

**Don't Fix the Nurse, Fix the System. Rethinking nursing work environments for enduring improvements**

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# DON'T FIX THE NURSE, FIX THE SYSTEM

Rethinking nursing work environments  
for enduring improvements



**Julia van Kraaij**

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# Don't Fix the Nurse, Fix the System

Rethinking nursing work environments  
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aan de Radboud Universiteit Nijmegen  
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Julia Josephine van Kraaij  
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**Promotor**

Prof. dr. H. Vermeulen

**Copromotor**

Dr. C.J. van Oostveen (Erasmus Universiteit Rotterdam)

**Manuscriptcommissie**

Prof. dr. M.H.W.A. van den Boogaard

Prof. dr. K.T.B. Ahaus (Erasmus Universiteit Rotterdam)

Prof. dr. B.M. Buurman (Universiteit van Amsterdam)

**Paranimfen**

Robbie van Kraaij

Eline Kuijpers

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# Chapter I

## **General introduction**

Nurses comprise more than half of the healthcare workforce, and are crucial for delivering safe, high-quality patient care in healthcare organizations worldwide (World Health Organization, 2020). Their roles are diverse, encompassing various responsibilities, educational backgrounds, and contributions. These activities range from performing care procedures and managing patient care plans to advocating for and supporting patients. Some nurses also engage in policy development, research, and advanced healthcare practices. Their diverse skill set and adaptability make them essential healthcare team members, capable of working in various settings and addressing a broad spectrum of patient needs (National Academies of Sciences, 2021).

For nurses to make these substantive contributions to quality care, they require sufficient resources, support, and a safe and stimulating work environment (Wei et al., 2018). However, healthcare systems are under pressure because of various factors, such as aging populations, increasing demands for care, technological advancements, and regulatory changes (Buchan et al., 2022; World Health Organization, 2020). These multifaceted challenges place nurses, with their many strengths, directly at the center of issues that increasingly impact them, the healthcare systems, and the organizations they work for (National Academies of Sciences, 2021). It is crucial to consider how these challenges affect the nursing profession, influencing their daily work and roles within healthcare systems (Felder et al., 2023).

Innovative strategies are required to address these systemic pressures and to ensure high-quality care is delivered. It is becoming increasingly apparent that the nursing work environment affects patient outcomes, nurse well-being, and the overall effectiveness of healthcare organizations (Wei et al., 2018). For example, Aiken et al. (2011) showed that improved work environments can reduce patient mortality and failure-to-rescue rates. Similarly, Stalpers et al. (2015) concluded in a systematic review that a positive nursing work environment improves nurse-sensitive outcomes, such as fewer patient falls, lower rates of pressure ulcers, and improved pain management. A supportive work environment has also been related to higher job satisfaction and better nurse retention (Tan Jr et al., 2024; Wan et al., 2018). Consequently, developing strategies to enhance the work environment is crucial for addressing the current conditions and demands in the health system. This dissertation explores the potential for enhancing the nursing work environment while adapting to these evolving challenges.

## Contemporary nursing: Challenges and opportunities

Nurses face various emotional and physical challenges while caring for patients, making their work environment unlike any other (Maben et al., 2023). Stress levels among nurses are higher than those of the general working population, driven by heavy workloads, bureaucratic regulations, and the increasing complexity of patient care. A recent study by the American Association of Colleges of Nursing has highlighted concerns about the current state of the nursing work environment, its potential future effects on the health system, and the overall well-being of the nursing profession (Ulrich et al., 2022). The profession faces significant challenges, such as nursing shortages, high turnover rates, budget constraints, and professional dissatisfaction, all of which threaten the quality of patient care (National Academies of Sciences, 2021). It is predicted that by 2030 there will be a global shortage of 4.5 million nurses (Boniol et al., 2022), with 2.5 million of these shortages occurring in Western countries (Scheffler & Arnold, 2019). This is because there are more nurses approaching retirement than younger nurses entering the profession. These shortages are also fueled by dissatisfaction, rising workloads, and increasing pressure on individual nurses (World Health Organization, 2020). A recent review by Wu et al. (2024) estimated a nurse turnover rate of 18% across Asia, North America, and Europe.

The COVID-19 pandemic has also affected the nursing workforce, particularly in terms of how evolving nurse supply and mobility trends will impact long-term viability. Disparities in nurse education around the world further complicate workforce mobility (Kunaviktikul & Turale, 2020). These factors underscore the urgent need for action to support the sustainability of the nursing workforce, emphasizing recruitment, retention, and overall workforce management (Buchan & Aiken, 2008; Buchan et al., 2022).

Amid these challenges, opportunities exist for innovation and advancement within the nursing profession. In 2020, the World Health Organization formulated key actions to address these challenges and to promote sustainability of the nursing workforce. They suggested changes in how nurses are educated, assigned, and managed, and how these changes can be integrated within broader health workforces and policies (World Health Organization, 2020). Continuing professional development is vital for maintaining high standards of nursing care and supports the dynamic nature of the nursing profession (Hakvoort et al., 2022). Addressing the challenges facing the nursing profession requires a strategic focus on enhancing the nursing work environment and supporting professional

development to attract and retain skilled nurses. In a stimulating nursing work environment, nurses are better equipped to deliver high-quality care and thereby enhance the overall effectiveness of their organization (Maben et al., 2023; Wei et al., 2018). Without improvements in the nursing work environment, nurses will keep leaving their profession in pursuit of more rewarding and sustainable work opportunities (Ulrich et al., 2022).

## Conceptual model for defining the work environment

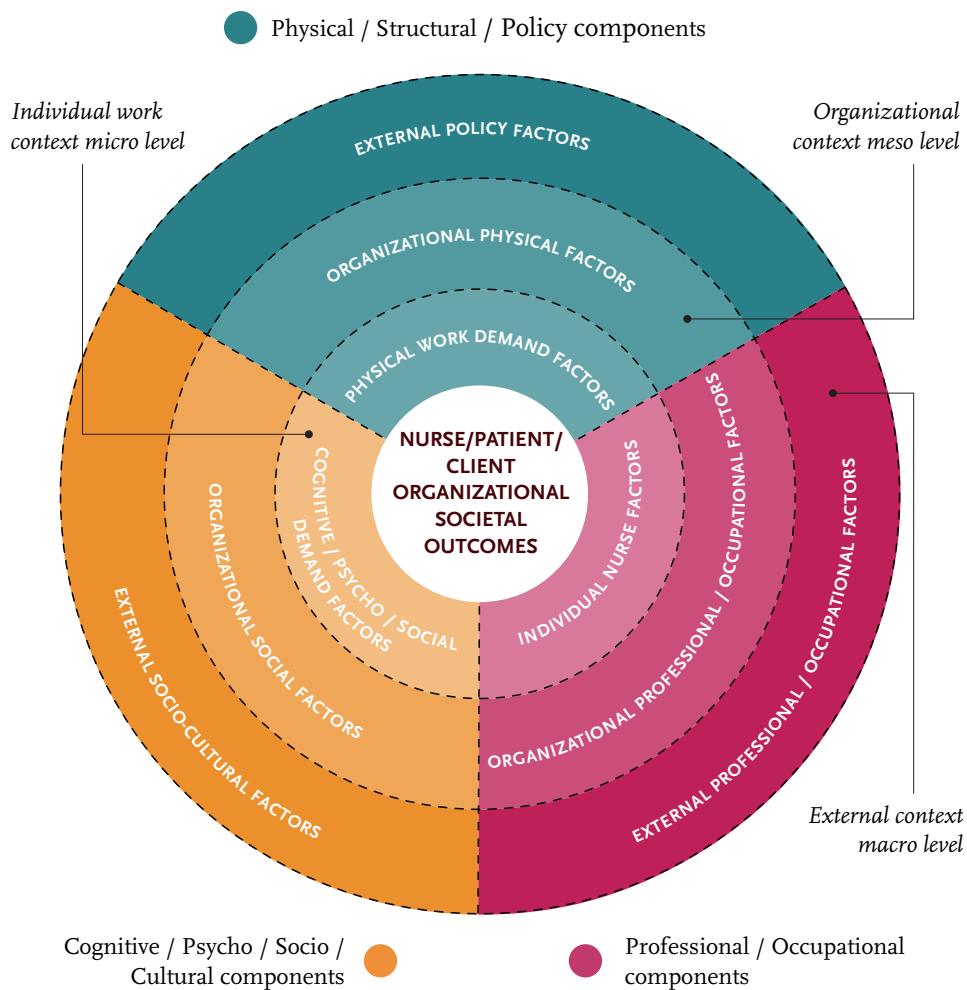
The nursing work environment is a complex multidimensional construct and is characterized by multiple elements that are interrelated and essential for achieving high-quality care (Maassen et al., 2021; Registered Nurses' Association of Ontario, 2013). Lake (2002) defined the work environment as 'the organizational characteristics of a work setting that facilitate or constrain professional nursing practice', including staffing and resource adequacy; collegial nurse-physician relationships; nurse managers' ability, leadership, and support; nurse participation in hospital affairs; and nursing foundations for quality care. While this definition has been extensively used in research to measure nursing work environments (Lake et al., 2024), adopting a broader, integrative perspective on the work environment could reveal additional mechanisms that enhance our understanding of nurses' work settings. For instance, national developments in the nursing profession and the broader context in which nurses operate could significantly influence how the work environment is structured and perceived.

The Registered Nurses Association of Ontario (RNAO) showed in their *Conceptual Model for Healthy Work Environments for Nurses* (Figure 1) that the nursing work environment not only is a physical space where care is delivered but also encompasses a complex interplay of organizational characteristics, culture, processes, structures, and system performances that collectively shape and influence nursing practice. This model underscores that the work environment integrates various factors at the individual, organizational, and external system levels. These components create an environment that supports quality care and effective nursing practice across all settings and domains (Registered Nurses' Association of Ontario, 2013).

This conceptual model is still useful, despite being over ten years old, because it is comprehensive and addresses the complex, interdependent nature of current healthcare practices. It also provides a framework for understanding how vari-

ous factors influence nurses' experiences and patient outcomes. This model goes beyond individual job roles, recognizing the work environment as an interconnected system. It also emphasizes the importance of continuous movement and responsiveness at all levels. Given the ongoing developments in the health system, maintaining attention to the work environment is crucial. Therefore, although the nursing field has advanced, we believe that the fundamental principles and insights of the model remain relevant and applicable to contemporary nursing practice.

Figure 1 | Conceptual model for healthy nursing work environments (Registered Nurses' Association of Ontario, 2013).



Recognizing and improving all elements within the work environment is essential for optimizing professional nursing practice. A stimulating work environment is built on three levels: individual, organizational, and external system levels. The center of the model represents the expected beneficiaries for nurses, patients, organizations, and society. The dotted lines symbolize the interconnections between the levels and components. Each level includes (1) physical and structural policy components, (2) cognitive, psychological, social, and cultural components, and (3) professional and occupational components.

- Physical and structural policy**

These components relate to the physical requirements such as workloads, changing schedules, or occupational safety, that could impact both individual nurses and organizational practices. This dimension also includes systemic conditions, such as care delivery models and legislative frameworks.
- Cognitive, psycho, socio, and cultural**

These refer to the different demands, such as work complexity, team relationships, emotional demands, or role clarity. These factors all influence a nurse's individual capabilities and organizational climates. External socio-cultural factors like demographic changes and consumer trends shape the broader context in which the nurses and organizations operate.
- Professional and occupational**

Personal attributes such as resilience and commitment to patient care impact how nurses respond to work demands. At the organizational level, these factors include scope of practice, level of autonomy, and interdisciplinary relationships. External policies and regulations shape broader professional and occupational environments.

### Stimulating work environments

Stimulating work environments – often referred to as innovative, professional, healthy, positive, resilient, or effective – encompass a broad construct associated with increased nurse job satisfaction and retention, where nurses feel honored, respected, heard, and valued (Dubois et al., 2013; Ulrich et al., 2022; Wei et al., 2018). Innovative professional environments have several positive characteristics, such as a diverse skill mix, higher staffing levels, supportive practices for professional development, and investments in innovation (Dubois et al., 2013). An increased

appreciation for the nursing work environment in the past two decades has resulted in a growing number of studies in this field. Although a significant amount of quantitative research on the nursing work environment has been conducted, there remain gaps in understanding the mechanisms that influence whether a work environment is perceived as stimulating. To address these gaps and offer a more complete view of the nursing work environment, additional qualitative studies are needed to complement the existing quantitative research.

Stimulating environments are created by integrating multiple elements, including leadership, communication, collaboration, decision-making, staffing, and recognition (American Association of Critical-Care Nurses, 2005). In their review, Wei et al. (2018) concluded that these elements offer a complete framework for healthcare organizations to support their nurses and enhance patient care outcomes. These elements help nurses to engage with the broader hospital context, ensuring their voices are heard in internal governance and policy decisions. This engagement must be encouraged for several reasons. First, nurses have direct contact with patients, which makes them invaluable for developing health policies. They can greatly influence the creation of appropriate and efficient health policies. Second, health policies directly impact nurses, and must create a stimulating work environment (Hajizadeh et al., 2021; Smith, 2014). Nurses are also expected to demonstrate clinical competence and deliver care based on a nursing organizational model. Therefore, clinical judgment is a crucial skill for nurses working in increasingly complex environments. They must make critical decisions while ensuring care is safe and patient centered (Connor et al., 2023). Stimulating environments also emphasize the critical role of supportive leadership from nurse managers (Cummings et al., 2018). Adequate staffing levels, access to resources, and positive relationships with colleagues are further characteristics of these stimulating work environments (Lake, 2002). Increased levels of registered nurse staffing are associated with a lower risk of patient death, shorter hospital stays, and fewer instances of missed necessary care (Dall'Ora et al., 2022; Griffiths et al., 2018; Kim & Kim, 2022). Resources, including staffing, was the most frequent factor identified by nurses for effective delivery of quality care (Kowalski et al., 2020). Workplace relationships have also been shown to impact a nurse's psychological health, productivity, and performance (Huddleston & Gray, 2016).

There is a growing interest in creating stimulating nursing work environments because of their crucial role in improving outcomes for patients, nurses, and organizations as well as the overall performance of healthcare systems. Various interventions have been developed in the past decade to enhance the nursing work

environment. However, these interventions have not been researched extensively (Eva et al., 2024; Paguio et al., 2020). Paguio and colleagues conducted a literature review and revealed four key characteristics of effective interventions. These focused on improving processes within the nursing work environments using participatory strategies like quality improvement, engaging frontline nurses and nurse executives, and implementing changes at the department level (Paguio et al., 2020). In addition, the conceptual model for healthy nursing work environments described previously, has revealed that a nurse's functioning is impacted by their interactions with the environment, highlighting the need for initiatives to create stimulating environments at various levels and dimensions (Registered Nurses' Association of Ontario, 2013).

Approaches to improve the nursing work environment vary significantly between countries and between organizations within the same country. This variability is influenced by the unique organizational cultures within healthcare settings, which play a crucial role in determining the success or failure of initiatives promoting positive work environments (Wei et al., 2018). The following section delves into Dutch-specific initiatives to enhance the nursing work environment. Customizing the Dutch nursing work environment involves adapting healthcare delivery to align with local norms, guidelines, and nurse and patient expectations in the Netherlands.

## Tailoring nursing practice in the Netherlands

In 2015, van Oostveen and colleagues concluded that Dutch nursing work environments needed to shift towards a 'professional model' because of a lack of support for nursing professionalization, inefficient processes, and low nurse-to-patient ratios (van Oostveen et al., 2015). Recent studies have found similar issues (Kox et al., 2020; Vermeulen & van Leeuwen, 2023). For instance, turnover among novice Dutch nurses has been attributed to a lack of stimulation in the workplace, a lack of passion, competence shortages, job dissatisfaction, workload issues, and no feelings of relatedness (Kox et al., 2020). The former Chief Nursing Officer at the Ministry of Health highlighted in an advisory report (Buurman, 2020) that Dutch nurses are often undervalued as mere caregivers rather than valued as professionals with crucial responsibilities across the entire healthcare system. She emphasized that the guiding principle should be "Nothing about us, without us." This principle underscored the need for nurses to be actively involved in discussions about their profession, care delivery, and professional mat-

ters at all organizational levels. The report advocated for the inclusion of nurses in decision-making processes related to their teams, organizations, and national policies. It also stressed the importance of continuous professional development through education to enhance their competencies and their influence in shaping the future of healthcare. Consequently, since 1 July 2023, a new law has granted healthcare workers the legal right to influence policies that impact their ability to deliver quality care, aiming to strengthen their role in shaping both care-related policies and workplace conditions such as scheduling and career development (Rijksoverheid, 2023).

These ongoing concerns and developments have led to considerations about creating different nursing profiles, functions, roles, and tasks. Work environments are evolving, with many hospitals transitioning towards differentiated nursing practice. Dutch healthcare organizations now face the significant challenge of re-designing their nursing work environments in response to these issues, and are actively seeking effective ways to implement these changes.

## Differentiated nursing practice

Differentiated nursing practices involve tailoring nursing roles and responsibilities to better align with individual competencies and education, and the specific needs of hospitals and the broader healthcare system. The aim of this approach is to help nurses assume their roles across various levels of care, including prevention, self-management, and collaborative care within integrated healthcare networks. However, hospitals face significant challenges in navigating these practices, influenced by many historical and political debates and practices (Felder et al., 2022; Schalkwijk et al., 2024).

Since the Bachelor of Nursing degree was introduced in the 1970s, stakeholders in nursing such as nurse leaders, policymakers, and unions have debated the differentiation of nursing practices (Schalkwijk et al., 2024). The Dutch system does not formally distinguish between vocationally trained and bachelor-trained nurses, and both are employed as 'registered nurses' with similar roles, responsibilities, and wages (van Schothorst-van Roekel et al., 2021). In 2019, the Dutch Ministry of Health, Welfare, and Sports introduced a legal proposal to define distinct practice roles for nurses based on their educational backgrounds. This proposal included a formal distinction between bachelor-trained nurses and vocationally trained nurses, each with specialized areas of expertise, specific levels of education, and

corresponding competencies. Additionally, the Bachelor of Nursing 2020 profile emphasized the advanced competencies and responsibilities of bachelor-trained nurses, aiming to align their roles with their higher level of education and training.

Advocates of differentiated nursing practice have argued that distinct practice roles could enhance the recruitment and retention of bachelor-trained nurses by making them feel that their skills and knowledge are being used properly. Conversely, opponents have claimed that this differentiation could unfairly favor bachelor-trained nurses and undermine the experience and expertise of vocationally trained nurses (Felder et al., 2022; Schalkwijk et al., 2024). After significant resistance from nurses and the public, the Minister of Health withdrew the amendment, and responsibility for further reforms was returned to the hospital sector. Without a national policy or protocol, Dutch hospitals are currently leading the (re)organization of their own nursing roles and work environments.

## Aim and outline of this thesis

The nursing work environment has been well-studied, but continuous exploration and adaptation of strategies is needed to address ongoing developments and challenges and to optimize the work environment. Further research is needed to evaluate the effectiveness of differentiated nursing practice in improving outcomes for patients, nurses, and the organization. This thesis aims to gain insights into the different components of the nursing work environment and how they are interconnected and to determine how the nursing work environment can be improved, especially in the context of differentiated nursing practice. This work seeks to understand and enhance nursing practice and patient care by comprehensively examining these critical factors.

*It is time for action, and this dissertation sets the stage for innovative approaches to nursing care.*

**Chapter 2** describes the findings from a scoping review of nurse education programs and nursing titles worldwide. It reviews initiatives that are aimed at harmonizing nurse education standards across countries to provide clarity about nurses' roles and responsibilities.

**Chapter 3** presents a study exploring the transition towards differentiated nursing practice among nurses in Dutch hospitals. Through interviews with project managers responsible for introducing differentiated nursing practice in their hospitals, this study reveals the perceptions of differentiated practice and how it is influenced by legislative change. It also identifies strategies for facilitating this change.

**Chapter 4** describes the nursing work environment, considering it as a complex and multifaceted system based on interviews with nurses and managers. It explores the dynamics of the work environment as hospitals transition to differentiated nursing practice.

**Chapter 5** presents a multicenter longitudinal cohort study on the impact of differentiated nursing practice on the work environment and turnover intention among nurses in hospital settings. Specifically focusing on the Dutch context, where hospitals have been introducing differentiated nursing practices since 2019, the study explores how these strategies can enhance the work environment and impact turnover intention among nurses.

**Chapter 6** offers strategies for promoting and supporting nurse-led changes to improve their work environment. Through participatory action research, this study demonstrates different mechanisms that facilitate or hinder nurse-led changes.

**Chapter 7** is the general discussion, which summarizes and discusses the results of all chapters within a broader theoretical and practical context. The limitations and recommendations for further practice and research are also addressed.

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# Chapter 2

## Uniformity along the way

*A scoping review on characteristics of nurse education programs worldwide*

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## Abstract

### Background

The changing demands on healthcare require continuous development and education in the nursing profession. Homogeneity in nursing qualifications reduces educational inconsistencies between and within countries. However, despite various initiatives, modifying nurse education remains challenging because different countries have their own legislations, structures, motivations, and policies.

### Objectives

To summarize the characteristics of nurse education programs around the globe and analyze the similarities and differences between them.

### Design and methods

A scoping review was performed to identify different characteristics of nurse education programs in Organization for Economic Cooperation and Development (OECD) countries. Records published between January 2016 and July 2021 were searched in the PubMed, Cinahl, and ERIC databases. The reference lists of all included articles were also searched manually for relevant studies. Articles were eligible if they described nurse education in one or more of the selected countries with a focus on nursing degrees (both undergraduate and postgraduate programs), nursing titles, program duration, study load hours, or practice hours. Data were independently extracted using a

predefined extraction sheet. We asked the respective nursing associations for confirmation and to provide any additional information.

### Results

After searching 9769 records, 117 were included in the synthesis. The included records described characteristics of undergraduate nursing educational programs (n=50), postgraduate programs (n=30), or both (n=37). In total, 86 undergraduate and 82 postgraduate programs were described, with a great variety in degrees, nursing titles, study load hours, and practice hours.

### Conclusions

This study demonstrates that there is still considerable variation in nurse education programs between countries. These diverse educational pathways lead to different nursing titles, and internationally standardized definitions of nursing roles have not been established. This makes it difficult to understand the healthcare role of nurses. Hence, efforts are needed to increase the quality and uniformity of nurse education around the world.

## Introduction

Achieving uniformity in nurse education is challenging and the globalization of healthcare has emphasized the educational gaps between countries (Kunaviktikul & Turale, 2020; Stievano et al., 2019). Nurse education must evolve and adapt to changing trends, such as the increased demand on healthcare systems due to the aging population, the rise of technology, the rapid global spread of communicable diseases, and the need for accessible and affordable care (National Academy of Medicine, 2021). To achieve this, the uniformity and quality of nurse education needs to be promoted (Baker et al., 2021; Global Education for Leadership in Nursing Education and Sciences, 2019).

Standardizing nurse education would not only reduce inconsistencies in nursing roles and functions but also raise the quality of nurse education worldwide, increasing the migration and mobility of nurses (Baker et al., 2021; Global Education for Leadership in Nursing Education and Sciences, 2019; Stievano et al., 2019). High-quality education could help nurses be involved in high-level decision-making and policy matters (Dyson, 2018). Clear professional nursing titles would reduce confusion among colleagues and patients about the role of nurses and may enhance safety in clinical practice (Leary et al., 2017). Standardized titles would also assist international knowledge transfer from scientific evidence to clinical practice (Lovink et al., 2021). Several initiatives have tried to standardize nurse education, but this is a challenging task because different countries have their own legislations, structures, motivations, and policies in place (Baker et al., 2021; Stievano et al., 2019; World Health Organization, 2021).

There are considerable differences in nursing titles, qualifications, and education levels between countries (Baker et al., 2021; Drennan & Ross, 2019; Dyson, 2018). Undergraduate nursing courses award diplomas, associate degrees, or bachelor degrees while postgraduate courses award, among others, master or doctoral degrees. However, these nursing programs offer many qualifications, and nurses with the same title may have different responsibilities in different countries. For example, some countries require registered nurses to have a diploma or certificate, whereas other countries require a bachelor's degree (Leary et al., 2017; National Council of State Boards of Nursing, 2022a; World Health Organization, 2020a).

## Background

The World Health Organization (WHO) has formulated global education standards for professional nurses and midwives (World Health Organization, 2009b) and has encouraged harmonization of nurse education (World Health Organization, 2020a). To increase the quality of nurse education, the Global Alliance for Leadership in Nursing Education and Science (GANES) developed a global framework for nurse education. This framework contains guidelines with standards and expectations of nursing graduates, nurse education programs, and educational institutions (Global Education for Leadership in Nursing Education and Sciences, 2019). The standards of nurse education have also been addressed by the Organization for Economic Cooperation and Development (OECD), which establishes evidence-based international policies (OECD, 2022). These initiatives help to manage workforce mobility and improve workforce skills, for example by proposing appropriate education reforms (Lovink et al., 2021).

Other initiatives include the Bologna Process and European Union (EU) directives (European Education and Culture Executive Agency Eurydice, 2018), the Trans-Tasman Mutual Recognition Act (Act, 2021, 1997), the Nurse Licensure Compact, and the Advanced Practice Registered Nurse compact (National Council of State Boards of Nursing, 2022b). The Bologna Process created a compatible three-cycle degree system for higher education in Europe with standardized bachelor, master, and doctoral degrees. The European and National Qualifications Frameworks (EQF and NQF) and the European Credit Transfer and Accumulation System established transparency and transferability of learning and qualifications between European countries (European Education and Culture Executive Agency Eurydice, 2018). For European nursing programs to be universally recognized, general nursing training must comprise at least three years of study (4600 h), at least half of which must be clinical training (World Health Organization, 2009b). The Trans-Tasman arrangement created mutual recognition between Australia and New Zealand for registered occupations like nursing (Act, 2021, 1997). The Licensure Compacts allow nurses to practice in any state of the United States without an additional license (National Council of State Boards of Nursing, 2022b). Despite these initiatives, variation still exists in nurse education.

The National Council of State Boards of Nursing has developed the Global Regulatory Atlas database (National Council of State Boards of Nursing, 2022a), which allows nurse regulation data from around the world to be compared. However, this database is incomplete. Moreover, a systematic search has failed to locate research

on the standardization and regulation of nurse education worldwide. Several scientific articles exist (Barrett et al., 2021; Humar & Sansoni, 2017; Lahtinen et al., 2014; Rafferty et al., 2019), but these are outdated, based on a limited number of countries, or focused on nursing in a specific care setting. This knowledge gap prevents countries from learning from each other and from responding to complex healthcare requirements such as labor market issues.

We aim to address this knowledge gap by summarizing the characteristics of initial nurse education programs in OECD countries around the world and analyzing the similarities and differences between them. OECD countries already collaborate on addressing educational challenges, which provides a unique opportunity for intercontinental comparison. This study will promote uniformity of nurse education and contribute to the transferability of nursing credentials, as recommended by the WHO (Baker et al., 2021). These findings will also clarify who nurses are and what their functions and roles in clinical practice are (World Health Organization, 2020a), and will alert nurses and policymakers to the differences in education that need to be addressed to raise the quality of nurse education worldwide (Baker et al., 2021).

## Methods

A scoping review was conducted to identify the characteristics of various international nurse education programs. We chose a scoping review because it allows synthesis and analysis of available literature about initial nursing education, without restricting parameters for specific study designs or requiring quality evaluation. Hence, a scoping review provides insight into knowledge gaps in nurse education and can be used for informed policymaking (Peters et al., 2020). The Preferred Reporting Items for Systematic Reviews and Meta-Analyses extension for Scoping Reviews (PRISMA-ScR) checklist (Tricco et al., 2018) was used.

### Search strategy

Literature published between 2016 and July 2021 was searched in the PubMed, Cinahl, and ERIC databases. The search strategy (Supplementary file 1) included a combination of keywords and subject headings to identify articles relevant to the topic. The reference lists of included articles were also searched to identify additional relevant studies. Internet databases on nurse education, licensure, and legislation were also screened and emails were sent to 38 nursing associations in OECD countries to confirm and/or complete the information. Eighteen asso-

ciations replied to this email. We use the term 'records' to describe all identified citations because news items, opinion articles, websites, educational standards, and reports were included.

### Inclusion criteria

Records were eligible for inclusion if they described nurse education in one (or more) OECD countries. Of the 38 member countries (Box 1), 26 were located in Europe, two in Oceania, four in North America, two in South America, and four in Asia (OECD. Our Global Reach, n.d.). To ensure our overview was up-to-date, we included articles published from 2016 because it can be expected that changes in nurse education based on the global education standards for professional nurses and midwives (World Health Organization, 2009b) and the Bologna process (European Education and Culture Executive Agency Eurydice, 2018) were implemented from then. For inclusion, articles needed to describe at least two of the following: nursing degrees (both undergraduate and postgraduate programs), nursing titles, full-time study duration, study load hours, or practice hours. Articles were excluded if they described a district or university-related program, specific nursing programs such as accelerated bachelor programs, bridging programs to gain a bachelor degree in nursing, part-time programs, or non-degree specialization courses. In articles from Belgium, Canada, and the United States, only nationwide information was included and no distinction was made between jurisdictions.

#### Box 1 | OECD member countries.

Australia, Austria, Belgium, Canada, Chile, Colombia, Costa Rica, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Israel, Italy, Japan, Korea, Latvia, Lithuania, Luxembourg, Mexico, the Netherlands, New Zealand, Norway, Poland, Portugal, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey, United Kingdom, United States

### Study selection

Records from all databases were combined and duplicates were removed using EndNote X9®. JK and MV independently assessed titles and abstracts of selected records (n=297). The two independent assessments had an agreement score of 94%, so the remaining records were divided between JK and MV and for eligibility assessment (categorized as included, excluded, or maybe). Next, full text versions were independently assessed for inclusion by JK and MV. Any doubts or disagree-

ments about inclusion were resolved through discussion and if needed co-author CV was consulted to reach consensus.

### Data charting and synthesis of the results

Data were recorded in a predefined data-charting form (Supplementary file 2). This data chart included the nursing title, degree, program duration, study load hours (for undergraduate and postgraduate programs), and practice hours (for undergraduate programs) (Box 2). Results from EU countries and non-EU countries were examined separately to determine any effects of the Bologna Process and Directives of the EU. The Global Regulatory Atlas (National Council of State Boards of Nursing, 2022a) was used as a baseline for all countries. Data from the included records were independently analyzed and sorted by JK and MV and any inconsistencies were discussed.

Further information was obtained from nurse associations. If there were any differences with the literature, information from the nurse associations was used in the results. Study load hours or practice hours described using the European Credit Transfer and Accumulation System were converted into hours to enable comparison with non-EU countries. One credit corresponds to 28 hours if not explicitly stated otherwise (European Union, 2017).

#### Box 2 | Definitions.

##### Nursing title

The title with which nurses practice and by which they are recognized. No distinction is made between (un)protected nursing titles by law.

##### Nursing degree

The nursing qualification awarded by the educational institution.

##### Duration

The time it takes to finish a nursing degree.

##### Study load hours

The study load to complete a degree, comprising theory and practice hours  
Practice hours: the number of practice hours in undergraduate nursing programs.

**Undergraduate program**  
pre-registration nursing program that prepares students to become a certified nurse.

**Postgraduate program**  
post qualification nursing program that prepares nurses for advanced practice position and/or title. This does not entail certificates for specializations.

## Results

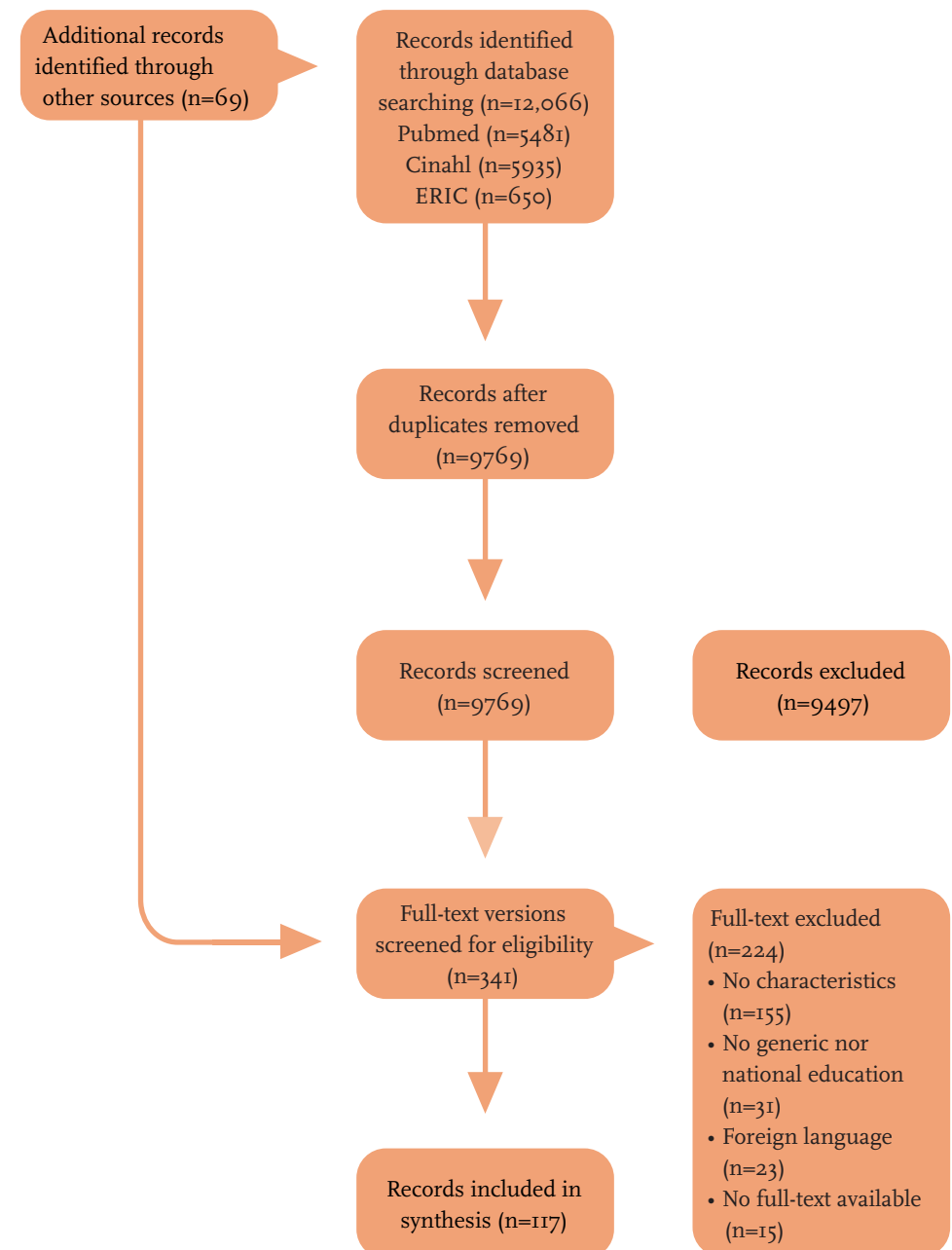
### Study selection

The search identified 12,066 records. After duplicates were removed, 9769 titles and abstracts were screened and 9497 of these were excluded because of irrelevancy to the theme. A manual search of the reference lists identified 69 additional records. In total, 341 records were assessed for eligibility. Of these, 224 were excluded: 155 did not discuss nurse education characteristics, 31 did not debate generic or national education, 23 were not written in English or Dutch, and 15 had no full text available. The remaining 117 were included in the synthesis (Figure 1).

### Study characteristics

Most included records (Table 1) were published in scientific journals. Of these, 11 were discussion papers (Aaron & Andrews, 2016; Ayala et al., 2019; Buerhaus et al., 2016; Christiansen et al., 2018; Dupin et al., 2020; Inatomi & Nomura, 2016; McCauley et al., 2020; McIntosh et al., 2016; Ousey et al., 2018; Rees et al., 2019; Sarzynski & Barry, 2019), 17 were descriptive papers (Alexander, 2016; De Geest et al., 2016; Eftekhari, 2019; Glasper, 2018a; Glasper, 2018b; Grainger, 2018; Hartjes et al., 2019; Hicks & Patterson, 2017; Lindell et al., 2017; Marquez & Arizmendi, 2019; Morris, 2019; Pilcher, 2020; Reid, 2018; Rodriguez, 2016; San Martin-Rodriguez et al., 2018; Thomas et al., 2016; Valiga & Thornlow, 2018), nine were opinion papers (Arrogante, 2017; Bellflower & Likes, 2019; Fotsch, 2018; Glasper, 2017a; Glasper, 2017b; Glasper, 2019; Harrison, 2017; Kessenich & Persaud, 2016; Stodart, 2017), one was a quantitative paper (Hallinan & Hegarty, 2016), three were qualitative papers (Bergström & Lindh, 2018; Maresova et al., 2020; Terhaar et al., 2016), and six were literature reviews (Ernits et al., 2019; Glarcher & Lex, 2020; Mark et al., 2019; Pradela et al., 2020; Ślusarska et al., 2018; White, 2017). There were also 18 books or book chapters (Alenius et al., 2019; Betlehem et al., 2017; Bruyneel et al., 2019; Ensio et al., 2019; Groccia & Ford, 2020; Hernán-

Figure 1 | Flow diagram of the search and selection process.



dez-Quevedo & Moreno-Casbas, 2019; Huisman-de Waal et al., 2019; Kózka et al., 2019; Morris et al., 2019; National Academy of Medicine, 2021; Riklikienė et al., 2019; Salminen et al., 2019; Schwendimann et al., 2019; Sjetne et al., 2019; Sveinsdóttir et al., 2019; Turk & Habjanić, 2019; Zander-Jentsch et al., 2019; Zikos et al., 2019), nine educational standards (Australian Nursing and Midwifery Accreditation Council, 2017; Australian Nursing and Midwifery Accreditation Council, 2019; Health Education England, 2017; Japan Association of Nursing Programs in Universities, n.d.; Nursing and Midwifery Board of Australia, 2021; Nursing and Midwifery Board of Ireland, 2020; Nursing and Midwifery Council, 2018; OeAD - Agency for Education and Internationalisation, 2020; Royal College of Nursing, 2021), 19 reports (Albrecht et al., 2016; Bachner et al., 2018; Behmane et al., 2019; Blümel et al., 2020; Economou et al., 2017; Eurodiaconia, 2016; Gerkens & Merkur, 2020; Habicht et al., 2018; International Qualifications Assessment Service, 2016; Japanese Nursing Association, 2016; Keskimäki et al., 2019; Kroneman et al., 2016; Marchildon et al., 2020; National Council of State Boards of Nursing, 2020; Rice et al., 2020; Saunes et al., 2020; Schwartz, 2019; Simões et al., 2017; Smatana et al., 2016), and four news items (Fawcett, 2017; Health Education England, 2016; Longhurst, 2017; Reeves, 2020). The remaining 20 records were website information (American Association of Colleges of Nursing, 2019; Bodell, 2017; Dutch Professional Nurse Practitioner Organisation (V&VS), n.d.; Finish Nurse Association, 2021; International Council of Nurses Nurse Practitioner/Advanced Practice Nursing Network, 2017a, 2017b, 2017c, 2017d, 2017e, 2017f, 2018; Kalenkoski, 2017; Latvian Qualifications Database, 2021; National Council of State Boards of Nursing, 2019, 2022a; OECD, 2016a, 2016b, 2016c, World Health Organization, 2020b; Ziegler, 2018). Most records described nurse education programs in Europe (n=70) and North America (n=27). The remaining records were from South America (n=2), Oceania (n=8), Asia (n=2), and multiple continents (n=8). The records described characteristics of undergraduate nursing educational programs (n=50), postgraduate programs (n=30), or both (n=37). The included records (Table 1) were published between 2016 and 2021.

### Undergraduate education

In total, 86 undergraduate educational programs (Table 2) were found, which awarded 26 different nursing titles (Figure 2). For all countries, one or more nursing titles were found. 'Registered nurse' (n=27) and 'nurse' (n=18) were the most frequent. Other common titles were 'nursing assistant' (n=6) and 'healthcare assistant' (n=5). Educational programs awarded 19 nursing titles in European OECD countries and 10 nursing titles in non-European OECD countries.

Bachelor degrees were present in most countries (n=33) and all awarded the title of 'registered nurse' or 'nurse'. From 2023, all European countries will offer at least a bachelor's degree in nursing. In Portugal, the degree to become a 'general nurse' is called a Licentiate degree. The requirements of this degree are in accordance with the Bologna Declaration and are transferable to a bachelor's degree in other European countries. Diploma degrees lead to the titles 'enrolled nurse' or 'nurse', except in Israel and the United States, where diplomas can lead to the title of 'registered nurse'. In Costa Rica, Japan, Korea, and Turkey, no information was found on bachelor programs, but other degrees were offered. These included (federal) diploma (n=8) and vocational (n=11) degrees, which awarded the title of 'registered nurse' or 'nurse assistant'. 'Associate', 'secondary education', 'certificate', and 'foundation' degrees were also identified. 'Federal diplomas' were offered in Switzerland. According to the Swiss Education System (State Secretariat for Education RaI, 2019), 'advanced federal diplomas' are equivalent to bachelor or master degrees, and the 'federal diploma of vocational education and training' and the 'federal certificate of vocational education and training' are compatible with professional education.

A bachelor's degree takes three to four years to complete in all countries except Chile, where it takes five years. Duration was highly variable among the other degrees. For example, a vocational degree lasts between one and four years in European and non-European countries. In some countries, programs with the same duration award different degrees and/or titles. For example, in the Netherlands, bachelor and vocational degrees take four years to complete and both award a title of registered nurse.

Study load hours for bachelor degrees ranged from 3600 hours in New Zealand to 6720 hours in some European countries. In European countries, bachelor degrees required a minimum of 4600 hours, which is in line with the Bologna legislation (World Health Organization, 2009a). Study load hours for nursing programs in non-European countries were not well reported. Vocational programs ranged from 720 study load hours for a one-year program in Poland to 6400 study load hours for a four-year program in the Netherlands.

Practice hours in bachelor programs varied from 800 hours for a three-year program to 2300 hours for a four-year program. A minimum of 50% of the study load had to be practice hours in European countries, except for Finland (World Health Organization, 2009a). Fewer practice hours were required in non-European bachelor programs, ranging from 800 hours in Australia to 1248 hours in

Israel. Practice hours in vocational programs varied from 450 hours for a one-year program in Italy to 1400 hours for a three-year program in Finland. Programs awarding titles of ‘healthcare assistant’ and ‘nurse assistant’ ranged from 850 practice hours for a one- or two-year program in Greece to 2560 practice hours for a three-year program in Switzerland. Practice hours varied greatly in both European and non-European countries.

### Postgraduate education

Postgraduate nurse education was reported in all countries except for Costa Rica, Greece, Luxembourg, and Turkey (Table 3). In total, 82 postgraduate programs were found, awarding 34 different nursing titles (Figure 3). ‘PhD’ (n=12) was the most frequent title in all countries and was awarded after completing a doctoral degree. ‘Advanced practice nurse’ (n=8), and ‘advanced nurse practitioner’ (n=5) were also common and were awarded after completing a master’s degree. In the United States the title ‘advanced practice (registered) nurse’ was awarded after completing either a master’s or doctoral degree. The largest variety of nursing titles was found in the United States (n=11), and some of these titles were not found in other countries, e.g., ‘nurse manager’, ‘nurse informaticist’, and ‘nurse educator’. In nine countries, postgraduate degrees were found that did not mention the corresponding nursing title.

Most countries offered a master’s degree (European countries: n=22, non-European countries: n=10) and a doctoral degree (European countries: n=17, non-European countries: n=6). In Finland, a distinction was made between master’s degrees obtained at a university and a university of applied sciences, but both awarded the same title of Advanced Practice Nurse, Clinical Nurse Specialist, or Nurse Practitioner. Some countries offered additional postgraduate degrees – New Zealand offered a ‘postgraduate certificate or diploma’, Sweden a ‘licenciate’ degree, Colombia a ‘postdoctoral degree’ and the United Kingdom a ‘professional doctorate’. Study load and program duration for master’s degrees varied from one to four years. However, most master’s degrees can be obtained within two years. Study load varied from 1680 h for a one-year program in the Netherlands to 3360 h for two-year master’s programs in Europe (n=13). Data on the study load hours for doctoral programs were not well reported. Doctoral programs take 6720 h in Finland and Sweden, 5040 h in Iceland, and 4500 h in Italy.

Table 1 | Characteristics of included studies.

