictive side rails[33f]	Clinical: Pressure ulcers[23r,13,35f] Infections[36r] Fractures[32r] Pain[13r] Disruptive behavior[29m] Process: Restraints[13,35f] Hospitalization[37r] Administrative: Total deficiencies[27f] QoC deficiencies[24,27f]
No significant relationship	Clinical: Pressure ulcers[22f] ADL decline[30r]	Clinical: ADL decline[30r]	Clinical: Infections[23r] ADL decline[23,30r] Urinary incontinence[30r] Weight loss[23r]	Clinical: Infections[23r] ADL decline[23r] Weight loss[23r]

2

	More Total Staff	More RN staff	More LPN/LVN staff	More NA staff
	Process: -	Process: Hospitalization[25m]	Process: Restraints[35f] Catheterization[23r,13f] Hospitalization[23,36r,25m]	Process: Catheterization[23r,13,35f] Hospitalization[23,36r,25m]
	Administrative: -	Administrative: Deficiencies for abuse: - any citation for abuse[*,20f] - F-223[†,20f] - F-224[‡,20f]	Administrative: Total deficiencies[24f] QoC deficiencies[24f] Deficiencies for safety: - Environmental safety[21f] - All K-tags[21f] Deficiencies for abuse: - any citation for abuse[*,20f] - F-223[†,20f] - F-224[‡,20f] - F-225[§,20f] - F-226[I,20f]	Administrative: Total deficiencies[24f] Deficiencies for safety: - Care safety[21f] - All K-tags[21f] Deficiencies for abuse: - any citation for abuse[*,20f] - F-223[†,20f] - F-224[‡,20f] - F-225[§,20f] - F-226[I,20f]
More likely to occur	Clinical: -	Clinical: Pressure ulcers[35f] Urinary incontinence[30r]	Clinical: Pressure ulcers[35f] Infections[36r]	Clinical: -
	Process: -	Process: Restraints[35f] Catheterization[35f]	Process: Catheterization[35f]	Process: -
	Administrative: -	Administrative: Deficiencies for abuse: - F-226[I,20f]	Administrative: Total deficiencies[27f] QoC deficiencies[27f] Deficiencies for safety: - Care safety[21f]	Administrative: Deficiencies for safety: - Environmental safety[21f] Deficiencies for restraints or restrictive side rails[33f]

Note: ADL, activities of daily living; f, facility level; LPN, licensed practical nurse; LVN, licensed vocational nurse; m, multilevel; NA, nurse assistant; r, resident level; RN, registered nurse; QoC, quality of care; * F-223, F-224, F-225 or F-226 ; † F-223: Citation for abuse; ‡ F-224: Citation for neglect, staff treatment of residents; § F-225: Criminal screening investigating and reporting; I F-226: Abuse prevention and policy development and implementation

DISCUSSION

The aim of this review was to analyze findings from longitudinal studies examining the impact of nurse staffing on QoC outcomes in nursing homes. This review did not find convincing evidence for a positive relationship between nurse staffing levels and QoC. We found that higher numbers of nurse staff were associated with better as well as lower QoC outcomes. For example, for restraint use and catheterization, both positive (ie, less restraints/catheterization) and negative outcomes (ie, more restraints/catheterization) were found. With regard to pressure ulcers, we found that more staff led to better results, no matter who (RN, LPN/LVN or NA) delivered care.

This review is the first to provide an extensive overview of longitudinal studies examining the relationship between staffing and QoC outcomes in nursing homes. However, some limitations must be considered. We defined longitudinal studies as those studies repeatedly measuring QoC outcomes (dependent variable) over a period of time, and at least 1 measurement of staffing should precede the assessment of QoC. Ideally, the measurement of staffing characteristics should be measured at baseline and should precede the assessment of QoC outcome parameters. As in some included studies, the timing of measuring staffing characteristics was not clearly described; it is questionable whether authors are examining the effects of staffing on QoC. For nursing homes with high turnover rates, baseline staffing data might be less relevant. Although staffing was not measured at baseline in each study, the measurement of staffing at least preceded the follow-up assessment(s) of QoC. Furthermore, conducting a meta-analysis might have resulted in a more precise estimate of the relationship between nurse staffing and QoC. However, because of the heterogeneous nurse staffing and QoC data considered in the included studies, this analysis was not feasible. Finally, scales for assessing the quality of observational studies are diverse, emphasizing different aspects of methodological quality. We chose the Newcastle-Ottawa scale[16] based on the recommendations of the Cochrane collaboration.[38] Another scale could have resulted in a different quality assessment of studies, although it is unlikely that this would have resulted in the in-/exclusion of other studies.

Our review found no consistent evidence for a positive relationship between nurse staffing and QoC, which is different from conclusions drawn in previous reviews.[6,10,11] Our less positive and unexpected result can partly be explained by the fact that we included only longitudinal studies. In general, cross-sectional study designs, as included in the previous reviews, lead more often to positive findings. The different length of follow-up among the various studies is another methodological issue that might account for the heterogeneity of results. However, several theoretical drawbacks should be taken into account as well.

First, most studies hypothesized a linear relationship between nurse staffing and QoC outcomes, assuming that more staff would lead to better QoC outcomes. As the relationship is probably nonlinear, meaning that a 1-unit increase in nursing staff will not necessarily lead to a 1-unit increase in QoC, this could be an explanation for the lack of effect.

A second explanation for lack of effect might be the selection of QoC outcomes in the included studies. As each QoC outcome only serves as a proxy for overall QoC,[10] QoC outcomes should be selected carefully. Some QoC outcomes could potentially be more nursing sensitive than others, leading to less nonsignificant findings. In addition, different content aspects regarding QoC hindered the interpretation of findings. For example, 4 studies[23,25,36,37] used hospitalization as a proxy for poor overall health. However, only unnecessary hospitalizations should be taken into consideration as a proxy for poor QoC.[39] In addition, in some studies assessing pressure ulcers, infections, or urinary incontinence, the authors did not distinguish between nosocomial and non-nosocomial outcomes. Only nosocomial outcomes, that is, outcomes developed during residents' stay in the nursing home, could be categorized as a nursing home QoC outcome. Moreover, the included studies do not examine the specific tasks executed by RN, LPN/LVN, and NA staff, and, therefore, these tasks were not known. It is questionable whether nursing staff of varying levels execute comparable tasks in different nursing homes. For example for pressure ulcers, we found that more staff led to better results, no matter who (RN, LPN/LVN, or NA) delivered care, raising questions about the contribution of each staffing category. RN staff could for example fulfill a leadership role in nursing homes, serving as role models for other nursing staff, positively influencing QoC. NA staff, in general, spends more time on direct resident care. Therefore, it could be that the higher frequency of resident contacts positively influences QoC.

Further research is needed before firm conclusions can be drawn. To deepen our insight into the impact of nurse staffing on QoC in nursing homes, future studies should consider characteristics beyond those of quantity of care provided.[6] Two important characteristics are turnover and the use of agency staff. Recent studies suggest that higher turnover rates[13,36] as well as more agency staff use[13] can be associated with poorer QoC. Other examples of important variables related to QoC in nursing homes are nurses' professional competence, work experience, and adherence to procedures and guidelines. In addition, it would be useful to know the specific tasks executed by various nursing staff, with special attention paid to nurse leadership. As the number of less educated staff in nursing homes is high, a supervisory role of RNs in nursing homes might be crucial for the improvement of QoC.[40] To obtain better insight into the total volume as well as the QoC provided to nursing home residents, future research needs to factor in the physician contribution of care as well. Besides assessing the quantity of care provided by physicians, it would be useful to also assess their specific tasks and supervisory role. In most countries, primary care practitioners deliver physician care in

nursing homes, often with consultation from geriatricians. However, in The Netherlands, for example, nursing home medical specialists are available to provide medical care in nursing homes. Therefore, between countries, the influence of physicians on QoC in nursing homes may vary greatly. Recent evidence[41] suggests that linking physicians to nursing homes through contracts and direct hire resulted in fewer rehospitalizations. However, only little is known about the relationship between physician staffing and QoC in nursing homes yet.

Moreover, future researchers should carefully select and interpret QoC outcomes for examining the relationship between staffing and QoC. For example, only unnecessary hospitalizations or nosocomial diseases should be taken into consideration as a proxy for poor QoC. For the analysis of the relationship between nurse staffing and QoC, statistical methods assuming a nonlinear relationship between staffing and QoC should be considered. With regard to methodology, the proper timing of data collection is crucial. As the influence of staffing on QoC is tested, it is necessary to collect staffing data prior to QoC data and cover a proper time period, long enough for QoC outcomes to develop.

CONCLUSIONS

No consistent evidence was found for a positive relationship between staffing and QoC including the specific contribution of each staffing category. Higher numbers of nurse staff were associated with better as well as lower QoC outcomes. Although some positive indications were suggested, major weaknesses in study designs limit the interpretation of the results. More knowledge on the theoretical relationship between staffing and QoC in nursing homes is necessary. Also, as most studies are US-based, the applicability of results cannot be generalized to other countries. All in all, the findings of this study demonstrate the necessity for well-designed longitudinal studies examining the effect of nurse staffing on QoC in nursing homes.

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2

CHAPTER 3

RELATIONSHIP BETWEEN THE PRESENCE OF BACCALAUREATE-EDUCATED RNS AND QUALITY OF CARE: A CROSS-SECTIONAL STUDY IN DUTCH LONG-TERM CARE FACILITIES

ABSTRACT

Background: Recent evidence suggests that an increase in baccalaureate-educated registered nurses (BRNs) leads to better quality of care in hospitals. For geriatric long-term care facilities such as nursing homes, this relationship is less clear. Most studies assessing the relationship between nurse staffing and quality of care in long-term care facilities are US-based, and only a few have focused on the unique contribution of registered nurses. In this study, we focus on BRNs, as they are expected to serve as role models and change agents, while little is known about their unique contribution to quality of care in long-term care facilities.

Methods: We conducted a cross-sectional study among 282 wards and 6,145 residents from 95 Dutch long-term care facilities. The relationship between the presence of BRNs in wards and quality of care was assessed, controlling for background characteristics, i.e. ward size, and residents' age, gender, length of stay, comorbidities, and care dependency status. Multilevel logistic regression analyses, using a generalized estimating equation approach, were performed.

Results: 57% of the wards employed BRNs. In these wards, the BRNs delivered on average 4.8 minutes of care per resident per day. Among residents living in somatic wards that employed BRNs, the probability of experiencing a fall (odds ratio 1.44; 95% CI 1.06-1.96) and receiving antipsychotic drugs (odds ratio 2.15; 95% CI 1.66-2.78) was higher, whereas the probability of having an indwelling urinary catheter was lower (odds ratio 0.70; 95% CI 0.53-0.91). Among residents living in psychogeriatric wards that employed BRNs, the probability of experiencing a medication incident was lower (odds ratio 0.68; 95% CI 0.49-0.95). For residents from both ward types, the probability of suffering from nosocomial pressure ulcers did not significantly differ for residents in wards employing BRNs.

Conclusions: In wards that employed BRNs, their mean amount of time spent per resident was low, while quality of care on most wards was acceptable. No consistent evidence was found for a relationship between the presence of BRNs in wards and quality of care outcomes, controlling for background characteristics. Future studies should consider the mediating and moderating role of staffing-related work processes and ward environment characteristics on quality of care.

BACKGROUND

Recent evidence suggests that higher staffing levels and an increase in baccalaureate-educated registered nurses (BRNs) lead to better quality of care (QoC) in hospitals.[1] For long-term care facilities (LTCFs) such as nursing homes, this relationship is less clear.[2,3] It is assumed that an increase in BRNs could lead to an improvement in quality of life and QoC for LTCF residents as well. However, in most countries, the number of BRNs in LTCFs is low.[4] Traditionally, working in LTCFs is associated with a low status career and inadequate salaries,[5] reducing the chance to attract sufficient BRNs. When present BRNs currently often fulfill management positions. If involved in daily care, they frequently perform similar tasks as less educated staff. Their unique expertise could be used to serve as a role model, supervisor or innovator in the facility. As the number of less educated staff in LTCFs is high, BRNs can advance other staff practice to improve QoC.[2,4,6] The importance of BRNs in LTCFs, and especially in nursing homes, is expected to increase further as new models of care will likely be implemented in the near future that require high level coordination and evaluation skills,[7] and BRNs are expected to have more of these abstract thinking skills than less educated staff.[8]

International evidence for the added value of BRNs in LTCFs is scarce.[2,3] Most studies assessing the relationship between nurse staffing and QoC in LTCFs are US-based,[2,3,9] and only a few focus on the unique contribution of RNs.[4,10] Most authors do not clarify the educational level of RNs, even though their educational backgrounds may differ substantially.[11] This study focuses on the unique contribution of BRNs in LTCFs. The aim of this study was to examine the relationship between the presence of BRNs in wards and QoC in Dutch LTCFs. As a national database on staffing and QoC is lacking in the Netherlands,[12] we conducted this study in cooperation with the Dutch Prevalence Measurement of Care Problems (LPZ: Landelijke Prevalentiemeting Zorgproblemen).[13] The LPZ measurement is an annual, multicenter, cross-sectional point prevalence measurement of several care problems in LTCFs (such as pressure ulcers and fall incidents).

In this study, we focus on nurse sensitive indicators of QoC. The relationship between the presence of BRNs in wards and outcomes that are most sensitive to nursing care is addressed. We chose the following five outcomes from the LPZ database: nosocomial pressure ulcers, medication incidents, falls, antipsychotic drug use, and urinary indwelling catheter use. Pressure ulcers are the most frequently used QoC outcome for assessing the relationship between nurse staffing and QoC in LTCFs and seem to be a nurse-sensitive outcome.[2,3] Ideally, only nosocomial pressure ulcers, which are pressure ulcers that developed during a resident's stay in the LTCF, should be considered.

In previous studies, higher nurse staffing levels in LTCFs were associated with a decrease in falls,[14-17] but evidence on the relationship between better educated staff and the occurrence of falls in LTCFs is lacking. In addition, evidence is absent for a

relationship between the presence of RNs in wards and medication incidents in LTCFs. However, we expect that medication incidents can be seen as a nurse-sensitive outcome as RNs spend much time on medication-related activities.[18,19] Nevertheless, the occurrence of falls or medication incidents in LTCFs should be prevented as both can have serious consequences for residents, e.g. fall-related injuries or adverse drug events.

The prevalence rates of antipsychotic drug use in LTCFs are often high.[20] We assume that the high prevalence rates can partly be explained by the inappropriate use of antipsychotic drugs, associated with poor QoC.[10,20] Antipsychotic drug use is defined as inappropriate when a clinical rationale is absent such as a diagnosis of delirium, schizophrenia, or psychotic disorder. Recent studies suggest that the prescription of antipsychotics is not based on clinical reasons alone, but that direct care staff in nursing homes often believe that antipsychotics are the only treatment choice to manage challenging resident behaviors including screaming, moaning or wandering.[20,21] The critical thinking skills of BRNs may place them in a better position to address challenging resident behavior without using antipsychotics, and might lead to less antipsychotic drug use on wards with higher BRN staffing levels.

Previous studies have considered fewer indwelling urinary catheters as a proxy for better urinary incontinence status of nursing home residents,[2,22,23] and showed that more RN staff was associated with fewer catheterizations.[22,23] The use of urinary indwelling catheters should be prevented as they can cause urinary tract infections, resident discomfort, and decreased mobility.[10,24] BRNs are expected to have a better understanding of these negative consequences. Therefore, the prevalence rate of residents with indwelling urinary catheters might be lower on wards where BRNs are present.

METHODS

Study design

This study was conducted in cooperation with the Dutch LPZ cross-sectional point prevalence measurement in April 2014. Annually, the LPZ measurement takes place on the same day in different health care settings. Participation of health care organizations is voluntary.[13] Data are collected at the organizational, ward, and resident level, using standardized questionnaires. Each participating organization appoints one coordinator who collects data at the organizational level, whereas ward managers provide data on their specific ward. Resident data (resident characteristics and prevalence of QoC outcomes) are collected by two health care professionals, one working on the resident's ward and one from another ward.[13] Inter-rater reliability between observers was found to be good (Cohen's kappa 0.87).[13,25,26] The standardized questionnaires are based on

psychometrically tested instruments, existing guidelines or literature reviews, and are developed and regularly updated in collaboration with experts.[27-34]

To obtain BRN staffing data, we added 3 questions to the LPZ ward-level questionnaire. For each ward, the total number of hours of care delivered by BRNs was ascertained, as well as time spent in direct resident care (personal and nursing care, e.g. help with activities of daily living) and indirect care (e.g. staff education, coaching, and care innovation projects). No data were available on total nurse staffing.

Setting and participants

In Dutch LTCFs, most wards provide complex nursing care, whereas some wards provide only assistance with domestic tasks.[35] Typically, long-term nursing care for older adults in the Netherlands is provided in somatic (for residents with physical disabilities) and psychogeriatric (for residents with dementia) wards.[36] Therefore, we included only residents aged > 60 years from psychogeriatric or somatic nursing care wards.

In the Netherlands, specifically trained nursing home medical specialists provide medical care for LTCF residents.[36] Both these specialists as well as associated health professionals (e.g. psychologists, physiotherapists) are employed by the LTCF. Similar to other countries, the educational level of nursing staff varies. The largest proportion of nursing staff consist of certified nurse assistants (educational level 3) with 2-3 years of vocational training.[36] Dutch certified nurse assistants are comparable to licensed practical/vocational nurses in the United States.[37] There are also nurse assistants (educational level 2), nurse aides (educational level 1) as well as some uneducated staff.[38] In many LTCFs, the lowest percentage of staff are RNs (educational level 4) and BRNs (educational level 5).

In total, 282 wards and 6,145 residents from 95 LTCFs were included in our study. The 95 LTCFs are managed by 20 Dutch elderly care organizations.

Data source, variables and measurement

Table 1 presents the study variables and their measurement.

Resident characteristics and QoC outcomes
Residents' age, gender, length of stay, number of comorbidities, and care dependency status (CDS)[39] were extracted from the LPZ, as well as the following QoC outcomes that were dichotomized (yes/no): nosocomial pressure ulcers, falls, antipsychotic drugs, medication incidents, and urinary indwelling catheters.

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Table 1: Study variables and their measurement

Variable	Measurement
Resident characteristics	
Gender	Man/woman
Age	Age in years
Length of stay	Number of days
Comorbidities	Number of comorbidities (0-24*): Infectious illness; cancer; endocrine, nutritional or metabolic illness/disease; diabetes mellitus; disease of blood or blood related organs; psychological disorders; dementia; nervous system disorder (excluding cerebrovascular accident (CVA)); spinal cord lesion/paraplegia; cardio vascular disease; CVA/hemiparesis; respiratory disorder/diseases, including nose and tonsils; disorder/disease of the digestive tract, including intestinal obstruction, peritonitis, hernia, liver, gallbladder, pancreas; disorder/disease of kidney/urinary tract, sexual organs; skin disorder/disease; motor disorder/disease; congenital disorders; injury resulting from accident(s); undesirable consequences of accident(s); symptoms and abnormal clinical or lab findings, not elsewhere classified; overdose/substance abuse/addiction; disease of the eye; disease of the ear; pregnancy, child birth; external factors for disease
Care dependency	Care Dependency Scale[39]: For each of the following 15 activities, the degree to which the resident is dependent upon care provided by others is indicated on a 5-point scale (completely dependent (1) – completely independent (5)*): eating and drinking, incontinence, body posture, mobility, day/night pattern, getting dressed and undressed, body temperature, hygiene, avoiding danger, communication, contact with others, sense of rules and values, daily activities, recreational activities, learning ability.[13] For each resident, the total score (sum of 15 items) was divided by 15 to obtain a mean score.
Presence of BRN	
Presence of BRN	At least one BRN present in ward
Quality of care outcomes	
Nosocomial pressure ulcers	Resident suffers from at least one nosocomial pressure ulcer category 2-4 (European Pressure Ulcer Advisory Panel (EPUAP) & National Pressure Ulcer Advisory Panel (NPUAP))[13,40]: Category 2: Partial thickness Category 3: Full thickness skin loss Category 4: Full thickness tissue loss
Medication incidents	Resident had at least one medication incident during the last 30 days **: Omitted dose Wrong dose Wrong time taken Wrong drug Wrong drug administration
Falls	Resident has fallen at least once during last 30 days **
Antipsychotic drug use	Antipsychotic drug use during last 7 days **
Indwelling urinary catheter use	Resident has an indwelling urinary catheter in place at the time

Variable	Measurement
Ward characteristics	
Ward type	Psychogeriatric/somatic nursing care ward
Ward size	Number of residents living on ward

Note: * underlined score is the most favorable score; ** answered by resident or responsible nurse and/or indicated in resident file[13]

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Presence of BRN

The total hours of care delivered by BRNs, as well as their hours spent on direct resident care and indirect care practices, were extracted from the LPZ. This data was used to distinguish between wards with at least one BRN present and wards that did not employ BRNs.

Ward characteristics

The ward type (somatic or psychogeriatric) as well as the ward size (number of residents living on ward) were extracted from the LPZ.

Statistical analyses

Data were analyzed with SPSS for Windows (version 22).

Missing data

In the Dutch LPZ, each participating organization can decide which QoC outcomes are assessed on the resident level within the organization.[30] Therefore, because of non-participation, data on QoC outcomes were partly missing. In addition, for some residents, data collectors were not able to determine whether or not the resident suffered from a QoC problem, leading to missing data as well. The latter was the case for nosocomial pressure ulcers (n=22; 0.4%), falls (n=53; 0.9%) and antipsychotic drug use (n=28; 0.5%).