Reference	Author(s)	Year	Source	Design	Objective	Education Type	Country/ Countries
Aaron & Andrews, 2016	Aaron & Andrews	2016	Journal: Israel Journal of Health Policy Research	Discussion paper	To report on the current status of Israeli healthcare provider shortages, describe an overview of the current state of selected Advanced Practice Providers development in the world, and to suggest a framework for modifying current practices in Israel	Postgraduate	Israel
Albrecht et al., 2016	Albrecht, Pribaković Brinovec, Jošar, Poldrugovac, Kostnapfel, Zaletel, Panteli & Maresso	2016	Health Systems in Transition	Report	To provide a detailed description of the Slovenian health system and of reform and policy initiatives in progress or under development	Undergraduate/ Postgraduate	Slovenia
Alenius et al., 2019	Alenius, Lindqvist & Tishelman	2019	Book chapter: Strengthening health systems through nursing: Evidence from 14 European countries	Book chapter	To provide a cross-sectional view of the nursing workforce in Sweden	Undergraduate/ Postgraduate	Sweden
Alexander, 2016	Alexander	2016	Journal: Clinical Nurse Specialist	Descriptive paper	To describe the characteristics of the AACN report on the Implementation of the DNP educational programs	Postgraduate	United States
American Association of Colleges of Nursing, 2019	American Association of Colleges of Nursing	2019	Website	Website information	To provide a fact sheet on the impact of education on nursing practice	Undergraduate	Greece, Iceland, Korea
Arrogante, 2017	Arrogante	2017	Journal: Nurse Education in Practice	Opinion article	To describe the development of nursing education in Spain	Undergraduate/ Postgraduate	Spain
Australian Nursing and Midwifery Accreditation Council, 2019	Australian Nursing and Midwifery Accreditation Council	2019	Website	Educational standard	To provide registered nurse accreditation standards	Undergraduate	Australia
Australian Nursing and Midwifery Accreditation Council, 2017	Australian Nursing and Midwifery Accreditation Council	2017	Website	Educational standard	To provide enrolled nurse accreditation standards	Undergraduate	Australia
Ayala et al., 2019	Ayala, Koch & Messing	2019	Journal: Nursing Inquiry	Discussion paper	To explore the basic characteristics of nursing education in Chile as a system	Undergraduate	Chile

Bachner et al., 2018	Bachner, Bobek, Habimana, Ladurner, Lep	2018	Health Systems in Transition	Report	To provide a detailed description of the Austrian health system and of reform and policy initiatives in progress or under development	Undergraduate	Austria
Behmane et al., 2019	Behmane, Dudele, Villerusa, Misins, Klavina, Mozgis & Scarpetti	2019	Journal: Health Systems in Transition	Report	To provide a detailed description of the Latvian health system and of reform and policy initiatives in progress or under development	Undergraduate	Latvia
Bellflower & Likes, 2019	Bellflower & Likes	2019	Journal: Policy, Politics, & Nursing Practice	Opinion article	To provide a commentary on potential crisis in nurse practitioner preparation in the United States	Postgraduate	United States
Bergström & Lindh, 2018	Bergström & Lindh	2018	Journal: Nurse Education in Practice	Qualitative	To understand how, from students' perspective, the nurse master's program structured knowledge for their future position as advanced practice nurses	Postgraduate	Sweden
Betlehem et al., 2017	Betlehem, Pek, Banfai & Olah	2017	Book chapter: Teaching and Learning in Nursing	Book chapter	To review the relevant scientific literature and analyze records of the Hungarian nursing registry to predict the nursing workforce tendencies	Undergraduate/Postgraduate	Hungary
Blümel et al., 2020	Blümel, Spranger, Achatzetter, Maresso & Busse	2020	Health Systems in Transition	Report	To provide a detailed description of the German health system and of reform and policy initiatives in progress or under development	Undergraduate	Germany
Bodell, 2017	Bodell	2017	Website: Nursing Notes	Website information	To provide information about the nursing associate role	Undergraduate	United Kingdom
Bruyneel et al., 2019	Bruyneel, Van den Heede & Sermeus	2019	Book: Strengthening health systems through nursing: Evidence from 14 European countries	Book chapter	To provide a cross-sectional view of the nursing workforce in Belgium	Undergraduate/Postgraduate	Belgium
Buerhaus et al., 2016	Buerhaus, Auerbach & Staiger	2016	Journal: Nursing economics	Discussion paper	To re-examine graduation trends to determine if there has been a decrease in the production of new associate degree nurse graduates.	Undergraduate	United States
Christiansen et al., 2018	Christiansen, Jacob, Twigg	2018	Journal: Collegian	Discussion paper	To examine key arguments and emerging evidence relevant to the debate on the appropriate duration of undergraduate nursing programs in Australia.	Undergraduate	Australia, Greece, Iceland, Ireland, Israel, The Netherlands, Portugal, United States
De Geest et al., 2016	De Geest, Ramelet, Fierz, Simon, Nicca, Eicher & Katapodi	2016	Journal: VSH Bulletin	Descriptive paper	To describe the development and implementation of nursing science at Swiss Universities.	Undergraduate/Postgraduate	Switzerland
Dupin et al., 2020	Dupin, Pinon, Jaggi, Texiera, Sagne & Delicado	2020	Journal: BMC Nursing	Discussion paper	To examine the academic curricula implemented in Geneva in the light of the concept of superdiversity.	Undergraduate	Switzerland
Dutch Professional Nurse Practitioner Organisation-V&VN VS, n.d.		n.d.	Website	Website information	To provide information about the Nurse Practitioner role in the Netherlands	Postgraduate	The Netherlands
Economou et al., 2017	Economou, Kaitehidou, Karanikolos & Maresso	2017	Health Systems in Transition	Report	To provide a detailed description of the Greek health system and of reform and policy initiatives in progress or under development	Undergraduate	Greece
Eftekhari, 2019	Eftekhari	2019	Journal: British Journal of Cardiac Nursing	Descriptive paper	To describe the nursing associate role and education.	Undergraduate	United Kingdom
Ensiso et al., 2019	Ensiso, Lammintakanen, Härkönen & Kinnunen	2019	Book chapter: Strengthening health systems through nursing: Evidence from 14 European countries	Book chapter	To provide a cross-sectional view of the nursing workforce in Finland	Undergraduate/Postgraduate	Finland
Ernits et al., 2019	Ernits, Puusepp, Kont & Tulva	2019	Journal: Professional Studies: Theory and Practice	Literature review	To describe the development of nursing and nurses' training in the context of social and political changes in Estonia.	Undergraduate	Estonia
Eurodiaconia, 2016	Eurodiaconia	2016	Website	Report	To provide an overview of the training, education, and professional fields of a professional group of care workers - the health care assistants - across several European countries	Undergraduate	Austria, Belgium, Denmark, Finland, France, Germany, Italy, Poland, Slovenia, Spain, Sweden, Switzerland, The Netherlands, United Kingdom
Fawcett, 2017	Fawcett	2017	Journal: Nursing Standard	News item	To provide information about the importance of a master's degree for career progression.	Postgraduate	United Kingdom
Finish Nurse Association, 2021	Finish Nurses Association	2021	Website	Website information	To provide information on nurse education in Finland.	Undergraduate	Finland
Fotsch, 2018	Fotsch	2018	Journal: Journal of Nursing Regulation	Opinion article	To describe states' reactions to advancement of nursing education.	Undergraduate	United States

Author(s)	Year	Journal/Source	Report	Description of the Belgian health system and of reform and policy initiatives in progress or under development	Education Level	Country
Gerkens & Merkur, 2020	2020	Health Systems in Transition	Report	To provide a detailed description of the Belgian health system and of reform and policy initiatives in progress or under development	Undergraduate/Postgraduate	Belgium
Glarcher & Lex, 2020	2020	Journal: Zeitschrift für Evidenz, Fortbildung und Qualität im Gesundheitswesen	Literature review	To show the current situation of Advanced Practice Nurses (APN) in Austria, and to underline the importance of measuring APN outcomes in implementing this role for future developments in health care.	Postgraduate	Austria
Glasper, 2017 <sup>a</sup>	2017	Journal: British Journal of Nursing	Opinion article	To discuss the recently launched curriculum for nursing associates and what this might mean for the delivery of care.	Undergraduate	United Kingdom
Glasper, 2018 <sup>a</sup>	2018	Journal: British Journal of Healthcare Assistants	Descriptive paper	To provide information about the new nursing associate standards of proficiency.	Undergraduate	United Kingdom
Glasper, 2017 <sup>b</sup>	2017	Journal: British Journal of Nursing	Opinion article	To discuss the Nursing and Midwifery Council's announcement that it will regulate the new nursing associate role.	Undergraduate	United Kingdom
Glasper, 2018 <sup>b</sup>	2018	Journal: British Journal of Nursing	Descriptive paper	To discuss the recently published set of educational standards for the training of nursing associates	Undergraduate	United Kingdom
Glasper, 2019	2019	Journal: British Journal of Healthcare Assistants	Opinion article	To discuss how the Nursing and Midwifery Council quality-assures nursing associate education.	Undergraduate	United Kingdom
Grainger, 2018	2018	Journal: British Journal of Healthcare Assistants	Descriptive paper	To provide insights for considering pre-registration nursing or midwifery training or nursing associate training.	Undergraduate	United Kingdom
Groccia & Ford, 2020	2020	Book: New Directions for teaching & learning	Book chapter	To describe the history of health professions education and to describe a model of university teaching and learning	Undergraduate	United States
Habicht et al., 2018	2018	Health Systems in Transition	Report	To provide a detailed description of the Estonian health system and of reform and policy initiatives in progress or under development	Undergraduate/Postgraduate	Estonia
Hallinan & Hegarty, 2016	2016	Journal: Australian Journal of Primary Health	Quantitative	To understand enablers to participation in postgraduate education for primary care nurses, and to explore how postgraduate education has advanced their nursing practice.	Undergraduate/Postgraduate	Australia
Harrison, 2017	2017	Journal: Gastrointestinal Nursing	Opinion article	To discuss the launch of the new nursing associate program.	Undergraduate	United Kingdom
Hartjes et al., 2019	2019	Journal: Journal of the American Association of Nurse Practitioners	Descriptive paper	To inform prospective graduate nursing students regarding the need for doctoral prepared nurses, the strengths, focus, and program requirements of the PhD in DNP degrees.	Postgraduate	United States
(Hernández-Quevedo & Moreno-Casbas, 2019)	2019	Book chapter: Strengthening health systems through nursing: Evidence from 14 European countries	Book chapter	To provide a cross-sectional view of the nursing workforce in Spain	Undergraduate/Postgraduate	Spain
Hicks & Patterson, 2017	2017	Journal: AORN Journal	Descriptive paper	To provide knowledge about nursing education options, types of degrees, practice roles, and accreditation	Undergraduate	United States
Huisman-de Waal et al., 2019	2019	Book chapter: Strengthening health systems through nursing: Evidence from 14 European countries	Book chapter	To provide a cross-sectional view of the nursing workforce in the Netherlands	Undergraduate/Postgraduate	The Netherlands
Inatomi & Nomura, 2016	2016	Journal: Juntendo Medical Journal	Discussion paper	To compare basic nursing education, the nurse license examination system and specialized nurse education in Korea with those of Japan and the United States.	Undergraduate/Postgraduate	Japan, Korea, United States*
International Council of Nurses Nurse Practitioner / Advanced Practice Nursing Network, 2018	2018	Website	Website information	To provide information about the status of advanced practice nursing in Canada	Postgraduate	Canada
International Council of Nurses Nurse Practitioner / Advanced Practice Nursing Network, 2017	2017	Website	Website information	To provide information about the status of advanced practice nursing in Finland	Postgraduate	Finland

International Council of Nurses / Nurse Practitioner / Advanced Practice Nursing Network, 2017 <sup>b</sup>	International Council of Nurses Nurse Practitioner / Advanced Practice Nursing Network	2017	Website	Website information	To provide information about the status of advanced practice nursing in Hungary	Postgraduate	Hungary
International Council of Nurses / Nurse Practitioner / Advanced Practice Nursing Network, 2017 <sup>c</sup>	International Council of Nurses Nurse Practitioner / Advanced Practice Nursing Network	2017	Website	Website information	To provide information about the status of advanced practice nursing in Czech Republic	Postgraduate	Czech Republic
International Council of Nurses / Nurse Practitioner / Advanced Practice Nursing Network, 2017 <sup>d</sup>	International Council of Nurses Nurse Practitioner / Advanced Practice Nursing Network	2017	Website	Website information	To provide information about the status of advanced practice nursing in Norway	Postgraduate	Norway
International Council of Nurses / Nurse Practitioner / Advanced Practice Nursing Network, 2017 <sup>e</sup>	International Council of Nurses Nurse Practitioner / Advanced Practice Nursing Network	2017	Website	Website information	To provide information about the status of advanced practice nursing in New Zealand	Postgraduate	New Zealand
International Council of Nurses / Nurse Practitioner / Advanced Practice Nursing Network, 2017 <sup>f</sup>	International Council of Nurses Nurse Practitioner / Advanced Practice Nursing Network	2017	Website	Website information	To provide information about the status of advanced practice nursing in Ireland	Postgraduate	Ireland
International Qualifications Assessment Service, 2016	International Qualifications Assessment Service	2016	Website	Report	To provide a country overview, a historical educational overview, and descriptions of school education, higher education, professional/technical/vocational education, teacher education, grading scales, documentation for educational credentials and a bibliography	Undergraduate	Colombia
Japan Association of Nursing Programs in Universities, n.d.	Japan Association of Nursing Programs in Universities	n.d.	Website	Educational standard	To provide information about certification courses after graduation of high school.	Undergraduate/ Postgraduate	Japan
Japanese Nursing Association, 2016	Japanese Nursing Association	2016	Website	Report	To provide information about the nursing system, education and working conditions in Japan.	Undergraduate/ Postgraduate	Japan
Kalenkoski, 2017	Kalenkoski	2017	Website	Website information	To provide a summary of post-graduation options for nurses.	Postgraduate	United States
Keskimäki et al., 2019	Keskimäki, Tynkkynen, Reissell, Koivusalo, Syrjä, Vuorenkoski, Rechel & Karamikolos	2019	Health Systems in Transition	Report	To provide a detailed description of the Finnish health system and of reform and policy initiatives in progress or under development	Undergraduate	Finland
Kessenich & Persaud, 2016	Kessenich & Persaud	2016	Journal: NP Women's Healthcare	Opinion article	To describe factors when contemplating a terminal degree.	Postgraduate	United States
Kózka et al., 2019	Kózka, Brzostek, Ksykiwicz-Dorota, Gabryś, Kilańska, Ogarek, Cisek, Przewoźniak & Brzycki	2019	Book chapter: Strengthening health systems through nursing: Evidence from 14 European countries	Book chapter	To provide a cross-sectional view of the nursing workforce in Poland	Undergraduate/ Postgraduate	Poland
Kroneman et al., 2016	Kroneman, Boerma, Van den Berg, Groenewegen, De Jong & Van Ginneken	2016	Health Systems in Transition	Report	To provide a detailed description of the Dutch health system and of reform and policy initiatives in progress or under development	Undergraduate	The Netherlands
Lindell et al., 2017	Lindell, Hagler & Poindexter	2017	Journal: American Nurse Today	Descriptive paper	To provide a brief history of doctoral education in nursing and to compare key aspects of PhD and DNP degrees	Postgraduate	United States
Longhurst, 2017	Longhurst	2017	Journal: Nursing Standard	News item	To inform about concerns over the nursing associate role	Undergraduate	United Kingdom
Marchildon et al., 2020	Marchildon, Allin & Merkur	2020	Health Systems in Transition	Report	To provide a detailed description of the Canadian health system and of reform and policy initiatives in progress or under development	Undergraduate	Canada
Maresova et al., 2020	Maresova, Prochazka, Baraković, Baraković Husić & Kuca	2020	Journal: Healthcare	Qualitative	To analyze the lack and need of general nurses and midwives in the Hradec Kralove region	Undergraduate	Czech Republic

Mark et al., 2019	Mark, Twigg, Barber & Warren	2019	Journal: Journal of Nursing Education	Literature review	To describe the programmatic features of entry-level master's programs in nursing in the United States that result in a generalist degree for individuals with a baccalaureate degree in another field	Postgraduate	United States
Marquez & Arizmendi, 2019	Marquez & Arizmendi	2019	Journal: International Physical Medicine & Rehabilitation Journal	Descriptive paper	To clarify the status of the transition from Mexico from 2009 to 2018	Undergraduate	Mexico
McCauley et al., 2020	McCauley, Broome, Frazier, Hayes, Kurth, Musil, Norman, Rideout & Villarruel	2020	Journal: Nursing Outlook	Discussion paper	To examine the factors influencing the ability of nursing schools to implement a universal DNP standard for APRNs	Postgraduate	United States
McIntosh et al., 2016	McIntosh, Thomas & Siela	2016	Journal: Dimensions of Critical Care Nursing	Discussion paper	To establish the differences of a non-Bachelor of Science in nursing (BSN) registered nurse and a 4-year prepared nurse, as well as to identify the education and clinical trends in critical care that require a BSN-prepared nurse.	Undergraduate	United States
Morris, 2019	Morris	2019	Journal: Forum on Public Policy online	Descriptive paper	To advance knowledge of nursing education in the United States, explore factors influencing the current nursing education model, and challenge assumptions for the future of nursing education	Undergraduate	United States
Morris et al., 2019	Morris, Matthews & Scott	2019	Book chapter: Strengthening health systems through nursing: Evidence from 14 European countries	Book chapter	To provide a cross-sectional view of the nursing workforce in Ireland	Undergraduate/Postgraduate	Ireland
National Academy of Medicine, 2021	National Academy of Medicine	2021	Book	Book	To describe the vision of the Committee on the Future of Nursing 2020-2030	Undergraduate/Postgraduate	United States
National Council of State Boards of Nursing, 2019	National Council of State Boards of Nursing	2019	Website	Website information	To describe the results of a questionnaire about educational nursing programs in different jurisdictions in the United States	Undergraduate	United States

National Council of State Boards of Nursing, 2020	National Council of State Boards of Nursing	2020	Journal: Journal of Nursing Regulation	Report	To provide an anthology that captures the similarities, differences, and details of nursing around the world	Undergraduate/Postgraduate	Australia, Austria, Belgium, Chile, Colombia, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Israel, Italy, Japan, Korea, Latvia, Lithuania, Luxembourg, Mexico, The Netherlands, New Zealand, Norway, Poland, Portugal, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey, United Kingdom, United States
National Council of State Boards of Nursing, 2022 <sup>a</sup>	National Council of State Boards of Nursing	2022	Website: Global Regulatory Atlas	Website information	To provide a comprehensive resource on the regulation of nurses in countries around the world	Undergraduate/Postgraduate	Australia, Austria, Belgium, Chile, Czech Republic, Costa Rica, Colombia, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Israel, Italy, Japan, Korea, Latvia, Lithuania, Luxembourg, Mexico, The Netherlands, New Zealand, Norway, Poland, Portugal, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey, United Kingdom, United States
Health Education England, 2016	NHS Health Education England	2016	Website	News item	To provide information about training places for nursing associates	Undergraduate	United Kingdom
Health Education England, 2017	NHS Health Education England	2017	Website	Educational standard	To set out what knowledge, understanding, skills, attitudes, and behaviors a trainee nursing associate will have developed and to set out a curriculum framework for approved educational institutions	Undergraduate	United Kingdom
Nursing and Midwifery Council, 2018	Nursing and Midwifery Council	2018	Website	Educational standard	To present standards of proficiency which represent the standards of knowledge and skills that a nursing associate will need to meet to be considered by the Nursing & Midwifery Council	Undergraduate	United Kingdom

Nursing and Midwifery Board of Australia, 2021	Nursing and Midwifery Board of Australia	2018	Website	Educational standard	To provide Nurse Practitioners standards for practice to be easily accessible to a variety of groups, including NPs, governments, regulatory agencies, education providers, health-care professionals and the community	Postgraduate	Australia
Nursing and Midwifery Board of Ireland, 2020	Nursing and Midwifery Board of Ireland	2021	Website	Educational standard	To provide standards and requirements for nurse and midwife education	Undergraduate/Postgraduate	Ireland
OeAD - Agency for Education and Internationalisation, 2020	OeAD - Agency for Education and Internationalisation	2020	Website	Educational standard	To provide education and career guidance counsellors in Austria and Europe with information about, among other things, the Austrian education system	Undergraduate	Austria
OECD, 2016 <sup>a</sup>	OECD	2016	Website	Website information	To provide an overview of trends in nursing education in France	Undergraduate/Postgraduate	France
OECD, 2016 <sup>b</sup>	OECD	2016	Website	Website information	To provide an overview of trends in nursing education in Germany	Undergraduate/Postgraduate	Germany
OECD, 2016 <sup>c</sup>	OECD	2016	Website	Website information	To provide an overview of trends in nursing education in Italy	Undergraduate/Postgraduate	Italy
Ousey et al., 2018	Ousey, Holloway, Downie, Moore & Cormish	2018	Journal: Wounds UK	Discussion paper	To debate the trainee nursing associates role with four health care professionals	Undergraduate	United Kingdom
Pilcher, 2020	Pilcher	2020	Journal: American Journal of Nursing	Descriptive paper	To provide information about Advanced Degrees in Nursing	Postgraduate	United States
Pradela et al., 2020	Pradela, Radosz & Sobiegala	2020	Journal: Nursing in the 21st Century	Literature review	To analyze literature concerning nursing education in Poland, with particular emphasis on current education and the Medical High School and Medical Vocational College at the secondary level in the basic range	Undergraduate/Postgraduate	Poland
Rees et al., 2019	Rees, Ousey, Koo, Ahmad & Bowling	2019	Journal: British Journal of Nursing	Discussion paper	To outline the different approaches and discuss some advantages and drawbacks of doctoral-level postgraduate study	Undergraduate/Postgraduate	United States
Reeves, 2020	Reeves	2020	Journal: Australian Nursing and Midwifery Journal	News item	To provide an overview of the Australian Nursing and Midwifery Foundation's submission to an independent review of nursing education from the government	Undergraduate	Australia

Reid Ponite, 2018	Reid Ponite	2018	Journal: Nursing Management	Descriptive paper	To offer insights and perspectives for baccalaureate-prepared nurses exploring next steps in their education	Postgraduate	United States
Rice et al., 2020	Rice, Rosenau, Unruh & Barnes	2020	Health Systems in Transition	Report	To provide a detailed description of the United States health system and of reform and policy initiatives in progress or under development	Undergraduate/Postgraduate	United States
Riklikienė et al., 2019	Riklikienė, Starkienė & Macijauskienė	2019	Book chapter: Strengthening health systems through nursing: Evidence from 14 European countries	Book chapter	To provide a cross-sectional view of the nursing workforce in Lithuania	Undergraduate/Postgraduate	Lithuania
Rodriguez, 2016	Rodriguez	2016	Journal: Oncology Nursing Forum	Descriptive paper	To provide brief background information concerning the evolution of the DNP degree and its present status, to define the DNP degree, and to guide oncology nurses' decision-making process regarding the DNP degree.	Postgraduate	United States
Royal college of Nursing, 2021	Royal College of Nursing	2021	Website	Educational standard	To provide educational standards for nurses working as advanced nursing practitioners	Postgraduate	United Kingdom
Salminen et al., 2019	Salminen, Koskinen, Heikkilä, Strandell-Laine, Haavisto & Leino-Kilpi	2019	Book chapter: Nursing Education and Nurse Education Research in Finland	Book chapter	To introduce nursing education and nurse education research in Finland and to emphasize the importance of good education	Undergraduate/Postgraduate	Finland
San Martin-Rodriguez et al., 2018	San Martin-Rodriguez, Soto & Escalada-Hernández	2018	Journal: Enfermería Clínica (English Edition)	Descriptive paper	To present a general analysis on the training of APNs at international level	Postgraduate	Australia, Canada, Finland, Iceland, Ireland, The Netherlands, New Zealand, Spain, Sweden, Switzerland, United Kingdom, United States
Sarzynski & Barry, 2019	Sarzynski & Barry	2019	Journal: The American Journal of Managed Care	Discussion paper	To compare NPs and PAs education and training with that of primary care physicians and review their scope of practice.	Postgraduate	United States
Saunes et al., 2020	Saunes, Karamikolos & Sagan	2020	Health Systems in Transition	Report	To provide a detailed description of the Norwegian health system and of reform and policy initiatives in progress or under development	Undergraduate/Postgraduate	Norway
Schwartz, 2019	Schwartz	2019	Website	Report	To present the outcomes of an independent review of nursing education in Australia	Undergraduate/Postgraduate	Australia

Schwendimann et al., 2019	Schwendimann, Auser, Schuber, Widmer, Addor, Desmedt & De Geest	2019	Book chapter: Strengthening health systems through nursing: Evidence from 14 European countries	Book chapter	To provide a cross-sectional view of the nursing workforce in Switzerland	Undergraduate/ Postgraduate	Switzerland
Simões et al., 2017	Simões, Augusto, Fronteira & Hernandez-Quevedo	2017	Health Systems in Transition	Report	To provide a detailed description of the Portuguese health system and of reform and policy initiatives in progress or under development	Undergraduate	Portugal
Sjetne et al., 2019	Sjetne, Tvedt & Ringard	2019	Book chapter: Strengthening health systems through nursing: Evidence from 14 European countries	Book chapter	To provide a cross-sectional view of the nursing workforce in Norway	Undergraduate/ Postgraduate	Norway
Slusarska et al., 2018	Slusarska, Zarzycka, Dobrowolska, Marciniowicz & Nowicki	2018	Journal: Nurse education in practice	Literature review	To present the development of nursing education in Poland in the context of socio-political changes in the country and from the perspective of the current challenges in nursing worldwide	Undergraduate/ Postgraduate	Poland
Smatana et al., 2016	Smatana, Pažitny, Kandilaki, Laktišová, Sedláková & Palušková	2016	Health Systems in Transition	Report	To provide a detailed description of a health system and of reform and policy initiatives in progress or under development in specific countries based on country-based reviews.	Undergraduate/ Postgraduate	Slovakia
Stodart, 2017	Stodart	2017	Journal: Kai Tiaki: Nursing New Zealand	Opinion article	To describe the development of enrolled nurse education.	Undergraduate	New Zealand
Sveinsdóttir et al., 2019	Sveinsdóttir, Gunnarsdóttir & Björnisdóttir	2019	Book chapter: Leadership in Nursing: Experiences from the European Nordic Countries	Book chapter	To describe the development of nursing education at all levels with emphasis on the most recent reforms of the BS program initiated in 2015.	Undergraduate/ Postgraduate	Iceland
Terhaar et al., 2016	Terhaar, Taylor & Sylvia	2016	Journal: Nursing education perspectives	Qualitative	To reflect on the progress of the DNP degree and its place in health care	Postgraduate	United States
Thomas et al., 2016	Thomas, McIntosh & Mensik	2016	Journal: Dimensions of Critical Care Nursing	Descriptive paper	To provide the registered nurse valuable information that will assist in the process of returning to college	Postgraduate	United States

Türk & Habjanić, 2019	Türk & Habjanić	2019	Book chapter: Strengthening health systems through nursing: Evidence from 14 European countries	Book chapter	To provide a cross-sectional view of the nursing workforce in Slovenia	Undergraduate/ Postgraduate	Slovenia
Valiga & Thornlow, 2018	Valiga & Thornlow	2018	Journal: Nursing 2020	Descriptive paper	To provide information about issues to consider when choosing a graduate nursing program.	Postgraduate	United States
White, 2017	White	2017	Journal: Policy, Politics, & Nursing Practice	Literature review	To explore how the nursing education systems in the United States and England have responded to recommendations in strategic reports, and how regulatory and funding structures have hindered or enabled these efforts	Undergraduate	United Kingdom
World Health Organization, 2020 <sup>b</sup>	World Health Organization	2020	Website	Website information	To provide information about postgraduate training in Latvia	Undergraduate	Latvia
Latvian Qualifications Database, 2020	Latvian Qualifications Database	2021	Website	Website information	To provide information about the Latvian nurse qualifications	Undergraduate/ Postgraduate	Latvia
Zander-jentsch et al., 2019	Zander-jentsch, Wagner, Rzayeva & Busse	2019	Book chapter: Strengthening health systems through nursing: Evidence from 14 European countries	Book chapter	To provide a cross-sectional view of the nursing workforce in Germany	Undergraduate	Germany
Ziegler, 2018	Ziegler	2018	Website	Website information	To explain how nurses and geriatric carers in Germany are trained, what their duties are and how much they earn.	Undergraduate	Germany
Zikos et al., 2019	Zikos, Diomidous, Mantas, Kaitelidou & Karanikolos	2019	Book chapter: Strengthening health systems through nursing: Evidence from 14 European countries	Book chapter	To provide a cross-sectional view of the nursing workforce in Greece	Undergraduate	Greece

Table 2 | Characteristics of undergraduate nursing education programs.

Undergraduate	Nursing title	Duration in years	Degree	Study load hours	Practice hours	References
Australia	Registered nurse	3	Bachelor	800	800	Australian Nursing and Midwifery Accreditation Council, 2017, 2019; Christiansen et al., 2018; Hallinan & Hegarty, 2016; National Council of State Boards of Nursing, 2020, 2022 <sup>a</sup> ; Reeves, 2020; Schwartz, 2019
	Enrolled nurse	1.5	Diploma	400	400	
Austria	Nurse	3	Bachelor <sup>c</sup>	4600		Bachner F. et al., 2018; Eurodiaconia, 2016; Glarcher & Lex, 2020; National Council of State Boards of Nursing, 2020, 2022 <sup>a</sup> ; OeAD - Agency for Education and Internationalisation, 2020
	Qualified general nurse	3	Diploma	4600		
	Second level assistant nurse	2				
Belgium	First level assistant nurse	1		1600		Bruyneel et al., 2019; Eurodiaconia, 2016; Gerkens & Merkur, 2020; National Council of State Boards of Nursing, 2020, 2022 <sup>a</sup>
	Nurse	4	Bachelor	4600	2300	
	Nurse	3-3.5	Diploma			
Canada	Health care assistant	1	Vocational			American Association of Colleges of Nursing, 2019; Christiansen et al., 2018; Marchildon et al., 2020; National Council of State Boards of Nursing, 2020, 2022 <sup>a</sup>
	Registered nurse	4	Bachelor			
Chile	Licensed practical nurse	2	Diploma			Ayala et al., 2019; National Council of State Boards of Nursing, 2020, 2022 <sup>a</sup>
	Nurse	5	Bachelor			
Colombia	Nursing assistant					National Council of State Boards of Nursing, 2022 <sup>a</sup>
	Undergraduate nurse	4.5	Bachelor			
Czech Republic	Auxiliary nurse	1.5	Technical/Vocational	1600-1800	60%	International Qualifications Assessment Service, 2016; National Council of State Boards of Nursing, 2020, 2022 <sup>a</sup>
	General nurse	3	Bachelor			
Denmark	Hospital attendant	4				Maresova et al., 2020; National Council of State Boards of Nursing, 2020, 2022 <sup>a</sup>
	Registered nurse	3.5-4	Bachelor <sup>b</sup>	5880 <sup>b</sup>	2520 <sup>b</sup>	
Estonia	Social health care assistant	8 months				Eurodiaconia, 2016; National Council of State Boards of Nursing, 2020, 2022 <sup>a</sup>
	Registered nurse	3.5-4.5	Bachelor <sup>b</sup>	5880	50%	
Finland	Registered nurse	3.5	Bachelor	5880	≥ 2300 <sup>b</sup>	Ernits et al., 2019; Habicht et al., 2018; National Council of State Boards of Nursing, 2020, 2022 <sup>a</sup>
	Practical nurse	3 <sup>b</sup>	Vocational <sup>b</sup>	5040	1400	
France	Registered nurse	3	Bachelor			Eurodiaconia, 2016; National Council of State Boards of Nursing, 2020, 2022 <sup>a</sup> ; OECD, 2016 <sup>c</sup>
	Health care assistant	8 months-1 year	Vocational			
Germany	Nurse <sup>b</sup>	3-4 <sup>b</sup>	Bachelor <sup>b</sup>	Min. 5040 <sup>b</sup>	2300 <sup>b</sup>	Blümel et al., 2020; National Council of State Boards of Nursing, 2020, 2022 <sup>a</sup> ; OECD, 2016 <sup>c</sup> ; Zander-Jentisch et al., 2019; Ziegler, 2018
	Nurse	3	Vocational	4600 <sup>b</sup>	2500	
	Nursing assistant <sup>c</sup>	1 or 2 <sup>b</sup>	Vocational <sup>b</sup>	1550-1800 <sup>b</sup>	850-1000 <sup>b</sup>	
Greece	Registered nurse	4	Bachelor	6720		American Association of Colleges of Nursing, 2019; Christiansen et al., 2018; Economou et al., 2017; National Council of State Boards of Nursing, 2020, 2022 <sup>a</sup> ; Zikos et al., 2019
	Nursing assistant	2				
Hungary	Nurse	4	Bachelor			Bellehem et al., 2017; National Council of State Boards of Nursing, 2020, 2022 <sup>a</sup>
	General nurse	3		4600		
	Nurse assistant	2	Secondary education			
Iceland	Registered nurse <sup>b</sup>	4	Bachelor	6720	2300 <sup>b</sup>	Christiansen et al., 2018; National Council of State Boards of Nursing, 2020, 2022 <sup>a</sup> ; Sveinsdóttir et al., 2019
	General nurse	4	Bachelor	≥ 4600 <sup>b</sup>	2300	
Israel	Registered nurse	4	Bachelor	≥ 1442 <sup>b</sup>	1248 <sup>b</sup>	Christiansen et al., 2018; National Council of State Boards of Nursing, 2020, 2022 <sup>a</sup>
	Registered nurse	2.5	Diploma	1442 <sup>b</sup>	1248 <sup>b</sup>	
	Registered nurse	3	Bachelor	5400 <sup>b</sup>	1800 <sup>b</sup>	
Japan	Auxiliary staff	1	Vocational	1000	450	Eurodiaconia, 2016; National Council of State Boards of Nursing, 2020, 2022 <sup>a</sup> ; OECD, 2016 <sup>c</sup>
	Nurse	4			≥1035	
	Nurse	3				
Korea	Assistant nurse	2		1890 <sup>b</sup>		Inatomi & Nomura, n.d.; Japanese Nursing Association, 2016
	Registered nurse	4	Bachelor	3920	≥1000	
Latvia	Assistant nurse	4	Bachelor	6720	≥1092	Behmane et al., 2019; National Council of State Boards of Nursing, 2020, 2022 <sup>a</sup> ; World Health Organization, 2020 <sup>c</sup> ; Latvian Qualifications Database, 2021
	Nurse	2-3	Vocational	5040		
Lithuania	Nurse	4	Bachelor	6720	2300 <sup>b</sup>	National Council of State Boards of Nursing, 2020, 2022 <sup>a</sup> ; Rikiklienė et al., 2019
	Nurse	3.5	Professional Bachelor	5880	2316 <sup>b</sup>	

Luxembourg	Nurse	4		National Council of State Boards of Nursing, 2020, 2022 <sup>a</sup>
	General care nurse	3	Bachelor <sup>c</sup>	
Mexico	Licensed nurse	4 <sup>f</sup>	Bachelor	Marquez & Atizmendi, 2019; National Council of State Boards of Nursing, 2020, 2022 <sup>a</sup>
	General nurse / nurse technician	3 <sup>f</sup>	High school	
	Auxiliary nurse	1.5		
The Netherlands	Registered nurse	4	Bachelor	Christiansen et al., 2018; Eurodiaconia, 2016; Huisman-de Waal et al., 2019; Kroneman et al., 2016; National Council of State Boards of Nursing, 2020, 2022 <sup>a</sup>
	Registered nurse	4	Vocational	
	Certified nursing assistants	3		2300 <sup>b</sup>
	Health and welfare Assistant	2		900
	Care assistant	1		
New Zealand	Registered nurse	3	Bachelor <sup>b</sup>	1100
	Enrolled nurse	1.5	Diploma	900
Norway	Registered nurse	3	Bachelor	2300 <sup>b</sup>
	Nursing/Healthcare assistant <sup>g</sup>	4	Vocational in high school <sup>b</sup>	50% 25% (the last year) <sup>b</sup>
Poland	Registered nurse	3	Bachelor	4720
	Health care assistant		Vocational	720
Portugal	General nurse	4	Licentiate <sup>h,i</sup>	6720 <sup>b</sup>
Slovakia	Registered nurse	3	Bachelor	4600 <sup>b</sup>
	Registered nurse <sup>b</sup>	3 <sup>b</sup>	Graduate general nurse – Higher professional study <sup>y</sup>	≥ 2300 <sup>b</sup> ≥ 2300 <sup>b</sup>
Slovenia	Registered nurse	3	Bachelor	4600
	Nurse technician	4	Vocational	≥ 2300 1000
Spain	Registered nurse	4	Bachelor	5880
	Nursing care assistant	1-2		1400
Sweden	Registered nurse	3	Bachelor	5040
	Health care assistant	3	Vocational / In-service	Not specified <sup>h</sup>

Switzerland	Registered nurse	3-4 <sup>b</sup>	Bachelor	5040	De Geest et al., 2016; Dupin et al., 2020; Eurodiaconia, 2016; National Council of State Boards of Nursing, 2020, 2022a; Schwendemann et al., 2019
	Registered nurse	3-4 <sup>b</sup>	Advanced Federal Diploma <sup>b</sup>	5400 <sup>b</sup>	
	Health care assistant	3	Federal Diploma of Vocational Education and Training <sup>b</sup>	4160 <sup>b</sup>	2560 <sup>b</sup>
	Nursing aides	2 <sup>b</sup>	Federal Certificate of Vocational Education and Training <sup>b</sup>	600	

Turkey	Nurse	4		National Council of State Boards of Nursing, 2020, 2022a	
United Kingdom	Nurse	3	Bachelor	2300	Bodell, 2017; Effekhari, 2019; Eurodiaconia, 2016; Glasper, 2017, 2017 <sup>a</sup> ; Glasper, 2018 <sup>a</sup> ; Glasper, 2018 <sup>b</sup> ; Glasper, 2019; Grainger, 2018; Harrison, 2017; Health Education England, 2016, 2017; Longhurst, 2017; National Council of State Boards of Nursing, 2020, 2022 <sup>a</sup> ; Nursing and Midwifery Council, 2018; Ousey et al., 2018; Schwartz, 2019; White, 2017
	Nursing associate	2	Foundation	675	
	Assistant practitioner	2	Foundation		
	Healthcare assistant		Certificate / Diploma in Healthcare support		
United States b	Registered nurse	4	Bachelor	200-954 or 60% or 8 semesters	American Association of Colleges of Nursing, 2019; Buerhaus et al., 2016; Christiansen et al., 2018; Folsch, 2018; Grocchia & Ford, 2020; Hicks & Paterson, 2017; Mark et al., 2019; McIntosh et al., 2016; Morris, 2019; National Academy of Medicine, 2021; Rees et al., 2019; Rice et al., 2020
	Registered nurse	3	Diploma	400-750 or 50% or 26 semesters hours	
	Registered nurse	2	Associate	160-900 or 50% or 26 semesters hours or 16 semester units	
	Licensed practical nurse / licensed vocational nurse	1-2	Vocational	160-750 or 50% or 48 semester hours	

Note | Parts for which no information have been found have been left blank.

<sup>a</sup> Only nation-wide information; may vary per state/region/municipality.

<sup>b</sup> Information provided by nursing association.

<sup>c</sup> From 2024 onwards, nursing training will only be provided as a Bachelor's degree.

<sup>d</sup> 1 ECTS=30 hours.

<sup>e</sup> From 2023 onwards, a bachelor program in nursing will be introduced.

<sup>f</sup> +1 year of social service.

<sup>g</sup> The requirements of this degree are in accordance with the Bologna Declaration and are transferable to a bachelor's degree in other European countries.

<sup>h</sup> Colleges are initial to decide themselves how many clinical hours each student must have.

Table 3 | Characteristics of postgraduate nursing education programs.

Postgraduate	Nursing title	Duration in years	Degree	Study load hours	References
Australia	Nurse practitioner	1.5	Master Doctoral	3000	Hallinan & Hegarty, 2016; National Council of State Boards of Nursing, 2020, 2022 <sup>a</sup> ; Nursing and Midwifery Board of Australia, 2021; San Martin-Rodriguez et al., 2018; Schwartz, 2019
Austria	Advanced Practice Nurse		Master <sup>c</sup>		Glarcher & Lex, 2020
Belgium	Advanced Practice Nurse		Master Doctoral	1680	Bruyneel et al., 2019; Gerkens & Merkur, 2020; San Martin-Rodriguez et al., 2018
Canada <sup>a</sup>	Nurse Practitioner Clinical Nurse Specialist	1.5-2 <sup>d</sup> 2	Master Master Doctoral		International Council of Nurses Nurse Practitioner/Advanced Practice Nursing Network, 2018; National Council of State Boards of Nursing, 2020; San Martin-Rodriguez et al., 2018
Chile			Master Doctoral		Ayala et al., 2019; National Council of State Boards of Nursing, 2020, 2022 <sup>a</sup>
Colombia			Master Doctoral Postdoctoral		National Council of State Boards of Nursing, 2020, 2022 <sup>a</sup>
Costa Rica					
Czech Republic	Nurse with a master's degree	2	Master		International Council of Nurses Nurse Practitioner/Advanced Practice Nursing Network, 2017 <sup>c</sup>
Denmark	Nursing Scientist <sup>b</sup> Advanced Nurse Practitioner <sup>b</sup>	2 <sup>b</sup> 2 <sup>b</sup>	Master <sup>b</sup> Master <sup>b</sup>	3360 <sup>b</sup> 3360 <sup>b</sup>	
Estonia	Advanced Nurse Practitioner	1.5 <sup>b</sup>	Master <sup>b</sup>	2340 <sup>b</sup>	National Council of State Boards of Nursing, 2020, 2022 <sup>a</sup>
Finland	Advanced Practice Nurse / Clinical Nurse Specialist / Nurse Practitioner <sup>e</sup> Advanced Practice Nurse / Clinical Nurse Specialist / Nurse Practitioner <sup>e</sup>	2 1.5	Masters' degree at university Masters' degree at University of Applied Sciences	3360 2520	Ensiso et al., 2019; International Council of Nurses Nurse Practitioner/Advanced Practice Nursing Network, 2017 <sup>c</sup> ; Salminen et al., 2019; San Martin-Rodriguez et al., 2018
France	PhD in Nursing Science <sup>b</sup> Nurse anesthetist Advanced Nurse Practitioner	2 2	Doctoral Master Master Doctoral	6720 <sup>b</sup>	OECD, 2016 <sup>c</sup>
Germany	Master level for education, management, clinical fields <sup>b</sup>	1.5-2 <sup>b</sup>	Master	2520-3360 <sup>b</sup>	OECD, 2016 <sup>b</sup>
Greece			Doctoral		
Hungary	Advanced Practice Nurse	1.5	Master Doctoral		Belethem et al., 2017; International Council of Nurses Nurse Practitioner/Advanced Practice Nursing Network, 2017 <sup>c</sup> ; National Council of State Boards of Nursing, 2020, 2022 <sup>a</sup>
Iceland	Master of Science <sup>b</sup> PhD <sup>b</sup>	2	Master Doctoral	3360 5040	Sveinsdóttir et al., 2019
Ireland	Advanced Nurse Practitioner	1-2 <sup>b</sup>	Master	2520	International Council of Nurses Nurse Practitioner/Advanced Practice Nursing Network, 2017 <sup>c</sup> ; Morris et al., 2019; Nursing and Midwifery Board of Ireland, 2020; San Martin-Rodriguez et al., 2018
Israel	Nurse Practitioner	1	Master	700-1240 <sup>b</sup>	Aaron & Andrews, 2016
Italy	Master in Nursing and Midwifery <sup>af</sup>	2 <sup>b</sup>	Master	3000 <sup>af</sup>	OECD, 2016 <sup>c</sup>
Japan	PhD <sup>b</sup> Advanced Practice Nurse / Clinical Nurse Specialist / Nurse Practitioner PhD	3-4 <sup>b</sup> 2 3	Doctoral Master Doctoral	4500 <sup>af</sup>	Inatomi & Nomura, 2016; Japan Association of Nursing Programs in Universities, n.d.; Japanese Nursing Association, 2016; National Council of State Boards of Nursing, 2020; San Martin-Rodriguez et al., 2018
Korea	Advanced Practice Nurse PhD	2-2.5 3	Master Doctoral		Inatomi & Nomura, 2016; National Council of State Boards of Nursing, 2022 <sup>a</sup>
Latvia	Master of Health Sciences in Nursing	1-2	Master	3360	Behmane et al., 2019; Latvian Qualifications Database, 2021
Lithuania	Advanced Nursing Practice <sup>b</sup> Leadership in Nursing <sup>b</sup> PhD in Nursing <sup>b</sup>	2 <sup>b</sup> 2.5 <sup>b</sup> 4	Master <sup>b</sup> Master <sup>b</sup> Doctoral	3360 <sup>b</sup> 2520 <sup>b</sup>	Riklikienė et al., 2019
Luxembourg					
Mexico	Postgraduate Nurse Postgraduate Nurse Doctoral Nurse	2-4 2-4 2-3	Master PhD		National Council of State Boards of Nursing, 2020, 2022 <sup>a</sup>
The Netherlands	Nurse Practitioner Nursing Scientist PhD <sup>b</sup>	2-3 1 4 <sup>b</sup>	Master Master Doctoral <sup>b</sup>	3360 1680	Dutch Professional Nurse Practitioner Organisation (V&VN VS), n.d.; Huisman-de Waal et al., 2019; San Martin-Rodriguez et al., 2018

New Zealand	Nurse Practitioner	2	Master	2400 <sup>b</sup>	International Council of Nurses Nurse Practitioner/Advanced Practice Nursing Network, 2017 <sup>c</sup> ; National Council of State Boards of Nursing, 2022 <sup>d</sup> , 2021 <sup>e</sup> ; San Martin-Rodriguez et al., 2018
	Clinical Nurse Specialist <sup>b</sup>	2 <sup>b</sup>	Master or Post-grad certificate of diploma <sup>b</sup>	≤ 2400 <sup>b</sup>	
Norway	Advanced Practice Nurse	2	Master	3360	International Council of Nurses Nurse Practitioner/Advanced Practice Nursing Network, 2017 <sup>c</sup> ; San Martin-Rodriguez et al., 2018; Saunes et al., 2020; Sjetne et al., 2019
	PhD	3	Doctoral		
Poland	Nurse with master's degree in nursing	2	Master	3360	Kozka et al., 2019; National Council of State Boards of Nursing, 2020, 2022 <sup>d</sup> ; Pradela et al., 2020; Slusaska et al., 2018
	PhD	4	Doctoral		
Portugal	Specialist nurse	1-5	Master <sup>b</sup>	2520 <sup>b</sup>	National Council of State Boards of Nursing, 2020, 2022a; Smatana M. et al., 2016
	Advanced Practice Nurse <sup>b</sup>	2-3 <sup>h</sup>	Master		
Slovakia	PhD <sup>b</sup>	4-5 <sup>h</sup>	Doctoral		
	Master	2	Master	3360	Albrecht et al., 2016; Turk & Habjanić, 2019
Spain	Specialist Nurse	2-3	Master		Arrogante, 2017; Hernández-Quevedo & Moreno-Casbas, 2019; San Martin-Rodriguez et al., 2018
	Advanced Practice Nurse	2	Master		
Sweden	Advanced Practice Nurse		Doctoral		
	Specialist nurse	1	Master	3360	Alenius et al., 2019; Bergström & Lindh, 2018
	Licentiate <sup>b</sup>	2	Licentiate <sup>b</sup>	3360	
	PhD <sup>b</sup>	4 <sup>b</sup>	Doctoral <sup>b</sup>	6720 <sup>b</sup>	
	Advanced Practice Nurse		Master	2520-3360 <sup>b</sup>	De Geest et al., 2016; National Council of State Boards of Nursing, 2020, 2022 <sup>d</sup> ; Schwendimann et al., 2019
Switzerland	Master of Science in Nursing <sup>b</sup>	1.5-3 <sup>b</sup>	Master	2520-3360 <sup>b</sup>	
	PhD		Doctoral		
Turkey					
United Kingdom	Advanced Nurse Practitioner	1	Master		Fawcett, 2017; Rees et al., 2019; Royal college of Nursing, 2021
	Doctor of Nursing	3-4	Professional doctorate		
	PhD	4	Doctoral		

United States	Advanced Practice Registered Nurse (NP, CNS, CNM, CRNA)	2	Master / Doctoral		Alexander, 2016; Bellflower & Likes, 2019; Hartjes et al., 2019; Inatomi & Nomura, 2016; Kalenkoski, 2017; Kessenich & Persaud, 2016; Lindell et al., 2017; Mark et al., 2019; McCauley et al., 2020; National Academy of Medicine, 2021; National Council of State Boards of Nursing, 2020; Pilcher, 2020; Reid Ponte, 2018; Rice et al., 2020; Rodriguez, 2016; San Martin-Rodriguez et al., 2018; Sarzynski & Barry, 2019; Terhaar et al., 2016; Thomas et al., 2016; Valiga & Thornlow, 2018
	DNP (Doctor of Nursing Practice)	2-3	Doctoral		
	PhD	4-5	Doctoral		
	Health Policy Nurse		Doctoral		
	Edd (Doctorate of Education)	3-4	Doctoral		
	Clinical Nurse Leader	15-36 months	Master		
	Nursing Scientist	2	Master		
	Nurse Educator	2	Master		
	Nurse Manager		Master		
	Nurse Informaticist		Master		
	Nurse Administrator	2	Master		

Note | parts for which no information have been found have been left blank.

- <sup>a</sup> Only nation-wide information; may vary per state/region/municipality.
- <sup>b</sup> Information provided by nursing association.
- <sup>c</sup> No national legal regulation about the master degree.
- <sup>d</sup> No data available from the states of Saskatchewan and Yukon.
- <sup>e</sup> Titles in working life vary because there is no regulation for APN roles and titles.
- <sup>f</sup> Only for management and educational area (laurea magistrale).
- <sup>g</sup> 1 ECTS=25 hours.
- <sup>h</sup> Internal versus external form.

Figure 2 | Undergraduate nursing titles.



Figure 3 | Postgraduate nursing titles.



## Discussion

### Summary of evidence

This study showed that different nurse education programs award the same or similar nursing titles. Furthermore, undergraduate and postgraduate degrees with different durations or study load hours also awarded similar nursing titles between countries and even within the same country. These variations are undesirable.

Undergraduate nurse education includes a bachelor's degree in most countries. The increasing evidence linking the proportion of bachelor-educated nurses to better health outcomes (Aiken et al., 2014; Haegdorens et al., 2019; Lasater et al., 2021) has caused a shift from vocational training to professional bachelor education in countries around the globe (World Health Organization, 2021). Our data showed that all European countries offer (or will offer) bachelor's degrees. Earlier studies (Lahtinen et al., 2014) reported that some countries (such as France and Luxembourg) still did not offer a bachelor's degree. More countries have now introduced bachelor programs thanks to the three-cycle degree structure of the Bologna Directive (European Education and Culture Executive Agency Eurydice, 2018). We also observed more consistency in nurse education programs among European countries than among non-European countries, which may also be due to this directive.

We found that master's degrees award various titles. The problem of different nursing titles within the same scope of practice (such as advanced specialist practice) has been addressed in previous research (Leary et al., 2017). The United States recognizes 11 different master's titles in nursing, which is by far the most of all countries. However, although master's programs in nursing are rapidly expanding in some countries (CALOHEE Project, 2018), career development opportunities are still poor for nurses in many countries. An innovative approach is needed to educate nurses, such as educating nurse engineers to respond to new technology interfaces and improve patient care (Glasgow et al., 2018).

These variations in nurse education suggest that two nurses with the same title may not be able to fulfill the same role (Drennan & Ross, 2019; World Health Organization, 2020a). Differences in the education needed to become a registered nurse have been well described and pose a big challenge for the pursuit of uniformity in nursing (Drennan & Ross, 2019; Kunaviktikul & Turale, 2020; Stievano et al., 2019). The lack of consistency in nurses' titles makes it difficult for the

public and employers to understand the nurse's role. It can also undermine confidence in the profession, which could in turn undermine safety (Leary et al., 2017). Internationally standardized definitions are needed to determine who a nurse is, understand nursing roles, and optimize nurses' contributions to healthcare (World Health Organization, 2020a). Standardizing educational pathways could facilitate international migration (Baker et al., 2021), helping nurses to find better salaries, healthier work environments, and more opportunities for professional development (Terhaar et al., 2016; World Health Organization, 2020a). The scarcity of nurses – emphasized by the COVID-19 pandemic – has provided a further impetus to initiatives for nurse migration (Glasgow et al., 2018). This has advantages for some and disadvantages for others; healthcare systems in high-income countries rely on foreign-trained nurses while those in other countries are losing nurses because of inadequate policies and investments in the nursing profession (Aiken et al., 2004; Stievano et al., 2019). The WHO recommends investing in professional development opportunities to retain nurses (Terhaar et al., 2016; World Health Organization, 2020a). In addition, nurses may lose their skills after moving to another country if they are not able to work at their qualification level because of different standards and job definitions (Maier et al., 2017). Standardization would reduce this risk and optimize the use of nurse competencies.

Standardizing and improving nurse education may also increase nurses' participation in shaping healthcare policies and healthcare organization. The degree to which nurses are involved in shaping healthcare policy and organization is linked to their education level. However, nurses currently make limited contributions to policymaking (Dyson, 2018). Strong nurse leadership and governance are needed to develop the nursing profession, improve the health and wellbeing of other nurses (World Health Organization, 2020a), and optimize staff and patient outcomes (Cummings et al., 2018).

Efforts have been made to standardize nurse education, but these efforts are not sufficient to meet the many challenges of creating uniformity in nurse education. For global standardization of nurse education, policymakers need to consider the similarities and differences between countries when developing or adjusting nursing programs. Policymakers from different countries should work together to exchange best practices and to develop common strategies from an international perspective (Stievano et al., 2019). This will increase the quality of education (World Health Organization, 2021), which will in turn improve patient care, development opportunities for nurses, and nurse involvement in strategic leadership.

### Study limitations

Although this study was set up systematically, there are some limitations that warrant consideration. It was difficult to consider the many global changes and developments, such as the United Kingdom leaving the EU (Ford, 2021). Characteristics were described in as much detail as possible, but other features of educational pathways, such as the content of curricula, could have contributed to the outcomes. However, these features were beyond the scope of this review. Only full-time study programs were included in this review. We are aware that various nurse education programs are not included in this study, such as part-time programs. However, these could not be included because of the vast amount of variation. The terminology used in nursing titles was extremely variable. For example, records did not always distinguish between 'nurse' and 'registered nurse.' Therefore, caution should be taken when interpreting the results.

### Conclusion

Despite different initiatives for the standardization and improvement of nurse education, incongruities still exist in nurse education programs worldwide. This means that nurses with the same job title may not have the same level of education and may not be able to fulfill the same role. This lack of consistency in educational pathways and titles may complicate the understanding of nursing roles and the position of nurses in healthcare, which may in turn affect patient safety. High-quality nurse education for both under- and postgraduate programs is essential to help the healthcare system face challenges such as labor market issues and the increasing use of technology. The results of this study may help nurses and policymakers to improve and standardize nurse education.

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## Supplementary file 1 | Search strategy

### Pubmed

((education, nursing[MeSH Terms]) OR (nurse education[Title])) OR (nursing education[Title]) AND (((((((((((((((nursing education[Title/Abstract]) OR (diploma[Title/Abstract]) OR (degree[Title/Abstract]) OR (graduate[Title/Abstract]) OR (career[Title/Abstract]) OR (baccalaureate[Title/Abstract]) OR (vocational[Title/Abstract]) OR (associate\*[Title/Abstract]) OR (license[Title/Abstract]) OR (master[Title/Abstract]) OR (doctoral[Title/Abstract]) OR (curriculum[Title/Abstract]) OR (system[Title/Abstract]) OR (mobility[Title/Abstract]))

Filters: from 2016-2020

### Cinahl

( (MM "Education, Nursing") OR (MM "Education, Nursing, Associate") OR (MM "Education, Nursing, Baccalaureate+") OR (MM "Education, Nursing, Graduate+") ) OR TI nurse education OR TI nursing education AND TI ( ("nursing education" OR "diploma" OR "degree" OR "graduate" OR "career" OR "baccalaureate" OR "vocational" OR "associate\*" OR "license" OR "master\*" OR "doctoral" OR "curriculum" OR "system" OR "mobility" ) ) OR AB ( ("nursing education" OR "diploma" OR "degree" OR "graduate" OR "career" OR "baccalaureate" OR "vocational" OR "associate\*" OR "license" OR "master\*" OR "doctor\*" OR "curriculum" OR "system" OR "mobility" ) )

Limiters: Published Date: 20160101-20201231

### ERIC

nursing education/ or nurse education.ti. or nursing education.ti.  
limit 2 to yr="2016-2020

Supplementary file 2 | Data extraction and chart

Undergraduate

Country	Nursing title	Duration in years	Degree	Study load hours	ECTS	Practice hours	Qualification	References
Australia	Enrolled nurse					400	AQF 5	<a href="#">Australian Nursing and Midwifery Accreditation Council. (2017). Enrolled nurse accreditation standards 2017. annmac.org.au/sites/default/files/2024-06/ANMAC_EN_Standards_web.pdf</a>
Australia	Registered nurse		Bachelor			800	AQF 7	<a href="#">Australian Nursing and Midwifery Accreditation Council. (2019). Registered nurse accreditation standards 2019. annmac.org.au/sites/default/files/2024-06/06920_annmac_reg_nurse_std_ee_2019_updated_fa.pdf</a>
Australia	Nurse	3	Bachelor			800		<a href="#">Christiansen, A., Jacob, E., &amp; Twigg, D. (2018). Is it time to consider a four-year nursing bachelor degree in Australia? A discussion paper. Collegium, 25(5), 567-571. doi.org/10.1016/j.colegn.2018.01.004</a>
Australia			Bachelor					<a href="#">Hallinan, C. M., &amp; Hegarty, K. L. (2016). Advanced training for primary care and general practice nurses: Enablers and outcomes of postgraduate education. Australian Journal of Primary Health, 22(2), 113-122. doi.org/10.1071/psy.14072</a>
Australia	RN	3						<a href="#">National Council of State Boards of Nursing. (2020). A global profile of nursing regulation, education, and practice. Journal of Nursing Regulation. doi.org/10.1016/S2155-8256(20)30039-9</a>
Australia	Enrolled nurse	1.5						<a href="#">National Council of State Boards of Nursing. (2020). A global profile of nursing regulation, education, and practice. Journal of Nursing Regulation. doi.org/10.1016/S2155-8256(20)30039-9</a>
Australia	Enrolled nurse	1.5						<a href="#">National Council of State Boards of Nursing. (2022). Global regulatory atlas. regulatoryatlas.com</a>
Australia	Registered nurse		Bachelor of Nursing degree					<a href="#">Reeves, J. (2020). Professional: Nursing education under review. Australian Nursing and Midwifery Journal, 26(9), 28.</a>
Australia	Enrolled nurse		Diploma of nursing					<a href="#">Reeves, J. (2020). Professional: Nursing education under review. Australian Nursing and Midwifery Journal, 26(9), 28.</a>
Australia	Enrolled nurse (EN) entrylevel		Diploma				AQF 5	<a href="#">Schwartz, S. (2019). Educating the nurse of the future: Report of the Independent Review of Nursing Education. www.health.gov.au/sites/default/files/documents/2019/12/educating-the-nurse-of-the-future.pdf</a>
Australia	EN with additional education		Advanced diploma				AQF 6	<a href="#">Schwartz, S. (2019). Educating the nurse of the future: Report of the Independent Review of Nursing Education. www.health.gov.au/sites/default/files/documents/2019/12/educating-the-nurse-of-the-future.pdf</a>
Australia	RN entry level	3	Bachelor				AQF 7	<a href="#">Schwartz, S. (2019). Educating the nurse of the future: Report of the Independent Review of Nursing Education. www.health.gov.au/sites/default/files/documents/2019/12/educating-the-nurse-of-the-future.pdf</a>
Australia	RN with additional education		Honours degree, graduate diploma, graduate certificate				AQF 8	<a href="#">Schwartz, S. (2019). Educating the nurse of the future: Report of the Independent Review of Nursing Education. www.health.gov.au/sites/default/files/documents/2019/12/educating-the-nurse-of-the-future.pdf</a>
Austria	Nurse	3	Bachelor	4600				<a href="#">OeAD - Agency for Education and Internationalisation. (2020). Schools for health care and nursing. Retrieved April 8, 2021, from www.bildungssystem.at/en/health-professions/school-of-nursing</a>
Austria	General nurse	3	Bachelor					<a href="#">Bachner, F., Bobek, J., Habimana, K., Ladumer, J., Lepuschütz, L., Ostermann, H., Rainer, J., Schmidt, A. E., Zuba, M., Quentin, W., &amp; Winkelmann, J. (2018). Austria: Health system review. Health Systems in Transition, 20(3). eurohealthobservatory.who.int/publications/i/austria-health-system-review-2018</a>
Austria	Second Level assistant nurse	2						<a href="#">Bachner, F., Bobek, J., Habimana, K., Ladumer, J., Lepuschütz, L., Ostermann, H., Rainer, J., Schmidt, A. E., Zuba, M., Quentin, W., &amp; Winkelmann, J. (2018). Austria: Health system review. Health Systems in Transition, 20(3). eurohealthobservatory.who.int/publications/i/austria-health-system-review-2018</a>
Austria	First level assistant nurse	1						<a href="#">Bachner, F., Bobek, J., Habimana, K., Ladumer, J., Lepuschütz, L., Ostermann, H., Rainer, J., Schmidt, A. E., Zuba, M., Quentin, W., &amp; Winkelmann, J. (2018). Austria: Health system review. Health Systems in Transition, 20(3). eurohealthobservatory.who.int/publications/i/austria-health-system-review-2018</a>
Austria	Care assistant	1		1600				<a href="#">Eurodiaconia. (2016). The education, training, and qualifications of nursing and care assistants across Europe. www.eurodiaconia.org/wordpress/wp-content/uploads/2016/08/The-education-training-and-qualifications-of-nursing-and-care-assistants-across-Europe-Final.pdf</a>
Austria	Registered nurse			4600				<a href="#">Glarcher, M., &amp; Lex, K. M. (2020). Advanced nursing practice in Austria under consideration of outcome measurement. Zeitschrift für Evidenz, Fortbildung und Qualität im Gesundheitswesen, 135, 11-16. doi.org/10.1016/j.zefq.2020.06.012</a>
Austria	Nurse	3						<a href="#">National Council of State Boards of Nursing. (2020). A global profile of nursing regulation, education, and practice. Journal of Nursing Regulation. doi.org/10.1016/S2155-8256(20)30039-9</a>
Austria	Nurse	3		4600				<a href="#">National Council of State Boards of Nursing. (2022). Global regulatory atlas. regulatoryatlas.com</a>
Belgium		3-3.5	Diploma				EQF 5	<a href="#">Bruyneel, L., van den Heede, K., &amp; Sermeus, W. (2019). Belgium. In A. Rafferty, R. Busse, B. Zander-Jentsch, W. Sermeus, &amp; L. Bruyneel (Eds.), Strengthening health systems through nursing: Evidence from 14 European countries. European Observatory on Health Systems and Policies.</a>

Belgium	4	Bachelor	4600	EQF 6	Bruyneel, L., van den Heede, K., & Sermeus, W. (2019). Belgium. In A. Rafferty, R. Busse, B. Zander-Jentsch, W. Sermeus, & L. Bruyneel (Eds.), <i>Strengthening health systems through nursing: Evidence from 14 European countries</i> . European Observatory on Health Systems and Policies.
Belgium	1	Vocational			Eurodiaconia. (2016). <i>The education, training, and qualifications of nursing and care assistants across Europe</i> . www.eurodiaconia.org/wordpress/wp-content/uploads/2016/08/The-education-training-and-qualifications-of-nursing-and-care-assistants-acro
Belgium	4	Bachelor	4600	2300	Gerkens S, Merkur S. Belgium. Health system review. <i>Health Systems in Transition</i> . 2020;22(5). eurohealthobservatory.who.int/publications/i/belgium-health-system-review-2020
Belgium	3	Diploma			Gerkens S, Merkur S. Belgium. Health system review. <i>Health Systems in Transition</i> . 2020;22(5). eurohealthobservatory.who.int/publications/i/belgium-health-system-review-2020
Belgium	2	Nurse assistant			Gerkens S, Merkur S. Belgium. Health system review. <i>Health Systems in Transition</i> . 2020;22(5). eurohealthobservatory.who.int/publications/i/belgium-health-system-review-2020
Belgium	4	General care nurse			National Council of State Boards of Nursing. (2020). A global profile of nursing regulation, education, and practice. <i>Journal of Nursing Regulation</i> . doi.org/10.1016/S2155-8256(20)30039-9
Belgium	4	Nurse/general care nurse	minimum 4600		National Council of State Boards of Nursing. (2022). <i>Global regulatory atlas</i> . regulatoryatlas.com
Canada	4	Registered nurse			American Association of Colleges of Nursing. (2019). <i>Fact sheet: The impact of education on nursing practice</i> . www.aacnursing.org/Portals/42/News/Factsheets/Education-Impact-Fact-Sheet.pdf
Canada	2	Diploma			Christiansen, A., Jacob, E., & Twigg, D. (2018). Is it time to consider a four-year nursing bachelor degree in Australia? A discussion paper. <i>Collegian</i> , 25(5), 567-571. doi.org/10.1016/j.colegn.2018.01.004
Canada	4	Bachelor			Christiansen, A., Jacob, E., & Twigg, D. (2018). Is it time to consider a four-year nursing bachelor degree in Australia? A discussion paper. <i>Collegian</i> , 25(5), 567-571. doi.org/10.1016/j.colegn.2018.01.004
Canada	RN		1125 hours over 5 years (p.26)		National Council of State Boards of Nursing. (2020). A global profile of nursing regulation, education, and practice. <i>Journal of Nursing Regulation</i> . doi.org/10.1016/S2155-8256(20)30039-9

Canada	Licensed practical nurse				National Council of State Boards of Nursing. (2020). A global profile of nursing regulation, education, and practice. <i>Journal of Nursing Regulation</i> . doi.org/10.1016/S2155-8256(20)30039-9
Canada	Registered psychiatric nurse				National Council of State Boards of Nursing. (2020). A global profile of nursing regulation, education, and practice. <i>Journal of Nursing Regulation</i> . doi.org/10.1016/S2155-8256(20)30039-9
Canada	Licensed practical nurse				National Council of State Boards of Nursing. (2022). <i>Global regulatory atlas</i> . regulatoryatlas.com
Canada	RN				National Council of State Boards of Nursing. (2022). <i>Global regulatory atlas</i> . regulatoryatlas.com
Canada	Registered nurse	Bachelor			National Council of State Boards of Nursing. (2022). <i>Global regulatory atlas</i> . regulatoryatlas.com
Chile	Nurse	Licenciado/Bachelor's degree			Ayala, R. A., Koch, T. F., & Messing, H. B. (2019). The system of nursing in Chile: Insights from a systems theory perspective. <i>Nursing Inquiry</i> , 26(1), e12260. doi.org/10.1111/nin.12260
Chile	Nursing assistant				National Council of State Boards of Nursing. (2020). A global profile of nursing regulation, education, and practice. <i>Journal of Nursing Regulation</i> . doi.org/10.1016/S2155-8256(20)30039-9
Chile	Nurse				National Council of State Boards of Nursing. (2020). A global profile of nursing regulation, education, and practice. <i>Journal of Nursing Regulation</i> . doi.org/10.1016/S2155-8256(20)30039-9
Chile	Nurse		5 on average, varies by region/municipality		National Council of State Boards of Nursing. (2022). <i>Global regulatory atlas</i> . regulatoryatlas.com
Colombia	Nurse	Bachelor			International Qualifications Assessment Service. (2016). <i>International education guide for the assessment of education from the Republic of Colombia</i> . open.alberta.ca/dataset/1784e4a0-9a49-47df-b976-ebb6323e4fe7/resource/38835ace-eb3f-45ca-ba06-121b9685a8c1/download/1br-iqas-colombia-international-education-guide-2016-12.pdf
Colombia	Nurse Assistant	Technical/vocational	1600-1800	60%	International Qualifications Assessment Service. (2016). <i>International education guide for the assessment of education from the Republic of Colombia</i> . open.alberta.ca/dataset/1784e4a0-9a49-47df-b976-ebb6323e4fe7/resource/38835ace-eb3f-45ca-ba06-121b9685a8c1/download/1br-iqas-colombia-international-education-guide-2016-12.pdf

Colombia	Auxiliary nurse					National Council of State Boards of Nursing. (2020). A global profile of nursing regulation, education, and practice. <i>Journal of Nursing Regulation</i> . doi.org/10.1016/S2155-8256(20)30039-9
Colombia	Undergraduate nurse/RN					National Council of State Boards of Nursing. (2020). A global profile of nursing regulation, education, and practice. <i>Journal of Nursing Regulation</i> . doi.org/10.1016/S2155-8256(20)30039-9
Colombia	Undergraduate nurse (RN)					National Council of State Boards of Nursing. (2022 <sup>1</sup> ). <i>Global regulatory atlas</i> . regulatoryatlas.com
Costa Rica	Auxiliary nurse					National Council of State Boards of Nursing. (2020). A global profile of nursing regulation, education, and practice. <i>Journal of Nursing Regulation</i> . doi.org/10.1016/S2155-8256(20)30039-9
Costa Rica	Nurse					National Council of State Boards of Nursing. (2020). A global profile of nursing regulation, education, and practice. <i>Journal of Nursing Regulation</i> . doi.org/10.1016/S2155-8256(20)30039-9
Costa Rica	Auxiliary nurse					National Council of State Boards of Nursing. (2022 <sup>1</sup> ). <i>Global regulatory atlas</i> . regulatoryatlas.com
Costa Rica	Nurse					National Council of State Boards of Nursing. (2022 <sup>1</sup> ). <i>Global regulatory atlas</i> . regulatoryatlas.com
Czech Republic	General nurse	3	Bachelor			Maresova, P., Prochazka, M., Baraković, S., Baraković Husić, J., & Kuca, K. (2020). A shortage in the number of nurses: A case study from a selected region in the Czech Republic and international context. <i>Healthcare</i> , 8(2), 152. www.mdpi.com/2227-9932/8/2/152
Czech Republic	General nurse					National Council of State Boards of Nursing. (2020). A global profile of nursing regulation, education, and practice. <i>Journal of Nursing Regulation</i> . doi.org/10.1016/S2155-8256(20)30039-9
Czech Republic	General nurse					National Council of State Boards of Nursing. (2022 <sup>1</sup> ). <i>Global regulatory atlas</i> . regulatoryatlas.com
Denmark	Social health care assistant	8 months		EQF 3		Eurodiaconia. (2016). <i>The education, training, and qualifications of nursing and care assistants across Europe</i> . www.eurodiaconia.org/wordpress/wp-content/uploads/2016/08/The-education-training-and-qualifications-of-nursing-and-care-assistants-across-Europe-Final.pdf
Denmark	Nurse	3.5-4				National Council of State Boards of Nursing. (2020). A global profile of nursing regulation, education, and practice. <i>Journal of Nursing Regulation</i> . doi.org/10.1016/S2155-8256(20)30039-9
Denmark	Registered nurse	3.5-4				National Council of State Boards of Nursing. (2022 <sup>1</sup> ). <i>Global regulatory atlas</i> . regulatoryatlas.com

Estonia	Registered nurse				50%	5800		Ermitis, Ü., Puusepp, K., Kont, K., & Tulva, T. (2019). Development of Estonian nursing profession and nurses' training: Historical, political, and social perspectives. <i>Professional Studies: Theory and Practice</i> , 5(20), 9-27.
Estonia	Nurse	3.5-4.5			40-50%			Habicht, T., Reinap, M., Kasekamp, K., Sikkut, R., Aaben, L., & Van Ginneken, E. (2018). Estonia: Health system review. <i>Health Systems in Transition</i> , 20. euro-observatory.who.int/publications/i/estonia-health-system-review-2018
Estonia	Registered nurse	3.5						National Council of State Boards of Nursing. (2020). A global profile of nursing regulation, education, and practice. <i>Journal of Nursing Regulation</i> . doi.org/10.1016/S2155-8256(20)30039-9
Estonia	Registered nurse							National Council of State Boards of Nursing. (2022 <sup>1</sup> ). <i>Global regulatory atlas</i> . regulatoryatlas.com
Finland	Qualified nurse - UAS	3.5				210		Ennio, A., Lammintakanen, J., Härkönen, M., & Kimmunen, J. (2019). Finland. In A. Rafferty, R. Busse, B. Zander-Jentsch, W. Sermeus, & L. Bruyneel (Eds.), <i>Strengthening health systems through nursing: Evidence from 14 European countries</i> . European Observatory on Health Systems and Policies.
Finland	Practical nurse		Vocational			180 ECTS credits, including 50 ECTS credits training		Ennio, A., Lammintakanen, J., Härkönen, M., & Kimmunen, J. (2019). Finland. In A. Rafferty, R. Busse, B. Zander-Jentsch, W. Sermeus, & L. Bruyneel (Eds.), <i>Strengthening health systems through nursing: Evidence from 14 European countries</i> . European Observatory on Health Systems and Policies.
Finland	Licensed practical nurse	3	Vocational					Eurodiaconia. (2016). <i>The education, training, and qualifications of nursing and care assistants across Europe</i> . www.eurodiaconia.org/wordpress/wp-content/uploads/2016/08/The-education-training-and-qualifications-of-nursing-and-care-assistants-across-Europe-Final.pdf
Finland	Registered nurse	3.5-4				210		Finnish Nurse Association. (2021). <i>Nurse education in Finland</i> . www.nurses.fi/nursing_and_nurse_education_in_finnish_nurse_education_in_finland/
Finland	General nurse	3-4.5						Keskimäki, I., Tynkynen, L., Reissell, E., Koivusalo, M., Syrjä, V., Vuorenkoski, L., Rechel, B., & Karanikolos, M. (2019). <i>Finland: Health system review. Health Systems in Transition</i> , 21(2). eurohealthobservatory.who.int/publications/i/finland-health-system-review-2019
Finland	Nurse	3.5						National Council of State Boards of Nursing. (2020). A global profile of nursing regulation, education, and practice. <i>Journal of Nursing Regulation</i> . doi.org/10.1016/S2155-8256(20)30039-9
Finland	Nurse							National Council of State Boards of Nursing. (2022a). <i>Global regulatory atlas</i> . regulatoryatlas.com



Finland	Practical nurse	3	Vocational		Salminen, L., Koskinen, S., Heikkilä, A., Strandell-Laire, C., Heavisto, E., & Leino-Kilpi, H. (2019). Nursing education and nurse education research in Finland. In T. B. Hafsteinsdóttir, H. Jónsdóttir, M. Kirkevold, H. Leino-Kilpi, K. Lomborg, & I. Rahm Hallberg (Eds.), <i>Leadership in nursing: Experiences from the European Nordic countries</i> (pp. 99-114). Springer International Publishing. doi.org/10.1007/978-3-030-10964-6_8
Finland	RN	3.5	Bachelor	210 ECTS including 90 ECTS clinical studies	Salminen, L., Koskinen, S., Heikkilä, A., Strandell-Laire, C., Heavisto, E., & Leino-Kilpi, H. (2019). Nursing education and nurse education research in Finland. In T. B. Hafsteinsdóttir, H. Jónsdóttir, M. Kirkevold, H. Leino-Kilpi, K. Lomborg, & I. Rahm Hallberg (Eds.), <i>Leadership in nursing: Experiences from the European Nordic countries</i> (pp. 99-114). Springer International Publishing. doi.org/10.1007/978-3-030-10964-6_8
France	Health care assistant	8 months-1 year			Eurodiaconia (2016). <i>The education, training, and qualifications of nursing and care assistants across Europe</i> . www.eurodiaconia.org/wordpress/wp-content/uploads/2016/08/The-education-training-and-qualifications-of-nursing-and-care-assistants-across-Europe-Final.pdf
France	Nurse	3			National Council of State Boards of Nursing. (2020). A global profile of nursing regulation, education, and practice. Journal of Nursing Regulation. doi.org/10.1016/S2155-8256(20)30039-9
France	Nurse				National Council of State Boards of Nursing (2022a). <i>Global regulatory atlas</i> . regulatoryatlas.com
France	Registered nurse	3			OECD (2016 <sup>b</sup> ). <i>Trends in nursing education in France</i> (Health workforce policies in OECD countries). www.oecd.org/france/OECD-Health-Workforce-Policies-2016-Nurses-France.pdf
Germany	Health care assistant	1-2			Eurodiaconia (2016). <i>The education, training, and qualifications of nursing and care assistants across Europe</i> . www.eurodiaconia.org/wordpress/wp-content/uploads/2016/08/The-education-training-and-qualifications-of-nursing-and-care-assistants-across-Europe-Final.pdf
Germany	Nurse	3			National Council of State Boards of Nursing. (2020). A global profile of nursing regulation, education, and practice. <i>Journal of Nursing Regulation</i> . doi.org/10.1016/S2155-8256(20)30039-9
Germany	Nurse	3			National Council of State Boards of Nursing. (2022a). <i>Global regulatory atlas</i> . regulatoryatlas.com
Germany	Second level nurse	1	Vocational		OECD. (2016 <sup>b</sup> ). <i>Trends in nursing education in Germany</i> (Health workforce policies in OECD countries). www.oecd.org/health/OECD-Health-Workforce-Policies-2016-Nurses-Germany.pdf

Germany	First level nurse	3	Vocational		OECD. (2016 <sup>b</sup> ). <i>Trends in nursing education in Germany</i> (Health workforce policies in OECD countries). www.oecd.org/health/OECD-Health-Workforce-Policies-2016-Nurses-Germany.pdf
Germany	Nurse	3		4600	Zander-Jentsch, B., Wagner, F., Rzyayeva, N., & Busse, R. (2019). Germany. In A. Rafferty, R. Busse, B. Zander-Jentsch, W. Sermeus, & L. Bruyneel (Eds.), <i>Strengthening health systems through nursing: Evidence from 14 European countries</i> . European Observatory on Health Systems and Policies.
Germany	Nurse Assistant	1		1600	Zander-Jentsch, B., Wagner, F., Rzyayeva, N., & Busse, R. (2019). Germany. In A. Rafferty, R. Busse, B. Zander-Jentsch, W. Sermeus, & L. Bruyneel (Eds.), <i>Strengthening health systems through nursing: Evidence from 14 European countries</i> . European Observatory on Health Systems and Policies.
Germany	Nurse	3		4600	Ziegler, J. (2018). Coveted qualifications: How to become a nurse. Retrieved December 4, 2021, from www.deutschland.de/en/topic/life/training-as-a-nurse-in-germany-duties-and-salary
Greece	Registered nurse	4			American Association of Colleges of Nursing (2019). <i>Fact sheet: The impact of education on nursing practice</i> . www.aacnursing.org/Portals/42/News/Factsheets/Education-Impact-Fact-Sheet.pdf
Greece		4	Bachelor		Christiansen, A., Jacob, E., & Twigg, D. (2018). Is it time to consider a four-year nursing bachelor degree in Australia? A discussion paper. <i>Collegian</i> , 25(5), 567-571. doi.org/10.1016/j.colegn.2018.01.004
Greece	Nurse	4			Economou, C., Kaitelidou, D., Karanikolos, M., & Marengo, A. (2017). Greece: Health system review. <i>Health Systems in Transition</i> , 21(4). iris.who.int/handle/10665/1330204
Greece	Nurse	4			National Council of State Boards of Nursing. (2020). A global profile of nursing regulation, education, and practice. <i>Journal of Nursing Regulation</i> . doi.org/10.1016/S2155-8256(20)30039-9
Greece	Nurse assistant	2			National Council of State Boards of Nursing. (2020). A global profile of nursing regulation, education, and practice. <i>Journal of Nursing Regulation</i> . doi.org/10.1016/S2155-8256(20)30039-9
Greece	Nurse (rn)	4			National Council of State Boards of Nursing. (2022). <i>Global regulatory atlas</i> . regulatoryatlas.com
Greece	Nurse assistant	2			National Council of State Boards of Nursing. (2022). <i>Global regulatory atlas</i> . regulatoryatlas.com
Greece	Graduate nurse				National Council of State Boards of Nursing. (2022). <i>Global regulatory atlas</i> . regulatoryatlas.com

Greece	Nurse	4	6720	240	Zikos, D., Diomidous, M., Mantas, J., Kaitelidou, D., & Karamikolos, M. (2019). Greece. In A. Rafferty, R. Busse, B. Zander-Jentsch, W. Sermeus, & L. Bruyneel (Eds.), <i>Strengthening health systems through nursing: Evidence from 14 European countries</i> . European Observatory on Health Systems and Policies.
Hungary	Nurse	4	Bachelor		Betlehem, J., Pek, E., Banfai, B., & Olah, A. (2017). Current characteristics of the Hungarian nurses' workforce. In <i>IntechOpen</i> . doi.org/10.5772/intechopen.68383
Hungary	Nursing assistant	2	Secondary education		Betlehem, J., Pek, E., Banfai, B., & Olah, A. (2017). Current characteristics of the Hungarian nurses' workforce. In <i>IntechOpen</i> . doi.org/10.5772/intechopen.68383
Hungary	General nurse	3			National Council of State Boards of Nursing. (2020). A global profile of nursing regulation, education, and practice. <i>Journal of Nursing Regulation</i> . doi.org/10.1016/S2155-8256(20)30039-9
Hungary	Bachelor of nursing	4			National Council of State Boards of Nursing. (2020). A global profile of nursing regulation, education, and practice. <i>Journal of Nursing Regulation</i> . doi.org/10.1016/S2155-8256(20)30039-9
Hungary	Graduate nurse				National Council of State Boards of Nursing. (2020). A global profile of nursing regulation, education, and practice. <i>Journal of Nursing Regulation</i> . doi.org/10.1016/S2155-8256(20)30039-9
Hungary	General nurse	3	4600		National Council of State Boards of Nursing. (2022*). <i>Global regulatory atlas</i> . regulatoryatlas.com
Hungary	Bachelor of nursing	4			National Council of State Boards of Nursing. (2022*). Global regulatory atlas. regulatoryatlas.com
Hungary	General nurse	3	4600		National Council of State Boards of Nursing. (2022*). Global regulatory atlas. regulatoryatlas.com
Iceland	Registered nurse	4			American Association of Colleges of Nursing. (2019). <i>Fact sheet: The impact of education on nursing practice</i> . www.aacnursing.org/Portals/42/News/Factsheets/Education-Impact-Fact-Sheet.pdf
Iceland		4	Bachelor		Christiansen, A., Jacob, E., & Twigg, D. (2018). Is it time to consider a four-year nursing bachelor degree in Australia? A discussion paper. <i>Collegian</i> , 25(5), 567-571. doi.org/10.1016/j.colegn.2018.01.004
Iceland	Nurse	4			National Council of State Boards of Nursing. (2020). A global profile of nursing regulation, education, and practice. <i>Journal of Nursing Regulation</i> . doi.org/10.1016/S2155-8256(20)30039-9
Iceland	Specialist nurse				National Council of State Boards of Nursing. (2020). A global profile of nursing regulation, education, and practice. <i>Journal of Nursing Regulation</i> . doi.org/10.1016/S2155-8256(20)30039-9
Iceland	Nurse	4			National Council of State Boards of Nursing. (2022*). <i>Global regulatory atlas</i> . regulatoryatlas.com

Iceland	BSc in Nursing (Vanaf 1987)	4	Bachelor	240	Sveinsdóttir, H., Gunnarsdóttir, T., & Björnsdóttir, K. (2019). Towards the future: The education of nurses in Iceland reconsidered. In T. B. Hafsteinsdóttir (Ed.), <i>Leadership in nursing: Experiences from the European Nordic countries</i> (pp. 161-175). doi.org/10.1007/978-3-030-10964-6_12
Ireland		4	Bachelor		Christiansen, A., Jacob, E., & Twigg, D. (2018). Is it time to consider a four-year nursing bachelor degree in Australia? A discussion paper. <i>Collegian</i> , 25(5), 567-571. doi.org/10.1016/j.colegn.2018.01.004
Ireland	General nurse	4.5	EQF 6		Morris, R., Matthews, A., & Scott, A. (2019). Ireland. In A. Rafferty, R. Busse, B. Zander-Jentsch, W. Sermeus, & L. Bruyneel (Eds.), <i>Strengthening health systems through nursing: Evidence from 14 European countries</i> . European Observatory on Health Systems and Policies.
Ireland	General nurse	4			National Council of State Boards of Nursing. (2020). A global profile of nursing regulation, education, and practice. <i>Journal of Nursing Regulation</i> . doi.org/10.1016/S2155-8256(20)30039-9
Ireland	General nurse	4			National Council of State Boards of Nursing. (2022*). Global regulatory atlas. regulatoryatlas.com
Ireland				4600	Nursing and Midwifery Board of Ireland. (2020). Nurse and midwife education: Standards and requirements.
Israel		4	Bachelor		Christiansen, A., Jacob, E., & Twigg, D. (2018). Is it time to consider a four-year nursing bachelor degree in Australia? A discussion paper. <i>Collegian</i> , 25(5), 567-571. doi.org/10.1016/j.colegn.2018.01.004
Israel	RN (Academic)	4			National Council of State Boards of Nursing. (2020). A global profile of nursing regulation, education, and practice. <i>Journal of Nursing Regulation</i> . doi.org/10.1016/S2155-8256(20)30039-9
Israel	RN (Diploma)	2.5			National Council of State Boards of Nursing. (2020). A global profile of nursing regulation, education, and practice. <i>Journal of Nursing Regulation</i> . doi.org/10.1016/S2155-8256(20)30039-9
Israel	Practical nurse	1			National Council of State Boards of Nursing. (2022*). <i>Global regulatory atlas</i> . regulatoryatlas.com
Italy	Auxiliary staff	1	Vocational	1000	Eurodiaconia (2016). <i>The education, training, and qualifications of nursing and care assistants across Europe</i> . www.eurodiaconia.org/wordpress/wp-content/uploads/2016/08/The-education-training-and-qualifications-of-nursing-and-care-assistants-across-Europe-Final.pdf
Italy	RN - general	3			National Council of State Boards of Nursing. (2020). A global profile of nursing regulation, education, and practice. <i>Journal of Nursing Regulation</i> . doi.org/10.1016/S2155-8256(20)30039-9

Italy	Registered nurse				National Council of State Boards of Nursing. (2022). <i>Global regulatory atlas</i> . <a href="http://regulatoryatlas.com">regulatoryatlas.com</a>
Italy	Registered nurse	3	Bachelor		OECD (2016). <i>Trends in nursing education in Italy</i> (Health workforce policies in OECD countries). <a href="http://www.oecd.org/health/OECD-Health-Workforce-Policies-2016-Nurses-Italy.pdf">www.oecd.org/health/OECD-Health-Workforce-Policies-2016-Nurses-Italy.pdf</a>
Japan	Nurse	4			Japan Association of Nursing Programs in Universities. (n.d.). <i>Scheme of taking a certification course after graduation of high school</i> . Retrieved April 12, 2021, from <a href="http://www.janpu.or.jp/en/learn/">www.janpu.or.jp/en/learn/</a>
Japan	Nurse	3			Japan Association of Nursing Programs in Universities. (n.d.). <i>Scheme of taking a certification course after graduation of high school</i> . Retrieved April 12, 2021, from <a href="http://www.janpu.or.jp/en/learn/">www.janpu.or.jp/en/learn/</a>
Korea	Registered nurse	4			American Association of Colleges of Nursing. (2019). <i>Fact sheet: The impact of education on nursing practice</i> . <a href="http://www.aacnursing.org/Portals/42/News/Factsheets/Education-Impact-Fact-Sheet.pdf">www.aacnursing.org/Portals/42/News/Factsheets/Education-Impact-Fact-Sheet.pdf</a>
Korea		4	University	140 credits	Inatomi, K., & Nomura, S. (2016). Nursing education in Korea: A comparison with nursing education in Japan and the United States. <i>Junendo Medical Journal</i> , 62, 406-411.
Korea	Assistant nurse				National Council of State Boards of Nursing. (2020). A global profile of nursing regulation, education, and practice. <i>Journal of Nursing Regulation</i> . doi.org/10.1016/S2155-8256(20)30039-9
Korea	Nurse	3-4			National Council of State Boards of Nursing. (2020). A global profile of nursing regulation, education, and practice. <i>Journal of Nursing Regulation</i> . doi.org/10.1016/S2155-8256(20)30039-9
Korea	Assistant nurse				National Council of State Boards of Nursing. (2022). <i>Global regulatory atlas</i> . <a href="http://regulatoryatlas.com">regulatoryatlas.com</a>
Latvia		2.5	Vocational training	at least 1.5y	Behmane, D., Dudele, A., Villerusa, A., Misins, J., Klavina, K., Mozgisis, D., & Scarpetti, G. (2019). Latvia: Health system review. Health Systems in Transition, 21(4). <a href="http://iris.who.int/bitstream/handle/10665/331419/HIT-21-4-2019-eng.pdf">iris.who.int/bitstream/handle/10665/331419/HIT-21-4-2019-eng.pdf</a>
Latvia		4	Bachelor		Behmane, D., Dudele, A., Villerusa, A., Misins, J., Klavina, K., Mozgisis, D., & Scarpetti, G. (2019). Latvia: Health system review. <i>Health Systems in Transition</i> , 21(4). <a href="http://iris.who.int/bitstream/handle/10665/331419/HIT-21-4-2019-eng.pdf">iris.who.int/bitstream/handle/10665/331419/HIT-21-4-2019-eng.pdf</a>
Latvia	Nurse	3-4			National Council of State Boards of Nursing. (2020). A global profile of nursing regulation, education, and practice. <i>Journal of Nursing Regulation</i> . doi.org/10.1016/S2155-8256(20)30039-9
Latvia	Nurse - Nursing school or medical college	3		4600	National Council of State Boards of Nursing. (2022a). <i>Global regulatory atlas</i> . <a href="http://regulatoryatlas.com">regulatoryatlas.com</a>
Latvia		3	First level higher vocational education		World Health Organization. (2020 <sup>b</sup> ). <i>Postgraduate training in Latvia</i> . <a href="http://apps.who.int/iris/bitstream/handle/10665/336238/WHO-EURO-2020-1304-41054-55734-eng.pdf;sequence=1&amp;isAllowed=y">apps.who.int/iris/bitstream/handle/10665/336238/WHO-EURO-2020-1304-41054-55734-eng.pdf;sequence=1&amp;isAllowed=y</a>
Latvia	Assistant nurse	3	Vocational	5040	Latvian Qualifications Database. (2021). <i>Latvian qualifications database</i> . <a href="http://www.latvijaskvalifikacijas.lv/en/">www.latvijaskvalifikacijas.lv/en/</a>
Latvia	Nurse	4	Bachelor	6720	Latvian Qualifications Database. (2021). <i>Latvian qualifications database</i> . <a href="http://www.latvijaskvalifikacijas.lv/en/">www.latvijaskvalifikacijas.lv/en/</a>
Latvia	Nurse	2-3	First level higher education	≥1092	Latvian Qualifications Database. (2021). <i>Latvian qualifications database</i> . <a href="http://www.latvijaskvalifikacijas.lv/en/">www.latvijaskvalifikacijas.lv/en/</a>
Lithuania	Nurse general practitioner	3.5			National Council of State Boards of Nursing. (2020). A global profile of nursing regulation, education, and practice. <i>Journal of Nursing Regulation</i> . doi.org/10.1016/S2155-8256(20)30039-9
Lithuania	Nurse general practitioner	3.5			National Council of State Boards of Nursing. (2022a). <i>Global regulatory atlas</i> . <a href="http://regulatoryatlas.com">regulatoryatlas.com</a>
Lithuania	Nurse	3.5	Professional Bachelor in Nursing	5880	Riklikienė, O., Starkienė, L., & Macijauskienė, J. (2019). Lithuania. In A. Rafferty, R. Busse, B. Zander-Jentsch, W. Sermeus, & L. Bruyneel (Eds.), <i>Strengthening health systems through nursing: Evidence from 14 European countries</i> . European Observatory on Health Systems and Policies.
Lithuania		4	Bachelor in Nursing	6720	Riklikienė, O., Starkienė, L., & Macijauskienė, J. (2019). Lithuania. In A. Rafferty, R. Busse, B. Zander-Jentsch, W. Sermeus, & L. Bruyneel (Eds.), <i>Strengthening health systems through nursing: Evidence from 14 European countries</i> . European Observatory on Health Systems and Policies.
Luxembourg	Nurse	4			National Council of State Boards of Nursing. (2020). A global profile of nursing regulation, education, and practice. <i>Journal of Nursing Regulation</i> . doi.org/10.1016/S2155-8256(20)30039-9
Luxembourg	Nurse (RN)	4		4600	National Council of State Boards of Nursing. (2022). <i>Global regulatory atlas</i> . <a href="http://regulatoryatlas.com">regulatoryatlas.com</a>
Mexico	Technical nurse		High school		Marquez, C., & Arizmendi, E. (2019). Transition of nursing professionalizing in Mexico. <i>International Physical Medicine &amp; Rehabilitation Journal</i> . 4. doi.org/10.15406/ijpmrj.2019.04.00212

Mexico	Graduate nurse	4	Bachelor	Marquez, C., & Arizmendi, E. (2019). Transition of nursing professionalizing in Mexico. <i>International Physical Medicine &amp; Rehabilitation Journal</i> , 4. doi: <a href="https://doi.org/10.15406/jpmrj.2019.04.00212">org/10.15406/jpmrj.2019.04.00212</a>
Mexico	Auxiliary nurse	1.5		National Council of State Boards of Nursing. (2020). A global profile of nursing regulation, education, and practice. <i>Journal of Nursing Regulation</i> . doi.org/10.1016/S2155-8256(20)30039-9
Mexico	Licensed nurse	4 years +1 year social service		National Council of State Boards of Nursing. (2020). A global profile of nursing regulation, education, and practice. <i>Journal of Nursing Regulation</i> . doi.org/10.1016/S2155-8256(20)30039-9
Mexico	General nurse/Nurse technician	3 + 1 year of social service		National Council of State Boards of Nursing. (2020). A global profile of nursing regulation, education, and practice. <i>Journal of Nursing Regulation</i> . doi.org/10.1016/S2155-8256(20)30039-9
Mexico	Auxiliary nurse	1.5		National Council of State Boards of Nursing. (2022 <sup>1</sup> ). <i>Global regulatory atlas</i> . <a href="https://regulatoryatlas.com">regulatoryatlas.com</a>
Netherlands	Nurse			National Council of State Boards of Nursing. (2022 <sup>1</sup> ). <i>Global regulatory atlas</i> . <a href="https://regulatoryatlas.com">regulatoryatlas.com</a>
New Zealand	Rn	3		National Council of State Boards of Nursing. (2020). A global profile of nursing regulation, education, and practice. <i>Journal of Nursing Regulation</i> . doi.org/10.1016/S2155-8256(20)30039-9
New Zealand	Enrolled nurse	1.5		National Council of State Boards of Nursing. (2020). A global profile of nursing regulation, education, and practice. <i>Journal of Nursing Regulation</i> . doi.org/10.1016/S2155-8256(20)30039-9
New Zealand	Registered nurse	3		National Council of State Boards of Nursing. (2022 <sup>1</sup> ). <i>Global regulatory atlas</i> . <a href="https://regulatoryatlas.com">regulatoryatlas.com</a>
Norway	General nurse	3		Stodart, K. (2017). Rejuvenating EN education. <i>Nursing New Zealand</i> , 23(4), 34.
Norway	General nurse	3		National Council of State Boards of Nursing. (2020). A global profile of nursing regulation, education, and practice. <i>Journal of Nursing Regulation</i> . doi.org/10.1016/S2155-8256(20)30039-9
Norway	Auxiliary nurse			National Council of State Boards of Nursing. (2020). A global profile of nursing regulation, education, and practice. <i>Journal of Nursing Regulation</i> . doi.org/10.1016/S2155-8256(20)30039-9
Norway	General nurse	3	Bachelor	National Council of State Boards of Nursing. (2022a). <i>Global regulatory atlas</i> . <a href="https://regulatoryatlas.com">regulatoryatlas.com</a>
Norway	Registered nurse	3	Bachelor	Saunes, I. S., Karanikolos, M., & Sagan, A. (2020). Norway: Health system review. <i>Health Systems in Transition</i> , 22(1). <a href="https://www.who.int/publications/i/item/HIT-22-1-2020">www.who.int/publications/i/item/HIT-22-1-2020</a>

Norway	Licensed practical nurse	4	Vocational	50%	Saunes, I. S., Karanikolos, M., & Sagan, A. (2020). Norway: Health system review. <i>Health Systems in Transition</i> , 22(1). <a href="https://www.who.int/publications/i/item/HIT-22-1-2020">www.who.int/publications/i/item/HIT-22-1-2020</a>
Norway	Registered nurse	3	Bachelor	50%	Sjetne, I. S., Tvedt, C. S., & Ringard, A. (2019). Norway. In A. Rafferty, R. Busse, B. Zander-Jentsch, W. Sermeus, & L. Bruyneel (Eds.), <i>Strengthening health systems through nursing: Evidence from 14 European countries</i> . European Observatory on Health Systems and Policies.
Norway	Practical nurse		Vocational		Sjetne, I. S., Tvedt, C. S., & Ringard, A. (2019). Norway. In A. Rafferty, R. Busse, B. Zander-Jentsch, W. Sermeus, & L. Bruyneel (Eds.), <i>Strengthening health systems through nursing: Evidence from 14 European countries</i> . European Observatory on Health Systems and Policies.
Poland	Health care assistant		Vocational	720	Eurodiaconia. (2016). <i>The education, training, and qualifications of nursing and care assistants across Europe</i> . <a href="https://www.eurodiaconia.org/wordpress/wp-content/uploads/2016/08/The-education-training-and-qualifications-of-nursing-and-care-assistants-across-Europe-Final.pdf">www.eurodiaconia.org/wordpress/wp-content/uploads/2016/08/The-education-training-and-qualifications-of-nursing-and-care-assistants-across-Europe-Final.pdf</a>
Poland	Nurse	3	Bachelor	50%	Kózka, M., Brzostek, T., Ksykiewicz-Dorota, A., Gabrys, G., Kilataska, D., Ogarek, M., Cisek, M., Przewoźniak, L., & Brzycki, P. (2019). Poland. In A. Rafferty, R. Busse, B. Zander-Jentsch, W. Sermeus, & L. Bruyneel (Eds.), <i>Strengthening health systems through nursing: Evidence from 14 European countries</i> . European Observatory on Health Systems and Policies.
Poland	RN	2-5			National Council of State Boards of Nursing. (2020). A global profile of nursing regulation, education, and practice. <i>Journal of Nursing Regulation</i> . doi.org/10.1016/S2155-8256(20)30039-9
Poland	Nurse with Bachelor's degree in nursing	3	Bachelor		National Council of State Boards of Nursing. (2020). A global profile of nursing regulation, education, and practice. <i>Journal of Nursing Regulation</i> . doi.org/10.1016/S2155-8256(20)30039-9
Poland	Bachelor of nursing	3			National Council of State Boards of Nursing. (2022 <sup>1</sup> ). <i>Global regulatory atlas</i> . <a href="https://regulatoryatlas.com">regulatoryatlas.com</a>
Poland	Nurse	3	Bachelor (first cycle)	180	Pradela, K., Radosz, Z., & Sobiegate, A. (2020). Nursing education in Poland. <i>Piel gniarstwo XXI wieku / Nursing in the 21st Century</i> , 19. doi.org/10.2478/pielxw-2020-0-0008
Poland	Nurse	3-3.5	Bachelor degree program	180 min	Slusarska, B., Zarzycka, D., Dobrowolska, B., Marciniowicz, L., & Nowicki, G. (2018). Nursing education in Poland: The past and new development perspectives. <i>Nurse Education in Practice</i> , 31, 118-125. doi.org/10.1016/j.nepr.2018.05.010
Portugal	General nurse	4			National Council of State Boards of Nursing. (2020). A global profile of nursing regulation, education, and practice. <i>Journal of Nursing Regulation</i> . doi.org/10.1016/S2155-8256(20)30039-9

Portugal	General nurse	4				National Council of State Boards of Nursing. (2022). <i>Global regulatory atlas</i> . regulatoryatlas.com	
Portugal	General nurse	4	University			Simões, J., Augusto, D. F., Fronteira, I., & Hernández-Quevedo, C. (2017). Portugal: Health system review. <i>Health Systems in Transition, 19</i> (2). iris.who.int/handle/10665/330211	
Slovak Republic	Nurse	3				National Council of State Boards of Nursing. (2020). A global profile of nursing regulation, education, and practice. <i>Journal of Nursing Regulation</i> . doi.org/10.1016/S2155-8256(20)30039-9	
Slovak Republic	Practical nurse					National Council of State Boards of Nursing. (2020). A global profile of nursing regulation, education, and practice. <i>Journal of Nursing Regulation</i> . doi.org/10.1016/S2155-8256(20)30039-9	
Slovak Republic	Nurse	3				National Council of State Boards of Nursing. (2022). <i>Global regulatory atlas</i> . regulatoryatlas.com	
Slovak Republic	Nurse		Bachelor			Smatana, M., Pažitný, P., Kandiľák, D., Laktišová, M., Sedláková, D., & Palušková, M. (2016). Slovakia: Health system review. <i>Health Systems in Transition, 18</i> (6). healthcareconsulting.sk/sites/default/files/hit-slovakia.pdf	
Slovenia	Registered nurse	3	Bachelor			Albrecht, T., Pribakovič Brinovec, R., Jošar, D., Poldrugovac, M., Kostmapfel, T., Zanellet, M., Panteli, D., & Maresso, A. (2016). Slovenia: Health system review. <i>Health Systems in Transition, 18</i> (3). iris.who.int/handle/10665/330245	
Slovenia	Health care technician / Practical nurse	4	Vocational		EQF 5	Eurodiaconia (2016). <i>The education, training, and qualifications of nursing and care assistants across Europe</i> . www.eurodiaconia.org/wordpress/wp-content/uploads/2016/08/The-education-training-and-qualifications-of-nursing-and-care-assistants-across-Europe-Final.pdf	
Slovenia	Registered nurse	3				National Council of State Boards of Nursing. (2020). A global profile of nursing regulation, education, and practice. <i>Journal of Nursing Regulation</i> . doi.org/10.1016/S2155-8256(20)30039-9	
Slovenia	Registered nurse	3		4600		National Council of State Boards of Nursing. (2022). <i>Global regulatory atlas</i> . regulatoryatlas.com	
Slovenia	Nurse assistant	4		1000		Turk, E., & Habjanić, A. (2019). Slovenia. In A. Rafferty, R. Busse, B. Zander-Jentsch, W. Sermeus, & L. Bruyneel (Eds.), <i>Strengthening health systems through nursing: Evidence from 14 European countries</i> . European Observatory on Health Systems and Policies.	
Slovenia	Registered nurse	3	Degree	4600	180	at least 2300	Turk, E., & Habjanić, A. (2019). Slovenia. In A. Rafferty, R. Busse, B. Zander-Jentsch, W. Sermeus, & L. Bruyneel (Eds.), <i>Strengthening health systems through nursing: Evidence from 14 European countries</i> . European Observatory on Health Systems and Policies.