In total, among residents living in somatic wards, between 1.5% (falls) and 18.2% (nosocomial pressure ulcers) of data were missing. Among residents living in psychogeriatric wards, the amount of missing data ranged from 0.4% (falls) to 12.8% (nosocomial pressure ulcers). We cannot ignore these missing observations since the reasons for not including these by some organizations is not known. Therefore, three different approaches were taken to handle missing data. First, we performed a complete case analysis, ignoring missing data. Second, a sensitivity analysis was performed, in which all cases with missing data on a dependent variable were considered as "not suffering from the disease" (e.g., not having nosocomial pressure ulcers). Third, missing data were imputed, using multiple imputation techniques. To ensure the variability of predictors,[41] the imputations were based on 7 (categorical) variables from the data set (BRNs working on ward, ward size, as well as residents'

length of stay, age, gender, number of comorbidities, and care dependency). After performing the sensitivity analyses and the multiple imputations, the findings of these analyses were compared with those from the complete-case analyses.

Univariate descriptive statistics
Univariate descriptive statistics were computed. Means and standard deviations were calculated for resident characteristics and BRN staffing. For QoC outcomes, percentages of residents suffering from the outcome were calculated (frequency distribution).

(Multilevel) logistic regression analyses
For each QoC outcome, we estimated the relationship between the presence of BRNs in wards and QoC controlling for background characteristics, i.e. ward size, and residents' age, gender, length of stay, number of comorbidities, and care dependency status.

   As the average time spent by BRNs per resident was low, we chose to dichotomize the BRN staffing variable, i.e. BRN not working on ward and BRN working on ward. Five control variables were recoded into categorical variables to avoid sparse cells and for the ease of interpretation.[42] Ward size was recoded into 4 categories, i.e. fewer than 12 residents, 13-24 residents, 25-36 residents, more than 37 residents. Age was recoded into 4 categories, i.e. age 61-70, age 71-80, age 81-90, and age 91-110. Length of stay was recoded into 6 categories, i.e. 0-1 years, 1-2 years, 2-3 years, 3-4 years, 4-5 years, and longer than 5 years. The number of comorbidities was recoded into 5 categories: 1 comorbidity, 2 comorbidities, 3 comorbidities, 4 comorbidities, and 5 or more comorbidities. The total CDS score of each resident was changed into 1 of 5 categories (completely dependent (1) – completely independent (5)).

   Due to differences in the care provided in somatic and psychogeriatric wards, separate analyses were performed among residents living in somatic and psychogeriatric wards. Ideally, to take into account possible correlations between residents living in the same ward and/or LTCF, 3-level logistic regression analyses should have been conducted in which residents were nested in wards and wards were nested in LTCFs. However, as some LTCFs were included with only one ward, it was not possible to conduct 3-level analyses examining the possible impact of wards and LTCFs simultaneously. These analyses led to estimation problems. Alternatively, two different 2-level logistic regression analyses were performed using a generalized estimating equation (GEE) approach. In these multilevel analyses, residents (level 1) were nested in wards (level 2) or residents (level 1) were nested in LTCFs (level 2). To test the correlation within residents living in the same ward or in the same LTCF, the intraclass correlation coefficient (ICC) was considered. Additionally, for each QoC outcome, a general logistic regression analysis was conducted for the resident level, not taking into account any hierarchy of data.

Ethical considerations

All data were extracted from an existing database (LPZ), in which we received permission to conduct secondary analyses. The LPZ received ethical approval from the Medical Ethics Review Committee (METC) of the University Hospital Maastricht and Maastricht University.

RESULTS

Univariate descriptive statistics

Ward and resident characteristics
From the 282 participating wards, 117 were somatic wards (2,604 residents) and 165 were psychogeriatric wards (3,541 residents). Resident's mean age was 84 years (SD ± 8) and 73% of the residents were female. Their mean length of stay was 2.9 years (1057 days (SD ± 1055)), and on average, residents had 3 comorbidities (SD ± 1). The mean CDS was 2.4 (SD ± 1.2), meaning that, on average, residents were functionally dependent.

Presence of BRN
57% of the wards employed a BRN, who delivered, on average, 4.8 minutes of care per resident per day (0.08 NHPRD, SD ± 0.08). The BRN conducted direct care practices on 91% of the wards that employed a BRN, and indirect care practices on 80% of the wards. On wards where the BRN had direct care practices, the average time spent on these practices was 3.6 minutes per resident per day (0.06 NHPRD, SD ± 0.07). On wards where the BRN had indirect care practices, the average time spent on these practices was 1.2 minutes per resident per day (0.02 NHPRD, SD ± 0.02).

QoC
From the residents that participated in our study, on average, 2.6% suffered from nosocomial pressure ulcers (category 2-4), 10.4% had experienced a fall, and 5.3% a medication incident. 7.2% of the residents had an indwelling urinary catheter and 19.6% received antipsychotic drugs. Table 2 shows a considerable variation in prevalence rates among residents between somatic (more likely to have a nosocomial pressure ulcer, medication incident or indwelling urinary catheter) and psychogeriatric wards (more likely to fall or use antipsychotic drugs). When analyzing the relationship between the presence of BRNs in wards and nosocomial pressure ulcers among residents living on psychogeriatric wards, residents who were completely independent (i.e., CDS 5; n=92) were excluded, as none of these residents suffered from nosocomial pressure ulcers.

Table 2: Differences in resident characteristics and prevalence rates of quality of care outcomes among residents living in somatic and psychogeriatric wards

	Residents living in somatic wards (n=2,604)	Residents living in psychogeriatric wards (n=3,541)
Resident characteristics		
Age in years (mean, SD) *	83 ± 9	84 ± 7
Female (%) *	70	75
Length of stay in years and days (mean, SD) *	3.1 (1,132 ± 1,200)	2.7 (1,002 ± 930)
Number of comorbidities (mean, SD) *	3 ± 1	3 ± 1
Care dependency (mean, SD) [a],*	2.9 ± 1.2	2.1 ± 1.1
Quality of care outcomes		
Nosocomial pressure ulcers (%) *	3.4 (n=2,131)	1.9 (n=3,086)
Medication incidents (%) *	6.2 (n=2,307)	4.6 (n=3,451)
Falls (%) *	7.6 (n=2,564)	12.4 (n=3,528)
Antipsychotic drug use (%) *	15.2 (n=2,296)	22.6 (n=3,434)
Indwelling urinary catheter use (%) *	11.7 (n=2,271)	3.9 (n=3,143)

Note: SD = standard deviation ; [a] degree to which the resident is dependent upon care provided by others is indicated on a 5-point scale (completely dependent (1) − completely independent (5)) ; * significantly different among residents living in somatic and psychogeriatric wards (p < 0.01) ; independent samples t-test or chi-square)

(Multilevel) logistic regression analyses

For each QoC outcome, the results of the multilevel and the general logistic regression analyses were almost identical, and the ICC was low. In addition, the results of complete case analyses and those from the sensitivity analyses, as well as the analyses with imputed data were almost identical. Therefore, we present only the results of the general logistic regression analyses for complete cases (Table 3).

As indicated in Table 3, among residents living in somatic wards that employed BRNs, the probability of experiencing a fall (odds ratio 1.44; 95% CI 1.06-1.96) and receiving antipsychotic drugs (odds ratio 2.15; 95% CI 1.66-2.78) was higher, whereas the probability of having an indwelling urinary catheter was lower (odds ratio 0.70; 95% CI 0.53-0.91). Among residents living in psychogeriatric wards that employed BRNs, the probability of experiencing a medication incident was lower (odds ratio 0.68; 95% CI 0.49-0.95). For residents from both ward types, the probability of suffering from nosocomial pressure ulcers did not significantly differ for residents living in a ward that employed BRNs. In addition, among residents living in somatic wards, the probability of experiencing a medication incident did not significantly differ for residents living in a ward that employed BRNs. Among residents living in psychogeriatric wards, the probability of experiencing a fall, receiving antipsychotic drugs, or having an indwelling

urinary catheter did not significantly differ for residents living in a ward that employed BRNs.

Table 3: Associations between presence of BRNs and quality of care indicators*

Outcome measure	Ward type	OR (BRN on ward vs. no BRN on ward)	95% CI	p-value
Nosocomial pressure ulcers				
	Somatic	0.68	0.42 – 1.10	0.12
	Psychogeriatric	0.79	0.46 – 1.38	0.41
Medication incidents				
	Somatic	1.17	0.82 – 1.67	0.39
	Psychogeriatric	0.68	0.49 – 0.95	0.02
Falls				
	Somatic	1.44	1.06 – 1.96	0.02
	Psychogeriatric	1.10	0.89 – 1.36	0.38
Antipsychotic drug use				
	Somatic	2.15	1.66 – 2.78	0.00
	Psychogeriatric	1.06	0.89 – 1.26	0.51
Urinary indwelling catheter use				
	Somatic	0.70	0.53 – 0.91	0.01
	Psychogeriatric	0.96	0.64 – 1.43	0.83

Note: * Fully adjusted models estimating the relationship between the presence of BRNs and quality of care controlling for background characteristics, i.e. ward size, and residents' age, gender, length of stay, amount of comorbidities, and care dependency status.
BRNs = baccalaureate-educated registered nurses ; OR = odds ratio ; 95% CI = 95% confidence interval around OR

DISCUSSION AND CONCLUSIONS

In our study, there was no consistent relationship found between the presence of BRNs in wards and several QoC indicators, controlling for background characteristics. Among residents living in somatic wards that employed BRNs, an increased probability of experiencing a fall and receiving antipsychotic drugs was found, and a decreased probability of having an indwelling urinary catheter. No significant differences were detected for nosocomial pressure ulcers and medication incidents. For residents living in psychogeriatric wards that employed BRNs a decreased probability of experiencing a medication incident was found, whereas the probability for developing any of the other QoC outcomes did not significantly differ.

Two systematic reviews also reported inconsistent findings on QoC indicators.[2,3] For this study, there are several factors that need to be taken into consideration. First, only

57% of the wards employed a BRN, who delivered, on average, 4.8 minutes of care per resident per day. BRN staffing levels may not have been high enough to establish better QoC outcomes. For comparison, in a recent Swiss study among 402 wards from 155 nursing homes, on average 32% of all full-time equivalents (FTEs) per ward were RNs.[43] In a recent US study among nursing homes in Colorado,[10] RNs spent on average 36 minutes of care per resident per day. As with all other studies examining the relationship between RN staffing and QoC, both studies did not indicate the educational background of RNs.

Second, for residents living in both types of wards, the prevalence of QoC problems seems low compared to studies conducted in other countries. However, differences in operationalization and measurement methods have to be considered when comparing prevalence rates to other studies,[44] making comparisons difficult.[26] The prevalence of nosocomial pressure ulcers was especially low, which may explain why the probability of suffering from nosocomial pressure ulcers did not significantly differ among residents living in wards that did or did not employ BRNs. For both ward types, antipsychotic drug use was the most prevalent QoC problem, yet the prevalence rate of 19.6% was low compared to prevalence rates in other countries. For example, in a study among Belgian nursing home residents the prevalence rate was 32.9%.[45] Nevertheless, the fact that, in our sample, one resident out of every five was provided with antipsychotic drugs, could be a signal of inappropriate drug use. Only unnecessary antipsychotic drug use should be considered as poor QoC. In this study, we were not able to distinguish between (in)appropriate antipsychotic drug use.

Third, the practices of BRNs working in Dutch LTCFs may not differ from those conducted by other nursing staff, meaning that BRNs are not employed optimally to benefit from their unique contribution to QoC outcomes. It seems that most BRNs are responsible for multiple wards, which is reflected in the low amount of time spent per resident per day. BRNs might only see residents that are in acute, complex care situations (e.g., when a decision whether or not to hospitalize the resident has to be made), instead of looking at each resident's overall care plan.

The findings of this study should be interpreted carefully. The cross-sectional design provides no information about causality. For example, we cannot say whether the employment of BRNs in somatic wards led to an increased probability of receiving antipsychotic drugs or whether BRNs were employed due to high antipsychotic drug use. As some LTCFs were included with only one ward, it was not possible to conduct 3-level analyses examining the possible impact of wards and LTCFs simultaneously. Moreover, we had to focus on BRNs alone, not taking into consideration the contribution of other nursing staff, nursing home medical specialists and allied professionals working in Dutch LTCFs. In addition, due the low average amount of time BRNs spent on wards, we could only distinguish between wards that did or did not employ BRNs, not taking into consideration the actual amount of time BRNs worked on the wards. To compare BRN staffing among wards, we calculated NHPRDs. However,

BRNs may only deliver care to residents with the most complex care problems. In our analyses, we distinguished between residents living in somatic and psychogeriatric wards, while in practice, the difference may not be that clear-cut, e.g., some residents living in somatic wards may suffer from dementia or residents living in psychogeriatric wards from somatic diseases as well. Finally, our analyses were limited to the QoC outcomes measured in the LPZ, while BRNs may influence other outcomes, e.g., outcomes related to quality of life of residents. Despite these limitations, our study is the first that provides insight into the relationship between the presence of BRNs in wards and QoC for Dutch LTCFs. As we made use of an existing data infrastructure (LPZ), the sample size was large (6,145 residents), and collected data was of good quality.

Although the Dutch government is making efforts to increase the number of BRNs working in elder care, the number of BRNs working in LTCFs is still low, as in 43% of the wards no BRNs were employed. Even for wards that employed BRNs, the mean amount of time spent per resident was low. For LTCFs it is therefore important to carefully think about how to best allocate BRNs on their wards. In recent years, there has been a call to shift emphasis back to the provision of essential nursing care, e.g., providing physical comfort and psychological support or establishing meaningful encounters between staff and residents.[46,47] It might be the case that BRNs add particular value to improving essential nursing care, thus future studies should consider this. Recently, David Richards has posed the question whether nursing outcomes might need to be defined in terms of a concept called 'amalgamation of marginal gains'.[47,48] During a hospital visit Richards experienced that small, individual actions by nurses only had marginal impact on his well-being, while in total, all these 'small actions' significantly reduced his feelings of discomfort and anxiety. By focusing on isolated components of essential nursing care (e.g., communication), Richards stresses one may miss the 'power of amalgamation'.[47]

In our study, we focused on the presence of BRNs in wards rather than considering staffing as a 'multidimensional construct'.[49] Future studies should also consider the mediating and moderating role of staffing-related work processes and ward environment characteristics. For example, more BRNs in the mix of staff might lead to better teamwork and communication, that could result in better QoC.[17,50] Other examples of work processes BRNs might have influence on are the coordination of care,[51] and the collaboration between nursing staff and nursing home medical specialists or allied health professionals.[52] In addition, BRNs might indirectly add value to QoC in LTCFs by acting as a clinical leader and coach for other nursing staff.[53] Moreover, BRNs might also have an influence on ward environment characteristics like the organizational culture or the team climate, which were associated with better QoC in previous studies.[54,55] Conducting mixed methods-studies, e.g. by combining direct observations with stakeholder interviews, may help to obtain more information on observable behavior (e.g., interactions with residents or other staff and other 'small actions') and unobservable cognitive work of BRNs leading to added value for residents, family members, and staff.[53]

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CHAPTER 4

QUANTITY OF STAFF AND QUALITY OF CARE IN DUTCH NURSING HOMES: A CROSS-SECTIONAL STUDY

ABSTRACT

The general belief is that the number of total staff hours per resident day (HPRD) and the staff mix (% registered nurses/total staff) are associated with quality of care (QoC) in nursing homes. However, findings from studies examining these relationships are inconsistent. In this brief report, we present findings from a cross-sectional, observational study on the relationship between HPRD and clinical as well as staff-reported QoC indicators. Data were collected in 55 nursing home wards that participated in the Dutch Prevalence Measurement of Care Problems in April 2014. We conducted adjusted (multilevel) logistic regression analyses for clinical outcomes and multilevel linear regression analyses for staff perception of QoC. Overall, we were unable to demonstrate a relationship between HPRD and QoC. Our findings underscore that focusing on quantity of nursing care might not improve QoC in nursing homes. The quality of the team should be taken into consideration as well.

INTRODUCTION

In many European countries, concerns about nursing home quality have led to political discussions on increasing funding, as it is widely assumed that more resources are needed to improve quality of care (QoC) in nursing homes.[1] A general, persistent belief is that the number of total staff hours per resident day and the staff mix (% registered nurses/total staff) are associated with QoC in nursing homes. Studies examining this relationship have mostly been conducted in the US and findings are inconsistent.[2-5] Findings based on US data cannot be generalized to European countries, as educational backgrounds of nursing staff differ. For example, in the US, a minimum of 75 hours of initial training are required to become a certified nurse assistant,[6] while in the Netherlands, the length of the educational program to become a nurse assistant is two years. First European studies show that evidence for a relationship between the number of total staff hours per resident day or the staff mix and QoC in nursing homes is lacking.[7-10] Studies that find a positive relationship mostly analyzed facility-level data from large US databases (e.g., OSCAR (Online Survey, Certification and Reporting)) that are not primarily intended for research purposes.[2,4] The accuracy of staffing data in such databases might be doubted, as they not necessarily reflect reality.[5] Moreover, data on staffing and QoC in these databases do not necessarily cover the same time periods, meaning that researchers are analyzing non-contemporaneous data.[4] In addition, in many studies, QoC is operationalized only as clinical resident outcomes, such as the prevalence of falls or nosocomial pressure ulcers. A limitation of these outcomes is that they only give an indication of QoC at one time point. As staffs' perception of QoC develops over time and is not based on isolated care components,[7] it is an important addition to clinical outcomes. Staffs' perception of QoC has been used in evaluating care in other settings and is considered a valid proxy measure of QoC.[7,11]

Evidence on the relationship between quantity of staff or the staff mix and staffs' perception of QoC in nursing homes is lacking. In this brief report, we present data on the relationship between the number of staff hours per resident as well as the staff mix and QoC in Dutch nursing homes. We included clinical outcomes as well as staff perception of QoC to assess these relationships.

METHODS

A cross-sectional, observational study was conducted among 55 wards within 21 nursing homes that participated in the Dutch Prevalence Measurement of Care Problems (LPZ) in April 2014. The LPZ is a cross-sectional point prevalence measurement of several care problems (such as pressure ulcers and fall incidents), taking place annually on the same day in different health care settings.[12] Unlike in some other countries, a national database on staffing and QoC is lacking in the Netherlands[13] and participation in the LPZ is voluntary. Data collection takes place on one day at facility, ward, and resident level, using standardized questionnaires that are based on

psychometrically tested instruments or existing guidelines and literature reviews. The questionnaires are developed and regularly updated in collaboration with expert groups. In this study, we only used data measured on resident level (resident characteristics and prevalence of clinical QoC outcomes). Data are collected according a standardized protocol. Within each ward, two health care professionals collected data on resident level. One professional was working on the residents' ward and one was from another ward. Inter-rater reliability between observers was tested to be good (Cohen's kappa 0.87).[12,14,15] The Medical Ethics Review Committee of the University Hospital Maastricht and Maastricht University approved the study protocol (METC14-4-057).

Resident characteristics (age, gender, length of stay, comorbidities, care dependency status) as well as clinical QoC outcomes (dichotomized (yes/no)) – nosocomial pressure ulcers, falls, antipsychotic drug use, medication incidents, urinary indwelling catheters – were extracted from the LPZ database. To obtain insight into staff perception of QoC, at least five staff members from every ward were invited to assess the QoC on their ward. They graded the overall QoC on their ward (grade 1-10, higher score indicating better QoC) and were asked to which extent they agreed with the statement "In case a family member had to be admitted to a nursing home now, I would recommend this ward" (completely not agree (1) – completely agree (5)).

Based on their ward roster, ward managers provided average total direct care staff hours for an average day within the last seven days. Based on the actual ward roster, they described the number of direct care staff members that worked on that day (morning (7:00 am – 12:00 noon), day (12:00 noon – 5:00 pm), evening (5:00 pm – 11:00 pm), and night (11:00 pm – 7:00 am) shifts), each staff members' educational background and the exact start and finish time of their shift. Direct care staff consisted of (certified) nurse assistants, nurse aids, specially trained feeding assistants, trainees, untrained staff, and vocationally or baccalaureate-educated registered nurses (RNs). For each ward the total direct care staff hours per resident per day were calculated, further referred to as hours per resident per day (HPRD). In addition, the staff mix was calculated for each ward.

Separate analyses were performed for somatic and psychogeriatric wards due to differences in prevalence of clinical outcomes. We estimated the relationship between HPRD and QoC (dependent variable), adjusting for ward size and resident characteristics (i.e., age, gender, length of stay, number of comorbidities, and care dependency status). We conducted (multilevel) logistic regression analyses for clinical outcomes and multilevel linear regression analyses (random intercept) for staff perception of QoC.

RESULTS

Descriptive statistics are described in Table 1.