Spain		4	Bachelor's degree in nursing			Arrogante, O. (2017). Nursing education in Spain. <i>Nurse Education in Practice, 24</i> , 27-28. doi.org/10.1016/j.nepr.2017.03.003	
Spain	Nursing assistant	1-2		1400	440	Eurodiaconia (2016). <i>The education, training, and qualifications of nursing and care assistants across Europe</i> . www.eurodiaconia.org/wordpress/wp-content/uploads/2016/08/The-education-training-and-qualifications-of-nursing-and-care-assistants-across-Europe-Final.pdf	
Spain	Nursing care assistant	1	ATS (Ayudante Tecnico Sanitario)			Hernández-Quevedo, C., & Moreno-Casbas, M. T. (2019). Spain. In A. Rafferty, R. Busse, B. Zander-Jentsch, W. Sermeus, & L. Bruyneel (Eds.), <i>Strengthening health systems through nursing: Evidence from 14 European countries</i> . European Observatory on Health Systems and Policies.	
Spain	Registered nurse	4	Bachelor degree	5880	210	50%	Hernández-Quevedo, C., & Moreno-Casbas, M. T. (2019). Spain. In A. Rafferty, R. Busse, B. Zander-Jentsch, W. Sermeus, & L. Bruyneel (Eds.), <i>Strengthening health systems through nursing: Evidence from 14 European countries</i> . European Observatory on Health Systems and Policies.
Spain	General care nurse	4				National Council of State Boards of Nursing (2020). A global profile of nursing regulation, education, and practice. <i>Journal of Nursing Regulation</i> . doi.org/10.1016/S2155-8256(20)30039-9	
Spain	Registered nurse / General care nurse	4				National Council of State Boards of Nursing. (2022). <i>Global regulatory atlas</i> . regulatoryatlas.com	
Sweden	Registered nurse	3	Bachelor of Science degree	5040	180	50%	Alenius, L. S., Lindqvist, R., & Tishelman, C. (2019). Sweden. In A. Rafferty, R. Busse, B. Zander-Jentsch, W. Sermeus, & L. Bruyneel (Eds.), <i>Strengthening health systems through nursing: Evidence from 14 European countries</i> . European Observatory on Health Systems and Policies.
Sweden	Health care assistant	3	Vocational				Eurodiaconia (2016). <i>The education, training, and qualifications of nursing and care assistants across Europe</i> . www.eurodiaconia.org/wordpress/wp-content/uploads/2016/08/The-education-training-and-qualifications-of-nursing-and-care-assistants-across-Europe-Final.pdf
Sweden	Health care assistant		In-Service				Eurodiaconia (2016). <i>The education, training, and qualifications of nursing and care assistants across Europe</i> . www.eurodiaconia.org/wordpress/wp-content/uploads/2016/08/The-education-training-and-qualifications-of-nursing-and-care-assistants-across-Europe-Final.pdf
Sweden	Nurse	3					National Council of State Boards of Nursing. (2020). A global profile of nursing regulation, education, and practice. <i>Journal of Nursing Regulation</i> . doi.org/10.1016/S2155-8256(20)30039-9
Sweden	Registered nurse	3					National Council of State Boards of Nursing. (2022). <i>Global regulatory atlas</i> . regulatoryatlas.com



Switzerland	Health care assistant	3	Vocational	5040	180	De Geest, S., Ramelet, A., Fierz, K., Simon, M., Nicca, D., Eicher, M., & Katapodi, M. (2016). Development and implementation of nursing science at Swiss universities. <i>VSH-Bulletin</i> , 2, 8. edoc.unibas.ch/57057/2/Seiten%20aus%2016_VSH_bulletin_august_web-2.pdf
Switzerland	Bachelor's degree	3	Federal diploma	5040	180	Dupin, C.-M., Pinon, M., Jaggi, K., Teixeira, C., Sagne, A., & Delicado, N. (2020). Public health nursing education viewed through the lens of superdiversity: A resource for global health. <i>BMC Nursing</i> , 19(1), 18. doi.org/10.1186/s12912-020-00411-3
Switzerland	Registered nurse	3	Registered nurse			Eurodiaconia (2016). <i>The education, training, and qualifications of nursing and care assistants across Europe</i> . www.eurodiaconia.org/wordpress/wp-content/uploads/2016/08/The-education-training-and-qualifications-of-nursing-and-care-assistants-across-Europe-Final.pdf
Switzerland	Registered nurse	3	Registered nurse			National Council of State Boards of Nursing. (2020). A global profile of nursing regulation, education, and practice. <i>Journal of Nursing Regulation</i> . doi.org/10.1016/S2155-8256(20)30039-9
Switzerland	Nurses	3-4	Nurses			National Council of State Boards of Nursing. (2022). <i>Global regulatory atlas</i> . regulatoryatlas.com
Switzerland	Health care assistants	3	Health care assistants			Schwendimann, R., Ausserhofer, D., Schubert, M., Widmer, M., Addor, V., Desmedt, M., & De Geest, S. (2019). Switzerland. In A. Rafferty, R. Busse, B. Zander-jentsch, W. Sermeus, & L. Bruyneel (Eds.), <i>Strengthening health systems through nursing: Evidence from 14 European countries</i> . European Observatory on Health Systems and Policies.
Switzerland	Nursing aides		Nursing aides			Schwendimann, R., Ausserhofer, D., Schubert, M., Widmer, M., Addor, V., Desmedt, M., & De Geest, S. (2019). Switzerland. In A. Rafferty, R. Busse, B. Zander-jentsch, W. Sermeus, & L. Bruyneel (Eds.), <i>Strengthening health systems through nursing: Evidence from 14 European countries</i> . European Observatory on Health Systems and Policies.
The Netherlands	Bachelor	4	Bachelor			Christiansen, A., Jacob, E., & Twigg, D. (2018). Is it time to consider a four-year nursing bachelor degree in Australia? A discussion paper. <i>Collegian</i> , 25(5), 567-571. doi.org/10.1016/j.colegn.2018.01.004
The Netherlands	Registered nurse	4	Level 5			Christiansen, A., Jacob, E., & Twigg, D. (2018). Is it time to consider a four-year nursing bachelor degree in Australia? A discussion paper. <i>Collegian</i> , 25(5), 567-571. doi.org/10.1016/j.colegn.2018.01.004

The Netherlands	Registered nurse	4	Level 4			Christiansen, A., Jacob, E., & Twigg, D. (2018). Is it time to consider a four-year nursing bachelor degree in Australia? A discussion paper. <i>Collegian</i> , 25(5), 567-571. doi.org/10.1016/j.colegn.2018.01.004
The Netherlands	Individual health carers	3	EQF 3			Eurodiaconia (2016). <i>The education, training, and qualifications of nursing and care assistants across Europe</i> . www.eurodiaconia.org/wordpress/wp-content/uploads/2016/08/The-education-training-and-qualifications-of-nursing-and-care-assistants-across-Europe-Final.pdf
The Netherlands	Registered nurse	4	Vocational/associate degree	min 6400		Huisman-de Waal, G., van Achterberg, T., Schoonhoven, L., & Heinen, M. (2019). The Netherlands. In A. Rafferty, R. Busse, B. Zander-jentsch, W. Sermeus, & L. Bruyneel (Eds.), <i>Strengthening health systems through nursing: Evidence from 14 European countries</i> . European Observatory on Health Systems and Policies.
The Netherlands	Registered nurse	4	Bachelor	6720	min. 2300	Huisman-de Waal, G., van Achterberg, T., Schoonhoven, L., & Heinen, M. (2019). The Netherlands. In A. Rafferty, R. Busse, B. Zander-jentsch, W. Sermeus, & L. Bruyneel (Eds.), <i>Strengthening health systems through nursing: Evidence from 14 European countries</i> . European Observatory on Health Systems and Policies.
The Netherlands	Enrolled nurse	3				Huisman-de Waal, G., van Achterberg, T., Schoonhoven, L., & Heinen, M. (2019). The Netherlands. In A. Rafferty, R. Busse, B. Zander-jentsch, W. Sermeus, & L. Bruyneel (Eds.), <i>Strengthening health systems through nursing: Evidence from 14 European countries</i> . European Observatory on Health Systems and Policies.
The Netherlands	Registered nurse	3-3.5	Associate degree			Kroneman, M., Boerma, W., van den Berg, M., Groenewegen, P., de Jong, J., & van Ginneken, E. (2016). Netherlands: Health system review. Health Systems in Transition, 18(2). www.who.int/publications/i/item/HIT-18-2-2016
The Netherlands	Registered nurse	4	Bachelor			Kroneman, M., Boerma, W., van den Berg, M., Groenewegen, P., de Jong, J., & van Ginneken, E. (2016). Netherlands: Health system review. Health Systems in Transition, 18(2). www.who.int/publications/i/item/HIT-18-2-2016
Turkey	Nurse	4				National Council of State Boards of Nursing. (2020). A global profile of nursing regulation, education, and practice. <i>Journal of Nursing Regulation</i> . doi.org/10.1016/S2155-8256(20)30039-9
Turkey	Nurse	4				National Council of State Boards of Nursing. (2022). <i>Global regulatory atlas</i> . regulatoryatlas.com
United Kingdom	Nursing associate	2				Bodell, C. (2017). <i>Everything you need to know about training to be a nursing associate</i> . Retrieved July 12, 2021, from nursingnotes.co.uk/resources/training-to-be-a-nursing-associate/
United Kingdom	Nursing associate	2	Foundation degree		673	Effekhari, H. (2019). Introducing nursing associates. <i>British Journal of Cardiac Nursing</i> , 14(9), 1-3. doi.org/10.12968/bjcn.2019.0094

United Kingdom	Health care assistant	2	Vocational	NHS 2&3	Eurodiaconia (2016). <i>The education, training, and qualifications of nursing and care assistants across Europe</i> . <a href="http://www.eurodiaconia.org/wordpress/wp-content/uploads/2016/08/The-education-training-and-qualifications-of-nursing-and-care-assistants-across-Europe-Final.pdf">www.eurodiaconia.org/wordpress/wp-content/uploads/2016/08/The-education-training-and-qualifications-of-nursing-and-care-assistants-across-Europe-Final.pdf</a>
United Kingdom	Assistant practitioner	2	Foundation Degree	NHS 4	Eurodiaconia. (2016). <i>The education, training, and qualifications of nursing and care assistants across Europe</i> . <a href="http://www.eurodiaconia.org/wordpress/wp-content/uploads/2016/08/The-education-training-and-qualifications-of-nursing-and-care-assistants-across-Europe-Final.pdf">www.eurodiaconia.org/wordpress/wp-content/uploads/2016/08/The-education-training-and-qualifications-of-nursing-and-care-assistants-across-Europe-Final.pdf</a>
United Kingdom	Nursing associate	2	Nursing associate foundation degree		Glasper, A. (2017). Nurse education and the development of the nursing associate role. <i>British Journal of Nursing</i> , 26(1), 56-57. doi.org/10.12968/bjon.2017.26.1.56
United Kingdom	Nursing associate	2	Foundation degree		Glasper, A. (2018). The final NMC standards for the education of nursing associates. <i>British Journal of Nursing</i> , 27(21), 1272-1273. doi.org/10.12968/bjon.2018.27.21.1272
United Kingdom	Nurse	3			Glasper, A. (2018). The Nursing and Midwifery Council standards for the education of nursing associates. <i>British Journal of Healthcare Assistants</i> , 12(12), 606-609. doi.org/10.12968/bjha.2018.12.12.606
United Kingdom	Nursing associate	2	Foundation Degree		Glasper, A. (2018). The Nursing and Midwifery Council standards for the education of nursing associates. <i>British Journal of Healthcare Assistants</i> , 12(12), 606-609. doi.org/10.12968/bjha.2018.12.12.606
United Kingdom	Nursing associate / Second level nurse	2	Foundation degree		Glasper, A. (2017). The nursing associate: A welcome new member of the NHS family? <i>British Journal of Nursing</i> , 26(5), 294-295. doi.org/10.12968/bjon.2017.26.5.294
United Kingdom	Nursing associate	2	Foundation degree		Grainger, A. (2018). Is pre-registration nursing or nursing associate training the right path for you? <i>British Journal of Healthcare Assistants</i> , 12(4), 182-185. doi.org/10.12968/bjha.2018.12.4.182
United Kingdom	Nursing associate	2	Foundation degree (Level-5 academic qualification on completion)		Harrison, P. (2017). Making new associations. <i>Gastrointestinal Nursing</i> , 15(2), 51. doi.org/10.12968/gasn.2017.15.2.51
United Kingdom	Nursing associate	2			Health Education England (2016). <i>HEE announces training places for over 2,000 nursing associates</i> . <a href="http://tinyurl.com/y26roy49">tinyurl.com/y26roy49</a>
United Kingdom	Nursing associate	2	Foundation degree		Health Education England (2017). <i>Nursing associate curriculum framework</i> . <a href="http://www.nhs.uk/sites/default/files/documents/Nursing%20Associate%20Curriculum%20Framework%20Feb2017_0.pdf">www.nhs.uk/sites/default/files/documents/Nursing%20Associate%20Curriculum%20Framework%20Feb2017_0.pdf</a>
United Kingdom	Nursing associate	2			Loughurst, C. (2017). Concern remains over nursing associate role. <i>Nursing Standard</i> , 31(27), 10. doi.org/10.7748/ns.31.27.10.s8

United Kingdom	Adult nurse	3			National Council of State Boards of Nursing. (2020). A global profile of nursing regulation, education, and practice. <i>Journal of Nursing Regulation</i> . doi.org/10.1016/S2155-8256(20)30039-9
United Kingdom	General nurse	3			National Council of State Boards of Nursing (2022). <i>Global regulatory atlas</i> . <a href="http://regulatoryatlas.com">regulatoryatlas.com</a>
United Kingdom	Nursing associate	2			Nursing and Midwifery Council (2018). <i>Standards of proficiency for nursing associates</i> . <a href="http://www.nmc.org.uk/globalassets/sitedocuments/standards/2024/standards-of-proficiency-for-nursing-associates.pdf">www.nmc.org.uk/globalassets/sitedocuments/standards/2024/standards-of-proficiency-for-nursing-associates.pdf</a>
United Kingdom	Nursing associate	2	675		Ossey, K., Holloway, S., Downie, F., Moore, Z., & Cornish, L. (2018). Trainee nursing associates: A landmark innovation? <i>Wounds UK</i> , 14(5), 8. <a href="http://www.wounds-uk.com/journals/issue/554/article-details/trainee-nursing-associates-a-landmark-innovation">www.wounds-uk.com/journals/issue/554/article-details/trainee-nursing-associates-a-landmark-innovation</a>
United Kingdom	Registered nurse	3	Baccalaureate degree (as of 2017)		White, E. (2017). A comparison of nursing education and workforce planning initiatives in the United States and England. <i>Policy, Politics, &amp; Nursing Practice</i> , 18(4), 173-185. doi.org/10.1177/1527154418759666
United States	Registered nurse	3	Diploma		American Association of Colleges of Nursing (2019). Fact sheet: The impact of education on nursing practice. <a href="http://www.aacnursing.org/Portals/42/News/Factsheets/Education-Impact-Fact-Sheet.pdf">www.aacnursing.org/Portals/42/News/Factsheets/Education-Impact-Fact-Sheet.pdf</a>
United States	Registered nurse	3	Associate		American Association of Colleges of Nursing (2019). <i>Fact sheet: The impact of education on nursing practice</i> . <a href="http://www.aacnursing.org/Portals/42/News/Factsheets/Education-Impact-Fact-Sheet.pdf">www.aacnursing.org/Portals/42/News/Factsheets/Education-Impact-Fact-Sheet.pdf</a>
United States	Registered nurse	4	Bachelor		American Association of Colleges of Nursing. (2019). <i>Fact sheet: The impact of education on nursing practice</i> . <a href="http://www.aacnursing.org/Portals/42/News/Factsheets/Education-Impact-Fact-Sheet.pdf">www.aacnursing.org/Portals/42/News/Factsheets/Education-Impact-Fact-Sheet.pdf</a>
United States	Registered nurse		Associate degree		Buerhaus, P. I., Auerbach, D. I., & Staiger, D. O. (2016). Recent changes in the number of nurses graduating from undergraduate and graduate programs. <i>Nursing Economics</i> , 34(1), 46-48.
United States	Registered nurse (RN)	4	Baccalaureate (BSN) degree		Christiansen, A., Jacob, E., & Twigg, D. (2018). Is it time to consider a four-year nursing bachelor degree in Australia? A discussion paper. <i>Collegian</i> , 25(5), 567-571. doi.org/10.1016/j.colegn.2018.01.004
United States	Licensed practical nurse (LPN)	2	Associate degree		Christiansen, A., Jacob, E., & Twigg, D. (2018). Is it time to consider a four-year nursing bachelor degree in Australia? A discussion paper. <i>Collegian</i> , 25(5), 567-571. doi.org/10.1016/j.colegn.2018.01.004
United States		3	Diploma program		Christiansen, A., Jacob, E., & Twigg, D. (2018). Is it time to consider a four-year nursing bachelor degree in Australia? A discussion paper. <i>Collegian</i> , 25(5), 567-571. doi.org/10.1016/j.colegn.2018.01.004
United States	Nurse	4	Bachelor degree		Fotsch, R. (2018). States react to advancement of nursing education. <i>Journal of Nursing Regulation</i> , 9(2), 60-61. doi.org/10.1016/S2155-8256(18)30110-4

United States					Glasper, A. (2019). How Nursing and Midwifery Council quality-assures nursing associate education. <i>British Journal of Healthcare Assistants</i> , 13(6), 296-299. doi.org/10.12968/bjha.2019.13.6.296
United States	2	Associate degree			Groccia JE, Ford CR. (2020). Preparing the Academy for the Evolution of Healthcare Education. In: Ford CR, Groccia JE, editors. <i>New Directions for Teaching and Learning</i> . John Wiley & Sons, Ltd; 2020. p. 13-30.
United States	4	Baccalaureate degree			Groccia, J. E., & Ford, C. R. (2020). Preparing the academy for the evolution of healthcare education. In C. R. Ford & J. E. Groccia (Eds.), <i>New directions for teaching and learning</i> (Vol. 2020, pp. 13-30). John Wiley & Sons, Ltd. doi.org/10.1002/tl.20388
United States		Licensed Practical Nursing / Licensed vocational nursing			Groccia, J. E., & Ford, C. R. (2020). Preparing the academy for the evolution of healthcare education. In C. R. Ford & J. E. Groccia (Eds.), <i>New directions for teaching and learning</i> (Vol. 2020, pp. 13-30). John Wiley & Sons, Ltd. doi.org/10.1002/tl.20388
United States	4	BSN			Hicks, R. W., & Patterson, R. (2017). Navigating nursing education. <i>AORN Journal</i> , 106(6), 523-533. doi.org/10.1016/j.aorn.2017.10.001
United States	3	Associate degree			Mark, H. D., Twigg, R. D., Barber, L., & Warren, N. (2019). Entry-level master's programs in nursing: Review of programmatic features. <i>Journal of Nursing Education</i> , 58(9), 525-529. doi.org/10.3928/01484834-20190819-05
United States	3	Hospital training			Mark, H. D., Twigg, R. D., Barber, L., & Warren, N. (2019). Entry-level master's programs in nursing: Review of programmatic features. <i>Journal of Nursing Education</i> , 58(9), 525-529. doi.org/10.3928/01484834-20190819-05
United States	4	Baccalaureate degree			Mark, H. D., Twigg, R. D., Barber, L., & Warren, N. (2019). Entry-level master's programs in nursing: Review of programmatic features. <i>Journal of Nursing Education</i> , 58(9), 525-529. doi.org/10.3928/01484834-20190819-05
United States	2-3	ASN			McIntosh, C. E., Thomas, C. M., & Siela, D. (2016). Non-Bachelor of Science in Nursing registered nurse to Bachelor of Science in Nursing registered nurse. <i>Dimensions of Critical Care Nursing</i> , 35(6), 303-308. doi.org/10.1097/DCC.0000000000000212
United States	3	Diploma			McIntosh, C. E., Thomas, C. M., & Siela, D. (2016). Non-Bachelor of Science in Nursing registered nurse to Bachelor of Science in Nursing registered nurse. <i>Dimensions of Critical Care Nursing</i> , 35(6), 303-308. doi.org/10.1097/DCC.0000000000000212
United States	4	BSN			McIntosh, C. E., Thomas, C. M., & Siela, D. (2016). Non-Bachelor of Science in Nursing registered nurse to Bachelor of Science in Nursing registered nurse. <i>Dimensions of Critical Care Nursing</i> , 35(6), 303-308. doi.org/10.1097/DCC.0000000000000212

United States	3	Diploma			Morris, T. L. (2019). The landscape of nursing education in the United States. <i>Forum on Public Policy Online</i> , 1.
United States	1.5-2	Associate degree			Morris, T. L. (2019). The landscape of nursing education in the United States. <i>Forum on Public Policy Online</i> , 1.
United States	4	Bachelor			Morris, T. L. (2019). The landscape of nursing education in the United States. <i>Forum on Public Policy Online</i> , 1.
United States		Bachelor of Science in Nursing (BSN)			National Academy of Medicine (2021). <i>The future of nursing 2020-2030: Charting a path to achieve health equity</i> . The National Academies Press. doi.org/10.17226/25982
United States	2-3	Associate's degree in Nursing (ADN) and Diploma in Nursing			National Academy of Medicine (2021). <i>The future of nursing 2020-2030: Charting a path to achieve health equity</i> . The National Academies Press. doi.org/10.17226/25982
United States	12-18 months	Licensed Practical Nurse (LPN)			National Academy of Medicine (2021). <i>The future of nursing 2020-2030: Charting a path to achieve health equity</i> . The National Academies Press. doi.org/10.17226/25982
United States	2-4	Registered nurse (RN)			National Council of State Boards of Nursing (2020). A global profile of nursing regulation, education, and practice. <i>Journal of Nursing Regulation</i> . doi.org/10.1016/S2155-8256(20)30039-9
United States	1-2	Licensed practical nurse / Licensed vocational nurse			National Council of State Boards of Nursing (2020). A global profile of nursing regulation, education, and practice. <i>Journal of Nursing Regulation</i> . doi.org/10.1016/S2155-8256(20)30039-9
United States	3	RN			National Council of State Boards of Nursing. (2022 <sup>1</sup> ). <i>Global regulatory atlas</i> . regulatoryatlas.com
United States		Nurse assistant			National Council of State Boards of Nursing. (2022 <sup>1</sup> ). <i>Global regulatory atlas</i> . regulatoryatlas.com
United States	2	Nurse assistant			National Council of State Boards of Nursing. (2022 <sup>1</sup> ). <i>Global regulatory atlas</i> . regulatoryatlas.com
United States		Graduate nurse			National Council of State Boards of Nursing. (2022 <sup>1</sup> ). <i>Global regulatory atlas</i> . regulatoryatlas.com
United States	4	Bachelor of nursing			National Council of State Boards of Nursing. (2022 <sup>1</sup> ). <i>Global regulatory atlas</i> . regulatoryatlas.com

United States	RN diploma	2-5	Diploma	National Council of State Boards of Nursing. (2022 <sup>1</sup> ). <i>Global regulatory atlas</i> . regulatoryatlas.com
United States	RN academic program	4	Academic program	National Council of State Boards of Nursing. (2022 <sup>1</sup> ). <i>Global regulatory atlas</i> . regulatoryatlas.com
United States	Nurse	3-4		National Council of State Boards of Nursing. (2022a). <i>Global regulatory atlas</i> . regulatoryatlas.com
United States	Nurse - Higher education after general secondary school	4		National Council of State Boards of Nursing. (2022 <sup>1</sup> ). <i>Global regulatory atlas</i> . regulatoryatlas.com
United States	Enrolled nurse	1-5		National Council of State Boards of Nursing. (2022 <sup>1</sup> ). <i>Global regulatory atlas</i> . regulatoryatlas.com
United States	Auxiliary nurse	1-5		National Council of State Boards of Nursing. (2022 <sup>1</sup> ). <i>Global regulatory atlas</i> . regulatoryatlas.com
United States	General nurse/Nurse technician	3 (+1y social service)		National Council of State Boards of Nursing. (2022 <sup>1</sup> ). <i>Global regulatory atlas</i> . regulatoryatlas.com
United States	Licensed nurse	4 (+1y social service)		National Council of State Boards of Nursing. (2022 <sup>1</sup> ). <i>Global regulatory atlas</i> . regulatoryatlas.com
United States	RN	2-5		National Council of State Boards of Nursing. (2022 <sup>1</sup> ). <i>Global regulatory atlas</i> . regulatoryatlas.com
United States	Registered nurse		Diploma	Rice, T., Rosenau, P., Unruh, L. Y., & Barnes, A. J. (2020). United States: Health system review. <i>Health Systems in Transition</i> , 22(4). eurohealthobservatory.who.int/publications/i/united-states-health-system-review-2020
United States	Registered nurse	2-3	Associate (ADN)	Rice, T., Rosenau, P., Unruh, L. Y., & Barnes, A. J. (2020). United States: Health system review. <i>Health Systems in Transition</i> , 22(4). eurohealthobservatory.who.int/publications/i/united-states-health-system-review-2020
United States	Registered nurse	4	Bachelor of Science degree (BSN)	Rice, T., Rosenau, P., Unruh, L. Y., & Barnes, A. J. (2020). United States: Health system review. <i>Health Systems in Transition</i> , 22(4). eurohealthobservatory.who.int/publications/i/united-states-health-system-review-2020
United States	Nurse	4	Baccalaureate degree	White, E. (2017). A comparison of nursing education and workforce planning initiatives in the United States and England. <i>Policy, Politics, &amp; Nursing Practice</i> , 18(4), 173-185. doi.org/10.1177/1527154418759666
United States	Nurse		Associate degree	White, E. (2017). A comparison of nursing education and workforce planning initiatives in the United States and England. <i>Policy, Politics, &amp; Nursing Practice</i> , 18(4), 173-185. doi.org/10.1177/1527154418759666

United States	Nurse		Diploma	White, E. (2017). A comparison of nursing education and workforce planning initiatives in the United States and England. <i>Policy, Politics, &amp; Nursing Practice</i> , 18(4), 173-185. doi.org/10.1177/1527154418759666
United States	Registered nurse	4	Bachelor 200-954 or 60% or 8 semesters	National Council of State Boards of Nursing (2019). <i>Member board profiles: Educational programs</i> . www.ncsbn.org/Educational_Programs_Entry_into_Practice.pdf
United States	Registered nurse	3	Diploma 400-750 or 50% or 26 semesters hours	National Council of State Boards of Nursing (2019). <i>Member board profiles: Educational programs</i> . www.ncsbn.org/Educational_Programs_Entry_into_Practice.pdf
United States	Registered nurse	2	Associate 160-900 or 50% or 26 semesters hours or 16 semester units	National Council of State Boards of Nursing (2019). <i>Member board profiles: Educational programs</i> . www.ncsbn.org/Educational_Programs_Entry_into_Practice.pdf
United States	Licensed practical nurse / Licensed vocational nurse	1-2	Vocational 160-750 or 50% or 48 semester hours	National Council of State Boards of Nursing (2019). <i>Member board profiles: Educational programs</i> . www.ncsbn.org/Educational_Programs_Entry_into_Practice.pdf

## Postgraduate

Country	Nursing title	Duration in years	Degree	Study load hours	ECTS	Practice hours	Qualification	References
Australia	Nurse practitioner		Master's degree					Hallinan, C. M., & Hegarty, K. L. (2016). Advanced training for primary care and general practice nurses: Enablers and outcomes of postgraduate education. <i>Australian Journal of Primary Health</i> , 22(2), 113-122. doi.org/10.1071/pjy14072
Australia	Nurse practitioner	1.5						National Council of State Boards of Nursing. (2020). A global profile of nursing regulation, education, and practice. <i>Journal of Nursing Regulation</i> . doi.org/10.1016/S2155-8256(20)30039-9
Australia	Nurse practitioner	1.5						National Council of State Boards of Nursing. (2022*). Global regulatory atlas. regulatoryatlas.com
Australia	Nurse practitioner		Master					Nursing and Midwifery Board of Australia. (2021). <i>Nurse practitioner standards for practice - Effective from 1 March 2021</i> .
Australia	NP		Master's degree					San Martín-Rodríguez, L., Soto, N., & Escalada-Hernández, P. (2018). Academic training for advanced practice nurses: International perspective. <i>Enfermería Clínica (English Edition)</i> , 29. doi.org/10.1016/j.enfcl.2018.08.003
Australia	Graduate RN, Graduate entry RNS, NP	Master's degree					AQF 9	Schwartz, S. (2019). <i>Educating the nurse of the future: Report of the Independent Review of Nursing Education</i> . www.health.gov.au/sites/default/files/documents/2019/12/educating-the-nurse-of-the-future.pdf
Australia	Doctor of nursing		Doctoral degree				AQF 10	Schwartz, S. (2019). <i>Educating the nurse of the future: Report of the Independent Review of Nursing Education</i> . www.health.gov.au/sites/default/files/documents/2019/12/educating-the-nurse-of-the-future.pdf
Austria	Advanced practice nurse		Master					Glärcher, M., & Lex, K. M. (2020). Advanced nursing practice in Austria under consideration of outcome measurement. <i>Zeitschrift für Evidenz, Fortbildung und Qualität im Gesundheitswesen</i> , 155, 11-16. doi.org/10.1016/j.zefq.2020.06.012
Belgium	Master in nursing		Master degree	60			EQF 7	Bruyneel, L., van den Heede, K., & Sermeus, W. (2019). Belgium. In A. Rafferty, R. Busse, B. Zander-jentsch, W. Sermeus, & L. Bruyneel (Eds.), <i>Strengthening health systems through nursing: Evidence from 14 European countries</i> . European Observatory on Health Systems and Policies.
Belgium	Doctoral programme		Doctoral degree				EQF 8	Bruyneel, L., van den Heede, K., & Sermeus, W. (2019). Belgium. In A. Rafferty, R. Busse, B. Zander-jentsch, W. Sermeus, & L. Bruyneel (Eds.), <i>Strengthening health systems through nursing: Evidence from 14 European countries</i> . European Observatory on Health Systems and Policies.
Belgium	Advanced practice nurse		Master					Gerken, S., & Merkur, S. (2020). Belgium: Health system review. <i>Health Systems in Transition</i> , 22(5). eurohealthobservatory.who.int/countries/belgium

Belgium	APN							San Martín-Rodríguez, L., Soto, N., & Escalada-Hernández, P. (2018). Academic training for advanced practice nurses: International perspective. <i>Enfermería Clínica (English Edition)</i> , 29. doi.org/10.1016/j.enfcl.2018.08.003
Canada	CNS		Master or doctorate					International Council of Nurses Nurse Practitioner/Advanced Practice Nursing Network. (2018). Status of Advanced Practice Nursing in Canada.
Canada	NP		Master or doctorate					International Council of Nurses Nurse Practitioner/Advanced Practice Nursing Network. (2018). Status of Advanced Practice Nursing in Canada.
Canada	NP	1.5-2						National Council of State Boards of Nursing. (2020). A global profile of nursing regulation, education, and practice. <i>Journal of Nursing Regulation</i> . doi.org/10.1016/S2155-8256(20)30039-9
Canada	NP	2						National Council of State Boards of Nursing. (2022*). Global regulatory atlas. regulatoryatlas.com
Canada	CNS	2	Master's degree					San Martín-Rodríguez, L., Soto, N., & Escalada-Hernández, P. (2018). Academic training for advanced practice nurses: International perspective. <i>Enfermería Clínica (English Edition)</i> , 29. doi.org/10.1016/j.enfcl.2018.08.003
Canada	NP	2	Master's degree					San Martín-Rodríguez, L., Soto, N., & Escalada-Hernández, P. (2018). Academic training for advanced practice nurses: International perspective. <i>Enfermería Clínica (English Edition)</i> , 29. doi.org/10.1016/j.enfcl.2018.08.003
Chile			Master's degree					Ayala, R. A., Koch, T. F., & Messing, H. B. (2019). The system of nursing in Chile: Insights from a systems theory perspective. <i>Nursing Inquiry</i> , 26(1), e12260. doi.org/10.1111/min.12260
Chile			Doctoral degree					Ayala, R. A., Koch, T. F., & Messing, H. B. (2019). The system of nursing in Chile: Insights from a systems theory perspective. <i>Nursing Inquiry</i> , 26(1), e12260. doi.org/10.1111/min.12260
Chile	Master's in nursing							National Council of State Boards of Nursing. (2020). A global profile of nursing regulation, education, and practice. <i>Journal of Nursing Regulation</i> . doi.org/10.1016/S2155-8256(20)30039-9
Chile	Doctoral nurse							National Council of State Boards of Nursing. (2020). A global profile of nursing regulation, education, and practice. <i>Journal of Nursing Regulation</i> . doi.org/10.1016/S2155-8256(20)30039-9
Chile	Doctoral nurse							National Council of State Boards of Nursing. (2022*). Global regulatory atlas. regulatoryatlas.com
Chile	Masters in nursing							National Council of State Boards of Nursing. (2022*). Global regulatory atlas. regulatoryatlas.com
Colombia	Master's in nursing							National Council of State Boards of Nursing. (2020). A global profile of nursing regulation, education, and practice. <i>Journal of Nursing Regulation</i> . doi.org/10.1016/S2155-8256(20)30039-9

Colombia	Doctorate in nursing					National Council of State Boards of Nursing. (2020). A global profile of nursing regulation, education, and practice. <i>Journal of Nursing Regulation</i> . doi.org/10.1016/S2155-8256(20)30039-9
Colombia	Postdoctorate in nursing					National Council of State Boards of Nursing. (2020). A global profile of nursing regulation, education, and practice. <i>Journal of Nursing Regulation</i> . doi.org/10.1016/S2155-8256(20)30039-9
Colombia	Postdoctoral nurse					National Council of State Boards of Nursing. (2022*). Global regulatory atlas. regulatoryatlas.com
Colombia	Doctorate in nursing					National Council of State Boards of Nursing. (2022*). Global regulatory atlas. regulatoryatlas.com
Czech Republic	Nurse with a master's degree	2	Master			International Council of Nurses Nurse Practitioner/Advanced Practice Nursing Network. (2017). Interest in Advanced Practice Nursing in the Czech Republic. (2017*). Interest in Advanced Practice Nursing in the Czech Republic.
Estonia	Advanced nurse practitioner	2				National Council of State Boards of Nursing. (2020). A global profile of nursing regulation, education, and practice. <i>Journal of Nursing Regulation</i> . doi.org/10.1016/S2155-8256(20)30039-9
Estonia	Advanced nurse practitioner	2				National Council of State Boards of Nursing. (2022*). Global regulatory atlas. regulatoryatlas.com
Finland	Master degree in nursing	1,5-2	Master	60-90		Ensis, A., Lammintakainen, J., Härkönen, M., & Kinnunen, J. (2019). Finland. In A. Rafferty, R. Busse, B. Zander-Jentsch, W. Sermeus, & L. Bruyneel (Eds.), <i>Strengthening health systems through nursing: Evidence from 14 European countries</i> . European Observatory on Health Systems and Policies.
Finland	NP/CNS	1,5	Master			International Council of Nurses Nurse Practitioner/Advanced Practice Nursing Network. (2017). Finland.
Finland			Doctoral			International Council of Nurses Nurse Practitioner/Advanced Practice Nursing Network. (2017). Finland.
Finland	Master at university of applied science	1,5	Master	2520		International Council of Nurses Nurse Practitioner/Advanced Practice Nursing Network. (2017). Finland.
Finland	Master at University of Applied Science	2	Master	3360		International Council of Nurses Nurse Practitioner/Advanced Practice Nursing Network. (2017). Finland.

Finland	Nursing science - University		Master			Salminen, L., Koskinen, S., Heikkilä, A., Strandell-Laine, C., Haavisto, E., & Leino-Kilpi, H. (2019). Nursing education and nurse education research in Finland. In T. B. Halsteinsdóttir, H. Jónsdóttir, M. Kirkevold, H. Leino-Kilpi, K. Lomborg, & I. Rahm Hallberg (Eds.), <i>Leadership in nursing: Experiences from the European Nordic countries</i> (pp. 99-114). Springer International Publishing. doi.org/10.1007/978-3-030-10964-6_8
Finland	APN		Post-graduate level or university degree			San Martín-Rodríguez, L., Soto, N., & Escalada-Hernández, P. (2018). Academic training for advanced practice nurses: International perspective. <i>Enfermería Clínica</i> (English Edition), 29. doi.org/10.1016/j.enfde.2018.08.003
France	Nurse Anesthetist	2	Master			OECD. (2016*). <i>Trends in nursing education in France</i> (Health workforce policies in OECD countries). www.oecd.org/france/OECD-Health-Workforce-Policies-2016-Nurses-France.pdf
France	Advanced nurse practitioner	2	Master			OECD. (2016*). <i>Trends in nursing education in France</i> (Health workforce policies in OECD countries). www.oecd.org/france/OECD-Health-Workforce-Policies-2016-Nurses-France.pdf
Germany			Master			OECD. (2016*). <i>Trends in nursing education in Germany</i> (Health workforce policies in OECD countries). www.oecd.org/health/OECD-Health-Workforce-Policies-2016-Nurses-Germany.pdf
Germany			Phd			OECD. (2016*). <i>Trends in nursing education in Germany</i> (Health workforce policies in OECD countries). www.oecd.org/health/OECD-Health-Workforce-Policies-2016-Nurses-Germany.pdf
Hungary		1,5	Master			Bellehém, J., Pek, E., Banfai, B., & Olah, A. (2017). Current characteristics of the Hungarian nurses' workforce. In <i>IntechOpen</i> . doi.org/10.5772/intechopen.68383
Hungary			PhD			Bellehém, J., Pek, E., Banfai, B., & Olah, A. (2017). Current characteristics of the Hungarian nurses' workforce. In <i>IntechOpen</i> . doi.org/10.5772/intechopen.68383
Hungary	Nurse practitioner					International Council of Nurses Nurse Practitioner/Advanced Practice Nursing Network. (2017*). Interest in Advanced Practice Nursing in Hungary.
Hungary	Advanced practice nurse		Master			International Council of Nurses Nurse Practitioner/Advanced Practice Nursing Network. (2017*). Interest in Advanced Practice Nursing in Hungary.
Hungary	Master's in nursing	1,5				National Council of State Boards of Nursing. (2020). A global profile of nursing regulation, education, and practice. <i>Journal of Nursing Regulation</i> . doi.org/10.1016/S2155-8256(20)30039-9
Hungary	Nurse practitioner					National Council of State Boards of Nursing. (2020). A global profile of nursing regulation, education, and practice. <i>Journal of Nursing Regulation</i> . doi.org/10.1016/S2155-8256(20)30039-9



Hungary	Masters in nursing	1.5	MScN	120	National Council of State Boards of Nursing. (2022*). Global regulatory atlas. <a href="http://regulatoryatlas.com">regulatoryatlas.com</a>
Hungary	Nurse practitioner				National Council of State Boards of Nursing. (2022*). Global regulatory atlas. <a href="http://regulatoryatlas.com">regulatoryatlas.com</a>
Iceland			Master	180	Swainsdóttir, H., Gunnarsdóttir, T., & Björnsdóttir, K. (2019). Towards the future: The education of nurses in Iceland reconsidered. In T. B. Hafsteinsdóttir (Ed.), <i>Leadership in nursing: Experiences from the European Nordic countries</i> (pp. 161-175). doi.org/10.1007/978-3-030-10964-6_12
Iceland			PhD		Swainsdóttir, H., Gunnarsdóttir, T., & Björnsdóttir, K. (2019). Towards the future: The education of nurses in Iceland reconsidered. In T. B. Hafsteinsdóttir (Ed.), <i>Leadership in nursing: Experiences from the European Nordic countries</i> (pp. 161-175). doi.org/10.1007/978-3-030-10964-6_12
Ireland	Registered advanced practice nurse		Master	2520	International Council of Nurses Nurse Practitioner/Advanced Practice Nursing Network. (2017). Status of Advanced Practice Nursing in the Republic of Ireland.
Ireland	Advanced nurse practitioner		Master		Morris, R., Matthews, A., & Scott, A. (2019). Ireland. In A. Rafferty, R. Busse, B. Zander-Jentsch, W. Sermeus, & L. Bruyneel (Eds.), <i>Strengthening health systems through nursing: Evidence from 14 European countries</i> . European Observatory on Health Systems and Policies.
Ireland			Master		Nursing and Midwifery Board of Ireland. (2020). <i>Nurse and midwife education: Standards and requirements</i> .
Ireland	NIP		Master		San Martin-Rodriguez, L., Soto, N., & Escalada-Hernández, P. (2018). Academic training for advanced practice nurses: International perspective. <i>Enfermería Clínica</i> (English Edition), 29. doi.org/10.1016/j.enfcl.2018.08.003
Israel	Nurse practitioner		Post-master		Aaron, E. M., & Andrews, C. S. (2016). Integration of advanced practice providers into the Israeli healthcare system. <i>Israel Journal of Health Policy Research</i> , 5(1), 7. doi.org/10.1186/s13584-016-0065-8
Italy	Nurse specialist	2	Master		OECD. (2016). <i>Trends in nursing education in Italy</i> (Health workforce policies in OECD countries). <a href="http://www.oecd.org/health/OECD-Health-Workforce-Policies-2016-Nurses-Italy.pdf">www.oecd.org/health/OECD-Health-Workforce-Policies-2016-Nurses-Italy.pdf</a>
Italy		3	PhD		OECD. (2016). <i>Trends in nursing education in Italy</i> (Health workforce policies in OECD countries). <a href="http://www.oecd.org/health/OECD-Health-Workforce-Policies-2016-Nurses-Italy.pdf">www.oecd.org/health/OECD-Health-Workforce-Policies-2016-Nurses-Italy.pdf</a>
Japan	Advanced practice nurse (CNS, NP)	At least 2	Master		Inatomi, K., & Nomura, S. (2016). Nursing education in Korea: A comparison with nursing education in Japan and the United States. <i>Juntendo Medical Journal</i> , 62, 406-411.
Japan	Nursing research (PhD)	At least 2	Doctoral course		Inatomi, K., & Nomura, S. (2016). Nursing education in Korea: A comparison with nursing education in Japan and the United States. <i>Juntendo Medical Journal</i> , 62, 406-411.
Japan			Master		Japan Association of Nursing Programs in Universities. (n.d.). <i>Scheme of taking a certification course after graduation of high school</i> . Retrieved April 12, 2021, from <a href="http://www.janpu.or.jp/en/learn/">www.janpu.or.jp/en/learn/</a>
Japan			Doctoral		Japan Association of Nursing Programs in Universities. (n.d.). <i>Scheme of taking a certification course after graduation of high school</i> . Retrieved April 12, 2021, from <a href="http://www.janpu.or.jp/en/learn/">www.janpu.or.jp/en/learn/</a>
Japan	CNS		Master		Japanese Nursing Association. (2016). <i>Nursing in Japan</i> . <a href="http://www.nurse.or.jp/jna/english/pdf/nursing-in-japan2016.pdf">www.nurse.or.jp/jna/english/pdf/nursing-in-japan2016.pdf</a>
Japan			Doctoral		Japanese Nursing Association. (2016). <i>Nursing in Japan</i> . <a href="http://www.nurse.or.jp/jna/english/pdf/nursing-in-japan2016.pdf">www.nurse.or.jp/jna/english/pdf/nursing-in-japan2016.pdf</a>
Japan	APN		Master		San Martin-Rodriguez, L., Soto, N., & Escalada-Hernández, P. (2018). Academic training for advanced practice nurses: International perspective. <i>Enfermería Clínica</i> (English Edition), 29. doi.org/10.1016/j.enfcl.2018.08.003
Korea	Advanced practice nurse	At least 2-2.5	Master's degree		Inatomi, K., & Nomura, S. (2016). Nursing education in Korea: A comparison with nursing education in Japan and the United States. <i>Juntendo Medical Journal</i> , 62, 406-411.
Korea	PhD	At least 3	Doctoral course		Inatomi, K., & Nomura, S. (2016). Nursing education in Korea: A comparison with nursing education in Japan and the United States. <i>Juntendo Medical Journal</i> , 62, 406-411.
Korea	Advanced practice nurse				National Council of State Boards of Nursing. (2022*). Global regulatory atlas. <a href="http://regulatoryatlas.com">regulatoryatlas.com</a>
Latvia	Master in public health	2	Master		Behmane, D., Dudele, A., Villenusa, A., Misins, J., Klavina, K., Mozgigis, D., & Scarpetti, G. (2019). Latvia: Health system review. <i>Health Systems in Transition</i> , 21(4). <a href="http://iris.who.int/bitstream/handle/10665/331419/HIT-21-4-2019-eng.pdf">iris.who.int/bitstream/handle/10665/331419/HIT-21-4-2019-eng.pdf</a>
Latvia			Doctoral		Behmane, D., Dudele, A., Villenusa, A., Misins, J., Klavina, K., Mozgigis, D., & Scarpetti, G. (2019). Latvia: Health system review. <i>Health Systems in Transition</i> , 21(4). <a href="http://iris.who.int/bitstream/handle/10665/331419/HIT-21-4-2019-eng.pdf">iris.who.int/bitstream/handle/10665/331419/HIT-21-4-2019-eng.pdf</a>
Latvia	Master of Health Sciences in nursing	1-2	Master	3360	Latvian Qualifications Database. (2021). <i>Latvian qualifications database</i> . <a href="http://www.latviaskvalifikacijas.lv/en/">www.latviaskvalifikacijas.lv/en/</a>

Lithuania	2	Master's	Riklikienė, O., Starkienė, L., & Maciauskienė, J. (2019). Lithuania. In A. Rafferty, R. Busse, B. Zander-Jentsch, W. Sermeus, & L. Bruyneel (Eds.), <i>Strengthening health systems through nursing: Evidence from 14 European countries</i> . European Observatory on Health Systems and Policies.
Lithuania	4	Doctorate	Riklikienė, O., Starkienė, L., & Maciauskienė, J. (2019). Lithuania. In A. Rafferty, R. Busse, B. Zander-Jentsch, W. Sermeus, & L. Bruyneel (Eds.), <i>Strengthening health systems through nursing: Evidence from 14 European countries</i> . European Observatory on Health Systems and Policies.
Mexico	2-3	Master's nurse	National Council of State Boards of Nursing. (2020). A global profile of nursing regulation, education, and practice. <i>Journal of Nursing Regulation</i> . doi.org/10.1016/S2155-8256(20)30039-9
Mexico	2-3	Doctoral nurse	National Council of State Boards of Nursing. (2020). A global profile of nursing regulation, education, and practice. <i>Journal of Nursing Regulation</i> . doi.org/10.1016/S2155-8256(20)30039-9
Mexico	2-4	Postgraduate nurse	National Council of State Boards of Nursing. (2020). A global profile of nursing regulation, education, and practice. <i>Journal of Nursing Regulation</i> . doi.org/10.1016/S2155-8256(20)30039-9
Mexico	2-3	License and certificate (doctorate)	National Council of State Boards of Nursing. (2022*). Global regulatory atlas. regulatoryatlas.com
Mexico	2-3	License and certificate (doctorate)	National Council of State Boards of Nursing. (2022*). Global regulatory atlas. regulatoryatlas.com
Mexico	2-3	Master or certificate	National Council of State Boards of Nursing. (2022*). Global regulatory atlas. regulatoryatlas.com
New Zealand	2-4	Master or PhD	National Council of State Boards of Nursing. (2022*). Global regulatory atlas. regulatoryatlas.com
New Zealand	2	Master	International Council of Nurses Nurse Practitioner/Advanced Practice Nursing Network. (2017). Status of Advanced Practice Nursing in New Zealand.
New Zealand	2	Master	National Council of State Boards of Nursing. (2020). A global profile of nursing regulation, education, and practice. <i>Journal of Nursing Regulation</i> . doi.org/10.1016/S2155-8256(20)30039-9
New Zealand	2	Master	National Council of State Boards of Nursing. (2022*). Global regulatory atlas. regulatoryatlas.com
New Zealand	2	Master	San Martin-Rodriguez, L., Soto, N., & Escalada-Hernández, P. (2018). Academic training for advanced practice nurses: International perspective. <i>Enfermería Clínica (English Edition)</i> , 29. doi.org/10.1016/j.enfcl.2018.08.003
Norway		Master	Saunes, I. S., Karamikolos, M., & Sagan, A. (2020). Norway: Health system review. <i>Health Systems in Transition</i> , 22(1). www.who.int/publications/i/item/HT22-1-2020

Norway	Advanced clinical practitioner	Master	3360	International Council of Nurses Nurse Practitioner/Advanced Practice Nursing Network. (2017d). Norway.
Norway	APNs	Master's degree		San Martin-Rodriguez, L., Soto, N., & Escalada-Hernández, P. (2018). Academic training for advanced practice nurses: International perspective. <i>Enfermería Clínica (English Edition)</i> , 29. doi.org/10.1016/j.enfcl.2018.08.003
Norway	APN	Master	120ECTS	Sjetne, J. S., Tvedt, C. S., & Ringard, A. (2019). Norway. In A. Rafferty, R. Busse, B. Zander-Jentsch, W. Sermeus, & L. Bruyneel (Eds.), <i>Strengthening health systems through nursing: Evidence from 14 European countries</i> . European Observatory on Health Systems and Policies.
Norway	PHD	3		Sjetne, J. S., Tvedt, C. S., & Ringard, A. (2019). Norway. In A. Rafferty, R. Busse, B. Zander-Jentsch, W. Sermeus, & L. Bruyneel (Eds.), <i>Strengthening health systems through nursing: Evidence from 14 European countries</i> . European Observatory on Health Systems and Policies.
Poland	2	Master		Kózka, M., Brzostek, T., Ksykiewicz-Dorota, A., Gabryś, G., Kilańska, D., Ogarek, M., Cisek, M., Przewoźniak, L., & Brzyski, P. (2019). Poland. In A. Rafferty, R. Busse, B. Zander-Jentsch, W. Sermeus, & L. Bruyneel (Eds.), <i>Strengthening health systems through nursing: Evidence from 14 European countries</i> . European Observatory on Health Systems and Policies.
Poland	Nurse with master's degree in nursing	2		National Council of State Boards of Nursing. (2020). A global profile of nursing regulation, education, and practice. <i>Journal of Nursing Regulation</i> . doi.org/10.1016/S2155-8256(20)30039-9
Poland	Masters nurse	2		National Council of State Boards of Nursing. (2022*). Global regulatory atlas. regulatoryatlas.com
Poland		Master's (second cycle)		Pradela, K., Radosz, Z., & Sobiegala, A. (2020). Nursing education in Poland. <i>Pielęgniarstwo XXI wieku / Nursing in the 21st Century</i> , 19. doi.org/10.2478/pielxixw-2020-0008
Poland		PhD (third cycle)		Pradela, K., Radosz, Z., & Sobiegala, A. (2020). Nursing education in Poland. <i>Pielęgniarstwo XXI wieku / Nursing in the 21st Century</i> , 19. doi.org/10.2478/pielxixw-2020-0008
Poland	Master program in nursing (ipv nursing science)	3360	at least 120	Ślusarska, B., Zarzycka, D., Dobrowolska, B., Marciniowicz, L., & Nowicki, G. (2018). Nursing education in Poland: The past and new development perspectives. <i>Nurse Education in Practice</i> , 31. 118-125. doi.org/10.1016/j.nepr.2018.05.010
Poland	Doctoral program	30-45		Ślusarska, B., Zarzycka, D., Dobrowolska, B., Marciniowicz, L., & Nowicki, G. (2018). Nursing education in Poland: The past and new development perspectives. <i>Nurse Education in Practice</i> , 31. 118-125. doi.org/10.1016/j.nepr.2018.05.010

Portugal	Specialist nurse	1,5			National Council of State Boards of Nursing. (2020). A global profile of nursing regulation, education, and practice. <i>Journal of Nursing Regulation</i> . doi.org/10.1016/S2155-8256(20)30039-9
Slovakia	Advanced practice nurse	2-3			National Council of State Boards of Nursing. (2020). A global profile of nursing regulation, education, and practice. <i>Journal of Nursing Regulation</i> . doi.org/10.1016/S2155-8256(20)30039-9
Slovakia	Advanced practice nurse				National Council of State Boards of Nursing. (2022*). Global regulatory atlas. regulatoryatlas.com
Slovakia	Master		Master's degree		Smatana, M., Pažtiny, P., Kandlak, D., Laktisová, M., Sedláčková, D., & Palušková, M. (2016). Slovakia: Health system review. <i>Health Systems in Transition</i> , 18(6). <a href="http://healthcareconsulting.sk/sites/default/files/hit-slovakia.pdf">healthcareconsulting.sk/sites/default/files/hit-slovakia.pdf</a>
Slovenia	Master		Master		Albreht, T., Pribaković Brinovec, R., Jošar, D., Poldrugovac, M., Kostmapfel, T., Zarel, M., Panteli, D., & Maresso, A. (2016). Slovenia: Health system review. <i>Health Systems in Transition</i> , 18(3). <a href="http://iris.who.int/handle/10665/330245">iris.who.int/handle/10665/330245</a>
Slovenia	Master	3360	120		Turk, E., & Habjanic, A. (2019). Slovenia. In A. Rafferty, R. Busse, B. Zander-jentsch, W. Sermeus, & L. Bruyneel (Eds.), <i>Strengthening health systems through nursing: Evidence from 14 European countries</i> . European Observatory on Health Systems and Policies.
Spain	Specialist nurse (seven recognized specialties)	2-3			Arrogante, O. (2017). Nursing education in Spain. <i>Nurse Education in Practice</i> , 24, 27-28. doi.org/10.1016/j.nepr.2017.03.003
Spain			Doctoral		Arrogante, O. (2017). Nursing education in Spain. <i>Nurse Education in Practice</i> , 24, 27-28. doi.org/10.1016/j.nepr.2017.03.003
Spain		2-3	Master's degree		Arrogante, O. (2017). Nursing education in Spain. <i>Nurse Education in Practice</i> , 24, 27-28. doi.org/10.1016/j.nepr.2017.03.003
Spain	Master		Master		Hernández-Quevedo C, Moreno-Casbas MT. Spain (2019). In: Rafferty A, Busse R., Zander-jentsch B, Sermeus W, Bruyneel L, editors. Strengthening health systems through nursing: Evidence from 14 European countries. Copenhagen: European Observatory on Health Systems and Policies.
Spain	PhD		PhD		Hernández-Quevedo, C., & Moreno-Casbas, M. T. (2019). Spain. In A. Rafferty, R. Busse, B. Zander-jentsch, W. Sermeus, & L. Bruyneel (Eds.), <i>Strengthening health systems through nursing: Evidence from 14 European countries</i> . European Observatory on Health Systems and Policies.
Spain	Specialized nurse	2 years of residency			Hernández-Quevedo, C., & Moreno-Casbas, M. T. (2019). Spain. In A. Rafferty, R. Busse, B. Zander-jentsch, W. Sermeus, & L. Bruyneel (Eds.), <i>Strengthening health systems through nursing: Evidence from 14 European countries</i> . European Observatory on Health Systems and Policies.

Spain	APN		Master's degree		San Martín-Rodríguez, L., Soto, N., & Escalada-Hernández, P. (2018). Academic training for advanced practice nurses: International perspective. <i>Enfermería Clínica</i> (English Edition), 29. doi.org/10.1016/j.enfcl.2018.08.003	
Spain	Specialized nurse		Master's degree		San Martín-Rodríguez, L., Soto, N., & Escalada-Hernández, P. (2018). Academic training for advanced practice nurses: International perspective. <i>Enfermería Clínica</i> (English Edition), 29. doi.org/10.1016/j.enfcl.2018.08.003	
Spain			Doctoral		San Martín-Rodríguez, L., Soto, N., & Escalada-Hernández, P. (2018). Academic training for advanced practice nurses: International perspective. <i>Enfermería Clínica</i> (English Edition), 29. doi.org/10.1016/j.enfcl.2018.08.003	
Sweden	Master	1	60		Alenius LS, Lindqvist R, Tishelman C. Sweden (2019). In: Rafferty A, Busse R., Zander-jentsch B, Sermeus W, Bruyneel L, editors. Strengthening health systems through nursing: Evidence from 14 European countries. Copenhagen: European Observatory on Health Systems and Policies.	
Sweden	Master		3360	120	Alenius, L. S., Lindqvist, R., & Tishelman, C. (2019). Sweden. In A. Rafferty, R. Busse, B. Zander-jentsch, W. Sermeus, & L. Bruyneel (Eds.), <i>Strengthening health systems through nursing: Evidence from 14 European countries</i> . European Observatory on Health Systems and Policies.	
Sweden	Clinical specialization programs		60-90 (no formal demands)		Alenius, L. S., Lindqvist, R., & Tishelman, C. (2019). Sweden. In A. Rafferty, R. Busse, B. Zander-jentsch, W. Sermeus, & L. Bruyneel (Eds.), <i>Strengthening health systems through nursing: Evidence from 14 European countries</i> . European Observatory on Health Systems and Policies.	
Sweden	Master	2	Master	3360	Busse, B. Zander-jentsch, W. Sermeus, & L. Bruyneel (Eds.), <i>Strengthening health systems through nursing: Evidence from 14 European countries</i> . European Observatory on Health Systems and Policies.	
Sweden	Specialist nursing	1	Master	1680	60	Bergström, P., & Lindh, V. (2018). Developing the role of Swedish advanced practice nurse (APN) through a blended learning master's program: Consequences of knowledge organization. <i>Nurse Education in Practice</i> , 28, 196-201. doi.org/10.1016/j.nepr.2017.10.030
Switzerland	APN		90 ECTS at UNIL / 120-180 ECTS for UNIBAS program		De Geest, S., Ramelet, A., Fierz, K., Simon, M., Nicca, D., Eicher, M., & Katapodi, M. (2016). Development and implementation of nursing science at Swiss universities. <i>VSH-Bulletin</i> , 2, 8. <a href="http://edoc.unibas.ch/57057/2/Seiten%20aus%2016_VSH_bulletin_august_web-2.pdf">edoc.unibas.ch/57057/2/Seiten%20aus%2016_VSH_bulletin_august_web-2.pdf</a>	



Switzerland	Nursing scientist	2	Master of Science (MSc)	2520	De Geest, S., Ramelet, A., Fierz, K., Simon, M., Nicca, D., Eicher, M., & Katapodi, M. (2016). Development and implementation of nursing science at Swiss universities. <i>VSH-Bulletin</i> , 2, 8. edoc.umbas.ch/57057/2/Seiten%20aus%2016_VSH_bulletin_august_web-2.pdf
Switzerland	PhD	3	Doctoral		De Geest, S., Ramelet, A., Fierz, K., Simon, M., Nicca, D., Eicher, M., & Katapodi, M. (2016). Development and implementation of nursing science at Swiss universities. <i>VSH-Bulletin</i> , 2, 8. edoc.umbas.ch/57057/2/Seiten%20aus%2016_VSH_bulletin_august_web-2.pdf
Switzerland	Advanced practice nurse	2	MScN		National Council of State Boards of Nursing. (2020). A global profile of nursing regulation, education, and practice. <i>Journal of Nursing Regulation</i> . doi.org/10.1016/S2155-8256(20)30039-9
Switzerland	Advanced practice nurse	2	MScN		National Council of State Boards of Nursing. (2022). Global regulatory atlas. regulatoryatlas.com
Switzerland		1,5-2	Master's degree	2520	Schwendimann, R., Ausserhofer, D., Schubert, M., Widmer, M., Addor, V., Desmedt, M., & De Geest, S. (2019). Switzerland. In A. Rafferty, R. Busse, B. Zander-Jentsch, W. Sermeus, & L. Bruyneel (Eds.), <i>Strengthening health systems through nursing: Evidence from 14 European countries</i> . European Observatory on Health Systems and Policies.
Switzerland			MScN	2520	Schwendimann, R., Ausserhofer, D., Schubert, M., Widmer, M., Addor, V., Desmedt, M., & De Geest, S. (2019). Switzerland. In A. Rafferty, R. Busse, B. Zander-Jentsch, W. Sermeus, & L. Bruyneel (Eds.), <i>Strengthening health systems through nursing: Evidence from 14 European countries</i> . European Observatory on Health Systems and Policies.
Switzerland			MScN	3360	Schwendimann, R., Ausserhofer, D., Schubert, M., Widmer, M., Addor, V., Desmedt, M., & De Geest, S. (2019). Switzerland. In A. Rafferty, R. Busse, B. Zander-Jentsch, W. Sermeus, & L. Bruyneel (Eds.), <i>Strengthening health systems through nursing: Evidence from 14 European countries</i> . European Observatory on Health Systems and Policies.
Switzerland	PhD		Doctoral		Schwendimann, R., Ausserhofer, D., Schubert, M., Widmer, M., Addor, V., Desmedt, M., & De Geest, S. (2019). Switzerland. In A. Rafferty, R. Busse, B. Zander-Jentsch, W. Sermeus, & L. Bruyneel (Eds.), <i>Strengthening health systems through nursing: Evidence from 14 European countries</i> . European Observatory on Health Systems and Policies.
The Netherlands	NP	2-3	Master		Dutch Professional Nurse Practitioner Organisation (V&VN VS). (n.d.). About the nurse practitioner in the Netherlands. Retrieved July 12, 2021, from <a href="http://vennvs.nl/information-in-english">vennvs.nl/information-in-english</a>

The Netherlands	Nurse specialist		Master (MANP)		Huisman-de Waal, G., van Achterberg, T., Schoonhoven, L., & Heinen, M. (2019). The Netherlands. In A. Rafferty, R. Busse, B. Zander-Jentsch, W. Sermeus, & L. Bruyneel (Eds.), <i>Strengthening health systems through nursing: Evidence from 14 European countries</i> . European Observatory on Health Systems and Policies.
The Netherlands	Nursing science		Master's		Huisman-de Waal, G., van Achterberg, T., Schoonhoven, L., & Heinen, M. (2019). The Netherlands. In A. Rafferty, R. Busse, B. Zander-Jentsch, W. Sermeus, & L. Bruyneel (Eds.), <i>Strengthening health systems through nursing: Evidence from 14 European countries</i> . European Observatory on Health Systems and Policies.
The Netherlands	APNs		Master's degree		San Martín-Rodríguez, L., Soto, N., & Escalada-Hernández, P. (2018). Academic training for advanced practice nurses: International perspective. <i>Enfermería Clínica</i> (English Edition), 29. doi.org/10.1016/j.enficle.2018.08.003
United Kingdom		1	Master's degree		Fawcett, T. (2017). Further study opens up career opportunities. <i>Nursing Standard</i> , 31(38), 38-39. doi.org/10.7748/ns.31.38.s38.s44
United Kingdom	PhD	4	Doctoral		Rees, S., Ousey, K., Koo, K., Ahmad, N., & Bowling, F. L. (2019). Higher degrees in nursing: Traditional research PhD or professional doctorate? <i>British Journal of Nursing</i> , 28(14), 940-945. doi.org/10.12968/bjon.2019.28.14.940
United Kingdom	Doctor of nursing 3-4		Professional/vocational/taught doctorate		Rees, S., Ousey, K., Koo, K., Ahmad, N., & Bowling, F. L. (2019). Higher degrees in nursing: Traditional research PhD or professional doctorate? <i>British Journal of Nursing</i> , 28(14), 940-945. doi.org/10.12968/bjon.2019.28.14.940
United Kingdom	ANP		Master		Royal College of Nursing (2021). <i>Advanced practice standards: RCN standards for advanced level nursing practice</i> .
United States	DNP		Doctorate		Alexander, S. (2016). Scholarship in clinical practice: An update on recommendations for doctor of nursing practice programs. <i>Clinical Nurse Specialist</i> , 30(1), 58-61. doi.org/10.1097/nur.0000000000000177
United States	APRN		DNP		Bellflower B., & Likes, W. (2019). Commentary on potential crisis in nurse practitioner preparation in the United States. <i>Policy, Politics, &amp; Nursing Practice</i> , 20(4), 186-187. doi.org/10.1177/1527154419882371
United States	APRN		Master		Bellflower B., & Likes, W. (2019). Commentary on potential crisis in nurse practitioner preparation in the United States. <i>Policy, Politics, &amp; Nursing Practice</i> , 20(4), 186-187. doi.org/10.1177/1527154419882371
United States	PhD	3			Hartjes, T. M., Lester, D., Arasi-Ruddock, L., McFadden Bradley, S., Munro, S., & Cowan, L. (2019). Answering the question: Is the Doctor of Philosophy or Doctor of Nursing Practice right for me? <i>Journal of the American Association of Nurse Practitioners</i> , 31(8), 439-442. doi.org/10.1097/jxn.0000000000000273



United States	DNP	2		Hartjes, T. M., Lester, D., Arasi-Ruddock, L., McFadden Bradley, S., Munro, S., & Cowan, L. (2019). Answering the question: Is the Doctor of Philosophy or Doctor of Nursing Practice right for me? <i>Journal of the American Association of Nurse Practitioners</i> , 31(8), 439-442. doi.org/10.1097/jxn.0000000000000273
United States	Nurse educator	At least 2	Master's course	Inatomi, K., & Nomura, S. (2016). Nursing education in Korea: A comparison with nursing education in Japan and the United States. <i>Juntendo Medical Journal</i> , 62, 406-411.
United States	Nurse administrator	At least 2	Master's course	Inatomi, K., & Nomura, S. (2016). Nursing education in Korea: A comparison with nursing education in Japan and the United States. <i>Juntendo Medical Journal</i> , 62, 406-411.
United States	APN (certified nurse midwife, certified registered nurse anesthetist, clinical nurse specialist, nurse practitioner)	Doctoral		Inatomi, K., & Nomura, S. (2016). Nursing education in Korea: A comparison with nursing education in Japan and the United States. <i>Juntendo Medical Journal</i> , 62, 406-411.
United States	PhD	At least 3	Doctoral course	Inatomi, K., & Nomura, S. (2016). Nursing education in Korea: A comparison with nursing education in Japan and the United States. <i>Juntendo Medical Journal</i> , 62, 406-411.
United States	DNP	At least 3	Doctoral course	Inatomi, K., & Nomura, S. (2016). Nursing education in Korea: A comparison with nursing education in Japan and the United States. <i>Juntendo Medical Journal</i> , 62, 406-411.
United States	NP		MSN or DNP	Kalenkoski, J. (2017). Higher education for nurses: A summary of post-graduation options. <i>Nursing Science Quarterly</i> , 64(1), 83-87. search.ebscohost.com/login.aspx?direct=true&db=cin20&AN=124402548&site=ehost-live
United States	Nurse anesthetist		MSN	Kalenkoski, J. (2017). Higher education for nurses: A summary of post-graduation options. <i>Nursing Science Quarterly</i> , 64(1), 83-87. search.ebscohost.com/login.aspx?direct=true&db=cin20&AN=124402548&site=ehost-live
United States	Nurse educator		MSN and PhD (preferred)	Kalenkoski, J. (2017). Higher education for nurses: A summary of post-graduation options. <i>Nursing Science Quarterly</i> , 64(1), 83-87. search.ebscohost.com/login.aspx?direct=true&db=cin20&AN=124402548&site=ehost-live
United States	Nurse researcher		MSN and PhD (preferred)	Kalenkoski, J. (2017). Higher education for nurses: A summary of post-graduation options. <i>Nursing Science Quarterly</i> , 64(1), 83-87. search.ebscohost.com/login.aspx?direct=true&db=cin20&AN=124402548&site=ehost-live

United States	DNP		DNP	Kalenkoski, J. (2017). Higher education for nurses: A summary of post-graduation options. <i>Nursing Science Quarterly</i> , 64(1), 83-87. search.ebscohost.com/login.aspx?direct=true&db=cin20&AN=124402548&site=ehost-live
United States	Health policy nurse		PhD	Kalenkoski, J. (2017). Higher education for nurses: A summary of post-graduation options. <i>Nursing Science Quarterly</i> , 64(1), 83-87. search.ebscohost.com/login.aspx?direct=true&db=cin20&AN=124402548&site=ehost-live
United States	PhD	3-6	Doctoral	Kessenich, C. R., & Persaud, S. T. (2016). Doctoral degrees: Looking at the options. <i>Women's Healthcare</i>
United States	Doctorate of education (EDD)	3-4	Doctoral	Kessenich, C. R., & Persaud, S. T. (2016). Doctoral degrees: Looking at the options. <i>Women's Healthcare</i>
United States	DNP		Doctoral	Kessenich, C. R., & Persaud, S. T. (2016). Doctoral degrees: Looking at the options. <i>Women's Healthcare</i>
United States	PNP	4-5		Lindell, D., Hagler, D., & Poindexter, K. (2017). PhD or DNP? Defining the path to your career destination. <i>American Nurse Today</i> , 12(2), 36.
United States	DNP	2-3		Lindell, D., Hagler, D., & Poindexter, K. (2017). PhD or DNP? Defining the path to your career destination. <i>American Nurse Today</i> , 12(2), 36.
United States	Advanced generalist role / CNL	15-36 months	Master	Mark, H. D., Twigg, R. D., Barber, L., & Warren, N. (2019). Entry-level master's programs in nursing: Review of programmatic features. <i>Journal of Nursing Education</i> , 58(9), 525-529. doi.org/10.1016/j.nurse.2019.08.019
United States	Advanced practice registered nurse (aprn) (i.e. Clinical nurse specialist, NPS, nurse midwives nurse anesthetists)	MSN		McCauley, L. A., Broome, M. E., Frazier, L., Hayes, R., Kurth, A., Musil, C. M., Norman, L. D., Rideout, K. H., & Villarruel, A. M. (2020). Doctor of nursing practice (DNP) degree in the United States: Reflecting, readjusting, and getting back on track. <i>Nursing Outlook</i> , 68(4), 494-503. doi.org/10.1016/j.outlook.2020.03.008

United States	Advanced practice registered nurse (APRN) (i.e. Clinical nurse specialists, NPs, APRN midwives nurse anesthetics)	DNP			McCaughey, L. A., Broome, M. E., Frazier, L., Hayes, R., Kurth, A., Musil, C. M., Norman, L. D., Rideout, K. H., & Villarruel, A. M. (2020). Doctor of nursing practice (DNP) degree in the United States: Reflecting, readjusting, and getting back on track. <i>Nursing Outlook</i> , 68(4), 494-503. doi.org/10.1016/j.outlook.2020.03.008
United States	APRN	3-5	Doctor of Philosophy in Nursing (PhD) and Doctor of Nursing Practice (DNP)		National Academy of Medicine (2021). <i>The future of nursing 2020-2030: Charting a path to achieve health equity</i> . The National Academies Press. doi. org/10.17226/25982
United States	APRN (nurse practitioners, clinical nurse specialists, nurse midwives, nurse anesthetists) and clinical nurse leaders, nurse educators, nurse administrators	12-18 months	Master's Degree in Nursing		National Academy of Medicine (2021). <i>The future of nursing 2020-2030: Charting a path to achieve health equity</i> . The National Academies Press. doi. org/10.17226/25982
United States	Advanced practice registered nurse (APRN)	2-4			National Council of State Boards of Nursing (2020). A global profile of nursing regulation, education, and practice. <i>Journal of Nursing Regulation</i> . doi.org/10.1016/ S2155-8256(20)30039-9
United States	Advanced practice nursing (APN)	1,5-3	Master's		Pilcher, J. (2020). Considering an advanced degree? <i>American Journal of Nursing</i> , 120(11), 68-71. doi.org/10.1097/01.Naj.0000721948.75891.70
United States	APRN	3	DNP		Reid Ponte, P. (2018). Graduate education options for baccalaureate-prepared nurses. <i>Nursing</i> , 48(7), 16-17. doi.org/10.1097/01.NURSE.0000534104.66025.f6

United States	APRN	2	MSN degree		Reid Ponte, P. (2018). Graduate education options for baccalaureate-prepared nurses. <i>Nursing</i> , 48(7), 16-17. doi.org/10.1097/01.NURSE.0000534104.66025.f6
United States	Advanced practice registered nurse (APRN)	MSN degree			Rice, T., Rosenau, P., Ummh, L. Y., & Barnes, A. J. (2020). United States: Health system review. <i>Health Systems in Transition</i> , 22(4). eurohealthobservatory.who.int/publications/i/limited-states-health-system-review-2020
United States	Advanced practice registered nurse (APRN)	DNP degree			Rice, T., Rosenau, P., Ummh, L. Y., & Barnes, A. J. (2020). United States: Health system review. <i>Health Systems in Transition</i> , 22(4). eurohealthobservatory.who.int/publications/i/limited-states-health-system-review-2020
United States	DNP		Doctor of Nursing Science		Rodriguez, E. S. (2016). Considerations for the Doctor of Nursing Practice degree. <i>Oncology Nursing Forum</i> , 43(1), 26-29. doi.org/10.1188/16.ONF.26-29
United States	PhD		Doctor of Nursing Science		Rodriguez, E. S. (2016). Considerations for the Doctor of Nursing Practice degree. <i>Oncology Nursing Forum</i> , 43(1), 26-29. doi.org/10.1188/16.ONF.26-29
United States	APN		Master's degree		San Martin-Rodriguez, L., Soto, N., & Escalada-Hernández, P. (2018). Academic training for advanced practice nurses: International perspective. <i>Enfermería Clínica (English Edition)</i> , 29. doi.org/10.1016/j.enfide.2018.08.003
United States	NP		Master's degree or Doctoral degree		Sarzynski, E., & Barry, H. (2019). Current evidence and controversies: Advanced practice providers in healthcare. <i>American Journal of Managed Care</i> , 25(8), 366-368.
United States	DNP	2			Terhaar, M. F., Taylor, L. A., & Sylvia, M. L. (2016). The doctor of nursing practice: From start-up to impact. <i>Nursing Education Perspectives</i> , 37(1), 3-9.
United States	NP	2	Master's degree		Thomas, C. M., McIntosh, C. E., & Mensik, J. S. (2016). Strategies for pursuing a master's degree. <i>Dimensions of Critical Care Nursing</i> , 35(3), 147-153. doi. org/10.1097/dcc.0000000000000180
United States	Clinical nurse specialist		Master's degree		Thomas, C. M., McIntosh, C. E., & Mensik, J. S. (2016). Strategies for pursuing a master's degree. <i>Dimensions of Critical Care Nursing</i> , 35(3), 147-153. doi. org/10.1097/dcc.0000000000000180
United States	Certified nurse anesthetist		Master's degree		Thomas, C. M., McIntosh, C. E., & Mensik, J. S. (2016). Strategies for pursuing a master's degree. <i>Dimensions of Critical Care Nursing</i> , 35(3), 147-153. doi. org/10.1097/dcc.0000000000000180
United States	Certified nurse midwife		Master's degree		Thomas, C. M., McIntosh, C. E., & Mensik, J. S. (2016). Strategies for pursuing a master's degree. <i>Dimensions of Critical Care Nursing</i> , 35(3), 147-153. doi. org/10.1097/dcc.0000000000000180



United States	NP	Master's degree	Valiga, T. M. T., & Thornlow, D. (2018). What to consider when choosing a graduate nursing program. <i>Nursing2021</i> , 48(1), 11-14. doi.org/10.1097/01.NURSE.0000527614.67902.8e
United States	Clinical nurse specialist	Master's degree	Valiga, T. M. T., & Thornlow, D. (2018). What to consider when choosing a graduate nursing program. <i>Nursing2021</i> , 48(1), 11-14. doi.org/10.1097/01.NURSE.0000527614.67902.8e
United States	Certified nurse anesthetist	Master's degree	Valiga, T. M. T., & Thornlow, D. (2018). What to consider when choosing a graduate nursing program. <i>Nursing2021</i> , 48(1), 11-14. doi.org/10.1097/01.NURSE.0000527614.67902.8e
United States	Certified nurse midwife	Master's degree	Valiga, T. M. T., & Thornlow, D. (2018). What to consider when choosing a graduate nursing program. <i>Nursing2021</i> , 48(1), 11-14. doi.org/10.1097/01.NURSE.0000527614.67902.8e
United States	Nurse educator	Master's degree	Valiga, T. M. T., & Thornlow, D. (2018). What to consider when choosing a graduate nursing program. <i>Nursing2021</i> , 48(1), 11-14. doi.org/10.1097/01.NURSE.0000527614.67902.8e
United States	Nurse manager	Master's degree	Valiga, T. M. T., & Thornlow, D. (2018). What to consider when choosing a graduate nursing program. <i>Nursing2021</i> , 48(1), 11-14. doi.org/10.1097/01.NURSE.0000527614.67902.8e
United States	Nurse informaticist	Master's degree	Valiga, T. M. T., & Thornlow, D. (2018). What to consider when choosing a graduate nursing program. <i>Nursing2021</i> , 48(1), 11-14. doi.org/10.1097/01.NURSE.0000527614.67902.8e
United States	Nurse practitioner	Master's degree	Valiga, T. M. T., & Thornlow, D. (2018). What to consider when choosing a graduate nursing program. <i>Nursing2021</i> , 48(1), 11-14. doi.org/10.1097/01.NURSE.0000527614.67902.8e
United States	Doctor of nursing practice (DNP)	Master's degree	Valiga, T. M. T., & Thornlow, D. (2018). What to consider when choosing a graduate nursing program. <i>Nursing2021</i> , 48(1), 11-14. doi.org/10.1097/01.NURSE.0000527614.67902.8e

# Chapter 3

## Differentiated nursing practice as a catalyst for transformations in nursing

*A multiphase qualitative interview study*

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## Abstract

### Aim

To identify and follow up on the transition towards differentiated nursing practice among bachelor trained and vocationally trained nurses in Dutch hospitals.

### Design

A multiphase general qualitative interview study.

### Methods

Fifty semi-structured interviews with project managers in charge of introducing differentiated nursing practice to their hospital were conducted. Purposive sampling was used, and data were collected in 2017, 2019 and 2020. A meta-analysis was conducted after independent primary thematic analysis of each data collection.

### Results

The introduction of differentiated nursing practice to Dutch hospitals was perceived as uncertain and ambiguous. Three themes were identified during the transition towards differentiated nursing practice: (1) call to action; (2) sitting and waiting; and (3) new beginnings and open ends. The change to differentiated nursing practice is not straightforward and these findings highlight the emerging awareness among project managers of the nature and complexity of the transition. During the study period,

professionalization of the nursing profession was recognized as fundamental in hospital organizations.

### Conclusion

Nursing cannot be separated from differentiated nursing practice. Visible leadership is important at all organizational levels and nurses' opinions must be considered as nurses are essential to such changes in healthcare.

### Impact

Differentiated nursing practice based on nursing education allows nurses to make the best use of their experience, skills and competencies, and could promote the provision of effective and high-quality patient care. However, in many cases, a nurse's practice role is based on their nursing licensure instead of their educational background. The change to differentiated nursing practice in hospitals is not straightforward and the nature and complexity of the transition needs to be acknowledged. Nurses have an important role in healthcare transformation and need to be active in developing and formulating rather than just implementing the changes.

## Introduction

Healthcare systems are increasingly burdened by challenges, including increasing healthcare costs, increasing demand for care, growing care complexity and increasing pressure for enhanced patient experience and person-centeredness (Byers, 2017; World Health Organization, 2016). Nurses play a major role in responding to these challenges and are at the frontline in delivering vital healthcare (Allen, 2018; World Health Organization, 2020). However, nursing shortages fueled by growing professional dissatisfaction are putting this vital role, and therefore high-quality patient care, at risk. Investing in career development and improving the nursing work environment can help nurses to provide high-quality patient care, encouraging them to come to and remain in clinical practice (World Health Organization, 2020).

Healthcare organizations worldwide have tried to strengthen their nursing workforces by redesigning nursing care delivery models to improve the quality of patient care and create challenging work environments that attract and engage nurses (Dubois et al., 2012; Havaei et al., 2019). Differentiated nursing practice is a nurse staffing model in which nursing roles are defined based on each individual's education and experience (Boston-Fleischhauer, 2019; Dubois et al., 2012). This approach allows nurses to use their individual experience, skills, and competencies to their full potential and may promote the provision of effective and high-quality patient care (Dubois & Singh, 2009; Lavander et al., 2017). Differentiated nursing practice also enables the development of a mixed workforce where challenging roles for nurses are aligned with their educational background (Yoder-Wise, 2019). Several studies have shown that a nurse's educational background affects the quality of patient care and that increasing the proportion of bachelor-trained nursing staff could improve patient, personnel, and organizational outcomes (Aiken et al., 2012; Butler et al., 2019; Haegdorens et al., 2019; Shin et al., 2018; Twigg et al., 2019).

The Dutch nursing organizational model has been described by van Oostveen et al. (2015) as a 'basic functional model' lacking a supportive climate for nursing professionalization. Nurses are dealing with inefficient work processes, high workload, and little managerial support, together with a lack of autonomy and authority (van Oostveen et al., 2015). Furthermore, there is no formal distinction between vocational and bachelor-educated registered nurses; they carry out the same activities, bear similar responsibilities, and receive similar wages (Huisman-de Waal et al., 2019; van Schothorst-van Roekel et al., 2020). Transforming the Dutch

nursing organizational model may improve practice environments and patient outcomes (Dubois et al., 2013).

## Background

For the last 40 years, various attempts to transform the organization of Dutch nursing care and to implement differentiated education-based nursing practice have failed. There are three different educational pathways to becoming a registered nurse: gaining a diploma, vocational training and gaining a bachelor degree. Nursing diplomas are achieved through hospital in-service training and considered equal to vocational training by the Minister of Health in the 1980s but ended in 1997. Roles in nursing practice are based on nursing licensures rather than educational background. In June 2019, the Ministry of Health, Welfare and Sport announced a legislative change that made differentiating nursing practice based on educational background obligatory by law. In doing so, a formal distinction between bachelor and vocationally trained nurses would be made in the organization and design of nursing work. However, this bill was abolished after widespread resistance among nurses, which was widely publicized by the media. Vocationally trained nurses felt threatened and depreciated because they would receive a lower salary and fewer tasks and responsibilities than their bachelor-trained colleagues. Because of this resistance, the Ministry abolished the amendment in October 2019 and handed the task of distinguishing nursing roles and functions over to the healthcare organizations. At the moment, effective measures remain undefined, and reforms are prone to local resistance. In addition, the definition of differentiated nursing practice and what this means in practice remains unclear (Boston-Fleischhauer, 2019; Lavander et al., 2017). These developments are reason to investigate the transition towards differentiated nursing practice in Dutch hospitals.

This research is part of a nationwide study on differentiated nursing practice in the Netherlands. This national research program is called 'RN2Blend' and is financed by the Dutch Ministry of Health, Welfare and Sports. The program focuses on the scientific substantiation and practical guidance of role advancement in the Dutch nursing profession. The aim of RN2Blend is to support the transition to new nursing roles, investigate the professional and economic effectiveness of role distinction, and determine the consequences on patient outcomes.

## The study

The study was designed and executed in accordance with the consolidated criteria for reporting qualitative research (COREQ) checklist (Tong et al., 2007).

### Aim

The aim of this paper is to investigate the transition towards differentiated education-based nursing practice among bachelor and vocationally trained nurses in Dutch hospitals. These insights will (1) improve the design of new nursing roles, functions, and differentiation models; (2) develop activities for successful differentiation; and (3) determine the clinical effectiveness of differentiated nursing practice.

### Design

A multi-phased general qualitative design was used to gain insight into the transition towards differentiated nursing practice in Dutch hospitals as well as the barriers and facilitators to the reorganization process (Percy et al., 2015). In 2017, 2019 and 2020, we conducted semi-structured interviews with project managers in charge of introducing differentiated nursing practice into their hospitals. Figure 1 presents a schematic representation of the research design together with a timeline of the related legislative changes to nursing practice in the Netherlands.

### Participants

We selected hospitals with different characteristics, approaches to the transition, project initiators, and ratios in vocational to bachelor-trained nurses to obtain more widespread information. Respectively four and two of the included hospitals in 2017 were also included in the 2019 and 2020 sample. The project managers were contacted by email and were informed about the aim of the study and invited to help plan an in-depth interview. Contact details were obtained from the Dutch hospital association and the Dutch Federation of University Medical Centers. Seventeen participating project managers were specifically hired for the job as project manager. The others also held different positions and/or functions in the hospital but were all actively involved in introducing differentiated nursing practice and in transforming the nursing organizational model (Table 1).

### Data collection

To gain the most information about how differentiated nursing practice was introduced, open-ended questions were used in the interviews (Supplementary file 1). The main questions can be found in Box 1. The interview guide was structured

Figure 1 | Schematic representation of the research design and process.

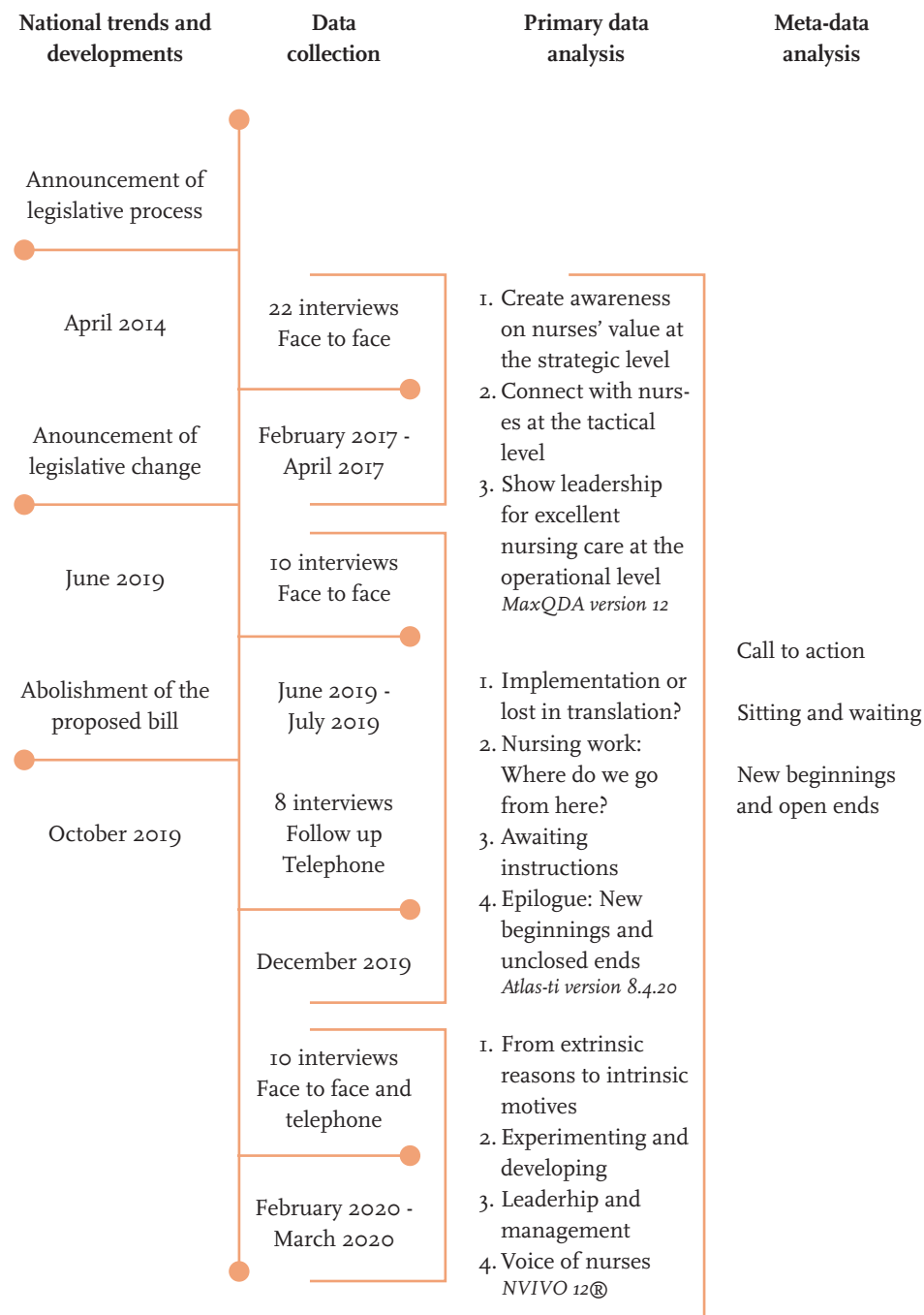


Table 1 | Characteristics of hospitals and participants.

Year of data collection		2017	2019	2020
Hospital characteristics				
Type of hospital	Academic	5	1	-
	Teaching	15	5	5
	General	2	4	5
Division of nurses	% vocationally educated nurses	60-87	50-90	40-80
	% bachelor educated nurses	13-40	10-50	20-60
Total of participated hospitals		22	10	10
Participant characteristics				
Gender	Male	3	1	1
	Female	21	11	12
Age (years)	<25	-	-	-
	25 to 35	3	3	3
	35 to 45	13	6	2
	45 to 55	6	3	3
	>55	2	-	5
Education level	Vocational	-	-	-
	Bachelor	7	3	5
	Academic	17	9	8
Nursing background	Yes	19	7	12
	No	5	5	1
Function	Project manager (hired for the job)	7	4	6
	(Department) manager	1	2	-
	Chair nursing advisory board	6	1	1
	Member nursing advisory board	1	-	-
	Manager educational department	5	2	1
	Advisor educational department	1	-	2
	Advisor human resources	1	3	2
	Secretary hospital board	1	-	-
	Nursing liaison officer	1	-	-
	Policy officer	-	-	1
	Implementation coach	-	-	1
Total responses (n)		24	12	13

by the five components of the model for managing complex change developed by Lippitt (Enterprise Management Limited): vision, skills, incentives, resources, and action plan. The absence of one of these components could lead to resistance or implementation failures.

In 2017, 2019 and 2020, 50 different project managers were interviewed. In three hospitals, the project managers preferred being interviewed in pairs as they held the same position. This was considered as appropriate since they were involved in the same processes and no power relations existed (Wilson et al., 2016). The semi-structured interviews were conducted in Dutch and were digitally recorded (with permission from the participants). The day, time and place of the interviews were arranged at the participants' convenience. Interviews lasted between 45 and 60 min and were transcribed afterwards as data collection and analysis were parallel processes. Data saturation was reached since it was considered that further data collection would bring up similar results (Saunders et al., 2018).

In 2017, interviews were conducted face to face by CO and two nursing science graduates. In 2019, interviews were conducted face to face by JK. After the legislation on differentiated nursing practice was withdrawn, participants were interviewed again to identify any changes in their transitional approach. At this time, four participating project managers were no longer employed at the hospitals; two suggested we interview the new project managers instead. In 2020, interviews were conducted by AZ, one of which was by telephone because of COVID-19 restrictions.

#### Box 1 | Main interview questions.

- Which activities have already been performed in order to start/support the differentiated nursing practice?
- Can you explain the vision behind the practice differentiation in your hospital? What do you hope to achieve?
- Which skills, knowledge, and resources were required to initiate differentiated practice?
- How is differentiated nursing practice implemented in your hospital? What went well? What could have been improved?

### Ethical considerations

The local medical ethics review board approved the study but waived the need for ethical approval. Participation was voluntary, and the project managers were assured of confidentiality and anonymity. Project managers gave written consent to participate in the interviews and for the interviews to be audio recorded. They were fully informed about the study before giving consent and had the right to withdraw at any time. There were no personal relationships between the project managers and interviewers. Data were saved under identification numbers according to the rules and legislations of the participating institutions.

### Data analysis

Data from the interviews conducted in 2017, 2019 and 2020 were analyzed separately and directly after the first interviews were conducted. Various codes and themes were identified from these three data analyses. We compared these data and conducted a meta-analysis to expand knowledge and to create an integrated view of the transition to differentiated nursing practice (Figure 1; Paterson et al., 2001).

#### Primary data analysis

Data were independently analyzed using a thematic analysis approach, which is often used to analyze qualitative data and to better understand patterns and themes across data sets (Braun & Clarke, 2012). Using MaxQDA (version 12), Atlas-ti (version 8.4.20) and NVIVO 12® software, we identified various sub-themes and three or four main themes for each year studied (Figure 1).

#### Meta-analysis of data

The next step of the data analysis was to find commonalities in and derive conclusions from the data collected in 2017, 2019 and 2020 (Paterson et al., 2001). This process goes beyond labelling data and allows the data to be fully comprehended (Thorne, 2020). Code interpretations and findings were discussed among all authors until consensus was reached. New meanings and interpretations were made, and three common themes were created (Figure 1). These themes are defined in Box 2.

### Rigor

We used various strategies to meet the rigor criteria as defined by Guba and Lincoln (1989). All authors were involved in the analysis and interpretation of the findings and in finalizing the article. The joint process of data analysis ensured an in-depth exploration of differentiated practice. Member checks were performed

by summarizing the interviews, reviewing the transcripts, and presenting and discussing the results with project managers. No adjustments were made to the identified themes. All authors are registered nurses and bracketing was used to distance from potentially present preconceptions (Tufford & Newman, 2012). JK is a female registered nurse and PhD candidate and is trained in health and life sciences. CO works as a senior advisor and researcher, and she has a post academic degree. PL is a senior researcher, and he is experienced in qualitative research. AZ is trained in nursing sciences, and she works as a lecturer at a Dutch nursing faculty. In addition, to reduce the risk of biased decisions and interpretations, an agent involved in organizational change reflected on the researchers' interpretation of the results (Polit & Beck, 2012).

Box 2 | Definitions of main themes.