Table 1: Differences in study variable characteristics among somatic and psychogeriatric wards

	Somatic wards (n=24)	Psychogeriatric wards (n=31)
Ward characteristics (n=55)		
Total direct care staffing (HPRD; mean, SD)	3.06 ± 0.58	3.15 ± 0.40
- Baccalaureate-educated RN staffing (HPRD; mean, SD)	0.02 ± 0.03	0.02 ± 0.05
- Vocationally trained RN staffing (HPRD; mean, SD)	0.16 ± 0.21	0.15 ± 0.15
- Certified nurse assistant staffing (HPRD; mean, SD)	1.91 ± 0.34	1.77 ± 0.38
- Nurse assistant staffing (HPRD; mean, SD)	0.41 ± 0.43	0.64 ± 0.38
- Nurse aide staffing (HPRD; mean, SD)	0.08 ± 0.17	0.12 ± 0.25
Staff mix (% RN/total staff; mean, SD)	0.05 ± 0.06	0.05 ± 0.05
Ward size (mean, SD)	27 ± 8	27 ± 10
Resident characteristics	617 residents	821 residents
Age in years (mean, SD)	79 ± 11	83 ± 9
Female (%)	65	72
Length of stay in years and days (mean, SD)	2.7 (1,002 ± 1,225)	2.6 (959 ± 873)
Number of comorbidities (mean, SD)	3 ± 1	3 ± 1
Care dependency (scale range: 1-5; mean, SD)[*]	2.7 ± 1.1	2.1 ± 1.1
Staff characteristics	104 staff members	153 staff members
Number of work hours per week (mean, SD)	29.45 ± 5.17	29.18 ± 5.48
Educational background		
- Baccalaureate-educated RN (%)	2.9 (n=3)	2.0 (n=3)
- Vocationally trained RN (%)	18.3 (n=19)	10.5 (n=16)
- Certified nurse assistant (%)	78.8 (n=82)	87.6 (n=134)
Quality of care outcomes		
Clinical outcomes[†]	617 residents	821 residents
Nosocomial pressure ulcers (% residents)[‡]	5.2 (n=597)	2.4 (n=803)
Medication incidents (% residents)	7.1 (n=562)	4.7 (n=790)
Falls (% residents)[‡]	6.1 (n=604)	12.0 (n=817)
Antipsychotic drug use (% residents)[‡]	10.7 (n=561)	26.6 (n=790)
Indwelling urinary catheter use (% residents)[‡]	17.0 (n=601)	4.0 (n=806)
Staff-reported outcomes		
Grade overall quality of care (scale range: 1-10; mean, SD)[‡§]	7.4 ± 0.9	7.7 ± 0.7
Recommending the ward (scale range: 1-5; mean, SD)[‡§]	3.5 ± 1.0	3.9 ± 0.9

Note: SD = standard deviation; * degree to which the resident is dependent upon care provided by others is indicated on a 5-point scale (completely dependent (1) – completely independent (5)); † Nosocomial pressure ulcers: Resident suffers from at least one nosocomial pressure ulcer category 2-4[12]; Medication incidents: Resident had at least one medication incident during the last 30 days (Omitted dose, wrong dose, wrong time taken, wrong drug, wrong drug administration); Falls: Resident has fallen at least once during the last 30 days; Antipsychotic drug use: Antipsychotic drug use during last 7 days; Indwelling urinary catheter use: Resident has an indwelling urinary catheter in place at the time; ‡ significantly different among somatic and sychogeriatric wards (p<.01; independent samples t-test or chi-square); § underlined score is the most favorable score

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Overall, a relationship between HPRD and clinical resident outcomes was not found. For each outcome, the multilevel and the fixed-effects logistic regression analyses were almost identical, and the ICC was low (ICC ≤ 0.04). Therefore, only the results of the fixed-effects logistic regression are reported (Table 2). For residents from both ward types, the probability of experiencing nosocomial pressure ulcers, falls, antipsychotic drug use, or urinary indwelling catheters was not significantly associated with HPRD (with odds ratios between 0.80 and 1.94; Table 2). For residents living in psychogeriatric wards, however, higher HPRD were associated with a higher probability of experiencing a medication incident (odds ratio 3.93; 95% CI 1.27-12.18). This was not demonstrated for residents living in somatic wards (odds ratio 0.98). In addition, a relationship between HPRD and staff-reported QoC for both ward types was not found, as HPRD were not significantly associated with staff-reported QoC (with parameter estimates ranging from -0.22 to 0.09; Table 2). Due to the low % of RNs in the participating wards, we were unable to estimate the relationship between staff mix and QoC.

Table 2: Associations between quantity of staff and quality of care indicators

Clinical indicators[*]	Ward type	OR	95% CI	p-value
Nosocomial pressure ulcers	Somatic	1.56	0.61-3.97	.36
	Psychogeriatric	1.21	0.31-4.76	.79
Medication incidents	Somatic	0.98	0.41-2.34	.97
	Psychogeriatric	3.93	1.27-12.18	.02
Falls	Somatic	1.94	0.84-4.50	.12
	Psychogeriatric	1.59	0.81-3.10	.18
Antipsychotic drug use	Somatic	1.23	0.59-2.55	.58
	Psychogeriatric	0.98	0.61-1.57	.93
Urinary indwelling catheter use	Somatic	0.90	0.51-1.59	.72
	Psychogeriatric	0.80	0.26-2.45	.70
Staff-reported indicators[†]	Ward type	b	SE	p-value
Grade overall quality of care	Somatic (ICC: 0.41)	- 0.22	0.33	.52
	Psychogeriatric (ICC: 0.30)	0.09	0.26	.72
Recommending the ward	Somatic (ICC: 0.26)	- 0.18	0.32	.58
	Psychogeriatric (ICC: 0.34)	0.04	0.32	.91

Note: OR = odds ratio; 95% CI = 95% confidence interval around OR; SE = standard error; ICC= intraclass correlation coefficient; * General logistic regression analyses: Fully adjusted models estimating the relationship between quantity of staff and clinical quality of care controlling for background characteristics, i.e. ward size, and residents' age, gender, length of stay, number of comorbidities, and care dependency status. † Multilevel linear regression analyses (random intercept): Fully adjusted models estimating the relationship between quantity of staff and staff-reported quality of care controlling for background characteristics, i.e. ward size and residents' mean age, gender (% female), length of stay, number of comorbidities, and care dependency status

DISCUSSION

Our data analyses showed that the quantity of nursing staff was not related to clinical indicators as well as staff-perceived QoC in nursing homes. This is in line with the conclusions drawn in prior European studies.[7-10]

Some methodological limitations should be considered. Due to the cross-sectional design, our findings should be interpreted carefully. Considering staff-reported QoC can be seen as a strength, as staffs' perception of QoC is an important addition to clinical outcomes. However, staff-reported QoC is based on the subjective views of individual staff members who may interpret the concept of QoC differently. Moreover, we were unable to test the relationship between staff mix and QoC. A strength of the study was that data were of good quality as we made use of an existing data infrastructure (LPZ), collected actual staffing data directly from ward rosters and all data were collected at the same point in time.

Our findings underscore that adding extra manpower will not per se lead to better QoC in European nursing homes. Nevertheless, probably there is a minimum HPRD threshold below which the probability of poor QoC outcomes is higher. However, focusing on quantity of nursing care alone might be too simple to improve QoC. The relationship between staffing and QoC seems to be more complex. Instead of focusing on the quantity of staff, one should therefore consider the quality (i.e., skills and competencies) of the team. In future studies, the quality of the team should be considered as well. Besides educational backgrounds of nursing staff, the ward environment and work processes might contribute to QoC in nursing homes. Tentative evidence suggests that better educated staff, a positive organizational culture and good teamwork, communication and coordination may lead to better QoC in nursing home wards.[7]

More information on the effects of ward environment (e.g., team climate) and work processes (e.g., communication or coordination), as well as the optimal allocation of nursing staff from different educational backgrounds is needed.

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CHAPTER 5

WORK ENVIRONMENT CHARACTERISTICS ASSOCIATED WITH QUALITY OF CARE IN DUTCH NURSING HOMES: A CROSS-SECTIONAL STUDY

ABSTRACT

Background: A lack of relationship between direct care staffing levels and quality of care, as found in prior studies, underscores the importance of considering the quality of the work environment instead of only considering staff ratios. Only a few studies, however, have combined direct care staffing with work environment characteristics when assessing the relationship with quality of care in nursing homes.

Objectives: To examine the relationship between direct care staffing levels, work environment characteristics and perceived quality of care in Dutch nursing homes.

Design: Cross-sectional, observational study in cooperation with the Dutch Prevalence Measurement of Care Problems

Settings: Twenty-four somatic and 31 psychogeriatric wards from 21 nursing homes in the Netherlands.

Participants: Forty-one ward managers and 274 staff members (registered nurses or certified nurse assistants) from the 55 participating wards.

Methods: Ward rosters were discussed with managers to obtain an insight into direct care staffing levels (i.e, total direct care staff hours per resident per day). Participating staff members completed a questionnaire on work environment characteristics (i.e., ward culture, team climate, communication and coordination, role model availability, and multidisciplinary collaboration) and they rated the quality of care in their ward.
Data were analyzed using multilevel linear regression analyses (random intercept). Separate analyses were conducted for somatic and psychogeriatric wards.

Results: In general, staff members were satisfied with the quality of care in their wards. Staff members from psychogeriatric wards scored higher on the statement 'In the event that a family member had to be admitted to a nursing home now, I would recommend this ward'. A better team climate was related to better perceived quality of care in both ward types (p ≤ 0.020). In somatic wards, there was a positive association between multidisciplinary collaboration and agreement by staff of ward recommendation for a family member (p = 0.028). In psychogeriatric wards, a lower score on market culture (p = 0.019), better communication/coordination (p = 0.018) and a higher rating for multidisciplinary collaboration (p = 0.003) were significantly associated with a higher grade for overall quality of care. Total direct care staffing, adhocracy culture, hierarchy culture, as well as role model availability were not significantly related to quality of care.

Conclusions: Our findings suggest that team climate may be an important factor to consider when trying to improve quality of care. Generating more evidence on which work environment characteristics actually lead to better quality of care is needed.

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INTRODUCTION

Nursing staff, including certified nurse assistants, nurse aides and registered nurses, provide most of the round-the-clock direct care in nursing homes. Even though the relationship between direct care staffing levels and quality of care (QoC) in nursing homes has been assessed in many, mostly US based, studies, the relationship is unclear as studies provide inconsistent conclusions.[1-3] Worldwide, little progress has been made on establishing minimum nursing home staffing standards, whereas these might positively affect the QoC and quality of life of nursing home residents.[4] However, improvements in the QoC in nursing homes in the future cannot simply focus on numbers and educational backgrounds of direct care staff. A lack of relationship between direct care staffing levels and QoC, as found in prior studies, underscores the importance of considering the quality of the work environment instead of just the staff ratios.[1,5] Only a few studies, however, have combined direct care staffing with work environment characteristics when assessing the relationship with QoC in nursing homes.[5,6] Therefore, comprehensive theoretical models, integrating direct care staffing and other work environment characteristics are scarce,[7] while at the same time, evidence on the relationship between work environment characteristics and QoC increases.[7]

Different work environment characteristics have been identified as determinants for QoC in prior studies. For example, ward environment characteristics such as positive work culture and a good team climate have been associated with better QoC in nursing homes.[7] Also, work processes like good communication and coordination among direct care staff have been associated with better QoC in nursing homes.[8,9] Evidence from the hospital setting suggests that multidisciplinary collaboration, such as between nurses and physicians, might lead to better QoC as well, but evidence for the nursing home sector is still scarce.[10] In the international literature, increasing attention is paid to the presence of role models as a determinant for QoC. A role model is a staff member whose work is emulated by other team members.[11] In countries like the US and Canada, role modeling is considered part of advanced roles such as nurse practitioner, nurse consultant or nurse specialist.[12] To our knowledge, the relationship between the presence of role models within a team and QoC in nursing homes has not been reported in the research literature. Nevertheless, we hypothesize that the presence of a role model in a ward might be associated with better QoC, as role models assist other direct care staff to deal more effectively with challenging or complex situations.[13] Based on a literature review, we developed the model presented in Figure 1, suggesting that work environment characteristics might mediate the relationship between staffing levels and QoC. In this study, all these factors that possibly determine QoC in nursing homes, i.e., direct care staffing levels, ward environment characteristics (work culture, team climate), as well as work processes (communication and coordination, multidisciplinary collaboration, presence of role models) will be considered jointly when

examining the relationship with QoC (Figure 1). In addition, specific attention will be paid to the selection of QoC outcomes. Nursing home QoC is predominantly operationalized as clinical outcomes for residents such as the prevalence of falls or medication incidents. Others have utilized staff perception of QoC,[5] since this has been found suitable in other settings.[14] Using direct care staff members as informants of the overall QoC in nursing homes might be an underexplored opportunity, as they have insights into aspects of QoC that are not necessarily documented in medical records or resident files.[15] Staff perception of QoC is not based on isolated components of QoC, e.g. a resident falls or there is a medication incident, but develops over time, and thus provides a more comprehensive view of the residents' care.[5]

The aim of our study is to examine the relationship between direct care staffing levels, work environment characteristics and perceived QoC in Dutch nursing homes. In our study, parts of the theoretical model presented in Figure 1 will be tested to infer this relationship.
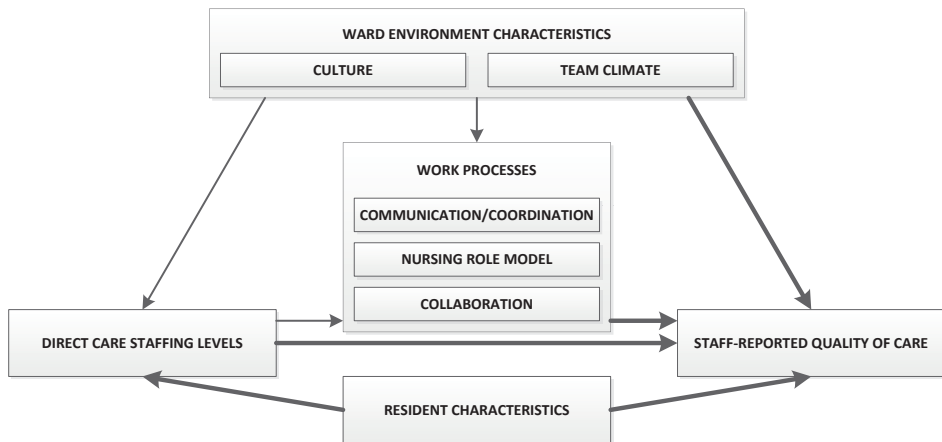
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Figure 1: Theoretical model of the relationship between direct care staffing levels, ward environment characteristics, work processes and staff-reported quality of care

Note: Bold arrows are tested in this study.

METHODS

Study design

We conducted this study in cooperation with the Dutch Prevalence Measurement of Care Problems (LPZ: Landelijke Prevalentiemetingen Zorgproblemen). The LPZ database includes a cross-sectional point prevalence measurement of several care problems (such as pressure ulcers and medication incidents) and takes place annually on the same day in different healthcare settings.[16] Health care organizations participate voluntarily. All nursing homes participating in the LPZ measurement in April 2014 were invited to participate in our study. Among nursing homes that agreed to participate, a cross-sectional, observational study was conducted between April and June 2014. The study was conducted in Dutch.

Setting and participants

Fifteen organizations with 44 nursing homes were invited to participate in our additional study. Within Dutch nursing homes, three different wards can be distinguished: somatic wards for residents with physical disabilities, psychogeriatric wards for residents with dementia, and rehabilitation wards that provide sub-acute rehabilitation. Somatic and psychogeriatric wards provide long-term, residential care, whereas rehabilitation wards provide short-term, skilled nursing care. In our study, we focused on somatic and psychogeriatric wards. Wards for residents with specific diseases such as Huntington's disease, were excluded. If the director of an invited organization gave consent to participate in the study, ward managers from this organization were invited to participate in a brief, voluntary interview concerning nurse staffing. Ward managers that gave informed consent were interviewed (via telephone). In addition, the ward managers were asked to distribute a digital questionnaire to at least five staff members working in their ward. The questionnaire was implemented using the online survey tool SurveyMonkey (www.surveymonkey.com) and included questions on ward environment characteristics, work processes, and staff-reported QoC. The choice to ask for at least five staff members and not for all staff members from a ward was made to keep participation in this study feasible. Staff members that were registered nurses or certified nurse assistants and worked at least 12 hours per week in one of the somatic or psychogeriatric wards were considered eligible for participation. The ward managers were asked to invite, to the extent possible, staff members with different educational background and years of work experience. All resident data were extracted from the LPZ database. Data about the residents were collected by two health care professionals, one who works on the resident's ward and one on another ward. These health care professionals received standardized training on how to collect resident level data.[16] Good inter-rater reliability testing between the two observers has been previously reported (Cohen's kappa 0.87).[17]

Data sources, variables and operationalization

In Table 1, the main variables, their operationalization and the data sources are presented. All measurement instruments were selected based on their psychometric properties (validity, reliability), clinical utility and appropriateness for the Dutch nursing home setting and population. To the extent that it is possible, previously tested scales were used for measurement. The ward manager interview, the questionnaire completed by staff members and the information extracted from the LPZ database were in Dutch. Interview questions were pretested for comprehensibility with ward managers, and questions included in the questionnaire were pretested with direct care staff (registered nurses, certified nurse assistants) from two nursing home organizations that did not participate in our study.

Resident characteristics
Residents' age, gender, nursing home length of stay, number of comorbidities and care dependency status were extracted from the LPZ database (Table 1). Care dependency was assessed with the Care Dependency Scale (CDS).[18] The CDS covers 15 activities for which the degree to which the resident is dependent upon care provided by others is indicated on a 5-point scale (completely dependent (1) – completely independent (5)): eating and drinking, incontinence, body posture, mobility, day/night pattern, getting dressed and undressed, body temperature, hygiene, avoiding danger, communication, contact with others, awareness of rules and values, daily activities, recreational activities, and learning ability.[16] For each resident, the total score (sum of 15 items) was divided by 15 to obtain a mean score.

Direct care staffing levels and ward size
Data on direct care staffing levels and the ward size (number of residents living in ward) were collected via ward managers. Ward managers provided data both on how many residents were living in the ward and on the nurse staffing for an average day within the last 7 days. Based on the actual ward roster, this included the number of direct care staff members that worked on that day (morning (7:00 am – 12:00 noon), day (12:00 noon – 5:00 pm), evening (5:00 pm – 11:00 pm), and night (11:00 pm – 7:00 am) shifts), each staff member's educational background and the exact start and finish time of their shift. The educational background of direct care staff working in Dutch nursing home varies and is explained in Table 1. Data were obtained via (telephone) interviews and based on actual schedules. Total staff hours per resident day (HPRD) were calculated by dividing the total direct care staff hours for that specific day by the number of residents living in the ward.

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Table 1: Study variables and their measurement

Variable	Measurement
Ward characteristics	
Total direct care staffing levels	Total direct care staff hours per resident per day (HPRD): Direct care staff consist of nurse aides, nurse assistants, certified nurse assistants (comparable to licensed practical/vocational nurses in the US[19]), vocationally trained registered nurses, baccalaureate-educated registered nurses, specially trained feeding assistants, trainees, and untrained staff.
Ward size	Number of residents living in ward
Ward type	Psychogeriatric/somatic nursing care ward
Resident characteristics	
Gender	Man/woman
Age	Age in years
Length of stay	Number of days
Comorbidities	Number of comorbidities (0-24*): Infectious illness; cancer; endocrine, nutritional or metabolic illness/disease; diabetes mellitus; disease of blood or blood related organs; psychological disorders; dementia; nervous system disorder (excluding cerebrovascular accident (CVA)); spinal cord lesion/paraplegia; cardio vascular disease; CVA/hemiparesis; respiratory disorder/diseases, including nose and tonsils; disorder/disease of the digestive tract, including intestinal obstruction, peritonitis, hernia, liver, gallbladder, pancreas; disorder/disease of kidney/urinary tract, sexual organs; skin disorder/disease; motor disorder/disease; congenital disorders; injury resulting from accident(s), undesirable consequences of accident(s); symptoms and abnormal clinical or lab findings, not elsewhere classified; overdose/substance abuse/addiction; disease of the eye; disease of the ear; pregnancy, child birth; external factors for disease
Care dependency	Care Dependency Scale[18]
Ward environment characteristics	
Organizational culture	Four different culture types from the competing values framework (CVF) for long-term care[20]
Team climate	Dutch 14-item version of the team climate inventory (TCI)[21]
Work process characteristics	
Communication/coordination	Communication/coordination subscale from the Work Environment and Perceived Work Effectiveness in Nursing Homes questionnaire[9]
Role model availability	Employee has a role model working in the ward (yes/no)
Multidisciplinary collaboration	Grade ranging from 1-10*
Staff-reported quality of care outcomes	
Grade overall quality of care	Grade ranging from 1-10*
Recommending the ward	"In the event that a family member had to be admitted to a nursing home now, I would recommend this ward" (completely not agree (1) – completely agree (5))*

Note: * underlined score is the most favourable score

Ward environment characteristics

Ward environment characteristics (organizational culture, team climate) were assessed by a questionnaire completed by staff members (registered nurses or certified nurse assistants). Organizational culture was measured with the Dutch version[20] of the competing values framework (CVF) for long-term care.[22] The six CVF items cover six domains: dominant organizational characteristic, administration, management style, organizational 'glue' (i.e., relational characteristics that connect the ward members together, for example, 'loyalty, trust and commitment' or 'formal procedures, rules and policies'), strategic emphasis and criteria for success. For each domain, staff members had to rank order four statements from 1 to 4, with 4 best describing the culture on their ward. Each statement belongs to a specific culture type: clan, adhocracy, market or hierarchy.[20] Clan culture is associated with shared goals and values, strong cohesion and a sense of collective identity. Adhocracy culture is characterized by the ability to adapt quickly to new opportunities and deal successfully with changes. In a market culture, there is a focus on profit, competitiveness and productivity. A hierarchy culture is characterized by centralized decisions, structures and rules.[20] Usually, more than one type of culture characterizes an organization.[20,23] Therefore, we calculated a total score for each culture type separately. Van Beek and Gerritsen[20] translated the CVF into Dutch applying back-translation and validated the scale in the Dutch nursing home setting. As the CVF is an ipsative or 'forced choice' scale and the scores on one subscale are dependent on scores on the other subscales, the internal consistency reliability cannot be tested.[22] Team Climate was measured with the Dutch 14-item version of the Team Climate Inventory (TCI).[21] The TCI measures four factors that contribute to the team climate: participative safety, support for innovation, vision, and task orientation. The underlying rationale is that effective team performance is often reached when team activities are characterized by these factors.[24] Staff members had to score for each item on a 5-point scale (strongly disagree – strongly agree), with higher scores indicating a better team climate. The score for each item was summed up to determine a total scale score. Strating and Nieboer[21] translated the TCI into Dutch and tested the construct validity, reliability, predictive validity and temporal stability of the scale, concluding that the psychometric properties were acceptable. For the four subscales of the TCI, they found Cronbach's alphas ranging from 0.73-0.80. In our sample, the Cronbach's alpha for the total scale was 0.90, indicating good internal consistency.