#### Call to action

Related to themes that highlight the need for change and serve as a call for action (extrinsic motivation and minimal involvement of nurses).

#### Sitting and waiting

The wait-and-see attitude of hospitals did not appear to be helpful in initiating change. The introduction of a legislative change was not such a simple solution.

#### New beginnings and open ends

Reference is made here towards the abolishment of the bill, increasing awareness of project managers and the freedom of hospitals to initiate their own transitions without external handles.

## Findings

All project managers found the transition to differentiated nursing practice to be unpredictable but believed in the potential benefits of a differentiated nursing workforce and its contribution to future healthcare. Although all project managers recognized the importance of differentiated nursing practice, many were reluctant to embrace the need for change. We identified three crucial episodes during the transition to differentiated nursing practice: (1) call to action; (2) sitting and waiting; and (3) new beginnings and open ends. In the first episode, the value and

necessity of differentiated nursing practice was not yet recognized, resulting in inefficient approaches and procedures. In the second episode, project managers became aware that the transition is complex and voiced the need for examples and frameworks. The inability to act because of uncertainties seemed to dominate the introduction of differentiated nursing practice in different hospitals. In the third episode, the national policy on differentiated nursing practice was withdrawn and frameworks moved away from these 'wait and see' attitudes. Project managers became aware of the nature and complexity of the transition and saw it as an opportunity to fully adapt the new practice to their hospital rather than depending on external forces to tell them what to do. At the heart of this were systemic changes, and the professionalization of the nursing profession was recognized as fundamental for the hospital as a whole.

#### Call to action

In the run-up to the legislative change, hospitals initiated their transitions and recognized the need for change. Challenges facing the healthcare system were the main reasons for initiating differentiated nursing practice. These challenges included multimorbidity, high patient turnover rates, and the increasing complexity of healthcare. Almost all project managers expected the quality of care to increase through better use of the skills, knowledge and expertise of nurses.

*By applying differentiated practice, every nurse will be deployed at his or her initial educational level. This enables optimal use of everyone's expertise and knowledge and quality of care will be improved. P23*

At this time, introduction of the new legislation forced hospitals to revise their established nursing practices and career pathways, regardless of whether they considered differentiated nursing practice to be valuable or not.

*Actually, it is born out of necessity because we are confronted with the new legislation. It is a must do. At the moment we still have to figure out how we will benefit from it. P29*

This suggests that extrinsic motivation was the driving force for initiating differentiated nursing practice and professionalization of the nursing profession. This greatly reduced motivation and leadership among project managers. Ambiguity of the legislative changes, knowledge gaps, other large-scale projects in the organization, and financial consequences all contributed to this reduction in motivation and leadership. Although extrinsic motivation from the introduced legislation did

initiate a transition to differentiated nursing practice, it was too limited to completely change the nursing care model in hospitals.

Most hospitals responded to the new legislation by defining new roles for vocational and bachelor-trained nurses. However, this approach lacked strategic vision and only a few project managers saw the need to develop a broader vision for differentiated nursing practice.

*You must be aware of the full impact of this transition. We have to advocate strongly for it and I'm sure we're not alone in this thinking. It would be smart to approach these complex transitions deliberately and comprehensively.* P13

*You must be able to explain the motives for change. What is your vision on nursing? That is the basis. Subsequently, you can talk about the actual content of the profession.* P32

All project managers believed that a supportive hospital management board that recognized the importance of the nursing profession was necessary for making successful changes to nursing roles and functions. Transforming the nursing model by introducing differentiated practice achieved the organizations' strategic objectives, but only a few hospitals were able to create a vision on nursing that was widely supported.

*One of the board members was involved in developing the vision on nursing. She was personally motivated to do this and showed commitment and passion. Now she promotes this vision – and that is possible because she knows the vision by heart and is the board member responsible for this project.* P9

Although a supportive hospital management board was essential for successful changes in nursing practice, we found that few were supportive.

*At this moment we have a new hospital management board and they are the exact opposite. They do support the project, but there is a lack of alignment. At the moment, we do not have the wind at our back. We used to have it back then, but we do not have that anymore.* P30

Creating an effective call to action strategy was challenging and all project managers recognized communication and collaboration between different management levels as essential. However, creating a connection between hospital management and hospital workers was difficult and this diminished the motivation to change.

*We have to discuss the organization of care with each other. Now it is fragmented. Everybody advocates for his own 'piece of the pie' and 'preaches for his own parish'.* P19

*The current governance structure demotivates nurses. Why should you professionalize at all if you are not involved in decision-making and have to leave direct patient care if you want more control over nursing practice? For most of the nurses, patient interaction is their first passion.* P1

Hospitals face political dynamics and awareness of different interests seemed to be an important issue. Nurses appeared to be minimally involved in shaping the nursing organizational model or their own work environment. Project managers reported a lack of knowledge, awareness and interest among nurses.

*Nurses must take their profession seriously, so they have to take responsibility for their own professional development. Now they wait patiently until something happens, thinking, 'we have always done it this way', and 'the management has to tell me when and how to change'. They have to exert and exercise greater guidance over the direction of their profession.* P20

This quote highlights that, although the transition to differentiated nursing practice was directly relevant to nurses, they were not involved in directing the reorganization of their work. The minimal involvement of nurses together with extrinsic motivation and lack of strategic management highlighted the need for action to achieve the desired organizational changes.

### Sitting and waiting

The external environment and national developments appeared to play a major role in getting the internal organization moving. The lack of clarity on educational requirements for new professional and function profiles complicated the enforced transition to differentiated nursing practice. The Dutch hospital association provided general guidelines for (1) developing local job descriptions; and (2) essential project elements and project management needed for successful differ-

entiation. Some project managers saw this as helpful in preventing ambiguities that could reduce disagreement among nursing staff.

*Hence, we have created something unique that fits the hospital. We did not come up with something we thought of ourselves, it is derived from the general guidelines. P31*

Hospitals were responsible for translating new professional profiles into local job descriptions and for developing educational programs for new or neglected competencies. However, the legislative changes caused concerns and resistance among nurses making it difficult for some hospitals to continue their change process. This hindered the clear definition of nursing roles and functions. One project manager indicated that these uncertainties postponed change implementation in their organization:

*We consciously did not call for action since this creates many concerns. We have seen this in other hospitals. There is simply still too much uncertainty. P29*

Support for change was reduced by a lack of clarity on how successful the change would be and what the differentiation model should look like, for example the optimal ratio of vocational to bachelor-trained nurses. As a result, some project managers were waiting for a policy from the hospital association or practices from other organizations.

*What kind of competencies are we actually talking about and what will be visible in practice? If that is not clear to me right now, why would it be clearer later? It requires a good conversation about the expectations and communication. P28*

Strategic considerations were identified that postponed experimentation and action. Project managers observed the direct environment and based their actions on the decisions of other hospitals, which made the change process inert. This competitive element among hospitals led to complex dilemmas – on the one side, becoming an attractive employer by investing in development opportunities and on the other side, losing vocationally trained nurses because of depreciation.

*There is consultation with surrounding hospitals about this project [red. differentiated nursing practice]. We are in a competitive environment [...]*

*The project can be of great influence whether you can easily attract nurses and whether you can easily lose them. P24*

Although action was difficult at this time, project managers seemed increasingly aware of the scale and complexity of the change. Introducing new legislation was not a simple way to achieve successful change.

### **New beginnings and open ends**

After the bill was withdrawn and the resistance among vocationally trained nurses dissipated, we expected hospitals would take no further steps to introduce differentiated nursing practice. To our surprise, the follow-up interviews showed that all project managers were motivated to continue their projects. The extrinsic motivation from the legislation had made them aware of the possible benefits of practice differentiation.

*The announcement of the legislative change was a nice catalyst. We had to talk to each other and think about it. You had to do something. That necessity has faded a bit now. P41*

Many project managers now realized that introducing differentiated nursing practice was not just about introducing a simple new work procedure. They acknowledged that it was a process of change and that reform and developing a clear vision and strategy were important.

*Our starting point was that the implementation of differentiated practice is a change process, where all wards must go through a development phase to experience what the implementation means and how it works side by side. P42*

The transition of the nursing profession required vision and strategic direction. However, some hospitals adjusted their policies in response to resistance. For some organizations, the negative associations with differentiated nursing practice increased focus on labor market trends. Hospital managers were afraid of losing nurses and thought they could recruit and retain nurses by improving working conditions.

*So we said above all, we will focus on the labor market. [...] we have focused on our employees and the labor market as reason to continue. Not so much because the quality of care will be improved. Of course, it is a nice*

*bycatch, but again if you have so many nursing shortages that will not be convincing.* P35

Organizations had to explain why continued reforms were needed. To do this, they described positive experiences from departments that already experimented with differentiated practice.

*This pilot ward is really enthusiastic, and we have seen satisfying results there. They are doing really well. That's so nice to see, that they get positive energy and go for it.* P50

Opinions were divided now that the national legislation had been withdrawn. Some project managers were happy that they were finally able to organize and design the differentiation themselves, while others still felt dependent on national developments and practical frames.

*I am a bit apprehensive since the consequences are unknown. Looking into the crystal ball is impossible and we don't know the effects of our choices. On the other hand, this does fit our hospital instead of doing something that is imposed by law. This comes from within the organization. In this way it is more natural and powerful.* P39

The importance of a bottom-up approach where nurses are involved in the change process was recognized by all project managers. Some tried to create safe and supportive environments by actively involving the unit managers. This encouraged communication with nurses. After the turbulent summer of 2019, project managers wanted to connect with nurses, create support and develop leadership. This promoted nurse accountability and ownership.

*There is so much going on and we want to hear from the nurses themselves how they are doing. At this moment, the core is the development of the nursing profession.* P33

*Within the hospital, this is really something we like to develop bottom-up. I notice that it brings very nice things and that nurses really get the feeling that they can show leadership and that it is up to them.* P47

The cancellation of the proposed bill somehow served as a wake-up call for action. Hospitals progressed in their different ways to shape their own vision for nursing.

There was an incentive to embrace the historic and institutionalized complexity of the situation and to further develop and reinforce the nursing work environment. New beginnings and open ends seemed to stimulate a successful transition towards differentiated nursing practice as a forward-facing discipline.

## Discussion

In this study, we found that the transition towards differentiated nursing practice in Dutch hospitals can be characterized by three crucial episodes: 'call to action', 'sitting and waiting', and 'new beginnings and open ends'. The introduction of differentiated nursing practice was met with resistance at first because it was imposed upon hospitals by a new national legislation and was driven by extrinsic motives. Gradually, hospitals became aware of the importance of the transition and realized the need for intrinsic motives. Once the imposed legislation was withdrawn, many hospitals developed a bottom-up approach and placed emphasis on creating a clear nursing vision.

## Main findings

Project managers expected that differentiated practice would improve patient, nurse, and organizational outcomes in their hospitals. They were already following existing research on work satisfaction of nurses, health status of patients, quality of care, and adequate utilization of staffing levels in hospitals (Needleman et al., 2020; O'Brien-Pallas et al., 2011), but a strategic vision on how to professionalize the nursing profession was not always present. Project managers were keen to invest in the skills and knowledge needed to meet the requirements of the new legislation but did not realize the importance of a support system to help nurses consolidate these new responsibilities and behaviors (Wagner et al., 2010). This may reflect a lack of commitment or ignorance about nursing at the middle management (Lalleman et al., 2016) and strategic level (Rasheed et al., 2020). It seems probably that vast changes concerning the nursing profession and the organization of nursing care are kept into localities of the nursing silo and nursing is seen as a separate domain.

Project managers focused on the practical distinctions between new nursing roles and functions, such as the development of new function profiles and project plans for their nurses. However, the quality of nursing care was also relevant not only to nurse staffing and scope of practice but also to the nursing practice environment as a whole (Allen, 2018; Dubois et al., 2012). This raises the question of whether

the transition to differentiated nursing practice was restricted to bachelor and vocationally trained nurses rather than transforming nursing functions, roles, and positions in hospitals. New roles and functions will create challenging new career opportunities for nurses and help them to develop a strong professional identity and leadership on all organizational levels (Ewens, 2003; van Oostveen et al., 2017).

The participating hospitals reported that they wanted to learn from the experiences of other hospitals about how to execute the differentiation. However, no major transitions were made in the past several years, suggesting that this 'wait and see' approach is not conducive to change. Austin et al. (2016) concluded that the 'wait and see' approach is ineffective at initiating complex change. The need to attract nurses and overcome the nurse shortage created a dilemma: on the one hand, focusing on practice differentiation could create new career paths that attract nurses. On the other hand, vocationally trained nurses could feel depreciated by the changes and quit. Strategic decision-making processes varied between hospitals; some felt more dependent on national guidance and practical frames than others did. Although the bill was withdrawn, it motivated hospitals to make decisions and ultimately take further steps in transitioning towards a differentiated practice. This confirms that hospitals need to make strategic decisions based on long-term visions (Austin et al., 2016).

The initial dependence of project managers on national guidance suggests that moves to transition towards differentiated practice would stop after the bill was abolished. However, all project managers chose to continue with the transition after the bill was withdrawn. The bill provided an external stimulus that initiated the change, which was then internalized. Many changes in healthcare are externally driven and it is important to understand how motivation can be encouraged at the individual level (Breckenridge et al., 2019). In this case, managers, policy makers, and politicians learned that making decisions on behalf of nurses can be disastrous (Felder et al., 2020). The legislative change triggered widespread resentment and demotivation among nurses but helped them to realize that they needed to be involved in the transition towards new nursing practice. Emphasis must now be placed on joint decision-making between nurses and hospital management (Rasheed et al., 2020). Seeing the long history of differentiated nursing practice (Matthias, 2015), the basic moral values of nursing must be debated, and nurses must be emancipated and allowed to play a leading role in the transition to differentiated nursing practice (van der Cingel & Brouwer, 2021).

Over time, project managers started to realize that professionalization of the nursing profession was fundamental to the hospital. This kind of 'episodic change' is infrequent and discontinuous and strategic efforts are needed to guide the organization in the right direction (Johansen et al., 2018; Weick & Quinn, 1999). However, most project managers lacked the management skills needed to guide this transition, which might explain why the impact of the transition and the crucial role of nurses were underestimated. It would probably have helped if project managers recognized the importance of nurse role differentiation in hospitals from a 'historic institutionalized' perspective focused on continuous change (Suddaby et al., 2013).

### Study limitations

There are a few limitations to the present study that should be considered when interpreting the results. First, the findings are only applicable to nursing practice in Dutch hospitals, although similar findings on differentiated nursing practice in the United States were described by Matthias (2015). Despite this, the present findings may help to predict trends in nursing practice transitions in other countries. The finding that a high number of bachelor-trained nurses is related to better patient outcomes has triggered hospitals worldwide to review their nursing care system (Aiken & Fagin, 2018). Finally, the differentiation of nursing practice is a dynamic process; however, we collected our data over time and believe that our results reflect the constant changes of the past few years.

### Recommendations for practice

This study provides valuable insight into the reorganization of nursing practice. First, we showed that it is crucial that hospitals actively anticipate changes to their environment and strategically plan nursing work accordingly (Austin et al., 2016). Nurses should be involved in policy making and in the differentiation of nursing practice at the organizational and national level (Rasheed et al., 2020). This could be accomplished by formulating clear roles, responsibilities, and expected behaviors for nurses, and by establishing nursing shared governance allowing nurses to make decisions in the reorganization of nursing practice (McKnight & Moore, 2021). Furthermore, supportive, visible nursing leadership should be created (Lalleman et al., 2016; Lasater et al., 2020; van Oostveen & Vermeulen, 2017).

## Conclusion

The introduction of differentiated nursing practice is not a straightforward change process and an external stimulus appeared to be needed to start and acknowledge the nature and complexity of the transition. The professionalization of the nursing profession is a great challenge for hospitals and cannot be realized by external motives such as the proposed legislative change. Visible leadership at all organizational levels is important wherein dialogues about the polyphony and multitude of perspectives need to be recognized. Nurses' voices need to be heard since they are essential for transformation of the nursing organizational model.

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### Supplementary file 1 | Interview guide structured by model for managing complex change

Questions and topics	
Main question	
Question	Which activities have already been performed in order to initiate differentiated nursing practice?
Topic	<i>Rationale (quality and patient safety, national developments, quality incentive grant)/function differentiation/nursing organizational structure/choice based on/phase of implementation</i>
Vision	
Question	Can you explain the vision behind the practice differentiation in your hospital? What do you hope to achieve?
Topic	<i>Key values/knowledge/multidisciplinary collaboration/autonomy of nurses/working environment/impact on nursing practice/culture/management support/professional practice model/current situation/development/involved in decision-making/translation/motivation</i>
Skills/resources	
Question	Which skills, knowledge, and resources were required to start the program of practice differentiation?
Topic	<i>Education/collaboration/innovation culture/finance/barriers and facilitators/ positive- negative experiences/organizational and clinical representatives/ different phase of implementation/feasibility/working environment/control/ recommendations</i>
Action plan	
Question	How is differentiated nursing practice implemented in your hospital? What went well? What could have been improved?
Topic	<i>Reality vs expectations/changes/organizational and clinical representatives/ communication/staging/orientation phase/perspectives/assuring/reporting/ barriers and facilitators/strategy/pilot</i>
Final question	Is there anything we did not ask, but which you think it is important?



# Chapter 4

## Organizational rigidity and demands

*A qualitative study on nursing work in complex organizations*

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## Abstract

### Background/Objectives

The nursing work environment is a critical element in healthcare delivery and a strong predictor of both patient and nurse outcomes. Understanding the complexity and multifaceted nature of this environment is essential for improving nursing practices and optimizing healthcare systems. This study aimed to gain insights into the perceived characteristics of the nursing work environment, considering it as a complex and multifaceted system.

### Methods

A qualitative research approach was employed, involving 42 semi-structured interviews with 43 nurses and managers from academic, teaching, and general hospitals in The Netherlands. Data were collected between July 2020 and August 2021 through convenience sampling. Thematic coding was conducted to identify key patterns and themes.

### Results

The findings revealed that nurses demonstrated flexibility and a strong commitment to high-quality care, despite grappling with rigorous organizational tasks and processes. Four key themes emerged: (1) direct patient care as a standard feature of nursing work; (2) nurses' flexibility for hospital productivity; (3) interdependencies, which decrease autonomous nursing practic-

es; and (4) organizational structures that determine how nurses can shape their work. Nurses found it difficult to balance direct care with broader tasks due to organizational rigidity, revealing a gap between ideal nursing practices and daily reality.

### Conclusions

This study highlighted the challenges within the nursing work environment, particularly in balancing direct care with organizational demands. Addressing this gap between ideal nursing practice and reality requires a systems approach. This includes autonomous practices, supportive management, and flexible structures, allowing nurses to shape their work and enhance job satisfaction and care quality.

## Introduction

The nursing work environment is crucial for providing high-quality patient care because it substantially impacts numerous critical aspects such as nurses' job satisfaction and retention (Aiken et al., 2013), patient outcomes (Aiken et al., 2011; Nascimento & Jesus, 2020), and organizational performance (Aiken et al., 2012; Wei et al., 2018). Nursing work environments are multifaceted, defined as “the organizational characteristics of a work setting that facilitate or constrain professional nursing practice” (Lake, 2002). Key elements include education and training opportunities for nurses, their involvement in policy-making, relationships with managers and physicians, autonomy, and adequate staffing levels (Lake, 2002; Maassen et al., 2021).

Nurses work in a dynamic healthcare ecosystem, engaging directly with patients, collaborating with other professionals, and navigating various policies, norms, and values. This dynamic nature, constantly changing and evolving, makes the healthcare system unpredictable (Thelen et al., 2023). In their daily practice, nurses are confronted with situations that demand quick decision-making. They are not only responsible for direct patient care but must also respond to ongoing changes, such as new technologies, updated protocols, and shifts in patient volumes (National Academies of Sciences, Engineering, and Medicine, 2021). To effectively manage these challenges, nurses need a clear understanding of the entire healthcare system and recognize how their actions influence other parts of the system, which are also influenced by it. This underscores the importance of acknowledging the dynamic nature of the healthcare system when improving the work environment (Swanson et al., 2012; World Health Organization [WHO], 2020). Improving these environments is crucial for enhancing outcomes for patients, nurses, and healthcare organizations (Aiken et al., 2012).

As healthcare systems worldwide face rising patient demands, staffing shortages, and the need for more efficient, patient-centered care, the pressure to create environments that support and empower nurses has intensified (Buchan et al., 2022; WHO, 2021). In response to these challenges, healthcare organizations are reconsidering nursing roles, functions, and tasks to better meet the evolving needs of nurses and patients. Some countries divide their nursing workforce based on skills and competencies, whereas others perform so based on educational background. For example, the differentiation of nursing practice, coupled with an increase in the proportion of bachelor-educated nurses, maximizes the skills and expertise of each type of nurse and allows for more efficient and effective patient

care delivery, such as reduced length of stay and a lower mortality rate (Aiken et al., 2011; Haegdorens et al., 2019).

In the Netherlands, differentiated nursing practices among registered nurses have been introduced. Numerous healthcare organizations have restructured their nursing practices to create a more efficient and professional work environment by strengthening nurses' roles within the organization, boosting the nursing profession's attractiveness, and elevating the quality of care (Van Kraaij et al., 2022). This transition extends beyond bachelor- and vocationally trained nurses; it involves a comprehensive transformation of nursing functions, roles, and positions within the organizations as they seek to reinforce the professionalization of nursing (Van Kraaij et al., 2022; Schalkwijk et al., 2024). These changes highlight the importance of using a systems thinking approach to understand the nursing work environment. This approach views the environment as a complex network of interactions between healthcare professionals, patients, and organizational structures (Thelen et al., 2023). Systems thinking recognizes how actions in one part of the system can impact the overall performance. By adopting this perspective in healthcare practices, organizations can better understand how individual actions influence the entire system. This leads to stronger connections and greater awareness of the dynamics within the healthcare environment (Swanson et al., 2012).

With the introduction of differentiated nursing practice, a comprehensive understanding of the complex nursing work environment and the necessary changes at all levels within the system is crucial (Swanson et al., 2012; Van Kraaij et al., 2022). Further research is needed to identify the factors at individual and system levels that enable nurses to thrive in a challenging work environment filled with complexities, uncertainties, and unpredictability (National Academies of Sciences, Engineering, and Medicine, 2021). Understanding how significant changes, such as differentiated nursing practices, can be effectively integrated into nurses' work is crucial. Gaining deeper insights into nursing work environments can lead to improvements in nursing practices, enhance patient care, and optimize healthcare systems (Aiken et al., 2012; WHO, 2021). Therefore, this study aims to explore the perceived characteristics of the nursing work environment while considering it a complex and multifaceted system.

## Materials and Methods

The study was designed and executed in accordance with the COnsolidated criteria for REporting Qualitative research (COREQ) checklist (Tong et al., 2007).

### Design

A qualitative descriptive approach was used to explore the perceived characteristics of the nursing work environment. Qualitative research offers valuable insights into health systems' complexities, including behaviors and perceptions (Thelen et al., 2023). By considering the perceptions of nurses and managers, we uncover the elements, strengths, and challenges concerning the nursing work environment, such as the implementation and transition towards differentiated nursing practices. Examining various perspectives enhances understanding of how actions and changes affect different parts of the system (McNab et al., 2020).

### Study settings and recruitment

In total, 22 nurses, 13 unit managers, 7 cluster managers, and 1 HR manager (see Box 1 for role descriptions) working in 3 different hospitals were selected by convenience sampling. The hospitals were selected based on their size, geographic location, and type. Characteristics of the selected hospitals and interviewees are shown in Table 1. Cluster managers were asked to distribute an invitation mail among their unit managers and nurses. The invitation mail explained the nature and aim of the research project and how we planned to use the results. Nurses and managers who were interested in participating were invited to schedule an interview by email.

Box 1 | Role descriptions of managers.

**Unit managers** are often referred to as head nurses or team leaders, and they possess a nursing degree. They are responsible for overseeing the operations within a hospital's nursing department. This involves supervising the nursing staff and managing resources and budget.

**Cluster managers** have a broader perspective on nursing management and coordination across various departments. They ensure that the hospital's vision, policies, and procedures are translated and followed across all nursing departments within their cluster.

**HR managers** are involved in workforce management, handling the recruit-

ment, training, and retention of nursing staff to meet both the needs of the departments and organizational goals.

Table 1 | Characteristics of hospitals and interviewees.

Hospital characteristics		N	%
Type	Academic	15	
	Teaching	15	
	General	13	
Number of beds	< 500	1	
	500-1000	1	
	> 1000	1	
Number of nurses	> 2000	1	
	1000-2000	1	
	< 1000	1	
Interviewee characteristics			
Gender	Male	8	18.7
	Female	35	81.3
Age (years)	< 25	1	2.3
	25-34	11	25.6
	35-44	12	27.9
	45-55	9	20.9
	> 55	10	23.3
Education level	Vocational	8	18.6
	Bachelor	24	55.8
	Academic	11	25.6
Function	Nurse	22	51.2
	Unit manager	13	30.2
	Cluster manager	6	16.3
	HR manager	1	2.3
Total responses		43	

<sup>1</sup> N=number of hospitals

<sup>2</sup> N=number of interviewees

## Data collection

In total, 42 semi-structured interviews with 43 nurses and managers were conducted by JK and EL. Semi-structured interviews involve the use of predefined questions while allowing flexibility to introduce new questions as the interviews progress (Myers, 2013). We chose to conduct individual interviews to explore the personal and detailed thoughts and feelings of the nurses (Carter et al., 2014). Two nurses were interviewed together as they both worked in the same department and did not want to be interviewed individually. An interview guide was used during the interviews (Supplementary file 1). Each interview started with the question “What does the patient’s care process from admission to discharge look like?” to identify nurses’ organizational tasks, processes, and dependencies. Further questions were inspired by items from the Practice Environment Scale of the Nursing Work Index (PES-NWI), a tool validated for assessing the quality of the nurses’ work environment (Lake, 2007). New topics have been incorporated to keep the interview guide up to date with current nursing practice and aligned with a sociotechnical systems perspective (Harrison et al., 2007).

Interviewees were asked about control over their practice setting and teamwork. The interviews were held in Dutch and digitally recorded with the interviewee’s permission. All interviewees were interviewed once, and the interviews took place between July 2020 and August 2021. The day and time of the interviews were arranged to suit the interviewees’ preferences. A total of 14 interviews were held face-to-face and 27 via a video call. Informed consent was obtained from the interviewees before the interviews started. The interviews lasted between 45 and 60 minutes.

## Data analysis

Data were collected and analyzed in parallel so the interview guide could be modified. The interviews were transcribed verbatim in Dutch by a paid transcription service. A confidentiality agreement was in place, and the company was approved by the Privacy Office at Radboud Academic Medical Center. The transcribed data was randomly checked against the original audio for accuracy.

Atlas-ti version 8.4.20 (ATLAS.ti Scientific Software Development GmbH, Berlin, Germany) was used for thematic coding. Inductive coding was used to formulate themes and stay connected to the data without a pre-existing frame or theory (Braun & Clarke, 2006). The six phases of thematic analyses included familiarization with the data, the creation of codes, and the search for and definition of themes.

First, JK, AB, and EL independently coded a subset of the interviews, aiming to gain insights into the characteristics of the work environment. This open coding round labeled all perceived important elements of the work environment. After completing this initial coding round, we discussed the findings and compared the codes. This led to the creation of a preliminary codebook covering thirteen dimensions such as nursing tasks, facilities, work pressure, management roles, nurses' ambitions, and COVID-19 impact. Following this, JK and AB independently coded the remaining interviews using the agreed-upon codebook, refining and expanding labels. Regular communication was maintained throughout this process to ensure consistency in the application of codes and to address any ambiguities. At the end of the coding process, the team collaboratively reviewed the codes and themes, ultimately formulating four final themes that captured the essential characteristics. These themes were grounded in the data and reflected individual experiences and broader organizational patterns. Finally, the sixth phase involved drafting the report. We synthesized the data and created a narrative that showed how the themes connected to the research questions. JK wrote the initial draft, and all co-authors reviewed and checked the content multiple times.

### Ethical considerations

The local medical ethics review board (Radboud Academic Medical Center, Nijmegen, the Netherlands) declared this study exempt from ethical approval for human subject research (study number: 2019-5992). This decision was made because the study did not involve any interventions that could impact participants' health or well-being. Participation was voluntary, and confidentiality and anonymity were assured. Interviewees gave written or verbal consent to participate in the interviews and for the interviews to be audio recorded. They were fully informed about the study before giving consent and had the right to withdraw at any time. There were no personal relationships between the interviewees and interviewers. Data were saved under identification numbers according to the rules and legislations of the Radboud Academic Medical Center.

### Rigor and reflexivity

All authors contributed to analyzing and interpreting the findings, as well as finalizing the article. We applied investigator triangulation by involving multiple researchers, which allowed us to integrate diverse perspectives into the analysis. This approach ensured that the findings were validated through a range of viewpoints and areas of expertise (Carter et al., 2014). The roles and potential influence on the research process and findings were critically examined and discussed. JK is a nursing science PhD candidate with a background in nursing, business admin-

istration, and health and life sciences. CO is a nursing dean and senior researcher and holds a post-academic degree in nursing. FvM is a professor of operations management and logistics in healthcare. HV is a professor of nursing science and clinical epidemiologist. EL works as a research nurse and an MSc candidate in nursing science at the time of the study. AB is a research assistant.

Additionally, we conducted member checking by presenting the preliminary results to interviewees at one of the three participating hospitals for validation. This process helped ensure credibility by allowing the interviewees to confirm or clarify our findings (Braun & Clarke, 2006).

## Results

Each participating hospital organized their nursing care differently with a variety of tasks and organizational processes. Variations in how differentiated practices were designed and introduced had their own impact on daily nursing practice. Some hospitals clearly distinguished nursing roles and functions based on training, skills, and experiences. In contrast, others adopted a more flexible approach, with all nurses handling similar tasks regardless of their education.

A common form was differentiation in nursing tasks between regular and specialized nurses. Specialized nurses had received specialty education and were assigned to patients requiring complex care procedures, such as mechanical ventilator support or complex wound management. There were also differences in the distribution of nursing tasks between bachelor-trained and vocationally trained nurses. Bachelor-educated nurses were 'nurse coordinators' and vocationally trained nurses were 'general nurses'. This differentiation was not based on complex patient care, but on the execution of transcending and overarching tasks such as coaching colleagues or applying evidence-based practice. At some departments, there was no differentiated nursing practice—nurses were assigned to all types of patients and tasks, despite different educational backgrounds.

All participating nurses were committed to delivering high-quality care and were dedicated to the well-being of their patients. Managers required nurses to be flexible, including adapting to changes in workload distribution and embracing new practices. However, the hospitals strictly adhered to established rules and procedures, and centralized control from the higher management was the norm. We found that, within these systems of numerous interconnections and complexities,

the responsibility for addressing patient care challenges often fell on the shoulders of the nursing staff. This tension between expected flexibility and rigid organizational structures manifested in four critical aspects of the nursing work environment. These themes reveal a gap between the ideal vision of the nursing profession and the reality of the current nursing environment. We observed essential elements within the nursing culture in hospitals, which their organizational structures also reflected. This created challenges in introducing improvements within the work environment, such as differentiated nursing practice.

### Direct patient care as a standard feature of nursing work

In general, the work environment was perceived as supportive for carrying out routine activities, such as daily recurring technical nursing activities. Both nurses and managers associated the essence of nursing work with the execution of direct patient care and did not link it directly to activities such as quality improvement or evidence-based practice. Nurses identified themselves as being responsible for direct patient care and being meaningful to the patient.

*I would call it a habit. Nurses still think: I do my job at the bedside and other people will execute the tasks beyond that. [...] they think: why do I have to be the one to do these suggestions? I'm working with a patient. In my opinion you're also working with the patient when revising quality documents for which you need the manager or director. However, on a different level. This switch is yet to come.* P25 NURSE

This perspective on the composition of nursing tasks was also seen in the interactions and expectations from colleagues. Nurses collaborated with and supported each other in direct patient care.

*Care workers naturally tend to help, to take over, and to close gaps. When I started working here, I thought this was one of the biggest problems. They just keep walking until they drop. They are not improving processes, but closing gaps because they want to do the right thing for the patient.*

P17 CLUSTER MANAGER

Differentiated nursing practice among bachelor- and vocationally trained nurses appeared to play a role in involving nurses in indirect nursing care activities. Some interviewees pointed out that designating 'nurse coordinators' and 'general nurses' enhanced the clarity surrounding the allocation of responsibilities and expectations among nurses, as well as their communication with unit and

cluster managers. For instance, one unit manager outlined how these roles were distributed, highlighting the nurse coordinator's (new) pivotal role in coaching and mentoring:

*Our triangle includes a nurse coordinator, an experienced vocationally trained nurse, and an inexperienced vocationally or bachelor-trained nurse. These three take care of a number of patients and the nurse coordinator is assigned to fewer patients than the other nurses. This creates more space for the nurse coordinator to coach colleagues, apply evidence-based practice, or monitor working group processes.* P19 UNIT MANAGER

In the organization of both direct and indirect nursing care, it was crucial for nurses to experience a strong sense of support from the hospital. Acknowledgement and appreciation of nurses' workload by higher levels of management were essential to underscoring the value of their contributions. Nonetheless, the one-sided perspective of nursing work, which is centered on bedside care for individual patients, appeared to be deeply rooted, influenced by both organizational expectations and nurses' own beliefs.

*I made the agreement that on Fridays, I am not available for the ward, but I will be present. I make sure not to wear my white uniform, so it is clear that I am there in a different role. The moment you wear the white uniform, you get caught up even in the smallest things* P2 NURSE

Nurses' flexibility is needed for hospital productivity

There seemed to be a great need for flexibility from nurses to align capacity with fluctuating demands. Nurse capacity did not seem sufficient to combine direct and non-direct patient care activities. Hospitals were looking for efficient ways to organize nursing work and deploy their nurses. Some interviewees noted advantages towards self-scheduling because it granted nurses more influence in shift allocations.

*If you handle the scheduling yourselves as a team, you allow everyone a degree of influence while setting specific requirements and consequences for not complying [...]. I think that it is most effective when individuals get the opportunity to participate in this process.* P4I NURSE

One hospital planned to experiment with employability of nurses across different departments. In this way, they hoped to balance the demand for care and nursing

supplies. The available capacity was calculated based on the average demand of care and patient population. A flexible shell was created where a number of nurses from different departments could be called up to work at another department to answer (temporary) high patient demands.

*We prepare the nursing work schedule based on the average [patient-to-nurse ratio]. Therefore, you have a basic team for the average patient population. In case of peaks, you can receive help from the neighbor department. We create clusters and nurses can be lent out within that cluster.* P39

CAPACITY MANAGER

However, this policy remained theoretical because of growing resistance among nurses. Nurses did not like the idea of working in different teams, and they were unable to consistently apply their expertise in certain departments. Consequently, despite potential gains in efficiency, hospitals hesitated out of concern that nurses might experience reduced job satisfaction and consider leaving the organization. The focus was primarily on productivity and achieving sufficient output, with nurses brought in to meet these demands. Consequently, the specific needs of nurses were sometimes overlooked, and too much flexibility was demanded.

*“If you deploy people [Nurses] too flexibly, there will be a higher rate of absenteeism. We will end up losing our staff as people do not want that. I get the impression that there is an assumption: ‘you are a general nurse, widely deployable, so you should do that.’”*

### Interdependencies decrease autonomous nursing practices

The flexibility of nurses was also reflected in the multitude of dependencies observed in their daily work. These work interdependencies were a significant factor influencing the organization and structure of nursing work processes. Nurses highlighted that the differentiation in nursing tasks between regular and specialized nurses increased interdependency in the execution of tasks for both regular and specialized nurses. For instance, certain procedures, like administering chemotherapy treatments or specific dialysis procedures, were exclusively within the purview of specialized nurses. Consequently, different nursing colleagues had to collaborate and coordinate the planning and sequence of care delivery for the same patient during a single shift. These interdependencies created challenges for nurses in managing their individual workload.

*It's possible that certain procedures may be restricted. For instance, we have a chemotherapy treatment [...] once you have completed a certification process, you're authorized to independently administer it.* P5 NURSE

Nurses were already facing numerous interdependencies with other departments and disciplines. The most frequently mentioned ones pertained to physicians, particularly in decisions related to treatment protocols and patient rounds.

*We experience many dependencies on the physician. If the physician has some delay, then we are stuck in our work.* P8 NURSE

Support processes like quality management or organization management were centrally organized and allocated outside the nursing teams. For instance, the organizational board mandated the use of various questionnaires and measurements to assess the quality of care and nursing practice errors. These outcomes were evaluated outside the department. This centralized organization of processes reflected a rigid structure with decision-making concentrated at higher levels of the hierarchy. This further compounded the nurses' reliance in their daily tasks and failed to foster professional accountability and ownership. Some interviewees regarded this as self-evident and the best way to organize these activities. Others had a more critical perspective, questioning whether it might be more effective to conduct these evaluations within the team since they were uncertain about how to use the results. The added value of quality management was not recognized, and the results did not stimulate self-learning and improvement. One nurse mentioned:

*I am not sure, but I think this is being done hospital wide. I think there are hospital-wide projects, and these results will undoubtedly end up somewhere. Yet I have never seen them, so they are not directly leading to us.*

P13 NURSE

Nurses found it challenging to initiate and complete such quality improvement projects because of the rigid structures and their impact on work schedules. Embracing autonomous nursing practice, where nurses assume responsibility for their entire scope of work, could create opportunities to allocate time and resources for quality management projects.

*It is necessary that I indicate in time that I need a day off indirect care to get started with it. If not, I will be scheduled for direct patient care and I*

*know it just won't happen then. You have to find the space yourself [...], you have to take that initiative and figure it out yourself. That you get those days scheduled to get started with it.* P13 NURSE

### Organizational structures are leading in how nurses can shape their work

To stimulate autonomous nursing practices and the performance of transcending and overarching tasks, nursing teams established specialized working groups focusing on areas such as hygiene prevention, evidence-based practice, and specific diseases. This encouraged nurses to play a more active role in advancing their professional knowledge. However, constraints such as limited time and inadequate financial resources hindered nurses from actively engaging in these working groups. Despite the efforts of unit managers to create space for these activities, it was not always practical or feasible during day-to-day operations as patient-care tasks took precedence. The scarcity of allocated time and the prioritization of direct patient care appeared to obstruct the actual realization of these activities in practice.

*You need to ensure time is provided. It takes some searching, but you can request for non-direct patient care activities [...]. We are often short on time, especially if it is a larger project. One day off is not enough. One day every two months is not much and during direct patient care, we do not have the time for it.* P13 NURSE

Staff shortages further complicated these efforts, as nurses assigned to indirect patient care activities were pulled back to the ward when others called in sick, reducing time for quality management. *“There is an area of tension. You want to improve quality in the background, but you also want to deliver quality care on the ward.”* P37 NURSE

Both unit and cluster managers found it challenging to delegate responsibilities to nurses when addressing disruptions in the nursing work environment, including tasks like coordinating schedules, bed management, and daily workload management. Several factors contributed to this. Firstly, managers believed that solving these issues on their own would be quicker and more efficient, all the while intending to protect nurses from these tasks and responsibilities, enabling them to focus on providing patient care.

I sometimes wonder if it has something to do with my leadership style. I like to arrange tasks myself and delegating is not my quality. I want to solve problems as quickly as possible. Everything I do is to protect them. *“They are already very occupied, and should I assign them those extra duties?”* P6 UNIT MANAGER

Additionally, nurses did not feel responsible or took ownership over the problems, which is illustrated by the following quote:

*It's always the same nurses who actually have spare time, but are less proactive in taking on tasks [non-direct patient care activities]* P7 UNIT MANAGER

Tactical decision-making was centralized with the managers and the perspective of nurses was not always considered. Many nurses did not perceive themselves as having a role in this level of decision-making, which further limited their engagement in areas such as the development of healthcare policies and the advancement of organizational objectives. This issue frequently appeared to be caused by an unsupportive organizational structure characterized by formal hierarchies. However, positioning a nurse in a strategic role was described as beneficial by interviewees. This became clear in the following quotation, in which a cluster manager with a nursing background how nurses have minimal influence because of existing power structures, but he made every effort to represent nurses at the strategic level.

*They do not hold strategic positions. We serve as tactical managers, so it is our task to translate [strategies] to the department [...] at the same time, I work to bring nursing care to attention at a strategic level to ensure the ongoing advancement of the nursing profession within the hospital.*

P12 CLUSTER MANAGER

*I hope that step by step we can all say ‘we are nurses in the nursing domain’. That domain comprises expertise and functions [from operational to strategic level] and we all need them to reach a higher level together, to create an own profession. [...] Be proud of the profession and what we stand for.* P9 CLUSTER MANAGER

The dichotomy between the flexibility of nurses and the inflexibility of hospital systems posed difficulties for nursing practice. Both nurses and managers found it difficult to achieve an optimal balance in structures, task allocation, and delegation of responsibilities, as they navigated a complex web of interdependencies.

However, identifying and achieving this balance could hold the key to a successful and effective approach in creating a stimulating work environment for nurses.

## Discussion

### Main findings

This study explained several critical aspects of the nursing work environment and the challenges nurses face in their daily practice. Nurses often needed to demonstrate flexibility in their job roles, responsibilities, and collaborative efforts. However, organizational structures were often demanding and inflexible. Hospitals exhibited the characteristics of professional bureaucratic structures (Mintzberg, 1979), a description that is made particularly prominent by the contrast between the inflexibility of hospital systems and the flexibility demanded of nurses. We recognized this dichotomy in four themes that comprise one main focus: advancing and recognizing nursing beyond the routine provision of bedside care in daily practice. The perception of the nursing profession shapes the responsibilities, relationships, task distribution, and structures within the work environment.

The first theme was that direct patient care is a standard feature of nursing work. This demonstrated that nurses were clinically focused and that their work was associated with the direct work environment on their ward. Recognition from peers and supervisors was noted as important in acknowledging nurses' contributions and workload challenges. Karasek (1979) identified this as 'social support' within his social job demand-control-support model. The tendency of nurses to take over, close gaps, and directly address unexpected problems seemed effective because short-term patient care could continue (Tucker & Edmondson, 2003). Nurses did not always appear to recognize disruptions in their work environment. This lack of recognition could lead to dissatisfaction, as they may not see opportunities to influence or address these issues. Systems thinking encourages a second-order approach, where nurses look beyond individual problems to consider the broader organizational and systemic factors contributing to the issues (Yang, Liu, & Sherwood, 2021; McNab et al., 2020; Thelen et al., 2023). This would allow for more sustainable improvements in nursing practice and work environments, fostering a culture of continuous improvement and proactive problem-solving.

Rather than only being responsible for taking care of their patients, it is important that nurses are also responsible for questioning their current work practices in the wider organizational context (van Schothorst-van Roekel, Weggelaar-Jansen, & de

Bont, 2020). Our results show that differentiated nursing practice stimulated involvement in transcending routine tasks, fostering the adoption of evidence-based practices, and leading working groups. This shift gave nurses the opportunity to solve problems with a second-order approach and improve their work environment. We relate this to 'organizing professionalism' where nursing evolves into a profession with broader influence in departments, organizations, and policy (van Kraaij, Lalleman, & Walravens, 2022).

The second theme was that flexibility is required for hospital productivity. This showed that nurses' flexibility is dependent on responding to fluctuations in patient care needs. Departments frequently faced staffing shortages, yet nurses were forced to solve these capacity issues. This finding was also emphasized by Wallenburg et al. (2023), who characterized nurses as 'general cargo', responsible for specific duties and tasks, without acknowledging their individual professionalism, career goals, and values. However, relying on nurse flexibility without addressing the wider workplace factors that affect them could cause more staff to leave (Brassey et al., 2022). This aligns with the concept of job demands in the Karasek model as nurses are required to respond to fluctuations in patient care needs, which could be a significant stressor in their work (Karasek, 1979). Nurses were also not involved in making decisions on the capability and capacity of care, despite evidence that considering nurses' judgments improves outcomes for patients, nurses, and healthcare organizations (Haegdorens et al., 2019). Nurses having little involvement in decisions about staffing and resources suggests a lack of job control, as they may not have the authority to influence or make decisions about their work environment (Karasek, 1979). When making decisions about nurse staffing, it appeared that completing patient care tasks was not the only significant factor. Elements such as 'quality work' or 'supervising nursing students' were also important (van der Mark et al., 2022). In addition, previous research has confirmed that hospitals with sufficient nursing resources achieved better health outcomes (Aiken et al., 2011). This confirms that nurses are valuable assets for improving patient outcomes in healthcare organizations.

Our study underscored the influence of middle managers (unit managers) on the nurses' work environment (Lalleman et al., 2017). Unit managers are uniquely positioned to reduce power differences, enhance trust, and contribute to a more collaborative decision-making process. Placing nurses in these strategic roles is crucial, as these roles require individuals who do not rely on authoritative power but are engaged and guided by informal influence (Lalleman et al., 2016). However, there seemed to be tension between middle managers' roles and their ability

to facilitate nurses' autonomy. In line with existing literature, middle managers sometimes possess an overwhelming urge to provide care (Lalleman et al., 2016). They aimed to protect their nurses by solving problems themselves and leaving them to deal with direct patient care, which may prevent nurses from feeling responsible for solving problems or obstacles in their work.

The third theme was that interdependencies reduce autonomous nursing practices. This showed that nurses experience many dependencies, both within nursing teams and from other departments and disciplines. This is well known because changes in nursing tasks have consequences for those both earlier and further along in the patient care process. Consider, for instance, the perioperative preparation undertaken by a nurse and the subsequent postoperative care. A surgeon occupies an intermediary role between those two activities. This is also referred to as reciprocal dependence (Mintzberg, 1979). The fewer dependencies, the better the nurses can work uninterrupted, which could enhance their control over their practice and their ability to shape their work (Achterbergh & Vriens, 2019). We also showed that many quality improvement tasks were assigned to individuals outside the team, leading to a dependence on these external parties and a lack of ownership within the nursing team. This could result in nurses losing the opportunity or inclination to address these issues themselves. Ideally, nursing teams should contain the expertise to handle such matters themselves, making them self-reliant in terms of innovation and problem-solving. This contributes to a culture of continuous quality improvement, which increases the quality of nursing care and job satisfaction among nurses (Kutney-Lee et al., 2016).

The fourth and final theme was that organizational structures that determine how nurses can shape their work. This reflected that the limited involvement of nurses in regulatory activities was reinforced by the existing organizational structures and management practices. Organizational structures of hospitals have frequently been criticized for not creating capability and sufficient time for nurses, and for not involving them in organizational strategic decision-making or policy processes (Duffield et al., 2007; Hajizadeh et al., 2021). In terms of Galbraith's theory (Galbraith, 1974), this indicates a need for more self-contained tasks. Greater control over tasks leads to higher efficiency because less information needs to be processed during the execution of these tasks (information processing). Additionally, it is important to consider the existing power dynamics within hospitals as they can significantly impact nursing practice. Mintzberg (1979) pointed out, that the phenomenon of professional bureaucracy, along with its associated rules and regulations, is a product of the informal power wielded by staff departments.

### Strengths and limitations

There are a few limitations to this study that should be considered when interpreting and building on the results. First, while efforts were made to include hospitals of various sizes, geographic locations, and types, the sample may not fully represent the complete Dutch healthcare landscape. Despite this, we believe that our findings may highlight trends and processes in other hospitals, both nationally and internationally. Second, the use of convenience sampling in this study may have introduced selection bias as interviewees were selected based on their availability and willingness to participate. Their perceptions might be different from those who did not agree to participate. Third, data were collected from July 2020 to August 2021, during the COVID-19 pandemic. This could have distorted the picture of the actual situation. Longitudinal data collection could have provided a more comprehensive understanding of the evolving nature of the nursing work environment. However, we believe that these dynamic times have put more focus on nursing work and the nursing environment and have encouraged critical reflection. Finally, the nursing work environment is a multifaceted concept that encompasses various viewpoints and interpretations (Maassen et al., 2021), some of which might not have been fully captured in this study. We tried to overcome this potential limitation by creating a topic list based on the PES-NWI with additional topics from other recent studies. In addition, Campbell et al. (2023) have recently shown that most PES-NWI elements have maintained their significance over time.

### Implications for policy and practice

Among the diverse fundamental elements of the nursing work environment, acknowledging nursing beyond the everyday delivery of bedside care has received much attention in this study. To improve nursing practice and enhance the quality of care, hospitals should consider strategies to empower nurses and reduce dependencies in their work. This transformation requires a systems thinking approach, recognizing that nursing is part of a larger health system with dynamic interactions across disciplines and other organizational structures (Lega & De Pietro, 2005).

Reducing dependencies could involve creating more self-contained tasks for nurses, thereby decreasing the amount of information that needs to be processed, and giving nurses more control over practice (Galbraith, 1974). Instead of focusing on (re)organizing relationships and direct work processes, it could be worthwhile to approach the work environment as an interconnected system, emphasizing the importance of collaboration across sectors, organizations, and disciplines. Nurs-

es should be seen as key actors in this system at *all* levels, contributing to decision-making processes that impact patient care and organizational culture (Swanson et al., 2012).

Although there is a desire to adopt a differentiated approach, existing organizational cultures and structures do not seem ready for this change. Consequently, managers often rely on nurses to bridge this gap by being adaptable and flexible. When transforming nursing care, it is important to acknowledge and recognize the nature of change and to listen to nurses' opinions. This can be done by defining clear roles and responsibilities and by involving nurses in the reorganization of nursing practice (Van Kraaij et al., 2021). In a stimulating environment, the complexity of nurses' work needs to be seen and nurses should be involved in making decisions about design and implementation of new ideas or changes within the organization (Ebright, 2010). Approaching a nursing-shared governance structure could further support this involvement, giving bedside nurses the opportunity to get involved in decision-making, practices, policies, and protocols (Kutney-Lee et al., 2016).

### Recommendations for further research

Further research on the perceptions of other internal stakeholders, such as patients, physicians, members of the hospital management board, or supporting personnel could provide a complete picture of the nursing work environment. This would also provide the opportunity to uncover the root cause of tension between nurses' flexibility and organizational constraints, along with the different interests at play.

## Conclusions

This study provides insights into the complexities and challenges nurses face in balancing direct patient care with broader healthcare responsibilities. These findings show that nurses often exhibit flexibility and are committed to providing high-quality healthcare, but that they often contend with organizational inflexibility, work dependencies, and a prevailing emphasis on direct patient care. These factors create a tension between the nurses' desire to engage in broader nursing roles and the constraints imposed on them by their work environment, revealing a gap between the ideal vision and expectations of the nursing profession and the current reality. To address these challenges, it is crucial to view the work environment as a complex system that includes autonomous and proactive nursing practices,

supportive management, empowering structures, and nurse involvement in decision-making. Reducing the demand for flexibility from nurses and increasing organizational flexibility may provide nurses with opportunities to design and shape their own work processes, increase their job satisfaction, and eventually improve the quality of their work. Creating a more flexible and collaborative work environment is essential to enhancing nurses' control over their practice and securing a sustainable nursing workforce for the future.

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## Supplementary file 1 | Interview guide

### Demographic information

Age, education level, function

### Main question

What does the patient's care process from admission to discharge look like?

- Are these activities integrated in the department?
- How would you describe your degree of responsibility?
- To what extent are you facilitated to practice autonomously? Can you solve your own problems?

### Topics

Leadership; control over practice setting; adequate authorization and clear chain of command; role clarity.

- Are the executing and regulatory activities divided and present within the nursing team? Can the nursing team design their own work?
- Are you involved in decision-making processes about policy, personnel, or organizational processes?

### Topics

Nurse participation in hospital affairs; task orientation; working according to guidelines; organizational learning; innovation and change readiness; information distribution.

- Who is responsible for monitoring organizational (quality) processes? How is performance measured? Who is responsible for quality assurance?

### Topics

Nurse foundations for quality of care; incident reporting and handling of errors; performance measurement.

- Are you satisfied with your work?
- How would you describe your workload?
- Do you have (technical) resources available?
- Is there room for personal development?

### Topics

Staffing and resource adequacy; structural and electronic resources available; workload; scheduling; career development; personal development; job satisfaction; level of stress; challenging and fun work; physical comfort; internal work motivation; job retention.

- How would you describe your relationship with your colleagues?
- How do these relationships influence your work?
- How would you describe the culture in your department?

### *Topics*

Nurse manager ability; support of nurses; collegial nurse-physician relation; teamwork; relational atmosphere; supportive coworkers; respect; open communication; trust; feeling valued; supportive organizational atmosphere; celebrating achievements; conflict management; justice; rewards; safety climate; employees as valuable partners; shared mission, vision; cultural values; patient-centered culture.

### *Closing question*

If you could sketch your ideal work environment, what's in it that you're missing right now?

# Chapter 5

## Enhancing work environments and reducing turnover intention

*A multicenter longitudinal cohort study on differentiated nursing practices in Dutch hospitals*

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## Abstract

### Background

Addressing the growing challenge of nurse retention requires coordinated actions at national and global levels to improve recruitment, retention policies, and investments in the nursing work environment. The nursing work environment, defined as the “organizational characteristics of a work setting that facilitate or constrain professional nursing practice”, is critical in influencing whether nurses decide to leave their jobs. This study investigates the impact of differentiated nursing practices – which involved tailoring roles and responsibilities based on nurses’ training, skills, and experience in Dutch hospitals – and investigated their impact on the nursing work environment and turnover intention (i.e., nurses’ intentions to leave their organization). We also explored whether the work environment mediates this relationship.

### Methods

A multicenter longitudinal cohort study was conducted across 19 Dutch hospitals between 2019 and 2023. Nursing professionals participated via digital surveys administered before (T<sub>0</sub>) and after (T<sub>1</sub>) differentiated nursing practices were introduced. The nursing work environment was assessed using the Practice Environment Scale of the Nursing Work Index. A multilevel analysis with a random intercept and fixed

slope was used to evaluate the impact of differentiated nursing practices on the work environment and on nurses’ turnover intentions.

### Results

We received 5411 responses to our questionnaire – 4259 at T<sub>0</sub> and 1152 at T<sub>1</sub>. Results showed that, while the overall work environment improved, particularly in the dimensions of *staffing and resource adequacy*, *collegial nurse-physician relationships*, and *participation in hospital affairs*, there were no significant improvements in *nursing foundation for quality of care* or *nurse managers’ ability, leadership, and support of nurses*. Additionally, differentiated nursing practices did not significantly impact turnover intention, nor did the work environment mediate this relationship.

### Conclusions

This study is the first to explore the unique effects of practice differentiation on turnover intention mediated by the work environment. The findings suggest that, while differentiated practices can enhance certain aspects of the work environment, a more systemic and integrated approach is required for sustained improvements. Future research should include longer term studies to fully understand the complex relationship and accompanying mechanisms between differentiated nursing practices, the nursing work environment, and turnover intention.

## Background

Nurses represent over fifty percent of the health workforce and play a pivotal role in healthcare systems worldwide; however, anticipated staff shortages pose a significant challenge for the decades ahead (World Health Organization, 2020). High turnover rates among nurses exacerbate this concern. For example, a recent literature review estimated a nurse turnover rate of 18% across countries in Europe, North America, and Asia (Wu et al., 2024). Key risk factors for nurse turnover include younger age, lower education levels, low salaries, and heavy workloads. Job dissatisfaction and dissatisfaction with the organization have also contributed to higher turnover rates (Wu et al., 2024). Multiple studies have linked nurse turnover to rising healthcare costs and compromised quality and safety of patient care (Bae, 2022). Effectively addressing this issue demands coordinated actions on national and global scales to establish recruitment and retention policies. Investing in the nursing work environment has been identified as a way to reduce the number of nurses leaving their current jobs or the profession altogether (De Vries et al., 2023; Bruyneel et al., 2023).

The nursing work environment is defined as the “organizational characteristics of a work setting that facilitate or constrain professional nursing practice” (Lake, 2002, p. 178) and plays a crucial role in turnover intention (i.e., the nurses’ intentions to leave their organization; Lake et al., 2019). Numerous factors in the nursing work environment affect retention, including organizational structure, culture, job demands, working conditions, staffing levels, and teamwork dynamics (De Vries et al., 2023; Halter et al., 2017). For instance, Raso et al. (2021) found that direct care nurses were more likely to leave, suggesting a potential link between job roles and retention dynamics. Moreover, providing development opportunities for nurses has been associated with reduced turnover intention (De Vries et al., 2023). These opportunities equip nurses with essential skills to navigate complex care demands and demonstrate organizational investment in their growth and well-being (Chen et al., 2021). These findings indicate that hospitals can improve nurse retention by addressing various factors, preferably in combination, while fostering a stimulating work environment (De Vries et al., 2023; de Vries et al., 2024).

Strategies to improve the nursing work environment vary across countries and even among organizations within the same country. This variation may result from differences in systems, cultural norms, available resources, and organizational vision and leadership (Kuhlmann et al., 2013; Van Kraaij et al., 2022). It is

therefore crucial to integrate the unique local context of hospital wards when tailoring intervention studies to evaluate nurse retention strategies (Berthelsen et al., 2024). While a significant body of nursing literature has provided strategies for improving nursing work environments, the long-term effectiveness of these interventions in retaining nurses has not been investigated (Lartey et al., 2014; Williams et al., 2024). Longitudinal data are needed to determine the sustainability of retention strategies. This research gap may limit the ability of healthcare organizations to make informed decisions and effectively implement evidence-based practices to retain nurses and create supportive work environments.

This longitudinal study aimed to explore the pivotal role of the nursing work environment in mitigating nurses' turnover intention and fostering a sustainable nursing workforce. Various initiatives have been introduced worldwide to enhance the appeal of the nursing profession by improving the nursing work environment with new roles and positions. For example, in the United Kingdom, nurse associates support healthcare teams by allowing registered nurses to handle more complex tasks, thereby bridging the gap between registered nurses and healthcare assistants (Thurgate & Griggs, 2023). Similarly, in the United States, the establishment of clinical nurse leaders has improved patient outcomes by using evidence-based practice to bridge the gap between administrative and clinical nurse roles (Cospers et al., 2023). In the Netherlands, hospitals have been adopting differentiated nursing practices. These practices involve tailoring roles and responsibilities based on nurses' training, skills, and experience, enabling hospitals to optimize their nursing workforce. In addition, differentiated practices are supported by professional governance structures to promote work autonomy and strategically position nurses within their organizations. These practices aim to strengthen nursing professionalization and attract more individuals to the profession by expanding career development opportunities (Felder et al., 2024; Van Kraaij et al., 2022).

Recent data from the Netherlands indicate that 15% of nurses intended to leave the hospital, while 19.2% intended to leave the profession altogether (Enea et al., 2024). This situation highlights the need for further exploration of differentiated nursing practices. Dutch nursing work environments are known for their complexity, numerous dependencies, and challenges in daily work processes (Van Kraaij et al., 2024). Transitioning to differentiated nursing practices could strengthen organizational capacity and address factors contributing to the number of nurses leaving the profession (De Vries et al., 2024; Van Kraaij et al., 2022). To investigate this further, we examined how differentiated nursing practices af-

fect the nursing work environment and turnover intention. We also examined the relationships between these three factors.

## Methods

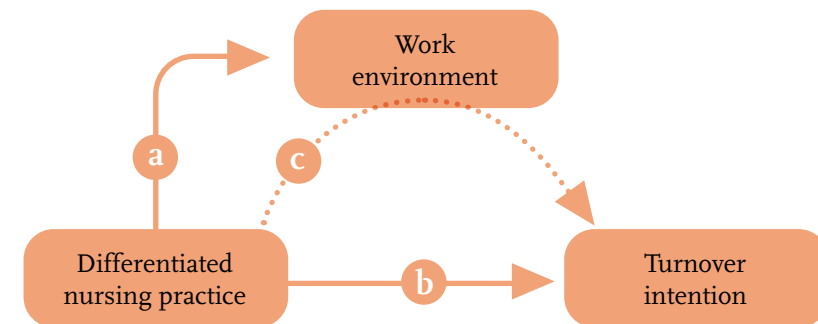
This study was designed and executed following the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) guidelines (von Elm et al., 2008).

## Hypotheses

Based on our aim to explore the pivotal role of the nursing work environment in reducing turnover intention, we formulated three hypotheses (Figure 1):

1. Differentiated nursing practices have a positive impact on the work environment (a)
2. Differentiated nursing practices reduce turnover intention among nurses (b)
3. The work environment mediates the relationship between differentiated nursing practice and turnover intention (c).

Figure 1 | Conceptual analytical framework of this study.



## Study design and setting

This multicenter longitudinal cohort study was conducted in nineteen Dutch hospitals, comprising six academic, nine teaching, and four general hospitals. The study is part of the nationwide Registered Nurses to Blend (RN2Blend) research program, which is examining differentiated nursing practice in the Netherlands (Lalleman et al., 2020).

## Intervention

The intervention involved introducing differentiated nursing practices, in which nursing roles and responsibilities were assigned based on each nurse's education level, work experience, and expertise (Boston-Fleischhauer, 2019; Martini et al., 2024; Van Kraaij et al., 2022).

Differentiated practices focused on supported and facilitated professional governance by establishing structures that promote work autonomy and strategically positioning nurses within the organization through shared governance structures (O'Grady & Clavelle, 2021; Van Kraaij et al., 2022). Consequently, nurses were empowered to make decisions in clinical practice, to contribute to organizational strategy to support effective work practices, and to guide the strategy of these policies within structured governance systems. Moreover, the intervention engaged professional growth and leadership within the various nursing roles. By emphasizing leadership in decision-making, accountability, and ownership of responsibilities in the new nursing roles (van Schothorst-van Roekel et al., 2021), the intervention sought to encourage nurses to take on more active roles within the healthcare environment (Martini et al., 2024). Hence, nurses were provided with structured development opportunities to enhance their leadership skills and became more involved in strategic and quality-related decision-making.

In practice, the intervention's core elements were enrolled by introducing the role of nurse coordinator alongside the existing nurse role (Martini et al., 2022; Van Kraaij et al., 2024). Some hospitals established these roles based on prior nursing education, creating and integrating differentiated positions for nurses trained at the vocational level and nurse coordinators with a bachelor's degree. In contrast, other hospitals chose to focus less on educational background, while basing the roles on work experience, personal ambitions, and demonstrated competencies. Additionally, hospitals varied in how they defined and implemented the role of the nurse coordinator, leading to differences in responsibilities, and scope of practice (Van Kraaij et al., 2022).

Importantly, the intervention did not follow a strict national protocol; instead, each intervention was locally tailored, allowing hospitals to implement the differentiation flexibly and adapt it to the context of their organizations (Van Kraaij et al., 2022). This adaptability allowed hospitals to design and implement the intervention in practice-based ways that best supported their organizational characteristics and goals (van Schothorst-van Roekel et al., 2021). Even within the same hospital, the application of the intervention varied across departments, as the specialty ar-

eas and operational needs differed. For a more comprehensive understanding, Supplementary file 1 presents a detailed description of a hospital intervention example, offering insights into the practical steps taken and adjustments made during the transition.

## Data collection procedures

The Nursing Quality Monitor (NQM) was used to collect data. This online questionnaire evaluates the quality of nursing care in Dutch hospitals, following Donabedian's structure-process-outcome quality-of-care model (Donabedian, 1988). The NQM covers aspects related to nursing structure (e.g., educational and staffing levels), the process of nursing care (e.g., work environment and missed nursing care), and outcomes (e.g., nurses' perceived quality of care and intention to leave). For this study, we focused on questions concerning the nursing work environment and turnover intention.

Data were collected and the NQM questionnaires were distributed by Newcom, an independent research bureau in the Netherlands (Newcom, 2024). Newcom provided the survey link to collaborating hospitals or departments, who then forwarded it to eligible participants, inviting them to complete the NQM survey in Dutch. Completing the NQM survey took participants approximately 30 minutes. Surveys were administered at baseline (T<sub>0</sub>) and at least one year after the differentiated nursing practices were introduced (T<sub>1</sub>). The time interval between T<sub>0</sub> and T<sub>1</sub> varied depending on the hospital or department's project planning.

## Participants

Aligned with the project planning for differentiated nursing practices within each specific hospital or department, all nursing professionals working in the participating wards were invited to complete the NQM survey through convenience sampling. The survey was also distributed among third- and fourth-year nursing students as they cover all nursing roles, including direct and indirect patient care activities and non-patient care-related nursing tasks (Morris et al., 2007). These roles are typically accounted for in the ward's full-time equivalent budget (van der Mark et al., 2023).

For this study, we only used data collected from registered nurses working on clinical nursing wards. This excluded nurse assistants, first- and second-year nursing students, registered nurses in outpatient clinics, nurses in functional departments (such as the endoscopy ward), unit managers, and cluster managers from the study.

## Box 1 | Ward types.

**Medical ward**

Nurses care for patients who are treated with medication rather than surgical interventions. This includes internal medicine, psychiatry, and gastroenterology.

**Surgical ward**

Nurses care for patients who are waiting for operative treatment or have already undergone an operation.

**Acute ward**

Nurses care for patients requiring acute attention for severe injuries or critical episodes of illness. This includes the intensive care unit, coronary care unit, and emergency room.

**Mixed ward**

Nurses care for patients with a combination of medical and/or surgical issues. Examples include gynecology and gastroenterological surgery.

**Other ward**

Nurses work in roles that do not fit the above categories, such as in day care, dialysis, or as float nurses who work across various wards.

Participants were independently sampled at each measurement point (T<sub>0</sub> and T<sub>1</sub>) through purposive sampling managed by each participating hospital, which determined the distribution of questionnaires across nursing wards. As a result, data were collected from different individuals at each time point, with no tracking of participants across T<sub>0</sub> and T<sub>1</sub>.

**Measurements****Descriptive data**

We collected sociodemographic variables, including gender (male, female), age, educational level (vocational training, diploma, specialized training, bachelor's degree, master's degree, PhD), full-time ( $\geq 32$  hours/week) or part-time ( $< 32$  hours/week) employment, years of experience in nursing, years of experience in the current hospital, ward type (medical, surgical, acute, mixed, and other) (see Box 1), and hospital type (general, teaching, academic).

**Nursing Work Environment**

A Dutch translation of the revised version of The Practice Environment Scale of Nursing Work Index (PES-NWI) was used to measure the nursing work environment (Sermeus et al., 2011). The PES-NWI is an internationally validated instrument that includes 32 items, each with a four-point Likert scale (strongly disagree, disagree, agree, or strongly agree). The items are evaluated into five subscales of work environment: *staffing and resource adequacy* (four items), *collegial nurse-physician relationships* (seven items), *nurse manager ability, leadership, and support of nurses* (four items), *nurse participation in hospital affairs* (eight items), and *nursing foundation of quality of care* (nine items) (Lake, 2002). The PES-NWI subscales and overall score (PES-NWI total) are represented as a composite measure by calculating the average of the relevant items (score varying from 1 to 4) and have high predictive validity for workforce stability issues in hospitals (Bruyneel et al., 2009). A score  $\geq 2.5$  is a positive assessment of the work environment (Lake). The Dutch translation of the PES-NWI of the RN4CAST-consortium was used (Sermeus et al.). The reliability, in terms of Cronbach's alpha, of this version of the PES-NWI subscales varies from 0.56 to 0.84 (Bruyneel et al.).

**Turnover intention**

Turnover intention was measured using the following dichotomous question: "If possible, would you leave the hospital within the next year because of dissatisfaction with your job?" This question was based on earlier research from RN4CAST (Sasso et al., 2019) and is considered a good predictor of actual turnover (Sermeus et al., 2011; Hayes et al., 2006).

**Data preparation**

For robust analysis, data were checked against specific criteria, and only hospitals with at least two participating wards were included in the analysis. Additionally, at least half plus one of the items  $((n/2)+1)$  needed to be completed for inclusion in the PES-NWI subscales. No respondents were excluded from the analysis based on these criteria.

**Data analysis**

IBM SPSS Statistics 29 software was used for the analysis (IBM Corp. IBM SPSS Statistics for Windows).

**Descriptive analysis**

Descriptive analyses are presented at T<sub>0</sub> and T<sub>1</sub> for participants' sociodemographic characteristics, perceptions of their work environment, and turnover intention. Fre-

quencies (n) and percentages (%) were calculated for categorical variables. Continuous normal-distributed data are presented as mean and standard deviation (SD). The Chi-square test and independent t-test were used to compare categorical and continuous variables between T<sub>0</sub> and T<sub>1</sub>, respectively.

### Multilevel analysis

While the nursing work environment is context bound (Lake, 2002), we assumed there would be differences between hospitals that could influence our result. Conventional regression analyses ignores these differences (Twisk, 2006), so we performed a two-level multilevel model analysis (random intercept model) to account for clustering of nurses within hospitals. Moreover, given the cross-sectional sampling at T<sub>0</sub> and T<sub>1</sub>, multilevel analysis is functional for clustering at the organizational level to examine patterns in intent to leave as they relate to hospital or department characteristics rather than tracking individual changes over time. Thus, level 1 data (individual nurse level) included gender, age, educational level, full-time or part-time employment, experience, and type of ward. Level 2 data represented the type of hospital (general, teaching, or academic).

The ICC values were 0.147 for PES-NWI and 0.007 for turnover intention. Although these low ICC values suggested that multilevel analysis might not be necessary for measuring the intervention effect on turnover intention, we still chose multilevel models for better estimates of both fixed and random effects (Hox et al., 2017).

Three multilevel models (two-level) with random intercept and fixed slope were used to study the outcomes. Model 1 examined the impact of differentiated nursing practice on the work environment using the PES-NWI subscales and the PES-NWI total score (Hypothesis a; Figure 1). Model 2 examined the impact of differentiated nursing practice on turnover intention (Hypothesis b; Figure 1). Model 3 studied the mediating effect of the work environment (PES-NWI total score) on the relationship between differentiated nursing practice and turnover intention (Hypothesis c; Figure 1).

Normal distribution was tested using graphical evaluations. The variance inflation factor was also calculated to test the multicollinearity assumption for each independent variable. Based on these findings, we excluded 'age' and 'years of experience in nursing' from the multilevel model.

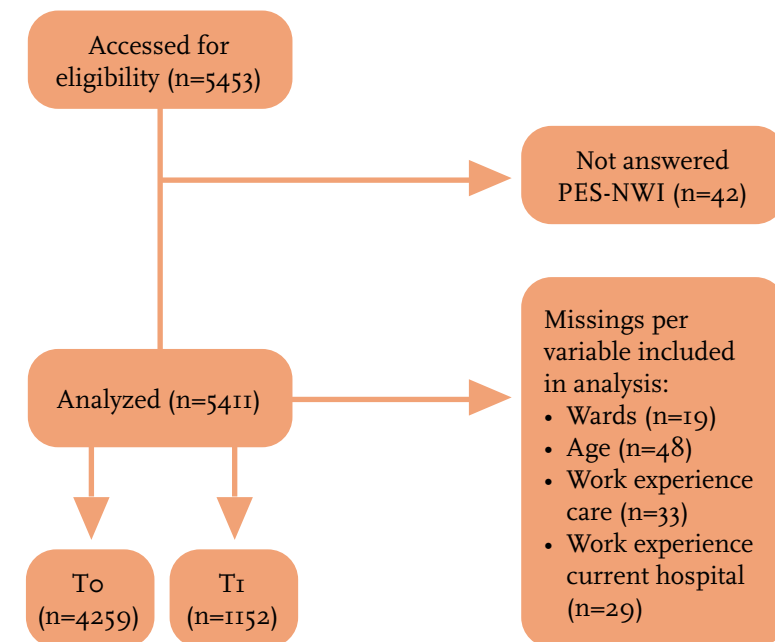
To ensure the stability and reliability of the estimated effects of the multilevel models, a sample size of at least 290 participants was required, based on the rule

that there should be at least 10 participants per category per variable (VanVoorhis et al., 2007). Results of the multilevel analysis were presented using estimates ( $\beta$ ) and standard error (SE), 95% confidence interval (CI), and -2 log likelihood values.

## Results

We received completed questionnaires from 5411 nurses working in 19 hospitals throughout the Netherlands. We received 4259 of these before the differentiated nursing practices were introduced (T<sub>0</sub>) and 1152 afterwards (T<sub>1</sub>) (Figure 1). The time between T<sub>0</sub> and T<sub>1</sub> varied from 7 months to three years.

Figure 2 | Study flowchart at T<sub>0</sub> and T<sub>1</sub> (T<sub>0</sub>=before differentiated nursing practices were introduced; T<sub>1</sub>=after differentiated nursing practices were introduced).



### Descriptive data

The gender distribution and employment status were consistent at T<sub>0</sub> and T<sub>1</sub>, with most nurses being female (88.4% at T<sub>0</sub> and 88.2% at T<sub>1</sub>) and most being employed part-time (60.6% at T<sub>0</sub> and 59.2% at T<sub>1</sub>) (Table 1). However, there were

Table 1 | Sample characteristics and variables under study.

	To (N=4259)	T1 (N=1152)	P value
Gender, n (%)			0.881
Female	3763 (88.4)	1016 (88.2)	
Male	496 (11.6)	136 (11.8)	
Age, mean (SD)	40.62 (12.61)	39.60 (12.77)	0.016
Education level, n (%)			< 0.001
Vocational degree	595 (14.0)	134 (11.6)	
Vocational + specialized training	531 (12.5)	112 (9.7)	
Diploma	383 (9.0)	88 (7.6)	
Diploma + specialized training	914 (21.5)	201 (17.4)	
Bachelor's degree	851 (20.0)	295 (25.6)	
Bachelor's + specialized training	897 (21.1)	296 (25.7)	
Master's degree	88 (2.1)	26 (2.3)	
Employment, n (%)			0.389
Full-time	1678 (39.4)	470 (40.8)	
Part-time	2581 (60.6)	682 (59.2)	
Work experience in patient care (years), mean (SD)	18.13 (12.80)	17.02 (12.86)	0.010
Work experience current hospital (years), mean (SD)	14.02 (11.38)	13.21 (11.20)	0.033
Hospital type, n (%)			< 0.001
Academic	1471 (34.5)	755 (65.5)	
Teaching	2349 (55.2)	340 (29.5)	
General	439 (10.3)	57 (4.9)	
Ward, n (%)			< 0.001
Medical	1367 (32.1)	368 (31.9)	
Surgical	954 (22.4)	368 (31.9)	
Acute	697 (16.4)	252 (21.9)	
Mixed	724 (17.0)	85 (7.4)	
Other	499 (11.7)	78 (6.8)	
PES-NWI total, mean (SD)	2.87 (0.38)	2.91 (0.36)	0.002
Staffing and resource adequacy	2.56 (0.60)	2.65 (0.57)	< 0.001
Collegial nurse-physician relationships	3.07 (0.48)	3.13 (0.47)	< 0.001
Nurse manager ability, leadership, and support of nurses	2.94 (0.61)	2.92 (0.62)	0.370
Nursing foundation of quality of care	2.97 (0.41)	2.97 (0.41)	0.807
Nurse participation in hospital affairs	2.69 (0.54)	2.76 (0.53)	< 0.001
Turnover intention, n (%)	1022 (24.0)	278 (24.1)	0.924

N=population size; PES-NWI=Practice Environment Scale of Nursing Work Index; SD=standard deviation; TO=digital surveys administered before differentiated nursing practices were introduced; T1=digital surveys administered after differentiated nursing practices were introduced.

some differences between To and T1. The mean age of nurses was slightly lower at T1 (39.60 years, SD 12.77) than at To (40.62 years, SD 12.61). In addition, more nurses held a bachelor's degree and a bachelor's degree with specialized training at T1 than at To (25.6% and 25.7%, respectively at T1; 20.0% and 21.1%, respectively at To). Additionally, nurses reported slightly less work experience in patient care at T1 (mean 17.02 years, SD 12.86) than at To (mean 18.13 years, SD 12.80) as well as less work experience in the current hospital at T1 (mean 13.21 years, SD 11.20) than at To (mean 14.02 years, SD 11.38).

We received responses from nurses working in various types of hospitals and wards. At To, most participants were working in teaching hospitals (55.2%), whereas most were employed in academic hospitals at T1 (65.5%). There were also differences in the hospital wards nurses were working on between To and T1; medical and surgical wards were predominant types at both time points, but the proportions varied (Table 1).

There were modest differences in the total PES-NWI score and three of its subscales between To and T1. Overall, nurses perceived their work environment more favorably at T1 (mean score 2.91, SD 0.36) than at To (mean score 2.87, SD 0.38). Specifically, perceptions of *staffing and resource adequacy* increased from 2.56 (SD 0.60) at To to 2.65 (SD 0.57) at T1, *collegial nurse-physician relationships* improved from 3.07 (SD 0.48) to 3.13 (SD 0.47), and *nurse participation in hospital affairs* rose from 2.69 (SD 0.54) to 2.76 (SD 0.53). Turnover intention remained consistent, with rates of 24.0% at To and 24.1% at T1.

### Effect of differentiated practice on the nursing work environment

Introducing differentiated practices had a small effect on nurses' perception of their work environment (Table 2;  $\beta=0.054$ , 95% CI 0.027 to 0.081). We corrected this association for gender, age, education level, type of employment, work experience in the current hospital, and the type of hospital and ward. Although the type of hospital did not influence the association between differentiated practices and nurses' perception of their work environment, nurses working in medical wards ( $\beta=-0.056$ , 95% CI -0.090 to -0.022), surgical wards ( $\beta=-0.086$ , 95% CI -0.112 to -0.050), acute wards ( $\beta=-0.049$ , 95% CI -0.087 to -0.011), and mixed wards ( $\beta=-0.075$ , 95% CI -0.144 to -0.011) perceived their work environment as less favorable than nurses working in other wards did. We also found that nurses with more work experience were more critical of their work environment ( $\beta=-0.001$ , 95% CI -0.002 to 0.000).

Table 2 | Multilevel model effect differentiated practice on PES-NWI total.

	Estimate ( $\beta$ )	SE	95% CI	P value
Intercept	2.821	0.086	2.645 to 2.997*	
Intervention	0.054	0.014	0.027 to 0.081*	
Gender				0.465
Male	-0.012	0.016	-0.042 to 0.019	
Female	0	0		
Education level				0.001
Vocational degree	0.044	0.036	-0.027 to 0.115	
Vocational + specialized training	0.028	0.036	-0.043 to 0.099	
Diploma	-0.042	0.039	-0.116 to 0.032	
Diploma + specialized training	0.015	0.036	-0.055 to 0.085	
Bachelor's degree	0.052	0.035	-0.016 to 0.121	
Bachelor's degree + specialized training	0.022	0.035	-0.046 to 0.090	
Master's degree	0	0		
Employment				0.956
Part-time	-0.001	0.011	-0.022 to 0.020	
Full-time	0	0		
Work experience current hospital (years)	-0.001	0.001	-0.002 to 0.000*	
Ward				< 0.001
Medical	-0.056	0.017	-0.090 to -0.022*	
Surgical	-0.086	0.018	-0.122 to -0.050*	
Acute	-0.049	0.019	-0.087 to -0.011*	
Mixed	-0.075	0.020	-0.114 to -0.036*	
Other	0	0	0	
Hospital type				0.505
Academic	0.040	0.098	-0.167 to 0.248	
Teaching	0.102	0.092	-0.092 to 0.296	
General	0	0		
Information criteria				
-2 log likelihood	4170.118			

SE=standard error; CI=confidence interval. \*  $P < 0.05$

### PES-NWI subscales

Differentiated practices had small positive effects on nurses' perceptions of various subscales of their work environment (Table 3), including *staffing and resource adequacy* ( $\beta=0.054$ , 95% CI 0.09 to 0.098), *collegial nurse-physician relation-*

*ships* ( $\beta=0.065$ , 95% CI 0.030 to 0.101), and *nurse participation in hospital affairs* ( $\beta=0.099$ , 95% CI 0.060 to 0.139).

The analyses showed that diploma nurses perceived slightly more support from their managers than those with other educational backgrounds did ( $\beta=-0.136$ , 95% CI -0.259 to -0.013), and that nurses with a bachelor's degree and specialized training perceived better collegial relationships ( $\beta=0.104$ , 95% CI 0.0105 to 0.194). Nurses with a vocational degree and specialized training and those with a bachelor's degree reported more positively on the foundational elements necessary to deliver high-quality of care. More experienced nurses reported less support from nurse managers ( $\beta=-0.003$ , 95% CI -0.005 to -0.001) and felt less involved in hospital affairs ( $\beta=-0.003$ , 95% CI -0.004 to -0.001). Nurses' perceptions of their work environment also varied based on the ward they worked in. Those in medical wards ( $\beta=-0.170$ , 95% CI -0.226 to -0.115) and surgical wards ( $\beta=-0.144$ , 95% CI -0.202 to -0.086) reported less staffing and resource adequacy, while nurses working in acute ( $\beta=0.025$ , 95% CI 0.002 to 0.102) and mixed ( $\beta=0.026$ , 95% CI 0.003 to 0.105) wards reported better collegial relationships. Nurses working in surgical wards also perceived a lower quality of care ( $\beta=-0.128$ , 95% CI -0.169 to 0.088) as well as less participation in hospital affairs ( $\beta=-0.098$ , 95% CI -0.150 to -0.046). Nurses working in all wards perceived a lower quality of care than those working on other wards (medical:  $\beta=-0.122$ , 95% CI -0.160 to -0.084; surgical:  $\beta=-0.128$ , 95% CI -0.169 to 0.088; acute:  $\beta=-0.105$ , 95% CI -0.148 to -0.063; mixed:  $\beta=-0.145$ , 95% CI -0.189 to -0.102). Lastly, nurses working in surgical ( $\beta=-0.098$ , 95% CI -0.150 to -0.046), acute ( $\beta=-0.105$ , 95% CI -0.160 to -0.050), and mixed ( $\beta=-0.069$ , 95% CI -0.125 to -0.012) wards experienced less participation in hospital affairs.

### Effect of differentiated practice on turnover intention

The introduction of differentiated practice did not affect turnover intention ( $\beta=-0.051$ , SE=0.087, 95% CI -0.221 to 0.119).

### Effect of differentiated practice on turnover intention via the nursing work environment

The nursing work environment had no effect on turnover intention ( $\beta=0.069$ , 95% CI -0.113 to 0.252), suggesting the work environment does not mediate the impact of differentiated practice on turnover intention.

Table 3 | Multilevel model impact on PES-NWI subscales.

	Subscale 1: Staffing and resource adequacy	Subscale 2: Collegial nurse-physician relationships	Subscale 3: Nurse manager ability, leadership, and support of nurses	Subscale 4: Nursing foundation of quality of care	Subscale 5: Nurse participation in hospital affairs
	$\beta$ (95% CI)	$\beta$ (95% CI)	$\beta$ (95% CI)	$\beta$ (95% CI)	$\beta$ (95% CI)
Intercept	2.652 (2.434 to 2.869 <sup>*)</sup>	2.950 (2.782 to 3.117 <sup>*)</sup>	2.986 (2.723 to 3.250 <sup>*)</sup>	2.856 (2.686 to 3.027 <sup>*)</sup>	2.704 (2.474 to 2.934 <sup>*)</sup>
Intervention	0.054 (0.009 to 0.098 <sup>*)</sup>	0.065 (0.030 to 0.101 <sup>*)</sup>	0.007 (-0.038 to 0.053)	0.026 (-0.005 to 0.056)	0.099 (0.060 to 0.139 <sup>*)</sup>
Gender					
Male	0.049 (-0.001 to 0.099)	-0.005 (-0.045 to 0.036)	-0.051 (-0.103 to 0.000)	-0.017 (-0.052 to 0.018)	-0.022 (-0.066 to 0.023)
Female	0	0	0	0	0
Education level					
Vocational degree	-0.096 (-0.211 to 0.020)	0.027 (-0.066 to 0.120)	-0.018 (-0.136 to 0.100)	0.103 (0.023 to 0.182 <sup>*)</sup>	0.090 (-0.012 to 0.193)
Vocational + specialized training	-0.068 (-0.184 to 0.048)	0.080 (-0.013 to 0.173)	-0.085 (-0.203 to 0.033)	0.094 (0.015 to 0.174 <sup>*)</sup>	0.009 (-0.094 to 0.112)
Diploma	-0.148 (-0.268 to -0.028)	-0.037 (-0.154 to 0.040)	-0.136 (-0.259 to -0.013 <sup>*)</sup>	0.029 (-0.054 to 0.112)	-0.017 (-0.124 to 0.090)
Diploma + specialized training	-0.087 (-0.200 to 0.026)	0.087 (-0.005 to 0.178)	-0.077 (-0.193 to 0.039)	0.073 (-0.005 to 0.151)	-0.020 (-0.121 to 0.081)
Bachelor's degree	-0.039 (-0.151 to 0.073)	0.055 (-0.035 to 0.146)	0.018 (-0.097 to 0.132)	0.089 (0.012 to 0.166 <sup>*)</sup>	0.067 (-0.032 to 0.167)
Bachelor's degree + specialized training	-0.044 (-0.155 to 0.067)	0.104 (0.015 to 0.194 <sup>*)</sup>	-0.046 (-0.159 to 0.068)	0.057 (-0.020 to 0.134)	-0.026 (-0.125 to 0.073)
Master's degree	0	0	0	0	0
Employment					
Part-time	-0.014 (-0.048 to 0.021)	0.007 (-0.020 to 0.035)	0.015 (-0.019 to 0.050)	-0.007 (-0.031 to 0.016)	-0.001 (-0.032 to 0.029)
Full-time	0	0	0	0	0
Work experience current hospital (years)	-0.001 (-0.003 to 0.001)	-0.001 (-0.002 to 0.00)	-0.003 (-0.005 to -0.001 <sup>*)</sup>	0.000 (-0.001 to 0.002)	-0.003 (-0.004 to -0.001 <sup>*)</sup>
Ward					
Medical	-0.170 (-0.226 to -0.115 <sup>*)</sup>	0.023 (-0.016 to 0.074)	0.004 (-0.053 to 0.061)	-0.122 (-0.160 to -0.084 <sup>*)</sup>	-0.030 (-0.080 to 0.019)
Surgical	-0.144 (-0.202 to -0.086 <sup>*)</sup>	0.024 (-0.070 to 0.025)	-0.028 (-0.088 to 0.031)	-0.128 (-0.169 to 0.088 <sup>*)</sup>	-0.098 (-0.150 to -0.046 <sup>*)</sup>
Acute	-0.009 (-0.071 to 0.053)	0.025 (0.002 to 0.102 <sup>*)</sup>	-0.030 (-0.093 to 0.033)	-0.105 (-0.148 to -0.063 <sup>*)</sup>	-0.105 (-0.160 to -0.050 <sup>*)</sup>
Mixed	-0.182 (-0.245 to -0.119)	0.026 (0.003 to 0.105 <sup>*)</sup>	-0.051 (-0.166 to 0.013)	-0.145 (-0.189 to -0.102 <sup>*)</sup>	-0.069 (-0.125 to -0.012 <sup>*)</sup>
Other	0	0	0	0	0
Hospital type					
Academic	0.122 (-0.114 to 0.359)	0.043 (-0.136 to 0.221)	-0.039 (-0.342 to 0.265)	0.083 (-0.111 to 0.278)	-0.038 (-0.304 to 0.227)
Teaching	0.071 (-0.150 to 0.292)	0.012 (-0.155 to 0.178)	0.102 (-0.182 to 0.385)	0.157 (-0.025 to 0.338)	0.108 (-0.139 to 0.356)
General	0	0	0	0	0
-2 log likelihood	9344.417	7054.674	9590.346	5399.985	8120.049

$\beta$ =estimate; CI=confidence interval. \* P < 0.05

## Discussion

### Main findings

This study explored the crucial role of the nursing work environment in reducing turnover intention in Dutch hospitals through differentiated nursing practice. Our first hypothesis was that differentiated practice would positively impact nurses' perception of their work environment. The results supported this hypothesis, showing an overall improvement in the perceived work environment, particularly in the subscales *staffing and resource adequacy*, *collegial nurse-physician relationships*, and *participation in hospital affairs*. However, there was no significant improvement in *nursing foundation for quality of care* and *nurse managers' ability, leadership, and support of nurses*. A previous Dutch study by Bloemhof et al. (2021) evaluated a program that aimed to improve the professional work environment, enhance nurses' expertise, and elevate nurses' roles. This evaluation was based on the measurements of the Essentials of Magnetism and showed improvements in seven areas, except for adequacy of staffing. This is in contrast to our findings, which showed an improvement in staffing adequacy after the introduction of our differentiated nursing practice. However, comparing these results is challenging because of differences in study design. Bloemhof et al. assessed a specific hospital intervention, while we evaluated the general principles of practice differentiation. Additionally, the Essentials of Magnetism used by Bloemhof et al. and the PES-NWI used in our study measure different aspects of the work environment.

Our results did not support our second hypothesis that differentiated nursing practice would reduce nurses' turnover intention. Similarly, our third hypothesis that the work environment would mediate this relationship was also not supported. We did observe slight improvements in three of the five PES NWI subscales, i.e., *staffing and resource adequacy*, *collegial nurse-physician relationships*, and *participation in hospital affairs*, but this did not affect turnover intention. This contrasts with earlier research linking a better work environment with decreased turnover intention (Lake, 2019; Boudreau et al., 2024). An earlier study conducted across ten countries, including the Netherlands, found that three subscales were significantly linked to turnover intention among nurses. These subscales were *nurse managers' ability, leadership, and support of nurses*, *collegial nurse-physician relationships*, and *participation in hospital affairs* (Heinen et al., 2013).

Differentiated nursing practices are context-specific and vary across organizations, making them difficult to standardize and define (van Kraaij et al., 2022; Schalkwijk et al., 2024). However, they typically involve creating new roles and provid-

ing supportive structures for professional governance (O'Grady & Clavelle, 2021). These mechanisms are often linked to strategies to improve the nursing work environment (Paguio et al., 2020; Yuk & Yu, 2023; Lavender et al., 2016; Al-Ruzzieh et al., 2022). The first mechanism of differentiated practice involves creating new, future-oriented nursing roles, with hospitals increasingly differentiating nurses based on their competencies and education levels. For instance, many hospitals have introduced nurse coordinator positions to manage patient care, improve quality of care, and support other nurses (Martini et al., 2024). These positions often require nurses with bachelor's degrees or bachelor's competencies. Increasing the proportion of bachelor-trained nurses and aligning their roles with their competencies may enhance the work environment. This is supported by research indicating that a higher skill mix of bachelor-trained nurses is associated with better work environments and improved outcomes for both patients and nurses (Schnelli et al., 2024).

The introduction of differentiated practices generally improved perceived staffing and resource adequacy, but not for nurses working on medical and surgical wards. A potential explanation is that practice differentiation in medical and surgical wards may have led to bachelor-educated nurses balancing direct patient care with additional responsibilities, leading to insufficient registered nurses to manage the workload and maintain quality of care (Schnelli et al., 2024). Van der Mark et al. confirmed this theory, noting that nurses reported difficulty in completing quality and organizational tasks, such as adhering to protocols and guiding students, when assessing staffing adequacy (Van der Mark et al., 2022). These findings underscore the need for a long-term vision on differentiated practices that actively involves all nurses.

The second mechanism of differentiated nursing practice focuses on promoting professional nursing governance through differentiated nursing roles. This approach emphasizes nurses' accountability, ownership, and decision-making in clinical practice. We found that this approach improved *collegial nurse-physician relationships* and *nurse participation in hospital affairs* (albeit slightly). These findings align with those of previous research showing that enhancing collaboration between nurses and physicians and increasing nurse autonomy requires a multifaceted approach, including active participation of nurses in decision-making (Aghamohammadi et al., 2019; Mabona et al., 2022). However, we did not observe improvements in the *nursing foundation for quality of care* or in *nurse managers' ability, leadership, and support of nurses* after introducing differentiated nursing practices. Several factors may explain this. Increasing opportunities for nurses to

engage in decision-making may enhance their perception of involvement, even if the foundational aspects of care or managerial support have not yet improved. Experienced nurses, with higher expectations based on their practice, might be more critical of the work environment (Wong et al., 2010). Furthermore, differentiated nursing practices, such as distinguishing between vocational and bachelor-trained nurses, have raised concerns among vocational nurses about role degradation (Felder et al., 2022). More qualified nurses often assess the work environment and care quality more critically (Mphaphuli, 2024). In addition, differentiated practices may target nurse participation in hospital affairs rather than addressing broader aspects like quality of care or managerial support. Effective managerial support and positive leadership are crucial for improving the nursing work environment.

Despite various interventions aimed at improving professional nursing governance, isolated approaches often fail to significantly improve the work environment (Paguio et al., 2020). The nursing work environment is complex and influenced by numerous factors, suggesting that isolated interventions may not fully address underlying issues (Van Kraaij et al., 2024). Introducing differentiated practices is a complex change that cannot be implemented linearly (Van Kraaij et al., 2022). Meaningful progress in the work environment requires integrated and transformational approaches, as changes in one part of the system will inevitably affect other parts (Registered Nurses' Association of Ontario, 2013). Our findings indicate that differentiated practices can enhance collaboration and decision-making, contributing to a better work environment.

Inconsistent application of differentiated practices across hospitals may explain why these changes have not significantly reduced turnover intention. Bloemhof et al. (2021) have emphasized the benefits of a comprehensive model, while van Kraaij et al. (2024) have advocated for a systemic approach to transforming the work environment.

## Strengths and limitations

A strength of this study is that it is, to the best of our knowledge, the first to investigate the unique impact of practice differentiation on turnover intention among nurses, and how this is mediated by the nursing work environment. This study provides valuable insights for organizations that differentiate nursing practices. Another strength is the large sample size, which enhances the power and reliability of our findings (Snijders, 2005).

There are also some limitations that need to be acknowledged. The first limitation is the absence of a standardized measure or protocol for practice differentiation, which means that each hospital or ward implemented differentiated practices in a slightly different manner. This could have affected the effect of the intervention. However, given the wide variety of tasks involved in nursing, which can differ significantly across patients, wards, and hospitals, differentiated practices must be adapted to specific contexts to ensure their appropriateness and effectiveness (van Kraaij et al., 2022; Schalkwijk et al., 2024). Hence, it is important to avoid overly rigid protocols. The flexibility and customization within each ward or hospital play a vital role in successful implementation of differentiated practices (Felder et al., 2024).

The second limitation is that we included only one pre- and one post-intervention measurement, which may not have fully captured the effect of the intervention or the effect of other events during the measurement period. Differentiated nursing practices are introduced in phases in a non-linear process (Rogers, 2003; Van Kraaij et al., 2022). Integrating this complex system, which involves multiple stakeholders, can take several years (Fixsen et al. 2005). Nevertheless, our finding that the intervention influenced specific aspects of the nursing work environment is encouraging. Future research should use repeated measurements over time, such as a time-series analysis, to better understand the long-term effects of practice differentiation on the work environment, retention rates, and quality of patient care.

Lastly, the absence of data on response rates is a limitation, potentially introducing non-response bias. Nonetheless, the sample characteristics at T<sub>0</sub> and T<sub>1</sub> are closely aligned. This suggests that the findings are likely representative.

## Implications for practice and research

Our results highlight the importance of practice differentiation in improving the nursing work environment specifically with regard to *staffing and resource adequacy*, *collegial nurse-physician relationships*, and *participation in hospital affairs*. These findings highlight the role of differentiated practice in empowering nurses to actively shape and influence their work environment. However, not all components of the work environment were improved by practice differentiation and nearly a quarter of nurses are still considering leaving their organization. This indicates that not all aspects of the work environment are adequately addressed by the in-

tervention. By considering the work environment as a system and influencing it as such, for example with comprehensive multicomponent programs as described by Bloemhof et al. (2021) complex changes like practice differentiation can be implemented successfully. A clear vision of what nursing is and which positions belong to it and an involvement of nurses in shaping changes are important for this (Van Kraaij et al., 2022). Managers can facilitate this by encouraging nurses to get involved in change processes, fostering positive collateral relationships, acknowledging nurse responsibility, investing in competency development for change, and creating a supportive environment where nurses feel valued, respected, and empowered to voice their concerns and ideas (Cheraghi et al., 2023; Morrison & Jensen, 2022). Managers, hospital boards, and nursing associations should lead these initiatives, ensuring that input is incorporated from nurses at *all* levels. Collaborating with professional networks can further strengthen this approach, allowing for a more comprehensive and inclusive strategy. Fostering nurse ownership and encouraging participation can help create a more supportive and effective work environment (Van Kraaij et al., 2024).