Work processes

In the questionnaire completed by staff members, work processes were assessed as well. Communication and coordination were measured with the communication/coordination subscale from the Work Environment and Perceived Work Effectiveness in Nursing Homes questionnaire that measures 'the degree to which communication between staff members is uninhibited, accurate, timely and effective, and focuses on effectiveness of procedures for coordinating tasks and job responsibilities'.[9] This subscale consists of 15 items, which are scored on a 5-point scale (strongly disagree – strongly agree). The score for each item was summed up to determine a total scale score, with higher scale scores indicating better communication/coordination. No Dutch version of the Work Environment and

Perceived Work Effectiveness in Nursing Homes questionnaire existed. To assure cross-cultural validity, the communication and coordination subscale was translated according to the forward-backward translation guidelines from Beaton et al.[25] The final Dutch version was tested for comprehensibility with direct care staff members (registered nurses, certified nurse assistants) to make sure that all items were appropriate for the Dutch nursing home setting. In our sample, the Cronbach's alpha of the scale was 0.80, indicating acceptable internal consistency. To obtain insight into the existence of role models, staff members were asked whether or not they had a colleague (not necessarily a higher-educated colleague, but, for example, another certified nurse assistant) they viewed as a professional role model. In addition, the multidisciplinary collaboration between direct care staff, physicians and paramedics was graded by staff members (grade ranging from 1–10 with higher scores indicating better multidisciplinary collaboration).

Staff-reported quality of care outcomes
In the questionnaire completed by staff members, two questions on QoC were included. Participating staff members graded the overall QoC on their ward (grade 1–10, a higher score indicating better QoC) and indicated to what extent they agreed with the statement "In the event that a family member had to be admitted to a nursing home now, I would recommend this ward" (completely not agree (1) – completely agree (5)).

Statistical analyses

Data analyses were performed with SPSS for Windows (version 22). Missing items were replaced by ward averages (n = 2) or respondents' mean score on the scales (n = 4). In addition, 8.9% (n = 23) of the respondents did not rank order all statements within organizational culture domains correctly. Statements that were not rank ordered correctly were considered as missing and were imputed using multiple imputation techniques.

   Differences in staff-reported QoC between somatic and psychogeriatric wards were found using independent samples t-tests, thus all subsequent analyses were considered separately. Means and standard deviations of ward, resident, staff, ward environment, work process characteristics as well as QoC were computed. To examine the relationship between direct care staffing levels, ward environment characteristics, work processes (independent variables) and staff-reported QoC (dependent variable), multilevel linear regression analyses (random intercept) were conducted, in which staff (level 1) was nested in wards (level 2). Intraclass correlation coefficients (ICC) were calculated to test the correlation between staff members working in the same ward. To test for multicollinearity among the independent variables, variance inflation factors (VIFs) were calculated. As all VIFs were lower than 5, no multicollinearity problem existed.[26] For each dependent variable (staff-reported QoC outcomes), two different analyses were conducted. First, we conducted fully-adjusted analyses in which we controlled for background characteristics (i.e. ward size and residents' mean age,

gender (female/male), length of stay, and number of comorbidities). Due to the low spread of the care dependency status variable, care dependency status was not considered as a background characteristic in the analyses. Second, we conducted unadjusted analyses in which we did not control for background characteristics. Likelihood ratios (-2LL) were considered to assess whether the adjusted or the unadjusted models fitted better (lower likelihood ratio values indicating a better fit).

Ethical considerations

The Medical Ethics Review Committee (METC) of the University Hospital Maastricht and Maastricht University approved the study protocol (METC14-4-057). Participation was voluntary and anonymous, and participants were informed that their answers would be treated as strictly confidential. No identifying information on the participants was collected. Ward managers had no access to the questionnaires completed by staff members and did not know which staff members had or had not completed the questionnaire. All data about the residents were extracted from an existing database (LPZ).

5

RESULTS

Descriptive statistics

Eight out of fifteen invited nursing home organizations participated in our study. The study was conducted in 21 nursing homes and 55 wards (31 psychogeriatric and 24 somatic). In total, 1438 residents were living in the 55 included wards, 617 lived in a somatic and 821 in a psychogeriatric ward. Ward and resident characteristics are described in Table 2.

Staff characteristics
Staff members amounting to 274 from the 55 included wards completed the questionnaire of ward environment and work process characteristics; 17 respondents were excluded from the analyses, as they did not complete the digital questionnaire. In total, 257 respondents were included in the analyses, of whom 84.0% were certified nurse assistants, 13.6% vocationally trained registered nurses, and 2.3% baccalaureate-educated registered nurses (Table 2).

Ward environment and work process characteristics
Staff members from somatic as well as psychogeriatric wards gave high mean ratings for the team climate (Table 2). For both types of wards, staff members scored, on average, highest on clan culture, followed by hierarchy, adhocracy and market culture. Also, the communication and coordination in their wards were rated as good. 73% of somatic ward staff members and 71% of psychogeriatric ward staff members indicated that they

had a colleague whom they saw as role model for themselves. In general, staff members were satisfied with the collaboration among the various disciplines.

Table 2: Differences in study variable characteristics among somatic and psychogeriatric wards

	Somatic wards (n=24)	Psychogeriatric wards (n=31)
Ward characteristics (n=55)		
Total direct care staffing (HPRD; mean, SD)	3.06 ± 0.58	3.15 ± 0.40
Ward size (mean, SD)	27 ± 8	27 ± 10
Resident characteristics	617 residents	821 residents
Age in years (mean, SD)	79 ± 11	83 ± 9
Female (%)	65	72
Length of stay in years and days (mean, SD)	2.7 (1,002 ± 1,225)	2.6 (959 ± 873)
Number of comorbidities (mean, SD)	3 ± 1	3 ± 1
Care dependency (scale range: 1-5; mean, SD) [a]	2.7 ± 1.1	2.1 ± 1.1
Staff characteristics	104 staff members	153 staff members
Number of work hours per week (mean, SD)	29.45 ± 5.17	29.18 ± 5.48
Educational background		
Baccalaureate-educated RN (%)	2.9 (n=3)	2.0 (n=3)
Vocationally trained RN (%)	18.3 (n=19)	10.5 (n=16)
Certified nurse assistant (%)	78.8 (n=82)	87.6 (n=134)
Ward environment characteristics		
Team climate (scale range: 14-70; mean, SD)	53 ± 7	55 ± 6
Clan culture (scale range: 6-24; mean, SD)	18 ± 3 (n=100)	19 ± 3 (n=134)
Adhocracy culture (scale range: 6-24; mean, SD)	14 ± 3 (n=100)	15 ± 3 (n=134)
Market culture (scale range: 6-24; mean, SD)	11 ± 4 (n=100)	10 ± 3 (n=134)
Hierarchy culture (scale range: 6-24; mean, SD)	17 ± 3 (n=100)	16 ± 3 (n=134)
Work process characteristics		
Communication/coordination (scale range: 15-75; mean, SD)	54 ± 7	56 ± 6
Role model (% staff having a role model)	73	71
Multidisciplinary collaboration (scale range: 1-10; mean, SD)	7.3 ± 0.8	7.2 ± 0.9
Staff-reported quality of care outcomes	104 staff members	153 staff members
Grade overall quality of care (scale range: 1-10; mean, SD)*	7.4 ± 0.9	7.7 ± 0.7
Recommending the ward (scale range: 1-5; mean, SD)*	3.5 ± 1.0	3.9 ± 0.9

Note: SD = standard deviation ; [a] degree to which the resident is dependent upon care provided by others is indicated on a 5-point scale (completely dependent (1) – completely independent (5)) ; * significantly different among somatic and psychogeriatric wards (p < .01 ; independent samples t-test)

Staff-reported quality of care

Overall, staff members from both somatic and psychogeriatric wards were satisfied with the overall QoC in their wards, while staff members working in psychogeriatric wards gave, on average, higher ratings (Table 2). More staff members from psychogeriatric wards agreed with the statement 'In the event that a family member had to be admitted to a nursing home now, I would recommend this ward', with a mean score of 3.9 from psychogeriatric staff compared to 3.5 from somatic staff (scale range: completely not agree (1) – completely agree (5)).

Factors influencing quality of care in nursing homes

The results of the multilevel regression analyses are reported in Table 3. As the -2LL was lower for the unadjusted models and the adjusted models were not significantly better (corresponding p-values > 0.05), unadjusted models should be preferred. The parameter estimates from the adjusted (controlling for ward size, residents' mean age, gender (female/male), length of stay, and number of comorbidities) and unadjusted models were comparable. In both ward types, somatic and psychogeriatric, team climate was associated with QoC. Better team climate was significantly related to better staff perceptions for overall QoC (p = 0.003 and p = 0.020) and agreement by staff of ward recommendation for a family member (p = 0.000 and p = 0.009). In somatic wards, there was a positive association between multidisciplinary collaboration and agreement by staff of ward recommendation for a family member (p = 0.028). In psychogeriatric wards, a lower score on market culture (p = 0.019), better communication/coordination (p = 0.018) and a higher rating for multidisciplinary collaboration (p = 0.003) were significantly associated with a higher grade for overall QoC. Total direct care staffing, adhocracy culture, hierarchy culture, as well as role model availability were not significantly related to QoC.

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Table 3: Factors Influencing Staff-Reported Quality of Care (QoC)

	Grade overall QoC Somatic wards			Grade overall QoC Psychogeriatric wards			Recommending the ward Somatic wards			Recommending the ward Psychogeriatric wards		
	b	SE	p-value	b	SE	p-value	b	SE	p-value	b	SE	p-value
Ward characteristics												
- Total direct care staffing	-0.160	0.185	0.388	0.101	0.172	0.557	-0.182	0.162	0.261	0.036	0.241	0.880
Ward environment												
- Team climate	0.048	0.016	0.003	0.025	0.011	0.020	0.073	0.019	0.000	0.036	0.014	0.009
- Adhocracy culture	-0.003	0.032	0.922	-0.046	0.025	0.067	-0.022	0.037	0.558	0.008	0.032	0.811
- Market culture	-0.021	0.023	0.370	-0.044	0.019	0.019	-0.026	0.027	0.336	-0.023	0.024	0.328
- Hierarchy culture	-0.034	0.029	0.246	-0.038	0.024	0.114	-0.049	0.035	0.165	-0.035	0.031	0.252
Work processes												
- Communication/coordination	0.019	0.015	0.206	0.025	0.010	0.018	-0.009	0.018	0.600	0.015	0.013	0.252
- Role model	-0.059	0.149	0.694	0.057	0.108	0.601	0.105	0.176	0.549	0.021	0.139	0.879
- Multidisciplinary collaboration	0.076	0.104	0.464	0.177	0.059	0.003	0.262	0.119	0.028	0.112	0.076	0.140
	ICC: 0.30			ICC: 0.18			ICC: 0.07			ICC: 0.24		

Note: p-values < 0.05 were considered statistically significant

DISCUSSION AND CONCLUSION

Overall, the findings of this study only partly confirm our theoretical model (Figure 1). In our study, team climate was the only factor consistently associated with staff-reported QoC. Significant associations were also found for market culture, communication/coordination, and multidisciplinary collaboration, although these were not consistent across ward types. Contrary to our expectations, no significant associations were found for total direct care staffing, adhocracy culture, hierarchy culture and role model availability.

On average, staff members from both somatic and psychogeriatric wards were satisfied with the overall QoC in their wards. This is in agreement with the findings from van Beek and Gerritsen,[20] who found that 72% of staff members rated the QoC in their ward as good to very good. Also, in a recent Swiss study,[5] 93% of staff members perceived the QoC in their ward as good. Our finding that team climate was consistently associated with staff-reported QoC is similar to those of Zúñiga et al.,[5] who found that 'teamwork and safety climate' was the most important factor associated with staff-reported QoC. Bosch et al.[24] assessed the team climate in 67 Dutch nursing home wards in 2005. Even though they did not find a relationship between team climate and QoC, respondents' scores on team climate were comparable with the high mean ratings for team climate found in our study. Prior evidence suggests that a better team climate is not only associated with better QoC, but also with higher job satisfaction of direct care staff working in nursing homes.[27]

In psychogeriatric wards, a lower score on market culture was associated with a higher grade for overall QoC. In a study from van Beek and Gerritsen,[20] conducted among Dutch psychogeriatric nursing home wards, market culture was also negatively associated with staff perceived QoC. As was the case with our study, staff members scored, on average, highest on clan culture, followed by hierarchy, adhocracy and market culture. In addition, better communication and coordination were significantly related to a higher rating for overall QoC in psychogeriatric wards. Compared with the findings from Temkin-Greener et al.,[9] staff members in our study perceived the communication and coordination in their wards as somewhat better. Good communication and coordination may improve QoC as it allows for timely responses to changes in residents' health, functional or mental status, as well as timely revisions in residents' care plans.[28]

In both ward types, a higher grade for multidisciplinary collaboration was associated with better perceived QoC. In somatic wards, better multidisciplinary collaboration was associated with higher scores on ward recommendation and in somatic wards with a higher grade for overall QoC. The fact that staff members in general were satisfied with the multidisciplinary collaboration might be partly explained by the employment pattern of physicians and other health professionals in Dutch nursing homes. In the

Netherlands, medical nursing home care is provided by specifically trained nursing home medical specialists, who are, like all other health professionals (e.g., psychologists, physical therapists, speech therapists), employed by the nursing home.[29] This might lead to a more coherent collaboration between professionals from different disciplines.

We were unable to demonstrate any relationship between total direct care staffing, adhocracy culture, hierarchy culture, or role model availability and staff-reported QoC. Also, in the study from Zúñiga et al.,[5] total direct care staffing levels were not associated with staff-reported QoC. This may indicate that staff satisfaction may not be improved by adding extra manpower. In a recent study conducted among Dutch hospital nurses,[30] nurses reported that they were more dissatisfied with their role than with the actual staffing levels, as they felt a lack of authority and autonomy in decision-making. Prior studies indicated that having autonomy within the workplace enhanced the care provided by nurses.[31,32] For example, in the study from McCabe et al.,[31] staff's autonomy was associated with self-efficacy and confidence in working with aged care residents. The fact that we were unable to demonstrate a relationship between adhocracy as well as hierarchy culture and staff-reported QoC confirms the findings from van Beek and Gerritsen.[20] Also, role model availability was not significantly related to staff-reported QoC. One explanation for the lack of effect might be that we only distinguished between staff members that did or did not have a colleague they saw as role model for themselves, not considering, for example, the extent to which staff members are actually motivated and inspired by their role model. In addition, in many cases, no registered nurses were working in the wards. Registered nurses may be more suitable as role models compared to certified nurse assistants.

The findings of this study should be interpreted carefully. Due to the cross-sectional design we could only assess associations and not imply any cause and effect relationships. Moreover, as the largest proportion of staff members consisted of certified nurse assistants and only a few registered nurses were working in the participating wards, we were unable to assess the relationship between the staff mix (i.e., percentage of registered nurses working in a ward) and staff-reported QoC. In some wards, no registered nurses completed the questionnaire, meaning that only the perspective of certified nurse assistants could be considered. Even though we provided ward managers with criteria for the selection of participating staff members (i.e., different educational background and years of experience), we cannot ensure that the staff members chosen by the ward managers were representative of all staff members that worked in a ward. Regarding staff-reported QoC as outcome variables of our study, a potential weakness may be that staff members interpret the concept of QoC differently based on their individual perceptions. In addition, especially the certified nurse assistants may be unable to recognize all QoC deficits in their wards. Due to the fact that only a few registered nurses participated, we were unable to test for differences in QoC reported by registered nurses and certified nurse assistants.

However, Zúñiga et al.[5] did not find differences in the ratings of registered nurses and nurse aides. A strength of the study was that we collected actual staffing data directly from the ward managers and all data were collected at the same point in time.

Our proposed theoretical model should further be refined in future longitudinal studies, considering work environment characteristics as potential mediators. Future studies could consider a combination of staff-reported QoC and clinical resident outcomes. Generating more evidence on which work environment characteristics actually lead to better QoC in nursing homes may help to improve QoC in future nursing homes, as this knowledge would enable ward managers to select better targeted improvement strategies. Our findings suggest that team climate may be an important factor ward managers should consider when trying to improve QoC in their wards.

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CHAPTER 6

FUTURE DISTINGUISHING COMPETENCIES OF BACCALAUREATE-EDUCATED REGISTERED NURSES IN NURSING HOMES

ABSTRACT

In view of the likelihood that the complexity of care required by those admitted to nursing homes will continue to increase, an expert consensus study was conducted to reach consensus on the competencies which distinguish baccalaureate-educated registered nurses from other nursing staff working in nursing homes. Thirty-one international experts, identified through literature and our professional network, participated in a two-round web-based survey and an expert meeting. Experts reached consensus on 16 desirable competencies, including some not traditionally associated with nursing expertise e.g. being a team leader, role model and coach within the nursing team. These findings suggest that revision of current nursing curricula, nurse training programs and nursing home job profiles might be needed to meet the medically and psychologically complex needs of nursing home residents.

INTRODUCTION

Worldwide, the aging of the population will increase demand for long-term care services.[1,2] Older adults want to stay at their own homes as long as possible, so only the most frail and dependent residents enter nursing homes.[3,4] In the future nursing homes will not only have to grapple with higher demand for services and the increasingly complex needs of residents, but also with significant workforce shortages and poorly trained staff.[2] The role of nursing staff is likely to become more complex as there is a trend to offer residents more personal choice, the diversity of care options is increasing and technological innovations continue.[5] Future nursing home employees are likely to work with robotic care providers making continuous use of new electronic monitoring and decision-making systems.[5] In addition to the shift to home and community based care for long-term living and support, other significant changes are occurring in health care systems worldwide that are influencing the resident population in nursing homes.[5,6] First, an increase in the use of sub-acute care for short term rehabilitation (v. medical-surgical or rehabilitation hospital) is resulting in more residents with acute needs and an increase in the flow of residents in and out of the nursing home.[7] Second, long-stay residents are most likely to have moderate to severe dementia.[8] Other changes are country-specific. For example in the United States (US), there is a growth in accountable care organizations (ACOs) requiring nursing homes to be preferred partners in health systems as well as an increased focus on nursing home quality benchmarks.[5,9] In the Netherlands, nursing home care is increasingly organized in small-scale and homelike environments, especially for people with dementia, in which nursing staff have integrated tasks.[10]

These changes demand explicit competencies of highly-skilled staff. Recent evidence suggests that an increase in baccalaureate-educated registered nurses (BRNs) leads to better quality of care (QoC) in hospitals,[11] but the impact on nursing home care is less clear.[12,13] We opine that an increase in the proportion of BRNs would lead to an improvement in quality of life and QoC for nursing home residents. We assume that BRNs in nursing homes, similar to BRNs in hospitals, may be better able to deal with the more complex care needs and could supervise less educated staff. However budget constraints have meant that there are few registered nurses (RNs) working in nursing homes and little is known about their unique contribution to QoC.[14]

As in many countries few RNs hold a baccalaureate degree, BRNs are an especially scarce resource in nursing homes, so obtaining more information on how to allocate them in nursing homes is desirable. Understanding how best to allocate BRNs depends on reaching a consensus on the competencies, i.e. skills, knowledge and attitudes, which will, in future, distinguish BRNs from other nursing staff. An understanding of what distinguishes BRNs from other nursing staff would help nursing home administrators to make informed decisions about human resource allocation[15] and could also inform future BRN educational programs. When reviewing current

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competency profiles, we found that information was lacking on specific competencies for BRN in nursing homes, although worldwide, a tremendous amount of BRN competency profiles exists. For example in the US, there are more than 600 registered nurse to bachelor of science in nursing (RN-BSN) programs alone.[16] However, BRN competency profiles in the US are often based on a general profile, the American Association of Colleges of Nursing (AACN) Essentials,[17] not mentioning setting-specific (i.e. nursing home) competencies for BRNs. We identified only four existing BRN-specific competency profiles[18-21] that are focusing on the care for older adults (Table 1). Although different nurse competency profiles for dementia care exist, none specifically addresses BRNs.[22] Only few profiles exist that focus on the nursing home setting, for example the "Nursing home culture change competencies for nurses".[23] Distinguishing profiles for BRNs are missing.

Table 1: Overview of limitations of existing BRN competency profiles for the care of older adults

Name of the BRN competency profile	Country/Year	Developed by	Specific for nursing home setting	Distinguishing competencies of BRNs form other nursing staff	Future-relevancy explicitly mentioned[a]	Broad overview of competencies[b]
Recommended Baccalaureate Competencies and Curricular Guidelines for the Nursing Care of Older Adults[18]	United States/ 2010	American Association of Colleges of Nursing / Hartford Institute for Geriatric Nursing	-	-	✓	✓
Competencies for the RN to deliver person-centered long-term care[19]	Canda/ 2012	Research group (McGilton et al.)	-	-	✓	-
Baccalaureate Gerontological and Geriatric Nursing Competence Profile[20]	The Netherlands/ 2012	Working group (members from educational and health care organizations)	-	-	✓	✓
Working areas of academically qualified registered nurses[21]	Germany/ 2014	German Nursing Council/ German Society of Nursing Science	✓	✓	-	-

Note: [a] Considering changes that are occurring in health care systems ; [b] i.e., not restricted to a specific area of expertise.

The aim of this study was to obtain insight into the competencies, which should in the future, distinguish BRNs from other nursing staff (e.g. registered nurses or licensed nurses) in nursing homes. As nursing home systems develop[5,24] it is important to ensure that BRNs are equipped with competencies that will enable them to meet future demands.

METHOD

We conducted an expert consensus study to obtain insight into the competencies which should, in the future, distinguish BRNs from other nursing staff. The study consisted of three different steps. First, a survey on future tasks and distinguishing competencies of BRNs in nursing homes was completed by expert panelists. Second, an expert meeting was held to discuss and interpret the findings of this survey with the expert panelists. Third, a final survey was completed by the expert panelists, aimed to determine the degree of consensus on the future distinguishing competencies of BRNs working in nursing homes.

The expert panel

Forty-one experts from various countries were identified through a literature search and our professional network. We defined an expert as an academically qualified person experienced in institutional long-term care and having expertise in the current work of BRNs in nursing homes in his or her country. We did not include BRNs since they would likely be influenced by their current working conditions and thus would have trouble envisioning alternative views of staff allocation. All identified experts were invited to participate in the consensus study.

Survey on future tasks and distinguishing competencies of BRNs in nursing homes

The survey was developed by our research team, who are all researchers in geriatrics. The survey had five parts. Part 1 asked about background information (age, gender, etc.). Part 2 consisted of questions on the current pattern of employment of BRNs in nursing homes (proportion of nursing home staff who are BRNs, current responsibilities of BRNs in the nursing home context). Part 3 was designed to elicit the respondent's opinions about the future of nursing homes, including opinions about the minimum and ideal proportion of nursing home staff that should be bachelor-educated in 2030. In Part 4 the respondent described how he or she foresaw the responsibilities of BRNs in nursing homes in 2030, by answering questions such as "In your opinion, how much time will bachelor-educated registered nurses working in nursing home wards/units (in

your country in the year 2030) in general spend on clinical responsibilities?". Part 5 asked the respondent to list 3–5 competencies specific to BRNs which he or she believed would be important in the nursing home context in 2030. Answering the questions in Parts 2 through 4 was intended to prompt the respondent to consider the competencies that should in future distinguish BRNs from other nursing staff.

All participating experts received an e-mail with a link to the digital survey which was implemented using the online survey tool Surveymonkey (http://www.surveymonkey.com). One researcher (RB) made a list of all competencies mentioned by the experts. The research team evaluated this initial list and deleted repetitions and combined similar competencies to eliminate redundancy. Next, the research team discussed all competencies and clustered them, based on their content, into 4 themes: leadership and coaching; communication; evidence-based practice; client assessment and geriatric expertise.

Expert meeting to review the future distinguishing competencies mentioned by experts

The experts who had completed the survey were invited to participate in an expert meeting, to discuss the analysis and interpretation of the survey results, paying particular attention to the competencies which would, in the future, distinguish BRNs from other nursing staff in nursing homes. The expert meeting was held during the November 2014 annual scientific meeting of the Gerontological Society of America. The two-hour discussion was led by a moderator (EvR) and two co-moderators (EC; JPHH). The discussion was audiotaped (and subsequently transcribed) while two other members of the research team (RB; HV) took contemporaneous notes.

Our analysis and the clustering into the 4 themes were discussed during the expert meeting. In addition, we asked which of the competencies on the list generated from the survey would really distinguish BRNs from other nursing staff with respect to each individual theme. Thinking about the specific contribution of BRNs to the care provided in nursing homes in the future helped the experts to answer these questions.

Final survey to determine the degree of consensus on the future distinguishing competencies

The list of distinguishing competencies, discussed and revised during the expert meeting, was presented in the final survey. Experts who completed the first survey received an e-mail with a link to the digital survey which was, again, implemented using the online survey tool Surveymonkey (http://www.surveymonkey.com). The experts were asked to assess each competency for application as a future role specific to BRNs in nursing homes. In line with other research we considered that consensus had been

reached on a competency when there was at least 75%[25,26] agreement among the experts.

Based on a discussion during the expert meeting we also included five short questions about the (future) employment of master-educated registered nurses (advanced nursing roles such as nurse practitioners) in nursing homes in the survey.

Ethical considerations

The Medical Ethics Review Committee (METC) of the Atrium Medical Centre (METC Atrium-Orbis-Zuyd) approved the study protocol (METC number 14-N-97).

Participation in the study was voluntary. Participants were informed that their answers would be treated as strictly confidential and no identifying information about participants was collected. Participants in the expert meeting provided written informed consent to participation.

RESULTS

Thirty-six experts agreed to participate in the survey study; 31 completed the initial survey (86%) and 28 (78%) completed both surveys. Five experts participated in the expert meeting.

Initial survey on future tasks and distinguishing competencies of BRNs in nursing homes

Twenty-four of the 31 experts who responded to the initial survey were women. The mean age of survey respondents was 51 years (range: 39–66 years) and 27 were registered nurses. The experts came from four different continents (North America, Europe, Asia and Australia) and 14 different countries: United States (6), Canada (2), Germany (4), the Netherlands (4), Belgium (2), Sweden (2), Norway (1), Finland (1), Switzerland (1), United Kingdom (1), Spain (2), Australia (2), South Korea (2) and Taiwan (1).

In most countries only a small proportion of nursing staff in nursing homes were BRNs. Across our sample as a whole the average proportion of nursing home nursing staff with a bachelor degree was 17% (range across countries: 1–70%). On average, experts thought that by 2030 at least 39% (range: 10–100%) of the nursing staff in nursing homes should be bachelor-educated, and suggested that ideally this proportion should be 53% (range: 15–100%). Experts thought that in the future BRNs would spend a similar proportion of their time on clinical responsibilities (e.g. skilled nursing procedures) but less time on managerial responsibilities (e.g. supervision, staffing the

ward/unit) and more time on specialist responsibilities (e.g. staff education, care innovation, quality management).

The experts identified 118 competencies distinguishing BRNs from other nursing staff. After eliminating redundancies this was reduced to a list of 38 competencies (see Table 2). Eighteen competencies were related to leadership and coaching, 3 to communication, 7 to evidence-based practice and 10 to client assessment and geriatric expertise. Frequently mentioned competencies included "being a leader on the ward/nursing unit," "being a staff and family coach/mentor," or "able to evaluate the situation of a client in its entirety." Our experts stressed that references to 'leadership' were not related to formal leadership positions, but to informal leadership as a role model and coach.

Table 2: Future distinguishing competencies of BRNs in nursing homes.

Results of survey: 38 competencies	Revised results expert meeting: 19 competencies	Results of final survey: 16 competencies
Leadership and coaching (18)	Leadership and coaching (9)	Leadership and coaching (8)
- Outstanding interpersonal, cooperation, coordination and relationship-building skills	- Being a team leader, role model and coach within the nursing team (no management leadership position)	- Being a team leader, role model and coach within the nursing team (no management leadership position)
- Able to establish a working relationship with the client	- Being a family coach/mentor	- Being a family coach/mentor
- Ability to educate clients, family members and nurse staff (e.g. in terms of chronic illness management, self-management, health management and prevention)	- Able to create a working relationship and collaborate effectively with nursing home staff from other disciplines	- Able to create a working relationship and collaborate effectively with nursing home staff from other disciplines
- Being a staff and family coach/mentor	- Able to coordinate the multidisciplinary team: BRN is the professional who sees the whole picture, should organize regular team meetings in which all disciplines participate; should manage the overall care coordination (if e.g. physiotherapist says that a person should be mobilized, BRN has to make sure that assistants do so; BRN should explain why things are done/should be done; should explain what it means for the client)	- Able to coordinate the multidisciplinary team: BRN is the professional who sees the whole picture, should organize regular team meetings in which all disciplines participate; should manage the overall care coordination (if e.g. physiotherapist says that a person should be mobilized, BRN has to make sure that assistants do so; BRN should explain why things are done/should be done; should explain what it means for the client)
- Being a leader on the unit/ward (team leadership)	- Being engaged in unit/ward politics	-
- Person-centered leadership skills	- Being an advocate of resources in the facility: Able to proper manage the social and health resources the nursing staff has access to	- Being an advocate of resources in the facility: Able to proper manage the social and health resources the nursing staff has access to
- Clinical leadership skills	- Able to write a care plan (instead of just putting scores into a computer): Think about interventions that are necessary, make sure that they will be done, conduct evaluations (Did we meet the goals we wanted to achieve?); if goals are not met, BRN should re-evaluate	- Able to write a care plan (instead of just putting scores into a computer): Think about interventions that are necessary, make sure that they will be done, conduct evaluations (Did we meet the goals we wanted to achieve?); if goals are not met, BRN should re-evaluate
- Supervision skills	- Able to work as part of an interdisciplinary	- Able to work as part of an interdisciplinary
- Handling team approaches and team models of care		
- Being a role model and coach within the nursing team		
- Able to collaborate effectively with staff from other disciplines in the nursing home		
- Assisting the team to deliver client-centered care		
- More abstract and systems thinking skills (e.g. understanding nursing homes and their role within the overall health care system, seeing nursing practice as both individual and group work)		
- Critical reflective skills (to identify areas for improvement in care and support, as well as		

Results of survey: 38 competencies	Revised results expert meeting: 19 competencies	Results of final survey: 16 competencies
self-reflection skills to improve own professional practice)	team in complex situations	team in complex situations
- Creativity to find and test new models of care as well as achieving support and autonomy to implement and evaluate such	- Able to bring the right team to the client (assess which staff members and which competencies are needed)	- Able to bring the right team to the client (assess which staff members and which competencies are needed)
- Being strategically and politically engaged		
- Able to manage the social and health resources to which nursing staff have access effectively		
- Able to coordinate the multidisciplinary team		
Communication (3)	**Communication (3)**	**Communication (2)**
- Highly skilled in communication	- Each staff member should be highly skilled in communication, but the BRN should be able to handle the more complex and challenging communication as well	- Each staff member should be highly skilled in communication, but the BRN should be able to handle the more complex and challenging communication as well
- Effective inter- and intra-professional communication	- Being a conflict manager	-
- Effective use of information technology	- Being able to appraise communication needs at the ward to establish a communication plan in complex situations: e.g. who communicates what with family/client/other staff members	- Being able to appraise communication needs at the ward to establish a communication plan in complex situations: e.g. who communicates what with family/client/other staff members
Evidence-based practice (7)	**Evidence-based practice (4)**	**Evidence-based practice (3)**
- Commitment to lifelong learning, evidence-based nursing practices (EBP), continuous quality improvement and clinical excellence	- Being the key person for knowledge translation/knowledge transfer (from ANP to BRN to lower educated staff)	-
- Competence to acquire, assess, implement and apply evidence-based practices (in practice and in education) and new, innovative care concepts	- Being committed to continuous quality improvement and clinical excellence at the unit level (e.g. we see a lot of falls, how to deal with them)	- Being committed to continuous quality improvement and clinical excellence at the unit level (e.g. we see a lot of falls, how to deal with them)
- Able to identify, appraise and implement new	- Seeing/appreciating the importance of	- Seeing/appreciating the importance of

Results of survey: 38 competencies	Revised results expert meeting: 19 competencies	Results of final survey: 16 competencies
knowledge	scientific research/evidence in practice	scientific research/evidence in practice
- Being a knowledge translation/knowledge transfer expert	- Able to plan, organize and perform nursing care according to evidence-based practice (BRN should be able to read and appraise literature, while the ANP is the 'big change' agent) and in line with the needs of individuals and society	- Able to plan, organize and perform nursing care according to evidence-based practice (BRN should be able to read and appraise literature, while the ANP is the 'big change' agent) and in line with the needs of individuals and society
- Good understanding of research and research results and the ability to conduct nurse research in geriatrics and gerontology		
- Able to plan, organize and perform nursing care according to EBP and in line with the needs and expectations of individuals and society		
- International exchange of ideas		
Client assessment and geriatric expertise (10)	Client assessment and geriatric expertise (3)	Client assessment and geriatric expertise (3)
- Able to evaluate the situation of a client in its entirety (comprehensive geriatric assessment, physical and social assessment)	- Able to evaluate the situation of a client in its entirety (comprehensive geriatric assessment, physical and social assessment)	- Able to evaluate the situation of a client in its entirety (comprehensive geriatric assessment, physical and social assessment)
- Inquiry based practitioner that conducts ongoing systematic data collection on client health and quality of life	- Being able to ascertain the goals of care, helping the team to reach them and follow up whether goals are reached	- Being able to ascertain the goals of care, helping the team to reach them and follow up whether goals are reached
- Able to analyze problems on individual as well as on population level	- Capable of making clinical judgments and asserting moral agency: Being able to estimate the necessity of things that are done (for example whether or not to conduct a specific test, whether or not to weigh terminally ill client twice a week)	- Capable of making clinical judgments and asserting moral agency: Being able to estimate the necessity of things that are done (for example whether or not to conduct a specific test, whether or not to weigh terminally ill client twice a week)
- Able to make an independent diagnosis of the nursing care required (using current theoretical and clinical knowledge)		
- Advanced clinical reasoning and decision-making skills (especially important in emergency situations)		
- Able to distinguish normal aging from disease processes		
- Able to request complementary tests: Blood test, X ray, etc.		
- Advanced skills and expertise regarding		

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Results of survey: 38 competencies	Revised results expert meeting: 19 competencies	Results of final survey: 16 competencies
complex nursing care (also including technical skills)		
- Able to handle challenging situations and manage complex behavior and psychological problems		
- Sound understanding and knowledge of geriatric medicine and needs of older people, as well as nursing interventions in this field: Advanced clinical knowledge in gerontology and geriatrics; end of life, palliative and hospice care; drug prescription; oral care; wound care; dementia care (and specific concepts used in dementia care); chronic pain management; sound understanding of chronic disabilities and diseases		

Expert meeting to review the future distinguishing competencies mentioned by experts

The participants of the expert meeting came from four different countries: United States (2), Canada (1), the Netherlands (1), and Switzerland (1).

During the expert meeting the clustering into the 4 themes was presented and discussed. From the list of 38 competencies, some competencies were discussed as being too general to be considered as distinguishing competency. Examples are "being strategically and politically engaged," "effective use of information technology," and "international exchange of ideas" (see Table 2). In addition, the experts suggested to revise the definitions of some competencies (see Table 2): for example, the competency "highly skilled in communication" was revised to "All staff should be highly skilled in communication, but the BRN should be able to handle the more complex and challenging communication as well." Based on the feedback from the experts, the research team reduced the list to 19 competencies.

The experts stressed that the competencies that distinguish BRNs from other nursing staff would depend partly on the context. Some competencies would only be relevant to specific settings (e.g. small-scale units, sub-acute rehabilitation etc.). The experts stressed that successful implementation of innovations in care practices would depend on collaboration between advanced practice nurses (APNs) and BRNs. Although nurses in both roles would be involved in front-line delivery of care, the experts saw the APNs as the clinical leaders, providing evidence on best practice and ensuring evidence informed delivery of care. APNs were seen as having more abstract and systems thinking skills, whereas it was envisioned that BRNs would oversee implementation of best practice guidelines at an operational level.

Final survey to determine the degree of consensus on the future distinguishing competencies

In the final survey, consensus was reached on 16 distinguishing competencies which would be desirable in BRNs working in nursing homes in the future. As Table 2 shows, half of the competencies (8) were related to leadership and coaching e.g. "being a team leader, role model and coach within the nursing team" or "able to create a working relationship and collaborate effectively with nursing home staff from other disciplines". Two of the remaining competencies were related to communication, three to evidence-based practice and three to client assessment and geriatric expertise.

The experts noted that the definitions of some competencies lacked clarity, as they were too general or were similar to other competencies. One expert suggested that examples of each competency should be provided. It was also emphasized that the BRN should be seen as part of a larger team: "Each member of the team has a distinct scope

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of practice and contribution to make, but in the end, all of them are responsible for the care of the resident and the family. So it is a team's responsibility to gather the evidence, implement best practice, and make decisions. It is a team's responsibility that the communication is optimal and that there are no conflicts. Focusing on the [bachelor-educated] RN alone will not change the care practices." (Nursing scientist, North America, respondent 23)

Most experts (75%) agreed that, ideally, BRNs and ANPs should work in a tandem. However, experts stressed that, as a starting point, more BRNs should be employed in the nursing homes: "Masters may indeed have more abstract thinking skills than bachelors. However, bachelors have more of these skills than the certified nurse assistants who now form the largest professional group in nursing homes. So the first step must be to involve more bachelor-educated registered nurses, and I certainly expect that they will make a difference." (Nursing scientist, Europe, respondent 4)

DISCUSSION

In this study, experts from different countries reached consensus on 16 competencies which in the future would be desirable for BRNs working in nursing homes. The identification of these competencies is an important step towards ensuring that the training of BRNs equips them with the competencies they will need to meet future demands. In every phase of our consensus exercise, most of the competencies identified were related to leadership and coaching, whereas traditionally more attention is paid to the development of expert knowledge and skills i.e. competencies related to nursing expertise and technical nursing skills.

Our findings are in line with the work from a collaboration between the Hartford Institute for Geriatric Nursing, the Pioneer Network and the Coalition of Geriatric Nursing Organizations.[23] This collaboration reported that competencies beyond those traditionally associated with the nurse expert role would be needed to facilitate person-directed care and culture change in nursing homes. This was a US-based study whose objective was to identify nurse competencies which would facilitate culture change in nursing homes,[23] whereas our study was broadened to consider the international context and competencies which should distinguish BRNs from other nursing staff working in nursing homes in the future.

In both survey rounds response rates were high (86% and 78%) and in their comments the experts stressed the importance of our consensus exercise; nevertheless the findings of our study should be interpreted carefully in view of some limitations of the research. Although the experts were selected carefully their opinions may not be representative. Another group of experts might have emphasized different competencies. As with all expert forecasts, there is a degree of uncertainty attached to their opinions and predictions. The extent to which the duties of BRNs of the future will

require the competencies identified by the experts will depend on how the nursing homes of the future actually function. The implications of between-country differences in BRN training and the nursing home context were not considered. Within-country differences between nursing home contexts (e.g. small-scaled living vs. 'regular' ward or nursing unit) were not taken into account either. However, we believe that the overarching competencies identified in our consensus study are relevant to all nursing home contexts and that in the first instance it is important to focus on such general competencies.

When making staffing decisions, nursing home administrators should allocate BRNs in a way that allows them to act in a liaison role among nursing home residents, family members and the multidisciplinary nursing home staff and to serve as role models for other staff. Currently BRNs in nursing homes often carry out care tasks that could be delegated to other members of the team or fulfill management positions; these duties do not reflect the competencies which distinguish them from other nursing staff. Management support will be crucial to changing staffing practices. After further elaboration the BRN competencies identified in this research could be included in nursing home job profiles in many countries, paying particular attention to the specific nursing home context.

Our findings also have implications for development of BRN curricula and training programs in many countries. In the future particular attention should be paid to leadership and coaching competencies, which are not explicitly covered in most training programs at present. In addition, our findings also suggest that competencies related to evidence-based practice, communication and client assessment and geriatric expertise will be important. Most BRN training programs already pay attention to the development of competencies related to evidence-based practice and communication, but more attention should be paid to ensuring that BRNs have opportunities to acquire geriatric expertise. The findings of this study should be considered when updating existing BRN competency profiles or developing new ones. Our list of desirable distinguishing competencies provides a starting point for national level discussion with diverse stakeholders about which BRN competencies will be relevant in the future.

CONCLUSION

An important finding was that BRN competencies other than those traditionally associated with the nurse expert role were considered important. Paying more attention to these competencies might lead to improvements in nursing home care. For example, enabling BRNs to liaise between nursing home residents, family members and the multidisciplinary nursing home staff might lead to better collaboration and more person-centered care. Explicitly promoting BRNs as role models for other staff might

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help other nursing staff deal more effectively with, for example, more challenging resident behavior or new technological innovations.

Although there is continuing uncertainty about the future of nursing homes, our findings suggest that revision of current nursing curricula, nurse training programs and nursing home job profiles might be needed to meet the medically and psychologically complex needs of nursing home residents.

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CHAPTER 7

BLAZING A TRAIL FOR BACCALAUREATE-EDUCATED REGISTERED NURSES IN NURSING HOMES: EXPERIENCES OF ADMINISTRATORS AND NURSING STAFF

Chapter 7 has not been published yet. The chapter will be added on publication.

CHAPTER 8

GENERAL DISCUSSION

The aim of this dissertation was to examine direct nursing care staffing in nursing homes. Besides considering staffing levels, particular attention was paid to the competencies, tasks and employment of baccalaureate-educated registered nurses (BRNs), as they are expected to serve as informal leaders with the ability to lead improvements and redesign practice environments in nursing homes. More specifically, this dissertation aimed to provide insight into 1) the relationship between direct nursing care staffing and staff-related work environment characteristics and quality of care (QoC) in nursing homes; 2) future desirable distinguishing competencies of BRNs in nursing homes; and 3) how organizations employ BRNs in nursing homes and what is the added value they bring to practice. To meet these objectives, six studies were conducted (Chapters 2-7).

In this final chapter, the main findings of these studies are summarized, methodological and theoretical considerations are discussed, and future directions for practice, education, policy, and research are presented.

MAIN FINDINGS

In this dissertation, no consistent evidence was found for a positive relationship between direct nursing care staffing and QoC in nursing homes. In our systematic review, higher staffing levels were associated with both higher and lower QoC indicators. Moreover, major methodological weaknesses (e.g., timing of data collection, accuracy of staffing data) limited the interpretation of the results. In our cross-sectional studies, no consistent evidence was found for a relationship between a) the presence of BRNs and clinical QoC outcomes, and b) the number of direct nursing care staff to both clinical and staff-reported QoC outcomes. Clinical QoC outcomes in most wards were acceptable and, overall, staff members from both somatic and psychogeriatric wards were satisfied with the QoC in their wards. Team climate was the only work environment characteristic consistently associated with staff-reported QoC and seems an important factor to consider when improving QoC in nursing homes. Team climate refers to aspects like feeling safe, understood and supported, and having a shared vision.

As BRNs were expected to serve as informal leaders with the ability to lead improvements and redesign practice environments in nursing homes, particular attention was paid to their competencies, tasks and employment. Thirty-one experts from different countries reached consensus on 16 desirable competencies, which should, in the future, distinguish BRNs from other nursing staff working in nursing homes. As half of the competencies were related to leadership and coaching, competencies other than those traditionally associated with the nurse expert role are considered important. In our qualitative study, we found that having a vision on how to implement the BRN role within the nursing home is a key factor on whether or not an

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organization employs BRNs in their nursing homes. Within and between the organizations that employed BRNs, there was a large variation in the positioning, roles, tasks and responsibilities of BRNs. Difficulties that BRNs experienced when they started working in the nursing home were related to their role clarity, the naming of the BRN role, the extent to which BRNs received support, the openness of the direct care teams, and the interactions of the BRNs with other staff members. The added value direct care staff members experienced of BRNs differed among organizations.

METHODOLOGICAL CONSIDERATIONS

While specific methodological considerations regarding each study were described in the previous chapters, some general strengths and weaknesses of the study methods will be addressed further, i.e., the study design, the measurement of staffing, and the measurement of QoC.

Study design

To examine the relationship between direct nursing care staffing and QoC in nursing homes, two different observational study methods were conducted. First, a systematic review of longitudinal studies (Chapter 2), and second, cross-sectional studies, using data from the LPZ-database ("Landelijke Prevalentiemeting Zorgproblemen"), and from interviews and questionnaires (Chapters 3-5). Summarizing evidence from or conducting randomized controlled trials on staffing and QoC would have been most desirable to assess causal effects, but conducting and designing these studies in this domain is expensive, difficult and therefore only feasible on a small-scale.[1] There are studies that approached a quasi-experimental design in situations where staffing levels were increased systematically on a large scale,[1] for example, after policy changes in minimum staffing standards in the United States.[2] Nevertheless, in most reported studies on staffing and QoC, observational designs are used.[3] Although longitudinal observational designs are preferred, some are stronger than others.[35] In our systematic review, we found that reported studies often use a panel-design, measuring staffing and QoC at different points in time.[1,4] These panel-designs might not be better than cross-sectional designs, as study participants might be different at each data collection point.[5] In addition, we saw in our systematic review that the timing of measuring staffing characteristics was not described clearly in every included study.[4]

Ideally, studies should be able to demonstrate that changes in staffing levels precede changes in QoC outcomes. Nevertheless, even if this is the case, there still is a potential for bias, as changes in staffing levels might be a result of changes in resident characteristics (e.g., residents with more comorbidities), which preceded changes in QoC outcomes, too.[6] In our study we used the LPZ-database. Although the LPZ is

conducted twice a year, most organizations only participate once a year. In our case, conducting a longitudinal study based on the LPZ would have resulted in a panel-study, collecting data at two points in time, with a time lag of one year. We considered the possibility to conduct a prospective, longitudinal cohort study, comparing two sub-cohorts, i.e., nursing homes with higher and lower (BRN) staffing levels. However, in our cross-sectional studies, we saw little variance in staffing levels. For example, there were very few nursing homes with high BRN staffing levels. Moreover, too few (B)RNs were working in the participating wards to examine the relationship between professional staff mix (% registered nurses/total staff) with QoC. We therefore concluded that conducting large-scale, longitudinal studies would not be appropriate. As little was known on the relationship between nurse staffing and QoC in Dutch nursing homes, conducting cross-sectional studies in collaboration with the LPZ was considered a relevant starting point to explore the relationship for the Dutch setting.

Measurement of staffing

In this dissertation, staffing data were collected at the ward level. This can be considered a strength, as many studies in this field examine staffing levels at facility level only.[4] Considering staffing at the ward level enabled us to distinguish between somatic and psychogeriatric wards, while facility level analyses presume that the effect of staffing is the same for each ward in the facility.[6] Nevertheless, analyzing staffing at the ward level means that one presumes that a) each resident within a ward receives the same amount of care, and b) the effect of staffing is the same for each resident, which might not necessarily be the case. Ideally, staffing should be measured at the level of the individual resident. This is hardly feasible in large-scale studies, as accurate measurements on individual level would require direct observations of staff-resident encounters. In terms of Donabedian's QoC framework,[7] direct observations would provide more insight into process aspects of staffing (e.g., roles, tasks, how staff is scheduled, consistency of staff (same staff members taking care for same group of residents)), while in our large-scale study, only structural aspects of the concept were considered.[1] Nevertheless, even when measuring staffing at individual level, it is hard to control for factors that may compensate lower staffing levels, like physician or allied professionals staffing levels,[1] labor-saving technologies (e.g., digitalization of administrative processes, nurse call system, camera supervision),[1,8,9] or the physical environment of the nursing home (e.g., length of hallways, location of medications and other equipment).[35]

Measurement of QoC

Two different methods were used to measure QoC in nursing homes. First, clinical outcomes that were measured in the LPZ (i.e., nosocomial pressure ulcers, medication

incidents, falls, antipsychotic drug use, indwelling urinary catheter use) were considered (Chapters 3 and 4). Second, in a subsample of nursing home wards, staff-perceived QoC was also assessed (Chapters 4 and 5).

Clinical QoC outcomes were the most likely to be considered when assessing QoC in nursing homes.[10] This was also found in our systematic review.[4] More than a decade ago, various authors claimed that since QoC in nursing homes is a multi-dimensional construct, then developing a comprehensive measure reflecting the most important dimensions of QoC would be necessary.[11-14] According to Donabedian, QoC consists of at least two interrelated dimensions, i.e., technical care (related to the management of health problems) and interpersonal processes (the psychosocial interaction between resident and staff member).[7,15] With regard to technical care, nurse sensitive clinical outcomes have been studied widely to assess QoC in nursing homes.[4] Interpersonal processes can be assessed by integrating resident, family and staff perspectives when assessing QoC in nursing homes, however, this is seldom done.[16] To obtain insight into both dimensions of QoC in our studies, we combined clinical QoC outcomes with staff-perceived QoC.

When assessing QoC, staff members may tend to consider QoC for all residents living in that ward. Ideally, we should have assessed resident and family perspectives, too, as they might provide insight into 'more subjective or interpersonal aspects of care',[17] and are more likely to only consider their personal experiences.

THEORETICAL CONSIDERATIONS

Our findings demonstrate that the prevalence of clinical QoC problems in the participating Dutch nursing home wards was low. Direct nursing care staff, in general, gave high mean ratings for QoC (overall QoC grade 7.7 in psychogeriatric wards and 7.4 in somatic wards on scale ranging from 1-10). They also agreed, to a great extent, with the statement 'In the event that a family member had to be admitted to a nursing home now, I would recommend this ward'. These findings suggest that there is a discrepancy between the negative public image of nursing homes and QoC as assessed in our studies.

As QoC is a multidimensional construct,[7] our focus on clinical and staff-perceived QoC outcomes only accounts for some of the care that is provided.[18,19] Obtaining insight into residents and family members' experiences may contribute to a more detailed understanding of QoC. Therefore, to better acknowledge the multidimensionality of the concept, resident and family perspectives should also be considered in QoC assessments. Nevertheless, it might be impossible to encompass all dimensions of QoC. In addition, similar to outcomes, the structural and process aspects of QoC seem to be multidimensional, as our studies revealed that focusing on quantity of direct nursing care staff alone is inadequate to assess the relationship with QoC. Beyond numbers of

staff, aspects that relate to the quality of staff should be considered. For example, staff members' skills and competencies, the roles they fulfill, or characteristics of a team's work environment.

Our results suggest that team climate may be an important work environment characteristic to consider when assessing QoC. When staff members have the feeling that the team climate is safe, they are more likely to openly address issues that could be improved.[20] This may enable team-learning, e.g. by asking for help, discussing problems or learning from errors.[21] Teams with increased learning behavior are expected to be more successful in dealing with innovations and change,[20] as team members have learned to address their wishes and needs.[21] In daily practice, team members might challenge the status quo more often, as they have learned to reflect on organizational issues that could be improved.[21] Teams that are able to generate new ideas and working methods are, for example, better able to respond to changes in resident preferences. Therefore, a positive team climate that increases a team's innovativeness might contribute to better QoC in nursing homes. Besides improving QoC, a better team climate may also lead to an improvement of other work environment characteristics (e.g., better communication and coordination), which might also contribute to QoC. Thus, team climate may mediate the relationship between other work environment characteristics and QoC, and should be considered as a potential mediator.

Besides team climate, we found that clinical leaders who act as coaches might be an important aspect to consider when trying to improve QoC in nursing homes. Clinical nurse leaders are expected to be able to improve QoC at the bedside, without fulfilling a formal leadership position (e.g., ward/location manager).[22-24] Stanley[25] defines a clinical nurse leader as 'a clinician who is an expert in their field, and who, because they are approachable and effective communicators, are able to act as a role model. In this role they are empowered to motivate others to align their values and beliefs about nursing care to their daily practice. However, clinical nurse leaders' influence on QoC is primarily studied theoretically and should be explored further. Theoretically, clinical nurse leaders are expected to facilitate effective communication, strengthen intra- and interprofessional relationships, build and sustain teams that strive for a common goal, and provide daily support to direct nursing care staff.[26] As they are present in the ward, they are considered to give feedback in real-time, to continuously monitor care delivery in a non-threatening way and to promote and sustain the uptake of evidence based practices through role modelling.[26]

In two of our studies (Chapters 6 and 7), the clinical nurse leader role in nursing homes was considered important and BRNs were expected to fulfill this role. Contrary to these expectations, one of our studies (Chapter 3) showed that in 43% of the 282 participating wards, no BRN was employed. In addition, in wards that employed a BRN, the amount of time spent on indirect care practices (e.g. staff education, coaching and care innovation projects) was low. This indicates that only few clinical nurse leaders are working in Dutch nursing homes. In other countries, master-educated RNs that work in

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direct resident care fulfill this clinical nurse leader role.[26] However, in Dutch nursing homes, master-educated RNs often work as physician extenders. At the same time, based on what is theoretically expected from clinical nurse leaders, it is questionable whether or not BRNs are able to fulfill this role. For example, international experts in one of our studies (Chapter 6) stressed that a successful implementation of innovations in care practice may finally depend on the collaboration between master-educated RNs and BRNs. Experts saw master-educated RNs as those professionals providing evidence on best practice and ensuring evidence-informed care delivery, while BRNs were expected to oversee the implementation of best practice guidelines at an operational level. To conclude, our findings suggest that a reconsideration of the roles of master-educated RNs and BRNs in Dutch nursing homes deserves attention.

FUTURE DIRECTIONS

The results of this dissertation have several implications for practice, education, policy and research.

Practice

Our findings showed that in 91% of the wards that employed a BRN, BRNs spent at least part of their time on direct care. When working in direct care, their responsibilities may not differ from those of other direct nursing care staff members. If so, organizations may not be optimally utilizing them. To ensure that BRNs are employed to their full scope of practice, and lower-educated staff members are not going beyond their practice scope,[27] the role of each staff member (e.g., BRN, RN, CNA) working in direct resident care should be differentiated. Nursing home organizations should develop a vision on the employment of each staff member to ensure that their goals, responsibilities and added value become clear for everyone in the organization, while assuring that they work together as a team. The development of such a vision requires buy-in at the board level.

   Second, our findings suggest that nursing home organizations should assure that the team climate of direct nursing care teams is positive and safe. When staff members have the feeling that the team climate is safe, they are more likely to talk openly about and learn to reflect on issues that could be improved.[20] A positive team climate might lead to staff members who challenge the status quo more often.[21] Ideally, direct nursing care staff members should also feel safe when collaborating with other health professionals (e.g., nursing home medical specialists, psychologists, physical therapists) that are employed by the nursing home.

   Third, findings of this dissertation indicate that informal clinical leaders who act as role models play an important role in nursing homes. Organizations should invest in

clinical nurse leaders in direct resident care, as they might assist managers in creating a positive work environment for direct nursing care teams.[23] Our findings suggest that BRNs, as the highest educated direct care staff members working in Dutch nursing homes, can likely fulfill this role. At the same time, our studies demonstrated that different types of role models exist. Therefore, nursing homes should determine which nurses are viewed by staff as role models, as they might have an influence (positive or negative) on a team's performance. Role models are not identified easily, and might therefore be an underutilized asset for the improvement of nursing home quality.[23]

Education

Our findings indicate that the amount of BRNs working in Dutch nursing homes is low. In our qualitative study (Chapter 7), directors and managers of organizations that do not actively employ BRNs within their nursing homes experience difficulties in attracting and retaining BRNs. BRN students complete internships in nursing homes, however, many students continue to stigmatize these as an undesirable work setting.[28] One problem is that often, nursing homes are the first clinical setting where BRN students do their internships.[29] These early placements mean that BRN students practice basic nursing skills (e.g., personal hygiene or bed baths) and thus view the experience in the nursing home as a setting that is not complex.[27] These basic nursing skills can be acquired in another setting. Universities of applied sciences should also assign nursing home placements for BRN students in their third or fourth year of training, thus enabling students to obtain insight into the complexity of working in nursing homes. Such placements will facilitate BRN students to rethink the nursing home as a potential work setting.[27]

Second, internships should enable BRN students to gain meaningful experiences. As not all nursing homes employ BRNs, it is likely that BRN students are supervised by non-BRN staff working in nursing homes. Another challenge is that the understanding regarding the scope of the internship might be less clear for these organizations.[28] Due to a lack of role models, organizations might not be able to position interns in a way that they receive meaningful experiences. As a consequence, the nursing home will remain an undesirable setting to work in. Educators should form local partnerships with nursing home organizations to assure that BRN students witness the complex work of BRNs in nursing homes and can practice at an expanded level.[28] This will lead to an improvement of internships. Besides preparing BRN students for working with older adults, internships in nursing homes should clarify the role of BRNs in this setting, enticing graduates to work in nursing homes.[28]

Third, educational programs should equip graduates with skills and competencies that are considered necessary for working in future nursing homes. Even though it is impossible to forecast the future, it is for example expected that nursing homes will play an important role in providing complex psychogeriatric care, geriatric

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rehabilitation, and palliative care. Moreover, the role of technology is expected to increase. Specifically for BRN students, leadership and coaching competencies are considered important. The Dutch 'Bachelor Nursing 2020' profile [30] was developed with the aim to equip BRN graduates with skills and competencies that meet future demands. Nevertheless, revisions of other curricula (e.g., CNAs) seem desirable, too.

Policy

As no consistent evidence for a positive relationship between direct nursing care staffing and QoC in nursing homes was found, the evidence base for implementing a generic minimum staffing standard for Dutch nursing homes is lacking. Still, probably there is a minimum staffing threshold below which the probability of poor QoC outcomes is higher. Instead of focusing on the quantity of staff, we welcome recent initiatives that instead consider team quality.[31] At the same time, it might be desirable to explore further how direct nursing care staff working in Dutch nursing homes experiences staffing in their ward. A perceived lack of adequate staffing might lead to implicit rationing of care (also referred to as 'care left undone', 'missed care' or 'omitted care'), especially omitting social aspects of care delivery.[32] Focusing on the completion of tasks (e.g., breakfast should be completed at a posted time, baths are given according to schedules) might result in (unnecessary) stress,[33] leading to a feeling that staffing is not adequate. In this situation, reconsideration of work routines might change staffs' perception on staffing.

Second, due to a lack of scientific evidence, it is difficult to convince nursing home organizations that rethinking their current staff allocation (e.g., employing better-educated staff) might improve QoC. The government should encourage local initiatives in which nursing home organizations experiment with a new mix of staff members or with more differentiated staff roles. Although the way in which these organizations have allocated their staff should not be employed as a blue-print by others, their 'lessons learned' could inspire and help other organizations to reconsider their staff allocation, too.

Third, future nursing home residents will have more influence on how their care is organized. In practice, this may mean that a balance has to be found between fulfilling resident needs and delivering care that is adequate and safe. Moreover, there might be discrepancies between preferences of residents themselves and what family members find important. Ideally when residents make choices regarding the organization of their care, they should be guided by staff that are competent to assess whether care delivery is adequate and safe, and are able, when needed, to mediate between residents and family members. It is likely that the current nursing home workforce is not prepared to guide residents in this process. Therefore, a careful preparation of the workforce (e.g., by training programs or coaching on the job) is considered desirable.

Research

Methodological work is needed to improve measurement of resident perspectives of QoC. As resident preferences can change quickly, instruments that can provide insight into real-time preferences are desirable. Ideally, to make them feasible for improving daily QoC, these instruments should be user-friendly for direct nursing care staff members. At the same time, instruments should not be too burdensome for residents. Therefore, a careful evaluation of the appropriate frequency of various measures is recommended.

Second, conducting large-scale studies on the relationship between BRN staffing levels and QoC in Dutch nursing homes may not provide new insights since probably BRN staffing levels still are too low to adequately examine this relationship. Instead of studying staffing levels, more insight should be obtained into what BRNs are actually doing in nursing homes. Conducting direct observations may lead to a better understanding of how BRNs work together with direct nursing care staff members or how they contribute to QoC in nursing homes.

Third, our proposed theoretical model should be further refined in future longitudinal studies. These studies should consider work environment characteristics as potential mediators. More information on specific work environment characteristics (e.g., team climate) that contribute to QoC in nursing homes would provide an evidence base for the development of interventions aimed at improving these specific characteristics.

Fourth, while informal leaders who serve as role models for other staff members are considered a 'hidden treasure'[23] in healthcare in general and, due to the high amount of low-educated staff, in nursing homes in particular, a common understanding of and evidence for the role are lacking.[22] Therefore, more insight should be obtained into characteristics of informal clinical leaders, their leadership behavior and the influence they have on team performance and QoC. In addition, it should be assessed whether or not BRNs are the professionals who should ideally fulfill this role in nursing homes.

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Summary

The aim of this dissertation is to examine direct nursing care staffing in nursing homes. Besides considering staffing levels, particular attention is paid to the competencies, tasks and employment of baccalaureate-educated registered nurses (BRNs), as these are expected to serve as informal leaders that have the ability to lead improvements and redesign practice environments in nursing homes. More specifically, this dissertation provides insight into the relationship between direct nursing care staffing, staff-related work environment characteristics and quality of care (QoC) in nursing homes. In addition, with a focus on BRNs, we report on future desirable distinguishing competencies of BRNs and how BRNs can be employed in nursing homes in ways that encourage their ability to add value to QoC.

Chapter 1 introduces the central concepts of this dissertation, i.e., 'nursing homes', 'direct nursing care staff' and 'quality of care', and presents the main objectives of this dissertation.

The results of a systematic review of 20 longitudinal studies examining the relationship between nurse staffing and QoC in nursing homes are presented in **Chapter 2**. No consistent evidence was found for a positive relationship between nurse staffing and QoC. Higher staffing levels were associated with better as well as lower QoC indicators. For example, for restraint use both positive (ie, less restraint use) and negative outcomes (ie, more restraint use) were found. With regard to pressure ulcers, we found that more staff led to fewer pressure ulcers and, therefore, better results, no matter who (registered nurse, licensed practical nurse/ licensed vocational nurse, or nurse assistant) delivered care. Furthermore, major methodological weaknesses (e.g., timing of data collection, accuracy of staffing data) limited the interpretation of the results.

Chapter 3 reports on a cross-sectional study on the relationship between the presence of BRNs and clinical QoC conducted among 282 wards and 6,145 residents from 95 Dutch long-term care facilities. 57% of the included wards employed at least one BRN. In these wards, the mean amount of time BRNs spent per resident was low (4.8 minutes per resident per day). BRNs conducted direct care practices (personal and nursing care, e.g. help with activities of daily living) on 91% of the wards that employed a BRN, and indirect care practices (e.g. staff education, coaching, and care innovation projects) on 80% of these wards. We found a considerable variation in prevalence rates among residents between somatic (more likely to have a nosocomial pressure ulcer, medication incident or indwelling urinary catheter) and psychogeriatric wards (more likely to fall or use antipsychotic drugs). For both ward types, no consistent evidence was found for a relationship between the presence of BRNs and QoC, controlling for background characteristics. Among residents living in somatic wards that employed BRNs, the probability of experiencing a fall and receiving antipsychotic drugs was higher, whereas the probability of having an indwelling urinary catheter was lower. Among residents living in psychogeriatric wards that employed BRNs, the probability of experiencing a medication incident was lower. For residents from both ward types, the

probability of suffering from nosocomial pressure ulcers did not significantly differ for residents in wards employing BRNs.

We then cross-sectionally assessed the relationship between the number of total staff hours per resident per day (HPRD) and QoC in 55 Dutch nursing home wards (**Chapter 4**). Besides clinical QoC, staff-reported QoC was assessed in this study. Staff members graded the overall QoC on their ward (grade 1-10, higher score indicating better QoC) and were asked to which extent they agreed with the statement "In case a family member had to be admitted to a nursing home now, I would recommend this ward". For residents from psychogeriatric and somatic wards, the probability of experiencing nosocomial pressure ulcers, falls, antipsychotic drug use, or urinary indwelling catheters was not significantly associated with HPRD. For residents living in psychogeriatric wards, however, higher HPRD were associated with a higher probability of experiencing a medication incident. This was not demonstrated for residents living in somatic wards. In addition, a relationship between HPRD and staff-reported QoC for both ward types was not found, as HPRD were not significantly associated with staff-reported QoC (grade for overall QoC; recommending the ward). These findings underscore that focusing on quantity of care might not improve QoC in nursing homes.

Chapter 5 presents a cross-sectional study examining the relationship between direct care staffing levels (measured as HPRD), work environment characteristics and staff-perceived QoC in 55 Dutch nursing home wards. Overall, staff members were satisfied with the QoC in their wards. Staff members from psychogeriatric wards scored higher on ward recommendation. A better team climate was related to better perceived QoC in both ward types. In somatic wards, there was a positive association between multidisciplinary collaboration and agreement by staff of ward recommendation for a family member. In psychogeriatric wards, a lower score on market culture, better communication/coordination and a higher rating for multidisciplinary collaboration were significantly associated with a higher grade for overall QoC. Total direct nursing care staffing, adhocracy culture, hierarchy culture, as well as role model availability were not significantly related to QoC. Although our findings propose that team climate may be an important factor to consider when trying to improve QoC, more evidence on which work environment characteristics lead to better QoC in nursing homes is needed.

Besides considering staffing levels, this dissertation contributes to the development of BRN roles in nursing homes by providing insight into their competencies, tasks and employment in nursing homes. The aim of the study reported in **Chapter 6** was to reach consensus on competencies, which should in the future, distinguish BRNs from other nursing staff (e.g., vocationally trained registered nurses, certified nurse assistants) in nursing homes. In this study, thirty-one experts from different countries reached consensus on 16 desirable competencies for BRNs working in nursing homes. Half of the competencies were related to leadership and coaching, two to communication, three to evidence-based practice and three to client assessment and geriatric expertise. Some of the competencies are not traditionally associated with nursing expertise e.g. being a

team leader, role model and coach within the nursing team. Therefore, although there is continuing uncertainty about the future of nursing homes, our findings indicate that revision of current nursing curricula, nurse training programs and nursing home job profiles might be needed to meet the medically and psychologically complex needs of nursing home residents.

Chapter 7 contains a qualitative study, aimed at obtaining insight into how organizations employ BRNs in nursing homes and what is the perceived added value in care practices that organizations experience from their employment. This study found that having a vision on how to utilize the BRN role within the nursing home is a key factor on whether or not an organization employs BRNs in their nursing homes. Organizations that do not employ BRNs expect that BRNs do not want to work in nursing homes while organizations that have a clear vision on how to use their role are successful in employment and retention of BRNs. In organizations that employ BRNs, the percentage of board members and managers with an RN background was higher. Within and between the organizations that employ BRNs, there is a large variation in the positioning, roles, tasks and responsibilities of BRNs. Difficulties that BRNs experienced when they started working in the nursing home were related to their role clarity, the naming of the BRN role, the extent to which BRNs received support, the openness of the direct care teams, and the behavior of BRNs. The added value direct care staff members experienced differed between organizations. Our findings suggest that BRNs might improve QoC in nursing homes and provide different implications for practice. A careful implementation and evaluation of the BRN role seems crucial for a successful employment.

The final chapter (**Chapter 8**) summarizes the main findings of this PhD project. In addition, it discusses methodological considerations related to the cross-sectional study design, the collection of staffing data at ward level, the conceptualization of direct nursing care staffing (i.e., HPRD, BRN present or not), and the measurement of QoC. Moreover, theoretical considerations related to 'good QoC' and staff-related factors (i.e., informal leadership, team climate) that might contribute to good QoC in nursing homes are discussed. Finally, the chapter presents future directions for practice, education, policy, and research. For example, it is recommended that nursing home organizations differentiate the role of each team member (e.g., BRN, certified nurse assistant) and invest in informal leaders and positive team climates. To ensure that BRN students gain meaningful experiences during their nursing home internships, educators and nursing home organizations should form local partnerships. Moreover, it is considered desirable that government encourages local initiatives in which nursing home organizations experiment with a new mix of staff members or with more differentiated staff roles. Finally, future studies should further explore how team climate and informal leadership can contribute to 'good QoC' in nursing homes.

Samenvatting

De kwaliteit van zorg in verpleeghuizen staat volop ter discussie. Steeds vaker komen incidenten in de zorg in de media, waarna er vaak gepleit wordt voor 'meer handen aan het bed'. De aanname daarbij is dat meer personeel leidt tot betere kwaliteit van zorg. Echter, er is weinig wetenschappelijke kennis beschikbaar over de relatie tussen de personele bezetting en de kwaliteit van zorg in verpleeghuizen. Dit proefschrift geeft meer inzicht in deze relatie. Naast de personeelsomvang en het opleidingsniveau van personeel in het algemeen, wordt specifiek gekeken naar de competenties, taken en inzet van HBO-verpleegkundigen. Van HBO-verpleegkundigen wordt verwacht dat zij een voorbeeldfunctie op de werkvloer kunnen vervullen, die bijdraagt aan een verbetering van de kwaliteit van zorg.

Concreet is de relatie onderzocht tussen personele bezetting, werkomgevingsfactoren en kwaliteit van zorg in verpleeghuizen. Daarnaast zijn wenselijke competenties van HBO-verpleegkundigen in kaart gebracht, die hen in de toekomst zouden moeten onderscheiden van andere medewerkers in de directe zorg. Ook is gekeken naar hoe HBO-verpleegkundigen in verpleeghuizen ingezet zouden kunnen worden, wat hun gepercipieerde meerwaarde is en wat er nodig is om de functie van de HBO-verpleegkundige in het verpleeghuis te implementeren.

Hoofdstuk 1 introduceert de centrale concepten van dit proefschrift, namelijk 'verpleeghuizen', 'medewerkers in de directe zorg' en 'kwaliteit van zorg'. Daarnaast worden de doelstellingen van dit proefschrift gepresenteerd.

De resultaten van een systematisch literatuuronderzoek naar longitudinale studies over de relatie tussen personele bezetting en kwaliteit van zorg in verpleeghuizen worden gepresenteerd in **Hoofdstuk 2**. Er werd geen eenduidig bewijs gevonden voor een positief verband tussen de personele bezetting en de kwaliteit van zorg. Een hogere personeelsbezetting ging gepaard met betere, maar ook met slechtere kwaliteitsuitkomsten. Voor vrijheidsbeperkende maatregelen werden bijvoorbeeld positieve (minder vrijheidsbeperking) en negatieve (meer vrijheidsbeperking) uitkomsten gevonden bij een grotere personeelsinzet. Met betrekking tot decubitus vonden we dat meer personeel leidde tot minder decubitus en daardoor betere kwaliteit zorg, onafhankelijk van wie (verpleegkundige, verzorgende of helpende) de zorg leverde. Methodologische tekortkomingen van de geïncludeerde studies (onder meer timing van meetmomenten, kwaliteit van data over personeelsbezetting) beperkten de interpretatie van de resultaten.

Hoofdstuk 3 beschrijft een cross-sectionele studie naar de relatie tussen de inzet van HBO-verpleegkundigen op een afdeling en klinische indicatoren voor kwaliteit van zorg (bijvoorbeeld decubitus en valpartijen). De studie werd verricht op 282 verpleeghuisafdelingen met in totaal 6145 bewoners van 95 Nederlandse zorginstellingen. Op 57% van de afdelingen werd minimaal één HBO-verpleegkundige ingezet. Als HBO-verpleegkundigen werden ingezet, leverden deze gemiddeld iets minder dan 5 minuten zorg per bewoner per dag. Daarvan besteedden zij gemiddeld ongeveer vier minuten aan directe zorgverlening en één minuut aan innovatietaken

(zoals scholing, coaching of zorgvernieuwingstrajecten). Op 20% van de afdelingen die een HBO-verpleegkundige inzetten, werd deze niet ingezet voor innovatietaken.

Met betrekking tot de prevalentie van zorgproblemen vonden we een duidelijk verschil tussen bewoners van somatische (meer decubitus, medicijnincidenten en kathetergebruik) en psychogeriatrische afdelingen (meer valpartijen en antipsychoticamedicatie). Voor beide type afdelingen werd geen duidelijke relatie gevonden tussen het inzetten van HBO-verpleegkundigen en de kwaliteit van zorg (gecorrigeerd voor achtergrondkenmerken). Bewoners van somatische afdelingen met een HBO-verpleegkundige hadden bijvoorbeeld een grotere kans op valpartijen en antipsychoticagebruik, en een kleinere kans op kathetergebruik, in vergelijking met bewoners van afdelingen die geen HBO-verpleegkundige inzetten. Bewoners van psychogeriatrische afdelingen met een HBO-verpleegkundige hadden een kleinere kans op medicijnincidenten, in vergelijking met bewoners van afdelingen die geen HBO-verpleegkundige inzetten. Voor bewoners van beide soorten afdelingen werd voor decubitus geen significant verschil gevonden tussen afdelingen die wel of niet HBO-verpleegkundigen inzetten.

De resultaten van een cross-sectionele studie naar de relatie tussen de personeelsbezetting (totale hoeveelheid geleverde zorg) en de kwaliteit van zorg in 55 Nederlandse verpleeghuisafdelingen worden beschreven in **Hoofdstuk 4**. De personeelsbezetting hebben we in kaart gebracht middels teamleider interviews (teamleiders baseerden zich daarbij op het dienstrooster). De uren geleverde zorg op een afdeling hebben we afgezet tegen het aantal bewoners op een afdeling en zo een indicator voor de totale hoeveelheid geleverde zorg berekend. Naast klinische kwaliteitsindicatoren hebben we gekeken naar de subjectief ervaren kwaliteit door medewerkers. Medewerkers gaven bijvoorbeeld een rapportcijfer voor de kwaliteit op hun afdeling en gaven aan in hoeverre zij het eens waren met de stelling "Als een familielid nu moet worden opgenomen, zou ik deze afdeling aanbevelen." Voor bewoners van psychogeriatrische en somatische afdelingen werd geen significante relatie gevonden tussen de hoeveelheid geleverde zorg en de kans op decubitus, valpartijen, antipsychotica- of kathetergebruik. Voor bewoners van psychogeriatrische afdelingen was een grotere hoeveelheid zorg gerelateerd aan een grotere kans op medicijnincidenten. Voor beide soorten afdelingen werden geen significante relaties gevonden tussen de hoeveelheid zorg en de door medewerkers ervaren kwaliteit. Deze resultaten suggereren dat meer medewerkers op een afdeling niet per se zullen leiden tot een betere kwaliteit van zorg in verpleeghuizen.

Hoofdstuk 5 bespreekt een cross-sectionele studie naar de relatie tussen de totale hoeveelheid zorg (uren per bewoner per dag), werkomgevingskenmerken en de subjectief ervaren kwaliteit door medewerkers (rapportcijfer en stelling over aanbevelen afdeling). Deze studie werd verricht in 55 Nederlandse verpleeghuisafdelingen, die ook in hoofdstuk 4 centraal stonden. Over het algemeen waren medewerkers tevreden over de kwaliteit van zorg op hun afdeling. Medewerkers

van psychogeriatrische afdelingen waren meer geneigd hun afdeling aan te bevelen. Voor beide type afdelingen (psychogeriatrie, somatiek) vonden we dat een positief teamklimaat een positief effect had op de kwaliteit van zorg. Voor psychogeriatrische afdelingen vonden we dat een minder marktgerichte cultuur (wat betekent dat de sfeer minder competitief is en het bereiken van concrete resultaten en output minder centraal staat), een betere communicatie/coördinatie en een betere multidisciplinaire samenwerking gerelateerd waren aan een hoger rapportcijfer voor de kwaliteit van zorg. Voor somatische afdelingen werd een positieve relatie gevonden tussen de multidisciplinaire samenwerking en het aanbevelen van de afdeling.

Naast informatie over de personeelsomvang en het opleidingsniveau van personeel in verpleeghuizen, beoogt dit proefschrift ook een bijdrage te leveren aan de discussie over de rol van HBO-verpleegkundigen in verpleeghuizen. Hierbij lag de focus op hun competenties, taken en inzet. Het doel van de studie, beschreven in **Hoofdstuk 6,** was het bereiken van consensus over competenties, die in de toekomst de HBO-verpleegkundige zou moeten onderscheiden van andere medewerkers in de directe zorg (waar hun meerwaarde ten opzichte van de overige medewerkers zou kunnen liggen; bijvoorbeeld MBO-verpleegkundigen, verzorgenden). In deze studie hebben 31 experts uit verschillende landen 16 competenties geïdentificeerd. De helft van deze competenties had betrekking op leiderschap en coaching, twee competenties hadden betrekking op communicatie, drie op evidence-based werken en drie op diagnostiek en geriatrische expertise. Sommige van deze competenties zijn eerder niet zo expliciet gekoppeld aan de expertise van verpleegkundigen, bijvoorbeeld 'rolmodel en coach voor het team zijn'. Het is dan ook belangrijk om de huidige opleidings- en scholingsprogramma's, maar ook functieprofielen kritisch te blijven toetsen op hun toekomstbestendigheid.

Hoofdstuk 7 beschrijft een kwalitatieve studie naar verschillen in hoe men HBO-verpleegkundigen in verpleeghuizen inzet, wat hun meerwaarde is en wat er nodig is om de functie van HBO-verpleegkundige beter in het verpleeghuis te implementeren. In deze studie vonden we dat het hebben van een visie over hoe men HBO-verpleegkundigen wil inzetten binnen het verpleeghuis bepaalt of organisaties hen daadwerkelijk inzetten. Organisaties die hen niet inzetten, verwachten dat HBO-verpleegkundigen niet in een verpleeghuis willen werken. Organisaties met een duidelijke visie over de inzet van HBO-verpleegkundigen lukt het deze te werven en te binden. Tussen en binnen organisaties die HBO-verpleegkundigen inzetten waren grote verschillen te zien wat betreft hun positionering, rollen, taken en verantwoordelijkheden. Moeilijkheden waar HBO-verpleegkundigen in het begin van hun aanstelling tegenaan liepen, waren bijvoorbeeld gerelateerd aan rolonduidelijkheid, de mate van ervaren steun en de openheid van de directe zorgteams. Tussen organisaties zat er verschil in de door medewerkers (MBO-verpleegkundigen, verzorgenden, helpenden) ervaren meerwaarde van HBO-verpleegkundigen. Onze resultaten wijzen erop dat de inzet van HBO-verpleegkundigen lijkt te kunnen bijdragen

aan een betere kwaliteit van zorg zoals ervaren door zorgorganisaties. Een zorgvuldige implementatie en evaluatie van de rol van HBO-verpleegkundigen is cruciaal voor hun succesvolle inzet.

In het laatste hoofdstuk, **Hoofdstuk 8**, worden de belangrijkste bevindingen van dit proefschrift samengevat. Ook worden methodologische overwegingen met betrekking tot onder meer het cross-sectionele studie design en het meten van kwaliteit van zorg besproken. Daarna volgen theoretische overwegingen met betrekking tot 'goede kwaliteit van zorg' en medewerker-gerelateerde factoren (informeel leiderschap, teamklimaat) die een bijdrage lijken te kunnen leveren aan 'goede kwaliteit van zorg' in verpleeghuizen. Ten slotte worden aanbevelingen gedaan voor de praktijk, opleidingen, beleid en onderzoek. Een belangrijke implicatie is bijvoorbeeld om roldifferentiatie bij zorgmedewerkers te creëren en te investeren in informele leiders en een positief teamklimaat. Informele leiders en een positief teamklimaat kunnen bijdragen aan het lerend vermogen van een team, iets wat ook belangrijk wordt gevonden in het nieuwe kwaliteitskader verpleeghuiszorg. Om te waarborgen dat studenten HBO-verpleegkunde tijdens hun stages in het verpleeghuis relevante en interessante ervaringen kunnen opdoen, worden opleidingen en verpleeghuisorganisaties aangeraden om intensievere lokale samenwerkingsverbanden te creëren. In toekomstig onderzoek moet onder andere bekeken worden hoe het teamklimaat en informeel leiderschap kunnen bijdragen aan 'goede kwaliteit van zorg' in verpleeghuizen.

Zusammenfassung

Ziel dieser Dissertation ist es, die personelle Besetzung in Pflegeheimen zu untersuchen. Neben dem Besetzungsgrad von Pflegepersonal in Pflegeheimen im Allgemeinen, fokussiert diese Dissertation auf die Kompetenzen, Aufgaben und den Einsatz von Bachelor-Pflegekräften. Von Bachelor-Pflegekräften wird erwartet, dass diese eine informelle Leitungsfunktion übernehmen, wodurch eine Pflegequalitätsverbesserung erreicht werden kann. Konkret bietet diese Dissertation Einblick in den Zusammenhang zwischen dem Besetzungsgrad, Arbeitsumgebungsfaktoren (z.B. Teamwork) und der Pflegequalität in Pflegeheimen. Des Weiteren, fokussierend auf Bachelor-Pflegekräfte, werden wünschenswerte Kompetenzen von Bachelor-Pflegekräften beschrieben, die diese zukünftig von anderen Pflegekräften in Pflegeheimen unterscheiden sollen. Auch wird beschrieben, wie Bachelor-Pflegekräfte in Pflegeheimen eingesetzt werden können, welchen Mehrwert sie haben und was nötig ist, um die Rolle der Bachelor-Pflegekraft im Pflegeheim zu implementieren.

In **Kapitel 1** werden die zentralen Konzepte dieser Dissertation beschrieben, nämlich ‚Pflegeheime', ‚Pflegeheimpersonal' und ‚Pflegequalität'. Im Anschluss folgt eine Beschreibung der Ziele dieser Dissertation.

Die Resultate einer systematischen Literaturstudie von 20 Längsschnittstudien, in denen der Zusammenhang zwischen dem Besetzungsgrad und der Pflegequalität in Pflegeheimen untersucht wurde, werden in **Kapitel 2** präsentiert. Für einen positiven Zusammenhang zwischen dem Besetzungsgrad und der Pflegequalität wurde keine eindeutige Evidenz gefunden. Für Fixierung wurden zum Beispiel positive (weniger Fixation) und negative (mehr Fixation) Ergebnisse gefunden. Bezüglich Dekubitus fanden wir, dass mehr Pflegepersonal zu weniger Dekubitus führte, und demnach zu besseren Ergebnissen, unabhängig vom eingesetzten Pflegepersonal (examinierte Pflegekräfte oder Pflegehilfskräfte). Methodologische Schwierigkeiten (zum Beispiel bezüglich der Zeitpunkte der Messungen oder der Qualität der Daten zur personellen Besetzung) begrenzten die Interpretation der Resultate.

In **Kapitel 3** wird eine Querschnittsstudie beschrieben, in welcher der Zusammenhang zwischen dem Einsatz von Bachelor-Pflegekräften und der Pflegequalität untersucht wurde. Diese Studie umfasste 282 Wohnbereiche und 6145 Bewohner von 95 niederländischen Einrichtungen der stationären Langzeitpflege. In 57% der Wohnbereiche wurde minimal eine Bachelor-Pflegekraft eingesetzt. In diesen Bereichen war die durchschnittliche Zeit, welche die Bachelor-Pflegekraft pro Bewohner im Wohnbereich verbrachte, niedrig (4,8 Minuten pro Bewohner pro Tag). Die Bachelor-Pflegekräfte wurden in 91% dieser Wohnbereiche in der direkten Pflege eingesetzt (persönliche und pflegerische Betreuung, zum Beispiel Hilfe bei Aktivitäten des täglichen Lebens) und in 80% dieser Wohnbereiche für indirekte Pflegeaktivitäten (zum Beispiel Schulung des übrigen Personals, Coaching, Pflegeinnovationsprojekte). Wir fanden eine beträchtliche Variation in den Prävalenzraten der Bewohner somatischer (mehr Dekubitus, Medikamentenfehler und Harnkatheter) und psychogeriatrischer Wohnbereiche (mehr Stürze und Antipsychotika). Für beide Wohnbereichstypen wurde

keine eindeutige Evidenz für einen Zusammenhang zwischen dem Einsatz von Bachelor-Pflegekräften und der Pflegequalität (kontrolliert für demografische Faktoren) gefunden. Unter Bewohnern somatischer Wohnbereiche auf denen eine Bachelor-Pflegekraft eingesetzt wurde, war die Wahrscheinlichkeit zu Stürzen und Antipsychotika einzunehmen höher, während die Wahrscheinlichkeit einen Harnkatheter zu benutzen niedriger war (im Vergleich zu Wohnbereichen, die keine Bachelor-Pflegekraft einsetzen). Unter Bewohnern psychogeriatrischer Wohnbereiche auf denen eine Bachelor-Pflegekraft eingesetzt wurde, war die Wahrscheinlichkeit eines Medikamentenfehlers niedriger. Für Bewohner von beiden Wohnbereichstypen hatte der Einsatz einer Bachelor-Pflegekraft keinen Einfluss auf die Dekubitusrate.

In einer anderen Querschnittsstudie haben wir den Zusammenhang zwischen dem Personaleinsatz und der Pflegequalität in 55 Wohnbereichen niederländischer Pflegeheime untersucht (**Kapitel 4**). Den Personaleinsatz haben wir mittels Interviews (basierend auf dem Dienstplan) in Erfahrung gebracht. Um einen Vergleich mit anderen Wohnbereichen zu ermöglichen, haben wir die Arbeitsstunden, die pro Bereich pro Tag eingesetzt wurden, durch die Anzahl der Bewohner eines Bereiches geteilt. Neben klinischen Qualitätsindikatoren wurde in dieser Studie auch die Qualitätseinschätzung des Pflegepersonals berücksichtigt. Das Pflegepersonal beurteilte die allgemeine Pflegequalität des eigenen Wohnbereiches (Note 1-10, höhere Zahl bedeutet bessere Qualität) und wurde gefragt, in welchem Maße man der folgenden Aussage zustimmt: „Wenn ein Familienmitglied jetzt in einem Pflegeheim aufgenommen werden müsste, würde ich diesen Wohnbereich empfehlen". Für Bewohner beider Wohnbereichstypen (somatisch und psychogeriatrisch), wurde kein Zusammenhang zwischen dem Personaleinsatz pro Bewohner pro Tag und der klinischen Pflegequalität (Dekubitus, Stürze, Antipsychotika, Katheter) gefunden. Lediglich für Bewohner psychogeriatrischer Wohnbereiche fanden wir einen Zusammenhang zwischen einem höheren Personaleinsatz und einer höheren Häufigkeit von Medikamentenfehlern. Wir fanden keinen Zusammenhang zwischen den Beurteilungen der allgemeinen Pflegequalität durch das Pflegepersonal und dem Personaleinsatz.

Kapitel 5 präsentiert eine Querschnittsstudie, in welcher der Zusammenhang zwischen dem Personaleinsatz (pro Bewohner pro Tag), Arbeitsumgebungsfaktoren und der Qualitätseinschätzung durch das Pflegepersonal untersucht wurde. Diese Studie wurde in denselben 55 Bereichen niederländischer Pflegeheime durchgeführt. Im Allgemeinen war das Pflegepersonal zufrieden mit der Pflegequalität des eigenen Wohnbereiches. Pflegepersonal psychogeriatrischer Bereiche stimmte eher zu, den Wohnbereich weiter zu empfehlen. Ein besseres Teamklima hing mit einer höheren Qualitätseinschätzung zusammen. In somatischen Bereichen wurde ein positiver Zusammenhang zwischen der multidisziplinären Zusammenarbeit und dem Weiterempfehlen des Wohnbereiches gefunden. In psychogeriatrischen Bereichen hingen eine weniger auf den Markt gerichtete Kultur (weniger kompetitiv und weniger fokussiert auf konkrete Ziele und Resultate), eine bessere Kommunikation/Koordination

und eine bessere multidisziplinäre Zusammenarbeit positiv mit der Benotung der Pflegequalität zusammen.

Neben Informationen zum Personaleinsatz und Ausbildungsniveau in Pflegeheimen, bezweckt diese Dissertation auch einen Beitrag an der Weiterentwicklung der Rolle der Bachelor-Pflegekraft im Pflegeheim zu leisten. Hierbei lag der Fokus auf den Kompetenzen, Aufgaben und dem Einsatz von Bachelor-Pflegekräften. Das Ziel der Studie, die in **Kapitel 6** beschrieben steht, war es Konsens zu erreichen über die Kompetenzen, die in Zukunft Bachelor-Pflegekräfte vom anderen Pflegepersonal in Pflegeheimen unterscheiden sollten (möglicher Mehrwert von Bachelor-Pflegekräften im Vergleich zu anderen Mitarbeitern). In dieser Studie haben 31 Experten aus verschiedenen Ländern 16 Kompetenzen identifiziert. Die Hälfte der Kompetenzen gehörte zum Bereich 'Führung ('leadership') und Coaching', zwei Kompetenzen zu ‚Kommunikation', drei zu ‚Evidence-Based Practice' und drei zu ‚Diagnostik und geriatrische Expertise'. Manche dieser Kompetenzen sind weniger explizit verknüpft an der Expertise von Pflegekräften, zum Beispiel ‚Vorbild und Coach für das Team sein'. Darum ist es wichtig, bestehende Schulungs- und Trainingsprogramme, aber auch Jobprofile kritisch auf ihre Zukunftsbeständigkeit zu überprüfen.

Kapitel 7 beschreibt eine qualitative Studie zu verschiedenen Möglichkeiten des Einsatzes von Bachelor-Pflegekräften in Pflegeheimen, deren Mehrwert und was nötig ist, um die Rolle der Bachelor-Pflegekraft besser im Pflegeheim zu implementieren. In dieser Studie fanden wir heraus, dass das Haben einer Vision über den Einsatz von Bachelor-Pflegekräften darüber bestimmt, ob diese tatsächlich eingesetzt werden. In Organisationen, die diese nicht einsetzen, ging man davon aus, dass Bachelor-Pflegekräfte nicht in Pflegeheimen arbeiten wollen. Organisationen mit deutlicher Vision über ihren Einsatz schafften es, diese zu werben und zu binden. Zwischen und innerhalb Organisationen, die Bachelor-Pflegekräfte einsetzen, sahen wir große Unterschiede bezüglich ihrer Positionierung, ihrer Rollen, ihrer Aufgaben und ihrer Verantwortungen. Schwierigkeiten womit Bachelor-Pflegekräfte zu Beginn ihrer Tätigkeit zu kämpfen hatten, hingen zum Beispiel mit der Undeutlichkeit ihrer Rolle, dem Maβ erfahrener Unterstützung und der Offenheit von Pflegeteams zusammen. Zwischen den Organisationen gab es Unterschiede im durch das Pflegepersonal (examinierte Pflegekräfte ohne Bachelorabschluss, Pflegehilfskräfte) beschriebenen Mehrwert von Bachelor-Pflegekräften. Unsere Resultate weisen darauf hin, dass der Einsatz von Bachelor-Pflegekräften zu einer wahrgenommenen Qualitätsverbesserung führen kann. Eine sorgfältige Implementation und Evaluation der Rolle der Bachelor-Pflegekraft scheint unabdingbar für ihren erfolgreichen Einsatz.

Im letzten Kapitel, **Kapitel 8**, werden die wichtigsten Resultate dieser Dissertation zusammengefasst. Auch werden methodologische und theoretische Gesichtspunkte dieser Dissertation diskutiert. Zuletzt werden Handlungsempfehlungen für Praxis, Lehre, Politik und zukünftige Forschung ausgesprochen.

Valorization

In this chapter, the societal value of this dissertation's findings will be discussed. These findings contribute to recent political and societal discussions on quality of care (QoC) in Dutch nursing homes.

Also, outside the Netherlands, it is a persistent belief that 'more hands' are needed to improve QoC in nursing homes. An increase in the number of staff is presumed to positively affect the QoC and quality of life of nursing home residents. Despite the heterogeneity across countries, nursing homes worldwide have to ensure the delivery of high QoC, and adequately staffing the homes remains a major concern in most countries. Direct nursing care staff vary in their educational level, thus it is a significant challenge to determine the numbers and types of staff as well as staffs' competencies that are necessary to meet the complex needs of nursing home residents. The findings of this dissertation have demonstrated that an increase in the number of staff will not, per se, lead to better QoC in nursing homes and have deepened the understanding of the influence of direct nursing care staff on QoC. To improve QoC in nursing homes, it seems necessary to think *beyond numbers*.

Findings of the studies described in Chapters 2-5 are published in a literature review that we conducted for the Dutch Ministry of Health, Welfare and Sport (VWS). VWS provided this report to delegates of the Dutch House of Representatives ('*Tweede Kamer*' in Dutch). It received a lot of media attention in July 2016 and has contributed to the recent quality framework for nursing homes ('*Kwaliteitskader verpleeghuiszorg*' in Dutch) of the National Health Care Institute ('*Zorginstituut Nederland*' in Dutch). This quality framework was published in January 2017 and provides temporary norms for – among other quality aspects – nursing home staffing. Based on the results of our report, the National Health Care Institute concluded that the evidence base for a generic minimum staffing standard is lacking. Instead, more attention has to be paid to the quality of teams, which is in line with our findings.

The findings of this dissertation contribute to the further development of the quality framework's staffing norms, which are classified into three themes: (1) Attention, presence and surveillance, (2) Specific knowledge and skills, (3) Reflection, learning and developing. Based on our findings, we provide implications for each theme hereafter.

Attention, presence and surveillance

One norm related to 'attention, presence and surveillance' states that 'during intensive care moments (e.g., getting up, going to bed, intake and dying), at least two care providers are present to execute these tasks'. Basically, for direct nursing care staff, it is important to ask for and to get help in those moments that help is needed. Getting help if needed may increase the delivery of safe care. Therefore, it is important that care providers are able to critically reflect on what they do. Critical reflection allows them to estimate and indicate whether or not they need help.

It is questionable whether it is possible to determine 'intensive care moments' in which help is needed. For example, in small-scale living groups, often one staff member works alone during a great extent of the day. When a resident falls, it might be necessary to ask a colleague – who is working in another living group within the facility – for help. In addition, based on the formulation of the norm, it does not become clear if the two care providers both need to be present in the ward or whether the second care provider can be called in if needed.

To further concretize this norm, the physical environment of a nursing home should be considered, too. In a stand-alone, small-scale living group with six residents, it might be financially impossible to guarantee that at least two care providers are present in the ward. One consequence may be that such small-scaled living groups disappear. Based on our findings, there is no reason to assume that two care providers (instead of one), per se, increase the QoC provided.

Specific knowledge and skills

One norm related to 'specific knowledge and skills' says '24/7, a BIG-registered registered nurse (RN; *'verpleegkundige'* in Dutch) is present within 30 minutes.' We have to take care that this norm is not interpreted by nursing home organizations, as 'It is not necessary to employ RNs within direct care teams, as long as an RN can be called in.' The RN should not be seen as a professional who only executes the technical nursing tasks (e.g., placing a catheter). Due to the rising complexity, it is desirable to integrate (baccalaureate-educated) (B)RNs in direct resident care. Especially within a self-organizing team, it might be wise to employ (B)RNs who can support lower-educated staff members.

In the mentioned norm, no differentiation is made between vocationally trained RNs and BRNs. For nursing home organizations, it would be helpful to concretize desirable responsibilities of (B)RNs in nursing homes in the quality framework. Providing an overview of these responsibilities helps organizations to ensure that (B)RNs are employed to their full scope of practice and that the role of each staff member (e.g., BRN, RN, certified nurse assistant (CNA)) within an organization is differentiated. With regard to BRNs, we saw in one of our studies (Chapter 6) that competencies other than those traditionally associated with the nurse expert role are considered important, for example, competencies related to informal leadership and coaching. A BRN who is only present upon request may not be able to serve as informal leader and coach for a direct nursing care team.

Master-educated RNs are not mentioned in the quality framework's staffing norms. In Dutch nursing homes, these RNs nowadays often work as physician extenders. In the quality framework, a consideration of which role master-educated RNs should play in Dutch nursing homes deserves further attention. For example, international experts in one of our studies (Chapter 6) stressed that a successful implementation of innovations

in care practice may finally depend on the collaboration between master-educated RNs and BRNs. They saw master-educated RNs as those professionals providing evidence on best practice and ensuring evidence-informed care delivery, while BRNs were expected to oversee the implementation of best-practice guidelines at an operational level. Therefore, it is wise to reconsider their mostly medically oriented positioning. Instead of taking over tasks from the nursing home medical specialist, they could, for example, play a role in the implementation and promotion of working methodologically. Since they have expertise in the fields of nursing and medicine, they might also be able to increase the interdisciplinary collaboration in nursing homes. Reconsidering the role of master-educated RNs can lead to a new career pathway for RNs in nursing homes, providing the opportunity to attract and employ more academically qualified staff in the future.

Reflection, learning and developing

In the future, working in nursing homes will become even more complex, not only due to an increase in residents' care needs but also due to the fact that nursing home residents and their informal network will have more influence on how their care is organized. Therefore, stimulating learning and development among the nursing home workforce (e.g., by training programs or coaching on the job) is considered desirable. One norm of the quality framework says 'For each care provider, there is enough time for learning and development via feedback, intervision, reflection and education. The amount and kind of [learning and development] are included in the quality plan.' Ideally, reflection, learning and developing should become a 'daily routine' integrated in the daily work of each direct nursing care team. To stimulate this, our results suggest that nursing home organizations should invest in positive team climates. When staff members have the feeling that the team climate is safe, they are more likely to openly address issues that should be improved. This may enable team learning, e.g., by asking for help, discussing problems or learning from errors. Besides team climate, we found that clinical leaders who act as coaches for the direct nursing care team might be an important aspect to consider. As they are present in the ward, they are considered to give feedback in real-time, to continuously monitor care delivery in a non-threatening way and to promote and sustain the uptake of evidence-based practices through role modeling.

Another norm related to 'reflection, learning and developing' says 'There is enough time available for primary responsible caregivers ('*eerst verantwoordelijk verzorgenden*' or '*contactverzorgenden*' in Dutch) to participate in the multidisciplinary meeting ('MDO' in Dutch).' Giving primary responsible caregivers the opportunity to participate in the multidisciplinary meeting is desirable, as these caregivers are those employees that are expected to know the clients best. Nowadays, often CNAs fulfill this role. In our qualitative study (Chapter 7), we saw that one nursing home organization chose to

position BRNs in a way that allowed them to closely collaborate with primary responsible caregivers and to coach them to fulfill their role. In another study (Chapter 6), international experts saw the BRN as the professional who is 'able to coordinate the multidisciplinary team' and is 'the professional who sees the whole picture, [who] should organize regular team meetings in which all disciplines participate; [and who] should manage the overall care coordination'. Therefore, it is questionable whether CNAs are able to fulfill the primary responsible caregiver role individually. Maybe they should fulfill this role in a tandem with BRNs. Alternatively, like in home care, it should be considered whether a BRN should fulfill the primary responsible caregiver role. A careful evaluation of which (combination of) caregiver(s) is able to meet the needs of residents is desirable.

INNOVATIVE ASPECTS OF OUR STUDIES

Outside the United States, research on the relationship between direct nursing care staffing and QoC in nursing homes is scarce. The study presented in Chapter 3 is the first large-scale study that provides insight into the amount and responsibilities of BRNs working in Dutch nursing care wards. Although different Dutch stakeholders have made efforts to increase the amount of BRNs in elderly care, the study shows that the amount of BRNs in institutional elderly care is still low.

In many countries, the amount of BRNs working in nursing homes is low; obtaining more information on how to best allocate them in nursing homes was considered desirable. To allocate them optimally, it is important to obtain insight into their competencies first. When studying existing competency profiles, we felt that these profiles did not provide sufficient clarity on which competencies distinguish BRNs from other direct nursing care staff. In addition, as worldwide significant changes are occurring in the nursing home sector, we were asking ourselves how future-oriented and setting-specific the existing profiles were. Contrary to other studies on the competencies of direct nursing care staff in elderly care, we did not include BRNs that are currently working in a nursing home in our panel, since they would likely be influenced by their current working conditions and thus would have trouble envisioning alternative views of staff allocation.

To blaze a trail for BRNs in nursing homes, we conducted an exploratory, qualitative study (Chapter 7) to obtain insight into factors that can contribute to the development of BRN roles in nursing homes. In addition, we wanted to explore why some organizations succeed in employing BRNs in nursing homes, while other organizations do not. This study showed, for example, that organizations that have a clear vision on how to employ BRNs within the nursing homes do not experience great recruiting and retention problems. Therefore, 'recruiting and retention problems' might no longer be an important argument for not employing BRNs in nursing homes.

DISSEMINATION OF FINDINGS

Already early in the project, we started to disseminate our results. For the scientific audience, five out of the six studies presented in this dissertation are published in peer-reviewed, international journals. Two of the articles are published 'open access', meaning that they are freely accessible for everyone interested in these studies. Another way to share our findings with other researchers and professionals was by giving (scientific) presentations at several national and international conferences. As the project was embedded within the Living Lab in Ageing & Long-Term Care, findings have been spread early among the long-term care organizations that participate in the Living Lab, too, for example, by giving lay presentations for direct nursing care staff and managers of these organizations. During the whole project, findings were discussed with representatives from national stakeholder organizations (branche organization Actiz, client organization LOC, the Dutch Nurses Association (V&VN), the Health Care Inspectorate (IGZ) and VWS). The report of the literature study conducted for VWS is freely accessible at:
https://www.rijksoverheid.nl/documenten/rapporten/2016/07/04/meer-is-niet-per-se-beter.

To disseminate the main findings of this dissertation further, several steps will be undertaken. Through writing accessible summaries, we hope to reach a wider audience. A Dutch summary as well as an e-book of this dissertation will be made available on the website of the Living Lab (http://www.academischewerkplaatsouderenzorg.nl). The e-book will also be made available via the platform '*Proefschriften Verpleegkunde*' (http://www.proefschriftenverpleegkunde.nl). This platform aims to make scientific knowledge in the field of nursing more accessible for students, educators and nurses in the Netherlands and Flanders. As this dissertation revealed relevant insights into the role of baccalaureate-educated registered nurses (BRNs) in nursing homes, particular efforts will be taken to inform these nurses. To achieve this, we will be in contact with the network of Dutch BRNs specialized in gerontology and geriatrics (http://www.hbo-vgg.net) and the steering group of the Dutch campaign '*HBO-V in de ouderenzorg – daar zit meer achter*' (http://www.daarzitmeerachter.nl). To disseminate the findings internationally, an English and German summary will be made available, too.

Part of the results of this dissertation will be included in a handbook, which provides nursing home organizations with concrete guidance on how to reach a more optimal staff mix between BRNs and other staff members working in nursing homes. This handbook will be developed in 2017.

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About the author

Ramona Backhaus was born in Heinsberg, Germany, on December 22, 1988. After graduating from secondary school at 'Kreisgymnasium Heinsberg' (1999-2008), Ramona followed the bachelor program 'Health Sciences' at Maastricht University's Faculty of Health, Medicine and Life Sciences. During this bachelor, she combined her major in Health Policy and Management with a free minor (Work and Health, Care Sciences). At the Faculty of Law, she attended an elective minor in Health Law. Next to her bachelor, she followed the two-year Honours Program 'Governance of Healthcare Innovation'. In 2011, Ramona continued her education at Erasmus University Rotterdam, where she followed the master program 'Health Economics, Policy and Law' at the institute of Health Policy and Management (iBMG) and obtained her master's degree in 2012.

In November 2012, Ramona started working as a PhD candidate within the 'Living Lab in Ageing and Long-Term Care' at the Department of Health Services Research at Maastricht University. As a PhD candidate, she conducted research into the impact of nursing staff on quality of care in nursing homes. Since February 2017, she works as a research fellow within the same Living Lab, where she participates in projects that are aimed at improving quality of care, particularly from a resident/family perspective. The Living Lab is part of the CAPHRI research line 'Ageing and Long-Term Care' at Maastricht University.

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Living lab in ageing and long-term care

LIVING LAB IN AGEING AND LONG-TERM CARE

This thesis is part of the Living Lab in Ageing and Long-Term Care, a formal and structural multidisciplinary network consisting of Maastricht University, 7 long-term care organizations (Cicero Zorggroep, Envida, Mosae Zorggroep, MeanderGroep Zuid-Limburg, Sevagram, Vivantes and Zuyderland) and Zuyd University of Applied Sciences, all located in the southern part of the Netherlands. In the Living Lab we aim to improve quality of care and quality of life for older people via a structural multidisciplinary collaboration between research, policy, education and practice. Practitioners (such as nurses, physicians, psychologists, physio- and occupational therapists), work together with managers, researchers, students, teachers and older people themselves to develop and test innovations in long-term care.

ACADEMISCHE WERKPLAATS OUDERENZORG ZUID-LIMBURG

Dit proefschrift is onderdeel van de Academische Werkplaats Ouderenzorg Zuid-Limburg, een structureel, multidisciplinair samenwerkingsverband tussen de Universiteit Maastricht, 7 zorgorganisaties (Cicero Zorggroep, Envida, Mosae Zorggroep, MeanderGroep Zuid-Limburg, Sevagram, Vivantes en Zuyderland) en Zuyd Hogeschool. In de werkplaats draait het om het verbeteren van de kwaliteit van leven en zorg voor ouderen. Zorgverleners (zoals verpleegkundigen, verzorgenden, artsen, psychologen, fysio- en ergotherapeuten), beleidsmakers, onderzoekers, studenten en ouderen zelf wisselen kennis en ervaring uit. Daarnaast toetsen en evalueren we vernieuwingen in de dagelijkse zorg. Praktijk, beleid, onderzoek en onderwijs gaan hierbij hand in hand.

PHD-THESES LIVING LAB IN AGEING AND LONG-TERM CARE / PROEFSCHRIFTEN ACADEMISCHE WERKPLAATS OUDERENZORG ZUID-LIMBURG

Ramona Backhaus. Thinking beyond numbers. Nursing staff and quality of care in nursing homes. 2017

Irma Everink. Geriatric rehabilitation. Development, implementation and evaluation of an integrated care pathway for older patients with complex health problems. 2017

Martin Van Leen. Prevention of pressure ulcers in nursing homes, a big challenge. 2017

Mariëlle Daamen-Van der Velden. Heart failure in nursing home residents. Prevalence, diagniosis and treatment. 2016

Armand Rondas. Prevalence and assessment of (infected) chronic wounds. 2016

Hanneke Beerens. Adding life to years. Quality of life of people with dementia receiving long-term care. 2016 (Cum Laude)

Donja Mijnarends. Sarcopenia: a rising geriatric giant. Health and economic outcomes of community-dwelling older adults with sarcopenia. 2016

Tanja Dorresteijn. A home-based program to manage concerns about falls. Feasibility, effects and costs of a cognitive behavioral approach in community-dwelling, frail older people. 2016

Basema Afram. From home towards the nursing home in dementia. Informal caregivers' perspectives on why admission happens and what they need. 2015

Noemi Van Nie-Visser. Malnutrition in nursing home residents in the Netherlands, Germany and Austria. Exploring and comparing influencing factors. 2014

Esther Meesterberends. Pressure ulcer care in the Netherlands versus Germany 0-1. What makes the difference? 2013

Math Gulpers. EXBELT: expelling belt restraints from psychogeriatric nursing homes. 2013

Hilde Verbeek. Redesigning dementia care. An evaluation of small-scale homelike care environments. 2011

Judith Meijers. Awareness of malnutrition in health care, the Dutch perspective. 2009

Ans Bouman. A home visiting program for older people with poor health. 2009.

Monique Du Moulin. Urinary incontinence in primary care, diagnosis and interventions. 2008

Anna Huizing. Towards restraint free care for psychogeriatric nursing home residents. 2008

Pascalle Van Bilsen. Care for the elderly, an exploration of perceived needs, demands and service use. 2008

Rixt Zijlstra. Managing concerns about falls. Fear of falling and avoidance of activity in older people. 2007

Sandra Zwakhalen. Pain assessment in nursing home residents with dementia. 2007

It is a persistent belief that more nursing staff is needed to improve quality of care in nursing homes. An increase in the number of staff is presumed to affect the quality of care and quality of life of nursing home residents. But is it the quantity of staff that matters? Or do we have to think beyond numbers, focusing on what nursing staff is doing in every day care practice to improve quality of care in nursing homes?

In this dissertation, Ramona Backhaus reports the results of her research on nursing staff and quality of care in nursing homes. She provides insight into the relationship between direct nursing care staffing, staff-related work environment characteristics (e.g., team work) and quality of care in nursing homes. In addition, she pays particular attention to the competencies, tasks and employment of baccalaureate-educated registered nurses. They are expected to serve as informal leaders that have the ability to lead improvements and redesign practice environments in nursing homes. The results of this dissertation have several implications for practice, education, policy and research.