Future research should investigate the complex relationship between differentiated nursing practices and turnover intention among nurses. While some aspects of the work environment were improved by differentiated practice, these improvements did not significantly reduce turnover intention, indicating a need for a deeper examination of how specific work environment factors influence retention and understand how these interact with differentiated practices. Longitudinal research is needed to assess the long-term impact of differentiated practices on nurse retention. By clarifying the mechanisms through which these practices affect the work environment, more targeted and effective interventions can be developed. A systems thinking research approach could provide a comprehensive view of how differentiated nursing practices influence the work environment (Trbovich, 2014).

## Conclusions

Differentiating nursing practices can improve the nursing work environment, especially staffing adequacy, nurse-physician relationships, and participation in hospital affairs. These findings underscore the value of practice differentiation in enabling nurses to influence and shape their work environment. This also shows hospital managers that differentiated nursing practice can create work environments that are more favorable to nurses and may encourage them to stay with the organization. However, to significantly increase nurse retention, a systemic

and multifaceted approach to improving the nursing work environment may be required. Researchers can help achieve this using a longitudinal and systemic approach to improve our understanding of the mechanisms of and complex relationships between differentiated nursing practices, the nursing work environment, and turnover intention.

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## Ethics approval and consent to participate

The study was conducted in compliance with the Declaration of Helsinki and was approved by the local Medical Ethics Review Board of Radboud Academic Medical Center. They determined that the study was exempt from the requirement for full ethical approval under the Dutch regulations for human subject research (nWMO 2019–5992), as the study did not impact participants' health or wellbeing. Before filling out the questionnaire, participants received information about the study and how their data would be processed. Participation in the study was voluntary. As formal written consent was not required, participants gave their consent by completing the questionnaire. The research company Newcom, responsible for data collection, adhered to the ISO 27001 guideline to ensure data security (Newcom, 2024). All data were anonymized using identification numbers and stored in accordance with Radboud Academic Medical Center's regulations, ensuring that only researchers directly involved in the study had access to the data.

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## Supplementary file 1 | Detailed description on the intervention in differentiated practices of one participating hospital

Before the transition to differentiated nursing practices, nursing teams in hospital A consisted of vocationally and bachelor trained registered nurses. Despite existing educational differences between these registered nurses, they performed the same tasks and roles.

With the introduction of differentiated nursing practices, hospital A transitioned from a single nursing role to a more specialized structure, creating two distinct roles: **nurse** and **nurse coordinator** (Box 1). These roles align with vocational and bachelor-level training, respectively. This differentiation aimed to enhance patient care and improve team efficiency by aligning roles with the nurses' educational backgrounds and competencies. As a result, vocationally trained nurses focus on hands-on, direct patient care, while bachelor-trained nurses, as nurse coordinators, are responsible for clinical leadership, complex clinical reasoning and decision-making, and promoting evidence-based practices.

Moreover, hospital A focused with the introduction of differentiated practices on the strategic positioning of nurses, especially those in the nurse coordinator role, to enhance their impact on patient care and organizational outcomes. This approach assigns nurse coordinators responsibilities that extend beyond patient care to include leadership and coordination of department-wide initiatives. Nurse coordinators translate national healthcare developments into departmental proposals, foster alignment in hospital-wide care delivery through standardized pathways, and lead (clinical) focus areas, i.e. complex clinical reasoning and evidence based practice for specific patient groups. They are accountable for planning, executing, and tracking these initiatives, coordinating with department heads and other units as needed. This strategic positioning reinforces their role as departmental leaders, empowering them to shape policies and practices aligned with patient needs and the hospital's objectives.

In alignment with the new differentiated structure hospital A also introduces distinct salary scales, with nurse coordinators positioned in a higher scale, providing them with greater potential for salary growth and career advancement. While nurse coordinators take a lead role in clinical decision-making, hospital A emphasizes a collaborative complementary approach, ensuring that both vocationally and bachelor-trained nurses contribute their unique skills to provide coordinated, holistic patient care.

### Box 1 | New roles in the differentiated structure.

#### **Nurse**

Nurses in this role focus primarily on direct, hands-on patient care, including administering medications, assisting with daily needs, monitoring patient conditions, and communicating with other healthcare providers. This role may also involve participation in specific focus areas or departmental working groups, contributing to ongoing improvement initiatives within the department.

#### **Nurse coordinator**

Nurse coordinators have a broader scope of practice, balancing direct patient care with leadership and organizational responsibilities. They play a key role in guiding clinical and departmental processes at both the unit and hospital levels, as well as within broader care networks. Nurse coordinators are central to clinical reasoning and decision-making, particularly in complex cases, and work collaboratively with multidisciplinary teams. They also promote evidence-based practices, assess care outcomes, identify areas for improvement, and contribute to the development and revision of protocols and procedures based on current research. Nurse coordinators are responsible for coordinating department initiatives, and promoting the collaboration for the initiatives across organizational level.

### **Career development opportunities**

During the transition, hospital A introduced new career pathways and educational opportunities for nursing staff. Vocationally trained nurses who wished to advance could complete bridge programs to obtain a bachelor's degree, allowing them to transition to the nurse coordinator role. Nurse coordinators may receive additional training or undergo assessments to ensure they meet consistent competency levels across the role.

### **Transition period**

The transition period for introducing differentiated nursing practices spanned three to five years, allowing departments time to adopt the new nurse and nurse coordinator roles fully. Initial steps involved assessing each department's staffing needs and skill levels, followed by targeted training and development programs to support nurses transitioning to the new roles. Temporary additional staffing was allocated to ensure consistent patient care while departments adjusted to new roles and responsibilities.

During this transition period, the practical application of differentiated roles was tailored at the departmental level. Each department customized the differentiation according to its unique operational needs and areas of clinical specialization. For example, highly specialized departments with a demand for complex clinical reasoning prioritized the nurse coordinators' role in guiding challenging clinical case assessments and decision-making. In contrast, other departments focusing on the embedding of evidence-based practices designated nurse coordinators to supervise journal clubs and write critical appraised topics and protocols.

Management played an active role in the transition, and department heads facilitated open communication with staff. By the end of the transition, departments were expected to have fully integrated the new roles into their standard operations, with the nurse and nurse coordinator roles clearly defined and established within the teams.

## Chapter 6

# Navigating uncertainties for promoting nurse-led changes in work environments

*A participatory action research*

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## Abstract

### Background

The nursing work environment is crucial for nurses' well-being and patients' quality of care. Despite effective interventions to improve the nursing work environment, understanding the most effective types and integration mechanisms for nurses remain challenging. As nursing practices evolve amid complex care demands and staff shortages, understanding nurses' challenges, support systems, and adoption mechanisms is vital to optimize the work environment and to enhance quality of care, job satisfaction, and staff retention.

### Purpose

To explore strategies for promoting and supporting nurse-led changes to improving their work environment.

### Methods

The study employed a participatory action research design on three nursing wards in a Dutch academic hospital. Action research teams with diverse ward nurses were established on each ward. The research took place between September 2022 and October 2023. Data were collected during observations, PhotoVoice workshops, and individual interviews. Data were analyzed using the rigorous and accelerated data reduction technique.

### Results

Nurses and managers showed patterns of behavior that either hindered or facilitated changes, leading to the emergence of three themes: strengthening relationships, taking the lead, and being up to the task. These themes highlight the importance of fostering collaboration, encouraging proactive attitudes, and building capabilities to address challenges and drive positive changes in their work environment. Feelings of uncertainty emerged in all themes, and this uncertainty hindered nurses from taking responsibility for facilitating change.

### Conclusions

This study demonstrated different mechanisms that either facilitate or hinder nurse-led changes and how feelings of uncertainty play a role. Nurses emphasized the importance of collaboration and proactive attitudes but faced challenges in recognizing responsibility and their perceived competencies. Strengthening nurses' resilience to and management of uncertainty is essential. Healthcare organizations should help nurses navigate uncertainty to foster positive changes.

### What is already known

- The nursing work environment significantly impacts both nurses and patients; positive environments are associated with better nurse wellbeing and quality of patient care.
- Various interventions demonstrate potential for improving the nursing work environment, yet uncertainty exists regarding their optimal efficacy.
- Nurses' engagement in change initiatives is crucial for creating a positive work environment, yet there is a gap in understanding the mechanisms that influence nurses' ability to drive changes and integrate them into daily practice.

### What this paper adds

- This study highlights the crucial interplay between uncertainty and responsibility in shaping nurses' ability to drive changes in their work environment.
- Strengthening relationships, fostering proactive attitudes, and enhancing competencies in nurses are crucial to stimulating resilience to uncertainty and to driving positive changes within their work environments.
- Participatory action research is valuable in stimulating nurses to enhance their own work environment by contributing to decision-making processes and collaborative problem-solving.

## Introduction

The nursing work environment directly impacts the well-being of both nurses and patients. Nurses who work in supportive and well-organized environments are more likely to provide high-quality care, leading to lower mortality and adverse events (Nascimento & Jesus, 2020), while also experiencing greater job satisfaction and well-being, which is crucial for retaining nursing staff (Wei et al., 2018). Therefore, investing in improving the nursing work environment could significantly alleviate the challenges currently facing healthcare systems, including staff shortages and the growing complexity of care (Ball et al., 2023; Copanitsanou et al., 2017; Smith, 2018).

The nursing work environment is multifaceted and encompasses specific organizational characteristics such as culture, processes, and structures that impact professional nursing practice (Lake, 2002; Maassen et al., 2021). Over the years, numerous interventions have been developed to enhance the nursing work envi-

ronment. Various reviews have outlined effective interventions, including those focusing on processes, psychosocial aspects, or digitalization (Eva et al., 2024; Paguio et al., 2020). These studies have demonstrated that interventions within the work environment can improve outcomes for nurses, patients, and organizations alike. However, although many interventions have proven effective, studies have primarily focused on quantitative results, and the most efficacious type of intervention remains uncertain (Paguio et al., 2020; Wei et al., 2018).

In effective interventions within nursing environments, key features include focusing on improving processes in the nursing work environment, employing participatory strategies, implementing changes at the unit level, and involving both frontline nurses and leaders (Paguio et al., 2020). Moreover, it is emphasized that nurses should take on the role of change agents (Wei et al., 2018). This highlights that nurses play a vital role in fostering and sustaining a positive work environment and that limiting their engagement in interventions risks valuable insights and perspectives being overlooked (Eva et al., 2024; Paguio et al., 2020; Wei et al., 2018). When nurses engage in change initiatives, they are encouraged not only to take ownership of their practice but also to foster (collective) leadership, facilitate professional growth, and potentially enhance a strong professional identity (Rasheed et al., 2020; van der Cingel & Brouwer, 2021).

Dutch nursing work environments are currently changing, with many hospitals transitioning towards differentiated nursing practices with varying competencies and education levels among nurses. By enabling nurses to leverage their expertise and skills, while fostering a diverse workforce that includes roles such as change agents, this approach has the potential to enhance the provision of high-quality care (Felder et al., 2024; van Kraaij et al., 2022). However, there are inherent complexities involved in facilitating these changes within the nursing work environment (van Kraaij et al., 2022). Hospitals face challenges as they navigate intricate practices influenced by historical and socio-political factors that shape nursing debates and practice (Schalkwijk et al., 2024). Previous research has taught us that we must involve nurses in such changes, yet the exact approach and effectiveness remain unclear. We have recognized the necessity of community-up approaches to mobilizing nurses and changing the work environment (van Kraaij et al., 2022), but a comprehensive understanding of nurses' ability to integrate these approaches into their work is imperative.

For these reasons, further research focusing on nurses' engagement in their work environment is necessary. We need insight into the challenges nurses face, the

support they receive, and the factors that either facilitate or hinder their role in changing their work environment. To address this, this study explores strategies for promoting and supporting nurse-led changes aimed at improving their work environment. This understanding could facilitate the development and implementation of interventions to optimize the nursing work environment, potentially improving the quality of care and increasing job satisfaction and nurse retention (Ball et al., 2023; Copanitsanou et al., 2017; Smith, 2018; Wei et al., 2018).

## Material and methods

### Design

The participatory action research design was suitable for this study for several reasons. Firstly, involving nurses as active participants in the research helps them to contribute their insights, experiences, and suggestions for enhancing their work environment. Participatory action research actively involves nurses, helping them to develop a sense of ownership of their practice and commitment to facilitate changes (Kemmis et al., 2014; van Lieshout et al., 2021). This is important for achieving successful outcomes and ensuring dedication to change initiatives (Rasheed et al., 2020; van Kraaij et al., 2022).

Throughout our study, we followed a critical participatory action research approach, deeply rooted in the critical theory paradigm (McTaggart, Nixon, & Kemmis, 2017). This approach emphasizes an iterative process of reflection and action, where we as researchers were actively engaged in the practice under study. We continuously reflected, often also with participants, on various elements such as positions, norms, interests, and our own assumptions. This ongoing reflection enabled us to gain deep insights into the work processes and to develop knowledge within the specific context of the practice. Such insights are essential for formulating effective and enduring strategies for improvement (Kemmis et al., 2014; van Lieshout et al., 2021)

Table 1 | Description of participating wards.

Ward	Specialism	Number of beds	Number of registered nurses (% bachelor trained)	Number of certified nursing assistants/ health and welfare assistants	Action research team nurses'
Ward A	Medical unit	32	50 (40%)	7	12
Ward B	Medical-surgical unit	39	40 (40%)	3	6
Ward C	Medical unit	56	72 (55%)	0	5

### Context and participants

The participatory action research was conducted on three wards (Table 1) in a Dutch academic hospital between September 2022 and October 2023. Wards were selected based on the following factors:

1. Authorization to conduct the research from cluster managers;
2. An intention to introduce differentiated nursing practice; and
3. The inclusion of diverse specialisms.

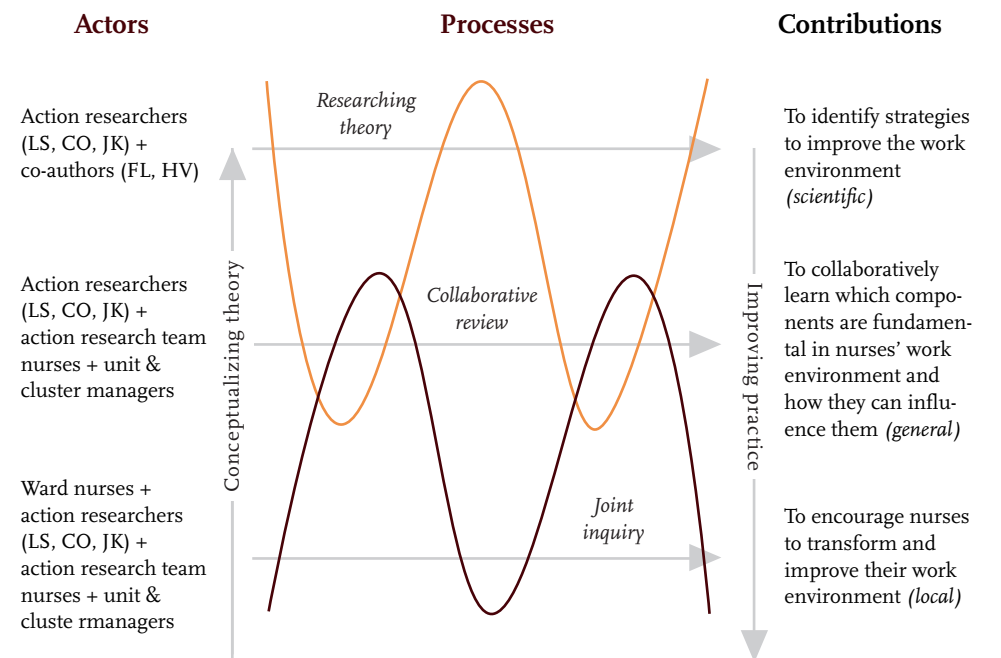
On each ward, an action research team with clinical ward nurses was established. Nurses could express their interest in joining the action research team after attending information sessions within their respective wards, and unit managers directly invited select nurses to (voluntarily) participate. These nurses were selected based on their potential valuable contribution to the action research team, either personally or professionally, or to ensure representation of the ward. The action research teams encompassed diverse levels of experience and educational backgrounds, including vocational and bachelor's degrees. All action research team nurses were clinical nurses, and some were senior nurses. Senior nurses are responsible for coordinating and overseeing patient care within the wards, ensuring that the needs of both patients and nursing staff are addressed. When forming the action research team, differentiated nursing practice was also considered by introducing the 'nurse coordinator'. These are nurses with a bachelor-level competency who lead nursing care for patients and families within a care pathway that focuses on innovation, professional development, coaching, evidence-based practice, and improving care quality (Personal communication, July 1, 2022). Each action research team included at least one aspiring nurse coordinator. During the study period, one ward initiated the implementation of nurse coordinators. All action research team nurses were allowed to allocate approximately two hours

per week to this research. The unit managers engaged in the participatory action research and were informed of the progress, but allowed the action research team nurses take the lead. One nurse from each action research team withdrew their participation, citing reasons including securing a new job and being too busy with other responsibilities.

### Data collection

An important characteristic of participatory action research is the continuous balancing act between developing theory and improving practice. Our study design was based on the Triple Process Structure model by Schuiling and Kiewiet (2016) (Figure 1).

Figure 1 | The research design and process intertwine three key processes: researching theory, collaborative review, and joint inquiry. The lines within the design visually represent the stages of this process, illustrating how all elements are interconnected and flow together to inform and shape the overall research process (adapted from Schuiling and Kiewiet (2016)).



This model integrates theory and practice and distinguishes contributions at three levels: the local practice contribution, the general practice contribution, and the scientific body of knowledge. This paper further explored the goal of scientific knowledge, complementing the focus of the first two contributions addressed during the practical research. While consistently navigating the three processes outlined by Schuiling and Kiewiet (2016), we structured our data collection into four phases (Table 2): pre-orientation, orientation, planning and testing actions, and evaluation (Kemmis et al., 2014; van Lieshout et al., 2021). These phases helped us to consistently navigate the outlined processes while addressing the three formulated contributions. Action research team meetings took place throughout the participatory action research to ensure theory and practice were integrated (process of collaborative review according to Schuiling and Kiewiet (2016)). These meetings served as a platform for sharing insights, reviewing progress, addressing challenges, and collectively making decisions related to the research or intervention being carried out. We continuously evaluated our discoveries, examining literature to identify successful and unsuccessful approaches and exploring which interventions proved effective.

### **Pre-orientation**

Relationship building was the main activity during this phase. We informed and obtained final approval from the management, briefed the participating nursing wards, invited nurses for the action research teams, and determined the research focus for each ward. To guide our focus, we utilized an annual survey assessing the quality of nurses' work environment, which included the Practice Environment Scale of the Nursing Work Index (Lake, 2002). This survey was conducted locally at the hospital's initiative to assess the quality of nursing care and evaluate its organizational aspects. We selectively incorporated findings relevant to the three wards involved in our present study. Using these results, we engaged in discussions with ward nurses during plenary sessions to identify important themes related to transforming their work environment. Multiple chances for improvement were acknowledged in this context, and three key challenges were identified on the three wards. Ward A, characterized by numerous medical specialties and a high personnel turnover, faced challenges in staying updated on medical content, with little room for extra training and improvement. In Ward B, which had a stable team and efficient working processes, there were difficulties involving the team in the implementation of protocols or execution of new work procedures. Ward C, known for its individualistic way of working and highly protocolized work procedures, was a place where nurses desired mutual involvement and connection during their work.

Table 2 | Overview of research phases, goals, data collection activities, and time in hours (see Supplementary file 1 for a specification of the activities and time in hours).

Phase	Goal	Activities	Time in hours
<i>All phases</i>	To facilitate collaboration, communication, and discussion among researchers and ART nurses, providing a platform for sharing insights, and collectively making decisions related to the research or intervention	Action research team meetings	50 (38 meetings)
Pre-orientation	To obtain approval, to inform, to determine research focus, and to recruit participants for the ART	Pre-discussions and alignment of the research with cluster and unit managers	3 (3 sessions)
	To provide information about the research	Information sessions with ward nurses	7 (7 sessions)
Orientation	To explore the current situation	Observations on three wards	52 (13 observations)
	To explore the current and desired situation	Photovoice	8 (6 sessions)
	To explore the current and desired situation	Semi-structured interviews	8 (16 interviews)
	To give an update on the research project and share the findings and potential actions	Meetings with cluster managers	1 (2 sessions)
Planning and testing actions	To implement and execute the formulated actions on the wards	Team workshops	7 (3 sessions)
Evaluation	To systematically evaluate the research	Meetings with action research team nurses and unit managers	3 (3 sessions)
	To provide information about the executed activities	Information session with ward nurses	1 (1 session)

### **Orientation**

During this phase, building upon the knowledge gained in the previous phase, we aimed to better understand the work environments and identify opportunities for improvement. This was achieved through observations, PhotoVoice workshops

with the nursing teams, and individual interviews. Observations gave us a realistic view of the current situation and allowed us to give immediate feedback to the nurses. Prior to the PhotoVoice sessions, we asked nurses to take two pictures of specific aspects in their work environment: one they considered positive and one negative. During the sessions, we facilitated reflection and discussion using the SHOWeD technique, which comprised five questions (Versey, 2024).

1. What do you see here?
2. What's really happening here?
3. How does this relate to our (work)lives?
4. Why does this problem, concern, or strength exist?
5. What can we do about it?

The researchers took field notes during these sessions. Directly after the observations and PhotoVoice sessions, semi-structured interviews were conducted with ward nurses to discuss and reflect on our observations. In total, 16 interviews were conducted with ward nurses selected by purposive sampling. The action research team nurses approached colleagues with a variety of ages, backgrounds, and work perspectives to participate in an interview. Nurses who agreed to participate were invited to schedule an interview (face-to-face or online using Microsoft Teams). For each ward, a different interview guide was constructed depending on the research focus (Supplementary file 2). Each interview was audio recorded and transcribed verbatim.

### ***Planning and testing actions***

This phase focused on the development and testing of a chosen intervention in practice. Ward A did not proceed to this phase. In Ward B, the emphasis was on implementing interventions that either facilitated or impeded changes. For instance, we conducted team meetings with exercises to embrace change and improvisation workshops. In Ward C, we established a buddy system in which evaluation moments were converted into opportunities for reflection. We discussed progress during the action research team meetings by sharing the experiences with testing the interventions and making sense of them collectively.

### **Evaluation**

The research project was systematically evaluated with the action research teams during this phase. A reflection meeting was organized for nurses and unit managers, where we collected their thoughts on the role of the action research team, individual contributions, and our role as researchers in the project. We also gathered

insights and advice on designing future research. The discussions also considered how the action research teams could sustain the intervention and approach future changes. While the action research teams continued with the project themselves, our role as researchers concluded after these evaluation sessions.

### **Data analysis**

Data were collected and analyzed in parallel processes, as analysis occurred gradually throughout the different action research phases. Collaborative analysis took place during meetings, observations, and interviews, providing a foundation for reflecting on patterns, underlying causes, and themes with the researchers, action research team nurses, and unit managers (Cornish et al., 2023). We also used the rigorous and accelerated data reduction technique for comprehensive analysis. This entails a systematic and incremental approach to reduce data and prioritize essential information, and consists of five steps (Watkins, 2017). In the first step, we verified consistent formatting by keeping a logbook of data collection, including references to minutes, transcripts, or audio files. In the second step, we created a data reduction table using Microsoft Excel. In this table, raw data were included and divided over the three wards. Two researchers (LS, CO) reviewed the table in line with the aim of the study and research question (what strategies can be employed to promote and support nurse-led changes aimed at enhancing the nursing work environment?). In the third step, we reduced information that did not appear of interest for the analysis and subcategorized the data into 55 codes. Subsequently, semi-final decisions were made about inclusion of codes. In the fourth step, LS, CO, and JK independently went through this data table and categorized the codes into six overarching themes: ownership, skills, collaboration, learning and reflection, management support, and leadership. In the fifth step, the researcher not engaged in the coding process (FL) peer reviewed the themes. All authors engaged in critical discussions about the recognized themes and grouped those themes that overlapped. Four overarching themes and 28 underlying codes were identified. With these themes and codes, we revisited the raw data and supplemented the themes with quotes, ensuring accuracy and completeness, with independent oversight from three authors (JK, LS, CO) (Supplementary File 3). We structured the result section around three themes, as we have integrated the theme 'support from manager' into the others.

### **Rigor and trustworthiness**

Participatory action research carries moral and political weight as it aims to address power dynamics and imbalances between stakeholders, while also generating valuable knowledge for a wider audience (Kemmis et al., 2014). The main

premise of this participatory action research was setting goals for local and general practice and generating (scientific) knowledge (Schuiling & Kiewiet, 2016). We also employed an iterative process, continuously refining strategies and actions through collaborative reflection and feedback. This helped us identify potential biases in data interpretation, while considering participation dynamics, relationships, and potential consequences of our actions (Kemmis et al., 2014). The reflective and thorough discussions between the researchers, action research team nurses, and unit managers, enhanced the credibility and confirmability of this research. All authors are non-practicing registered nurses. JK is a nursing science PhD candidate and holds MSc degrees in business administration and health and life sciences. LS holds a MSc degree in nursing science and is a nursing staff advisor. FL is an associate professor with expertise in participatory action research and development of effective workplace cultures. HV is a professor of nursing science and clinical epidemiologist. CO is a nursing dean and senior researcher. All authors participated in analyzing and interpreting the findings and finalizing the article. We used the Standards for Reporting Qualitative Research guidelines to ensure consistency and rigor throughout the research process (O'Brien et al., 2014).

### Ethical considerations

The study was approved by the local medical ethics review board of the Radboud University Medical Center (study number 2019- 5992), and the need for ethical approval for human subject research was waived. Written consent was obtained from all ward nurses, emphasizing voluntary participation, confidentiality, and anonymity. Ward nurses were informed of their right to withdraw at any time. We also adhered to the fundamental principles of research ethics by respecting all individuals involved and honoring their integrity (Kemmis et al., 2014). Data were anonymized and stored according to the regulations of the Radboud Academic Medical Center.

### Results

We explored the conditions influencing nurses' capability to foster ownership, strategies to encourage nurses' responsibility, and willingness of nurses to change their work environment. Although the wards were diverse and faced different challenges, making a change in the work environment appeared to be a big challenge for all wards. We identified patterns in the behavior of nurses and their managers that either hindered or facilitated changes. Three overall key themes

emerged: (1) strengthening relationships: fostering a sense of community and collaboration; (2) taking the lead in improvement and change: the necessity for a proactive attitude; and (3) being up to the task: the need for perceived competence. Nurses faced uncertainties within these themes, hindering their ability to take responsibility.

### Strengthening relationships: fostering a sense of community and collaboration

The development of sense of community and collaboration among ward nurses appeared to be an important aspect when changing the work environment. We observed two forms of collaboration among nurses: (1) social interactions and a sense of belonging during work and (2) collaborative problem-solving.

During the PhotoVoice sessions on all three wards, nurses captured photos depicting a good atmosphere and appreciation from colleagues. These images included positive messages exchanged in the coffee room and treats from both colleagues and patients: *"Having put in your utmost effort for three weeks straight, appreciation is truly welcomed. Delightful treats then help to turn things around."* 9/11, PHOTOVOICE, NURSE, WARD B

Engaging with each other during work was identified as an important aspect: *"We have a nice team and nice colleagues, we support each other; this influences the quality of care. Patients also appreciate and experience this"* (9/11, PhotoVoice, nurse, ward B). However, nurses did not always think there was enough of this: *"Due to the hard work, we don't always have time for each other or even to take care of ourselves"* 16/12, PHOTOVOICE, NURSE, WARD C. On one ward, it was not possible for the ward nurses to regularly interact or communicate with each other, despite its importance for fostering collaboration, because of the large team and rotating shifts: *"You don't know what's going on with everyone, because it's a big team"* (1/2, interview 6, nurse, ward C). This lack of mutual engagement surfaced during the scheduling process as colleagues frequently did not volunteer to exchange shifts. Moreover, three team managers were present on the largest ward, so establishing connections between nurses was even more complex. Engagement was more pronounced on one ward where managers actively invested in team-building activities.

Recognizing the importance of interaction, ward nurses acknowledged that providing feedback to address behavioral issues or commitments was easier when they had established relationships with their nurse colleagues: *"It is easier to address each other if you know each other better"* 24/2, INTERVIEW 10, NURSE, WARD C. This

quote emphasizes the importance of building strong interpersonal connections to facilitate effective feedback mechanisms and address issues proactively.

The need for collaborative problem-solving became apparent during the action research team meetings. This included teamwork, communication, and a shared commitment to addressing challenges. The ability to collaborate on a project, particularly when dealing with new and unfamiliar tasks, was recognized as crucial. *“When researching literature, it’s nice to have a buddy instead of being alone, because there is less experience in this.”* 26/5, EVALUATION, ACTION RESEARCH TEAM NURSE, WARD A

Action research team nurses were looking for an effective way to communicate within the group. They knew this was important, but it was challenging to keep everyone informed and engaged. *“The attendees took up the tasks and that made the ones that were not present less involved, because they did not know what to do.”* 26/5, EVALUATION, ACTION RESEARCH TEAM NURSE, WARD A

### Taking the lead in improvement and change: the necessity for a proactive attitude

The dedication of the ward nurses to the well-being of their patients drove them to take the lead when making clinical judgments and actions. For instance, we observed that ward nurses ensured a smooth progress of examinations, made sure that necessary checks were performed on time, and coordinated their schedules with physicians.

*“I always schedule an early shift the day before the medical grand rounds to be adequately prepared. With just the handover and a quick overview, you do not have enough information.”* 17/II, OBSERVATION, NURSE, WARD B

However, this seemed to be limited to patient care and ward nurses appeared somewhat negligent when asked about, for example, quality improvement projects, departmental change initiatives, or evidence-based practice. As one nurse mentioned: *“The team disengages and is difficult to reach, but for the patient, they do everything”* 14/12, ACTION RESEARCH TEAM NURSE, WARD C. Despite this, some ward nurses recognized their important role:

*“I think it is positive when nurses take the lead in changes. We are also at the bedside, and if we have to change things, it would be nice if we determine the bottlenecks ourselves. It can be determined from above, but then it [the solutions] is not always feasible.”* 19/I, INTERVIEW 2, NURSE, WARD B

Managers also played a crucial role in helping nurses to embrace their roles and responsibilities, which included the provision of resources, encouragement, and empowerment to enhance their effectiveness. For example, the introduction of the role of a nursing researcher posed a significant challenge on one ward, as revealed in an interview:

*“When I started my master education, I approached my managers to ask how we could structure or implement it. I asked, ‘Do you have any use for me?’ Well, that was all quite challenging, simply because it’s unfamiliar territory. So, I didn’t feel much cooperation there, and I still don’t always.”* 17/3, INTERVIEW II, NURSE, WARD A

Ward nurses were able to come up with solutions to problems they experienced, but quickly dismissed these ideas because they did not consider it their task or responsibility to find solutions. For instance, during one of the PhotoVoice sessions, nurses mentioned that they faced challenges with tangled cords on electrical devices:

*“Before we can use the device, we spend a considerable amount of time untangling the cords. [...] We use this device multiple times a day, and a better design would help us use it more effectively.”* 9/II, NURSE, PHOTOVOICE, WARD B

Despite having valuable ideas for improvement, none of the ward nurses submitted their proposals to the hospital’s design improvement department, citing reasons like heavy workloads, lack of time, or a preference for on-site submissions. Nurses attributed the problems to external factors and felt a sense of resignation regarding their limited influence. Nevertheless, during an interview, it came to light that nurses might hastily conclude they lack influence when, in fact, they may be uncertain about whom to approach or about the appropriate course of action in such situations:

*“During the PhotoVoice sessions, I noticed remarks like, ‘I’m not happy about this, but I have no influence over it.’ However, I believe that, in some cases, these were matters where nurses could exert influence if they knew which routes to explore or with whom to engage in conversation.”* 17/3, INTERVIEW II, NURSE, WARD A

At the beginning of this project, the action research team nurses were uncertain about the project’s timeline and about what was expected in terms of their roles

and tasks. During the action research team meetings, we noticed that, when there was uncertainty, the tendency was often to not perform the task rather than seek help. The action research team nurses had difficulties with taking responsibility to clarify and address the problem: *“I often thought it was my fault if I didn't understand something. That hindered me from asking.”* 26/5, EVALUATION, ACTION RESEARCH TEAM NURSE, WARD A

The action research team nurses were not accustomed to the level of responsibility assigned to them, as they typically received directions from their managers: *“Nurses do not determine policy, but participate in its execution”* (10/10, evaluation, action research team nurse, ward C). This observation became apparent in the action research team meetings, where nurses exhibited a tendency to turn to the manager expectantly when asked something. It turned out to be crucial for managers to possess the right competencies to motivate and encourage nurses to take responsibility, as one of the ward nurses mentioned:

*“I think they are the biggest incentive to make us feel professional. They certainly play a role, both in organizing days for quality work and in strengthening our professional sense.”* 17/3, INTERVIEW II, NURSE, WARD A

The ability to deal with setbacks and seek help when needed emerged as important factors when taking control. For example, during one of the team meetings, action research team nurses encountered significant resistance from colleagues after presenting initial results of the project and potential solutions. A few ward nurses disagreed, leading to threats of resignation and personal feelings of attack among the action research team nurses. However, the action research team nurses perceived this as a window of opportunity for change and embraced the challenge of still getting the team on board with the proposed changes:

*“The team meeting was a turning point. Then we thought, okay, we really have to keep it much closer to the team, but we also really have to play our role in that”* 10/10, EVALUATION, ACTION RESEARCH TEAM SENIOR NURSE, WARD C

When the action research team nurses assumed control, we noticed a notable improvement in the project's progress, enabling them to effectively initiate the intervention phase. This positive development was also recognized by the nurses themselves, as expressed during a project evaluation: *“Towards the end of the project, I got the idea that we had taken more control ourselves, and I think we learned a lot from that.”* 10/10, EVALUATION, ACTION RESEARCH TEAM SENIOR NURSE, WARD C

### Being up to the task: the need for perceived competence

Taking on the responsibility to initiate changes seemed to be connected to the perceived level of competence to assume that responsibility. We observed that ward nurses showed greater readiness to take on responsibilities when they felt assured of their necessary skills. Initiating a shift with a critically ill patient was not stressful for a ward nurse who confidently stated:

*“I've been in the business for a while. I have already seen and experienced a lot. This combination of theoretical knowledge and experience makes me flexible and agile. I adapt and I see what needs to be done.”* 7/4, INTERVIEW 14, NURSE, WARD A

Ward nurses were very adept at recognizing and articulating challenges in their work environment. However, our observation revealed that they lacked the necessary skills to prioritize these challenges effectively. For instance, during a PhotoVoice session, ward nurses extensively discussed issues like disorderly wards and the absence of materials, which were essentially straightforward problems. There was no focus on addressing deeper structural or systemic challenges associated with these issues.

We became aware that, in the daily routine, a cyclical learning and improvement process was lacking among the nurses. Their solution-oriented approach was often to find temporary fixes and shortcuts instead of permanent solutions to enhance their work environment: *“Are we going to invest our energy in untangling the wires of electrocardiogram machines? I think it's a waste of my time.”* 9/11, PHOTOVOICE, NURSE, WARD B

Moreover, ward nurses pointed out that the nursing process had evolved into a sequence of tasks facilitated by the highly task-oriented electronic patient record. This, coupled with nurses' tendency to focus on the immediate allocation of duties and patient care workload during evaluations, hindered the exploration of structural and systemic solutions.

*“The point is that it is solved quickly, not that it is solved with good quality. I think that a structural approach, for something that works in the longer term, often fails to occur.”* 17/3, INTERVIEW II, NURSE, WARD A

The action research team initially led the project but encountered challenges as they grappled with how to approach and initiate it. We noticed that action research

team nurses did not consider themselves skilled in the field of project and change management and evidence-based practice. One action research team nurse mentioned: *“I’ve had an afternoon course of project management, but I find it challenging to link that to this project.”* IO/IO, EVALUATION, ACTION RESEARCH TEAM SENIOR NURSE, WARD C

While managers initially adhered to the request to step back and let action research team nurses lead the project, it became clear that ongoing managerial support was essential when nurses faced challenges initiating the project and assuming responsibility. Successful support included managerial guidance while delegating decisions regarding the content to the project teams:

*“From the halfway point onwards we also had her [the manager] more as a source of information and then we just started sparring with her and you learned things from that.”* IO/IO, EVALUATION, ACTION RESEARCH TEAM NURSE, WARD C

The research project stagnated in wards where this did not take place. Positive impacts were also observed when managers engaged in self-reflection and encouraged a reflective approach. Action research team nurses emphasized the importance of being able to depend on their manager during challenging situations, appreciating a collaborative and supportive dynamic:

*“Because as a manager I was expected not to direct anything, so I didn’t do that. That also asked something of me. But at a certain point I intervened and said: ‘I think we now have to provide a little more guidance and give the working group more guidance about their role, the role of the researchers and the expectations.’”* IO/IO, EVALUATION, MANAGER, WARD C

With managerial coaching and practical support, such as offering relevant literature and demonstrating procedures, action research team nurses grew confident in their own abilities. This increased perceived competence made them more proactive, wherein action research team nurses asked for help, talked about responsibility, and they explored possibilities:

*“At the beginning, I did not really know what to do, but as I got further into the process I just knew what was expected of me, and did that, and I really enjoyed seeing that I got better and better at it.”* (IO/IO, EVALUATION, ACTION RESEARCH TEAM SENIOR NURSE, WARD C

They also began to value the change process in their ward: *“I have come to appreciate the process of change more, instead of the result. Because the process determines success.”* 6/7, EVALUATION, ACTION RESEARCH TEAM NURSE, WARD B

## Discussion

The aim of this study was to explore strategies and mechanisms that promote and support nurse-led changes within the nursing work environment through participatory action research. We showed that feelings of uncertainty and responsibility affected nurses’ ability to foster ownership and initiate changes in their work environment. We noted this pattern across three primary themes: (1) strengthening relationships: fostering a sense of community and collaboration; (2) taking the lead in improvement and change: the necessity for a proactive attitude; and (3) being up to the task: the need for perceived competence.

The first key finding was the importance of strengthening relationships in creating a positive work environment. We observed this as a need for community, collaboration, and teamwork among ward nurses. In line with earlier research findings (Ahlstedt et al., 2019; Hanafin et al., 2022), nurses were more likely to commit to and engage in their work and the organization when they felt connected to their colleagues and the organization. Managers played an important role here by promoting positive relationships between colleagues (Ahlstedt et al., 2019; Hanafin et al., 2022). We also noted the significance of collaborative problem-solving and fostering a supportive, collegial environment among nurses, which has been emphasized in previous research (Hörberg et al., 2023). Nurses showed a preference for teamwork, especially when dealing with uncertainties in task identification or execution, such as when they were assigned unfamiliar activities.

The second theme that emerged was the initiative to lead improvement and change within the work environment. We noticed that nurses were often primarily task focused and seemed to overlook their potential responsibility for initiating improvement and change. However, once they recognized their responsibility, they showed proactive mindsets. Pursio et al. (2021) defined nurses’ participation in decision-making processes and their ability to influence them as professional autonomy. They underscored the importance of shared leadership and supportive nurse managers in empowering nurses to exert their influence. An open attitude towards change is (partly) fostered by managers being reliable, inspiring, and encouraging (Cheraghi et al., 2023). Nurses possessed a degree of influence over

their work environment, yet they also relied on support from their managers. We demonstrated the important role of nurse managers in stimulating nurses to assert their (organizing) roles and encouraging them to construct solutions to barriers in their environment. This was illustrated in one action research team, which faced resistance from the nursing team on suggested interventions to improve the work environment. In this case, the unit manager successfully intervened by prioritizing the process over the content and by encouraging action research team nurses to take responsibility for their professional role. We also observed that uncertainties hindered nurses' ability to initiate changes and that nurses mainly felt responsible for direct patient care rather than for initiating change. This can be attributed to the professional identity of nurses (Philippa et al., 2021; van der Cingel & Brouwer, 2021) and to deeply rooted organizational processes and structures tailored to bedside nursing work (van Kraaij et al., 2024; Felder et al., 2024). Nurses cannot take responsibility without adequate authorization, and organizational constraints such as unclear rules, hierarchical structures, and limited control over practice can impede this (Pursio et al., 2021). In addition, perceptions of the professional image and corresponding practices in nursing are not always contemporary. Interestingly, prior research attributed uncertainty in nursing practice to ambiguity within the nursing domain (Vaismoradi et al., 2011). Nursing is frequently seen as a profession dominated by women, with its professional identity influenced by subjective factors such as societal perceptions and stereotypes, rather than by the complex and professional roles and responsibilities it encompasses (Philippa et al., 2021; Teresa-Morales et al., 2022).

Nurses demonstrated proficiency in patient care; however, they perceived a deficiency in the skills necessary for prioritizing challenges and implementing structural and systemic improvements (van Oostveen et al., 2015). Due to time constraints, nurses often resort to working within established routines, neglecting to address the root causes of issues, and primarily engaging in first-order problem solving (Tucker & Edmondson, 2002).

Our final theme was the need for perceived competence to assume responsibility to improve the work environment. Nurses were proficient in patient care, but they perceived deficiency in the skills necessary to prioritize challenges and implement structural and systemic improvements (van Oostveen et al., 2015). Nurses had limited time for reflection, so frequently resorted to working in a routine manner, without addressing underlying causes of problems and essentially engaging in first-order problem solving (Tucker & Edmondson, 2002). In this context, nurses should prioritize supporting each other in learning and reflection over assisting

one another in completing patient care. To foster a culture of continuous improvement among nurses, a shift towards a second-order learning approach involving cyclical learning and improvement is needed (Tucker and Edmondson, 2002). Earlier studies have demonstrated that differentiated nursing practice could help nurses use this second-order approach to address issues (van Kraaij et al., 2024). However, this entails more than just altering roles and job descriptions; it requires a complete organizational transformation that includes nurses. Organizations must establish a culture of mutual accountability for implementing solutions and efforts should focus on building confidence among employees that their contributions matter (Mazur et al., 2012). Aligning processes, structures, and relationships across the organization is essential to support second-order learning behaviors among nursing teams (van Kraaij et al., 2022; van Schothorst-van Roekel et al., 2020). This alignment fosters an environment where nurses engage in cyclical learning and improvement, promoting ongoing enhancements in healthcare delivery.

These three themes are interconnected, and uncertainties have hindered nurses' ability to take on responsibilities. To assume responsibility effectively, nurses need to have the necessary competencies, foster effective collaboration, and receive strong managerial support, which includes relational support and an unconditional trust and belief in nurses' capacity to act. This enables them to navigate uncertainty and take control of their responsibilities confidently. Research on uncertainty in nursing practice is sparse and has mainly focused on uncertainty in clinical practice (Vaismoradi et al., 2011). However, an earlier study on work environment uncertainty and organizational readiness for change among nurses showed that knowledge, skills, and aptitudes of nurses need to be promoted so they can respond to uncertainty (Alsolami et al., 2023). The consistency of these themes corresponds with the principles of self-determination theory, which underscores relatedness, highlighting the importance of belonging, feeling connected with others, autonomy, self-direction, and a sense of independence and competence. This stresses the significance of feeling effective and capable. These factors are essential in fostering intrinsic motivation, well-being, and organizational effectiveness (Deci et al., 2017; Ryan & Deci, 2000). Establishing a healthy work environment requires joint effort from nurses, managers, and the organization. When nurses perceive a supportive and trustworthy environment, they are more likely to feel encouraged and motivated to confront uncertain situations and eventually make improvements in their work environment.

### Strengths and limitations

A strength of this study is that participatory action research enabled nurses to give their perspectives and experiences on the mechanisms that either facilitate or hinder nurse-led changes (Kemmis et al., 2014; van Lieshout et al., 2021). Our participatory approach not only fostered learning and reflection but also encouraged nurses to engage in second-order problem-solving and lead changes themselves. With our guidance and support, they learnt how to adjust or implement changes. This process of learning and change allowed us to explore mechanisms and acquire evidence-based insights into strategies and their contributions to facilitating nurse-led changes that improve the work environment. This underscores the potential of participatory action research in enabling nurses to take responsibility and to actively contribute to positive changes. To our knowledge, this is the first study to investigate how these mechanisms operate in practice and to identify what nurses require to change their work environment. Potential limitations of participatory action research are challenges such as social desirability bias and potential conflicts of interest. To address these issues, we maintained a critical attitude and practiced reflexivity to interpret nurses' experiences and minimize bias (Bispo Júnior, 2022).

Another potential limitation is that we did not use a participatory approach with the action research team nurses to code the data. However, data were analyzed iteratively throughout the research after various activities. Findings were discussed with the action research team nurses, and new data collection activities were planned based on these analyses. Although this study was conducted in one Dutch academic hospital, we believe that our findings and implications can be applied to other healthcare settings. A further limitation is that the study was not long enough to fully uncover long-term impacts. However, the focus was on processes within different action research teams and the strategies used to activate them. We observed similar patterns on the wards, but ongoing evaluation and adjusting strategies at the ward level will be crucial to ensure sustained improvements.

### Implications

These findings have several implications for nursing practice and research in improving the nursing work environment. We have shown that raising awareness about the fundamental motivational needs of strengthening relationships, fostering proactive attitudes, and enhancing competencies can reveal nurses' motivations for change (Ahlstedt et al., 2020). Improving nurses' resilience and ability to handle uncertainty can facilitate successful transitions in the work environment (Hörberg et al., 2023). Developing skills in uncertainty management among

nurses could further foster a supportive and collegial environment, the assertion of autonomy, and the development of perceived competence. These skills include developing personal reflection skills (Hörberg et al., 2023) and second-order problem solving skills (Tucker & Edmondson, 2002). Routine first-order problem solving restricts the implementation of structural changes, which has implications for both education and practice. Alongside regular nursing training, which predominantly focuses on clinical situations, courses should equip nurses with strategies to navigate uncertainty (Hörberg et al., 2023). We also highlighted that nursing managers play a crucial role in promoting and supporting resilience among nurses by encouraging involvement, fostering positive relationships, acknowledging nurse responsibility, investing in competency development, and creating a supportive environment where nurses feel valued, respected, and empowered to voice their concerns and ideas (Cheraghi et al., 2023; Morrison & Jensen, 2022). Further research could investigate the long-term effects of participatory action research interventions on nursing environments and the continuous evaluation of strategies at ward levels to sustain improvements. Future work should also explore how nurses manage uncertainty as these skills have not been well studied, particularly regarding how they affect quality improvement and change initiatives.

### Conclusions

This study has contributed to the sparse research on strategies for promoting nurse-led changes through participatory action research. The interplay between responsibility and uncertainty influenced nurses' ability to initiate changes within their work environment. Nurses emphasized collaboration and proactive attitudes in addressing uncertainties but faced challenges in recognizing their responsibility and their perceived competence for initiating structural changes. Strengthening nurses' resilience and uncertainty management skills through reflective practices and proactive problem-solving is crucial for successful transitions in the work environment. Hence, healthcare organizations should raise awareness of nurses' fundamental motivational needs and support them in navigating uncertainty to foster positive changes.

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**Supplementary file 1 | Data collection activities and time in hours**

Date	Phase <sup>a</sup>	Activity	Ward	Time in h
27-5-2022	I	Pre-discussions and alignment of the research with cluster and unit managers		I
16-8-2022	I	Information session with nurses to provide information about the research	B	I
16-8-2022	I	Pre-discussions and alignment of the research with cluster and unit managers		I
19-8-2022	I	Pre-discussions and alignment of the research with cluster and unit managers		I
19-8-2022	I	Information session with nurses to provide information about the research	C	I
6-9-2022	I	Information session with nurses to provide information about the research	C	I
20-9-2022	I	Information session with nurses to provide information about the research	A	I
20-9-2022	I	Information session with nurses to provide information about the research	B	I
27-9-2022	I	Information session with nurses to provide information about the research	A	I
4-10-2022	I	Information session with nurses to provide information about the research	A	I
4-10-2022		Action research team	B	I
14-10-2022		Action research team	C	I
2-11-2022	2	Observation	B	8
2-11-2022	2	Unit managers	B	I
3-11-2022	2	Observation	C	8
9-11-2022		Action research team	B	I
9-11-2022	2	PhotoVoice	B	3
10-11-2022	2	Observation	B	4
17-11-2022	2	Observation	B	4
17-11-2022	2	Observation	C	4
22-11-2022		Action research team	B	1,50
22-11-2022	2	Observation	C	4
28-11-2022		Action research team	C	1,50
1-12-2022		Action research team	A	I
9-12-2022	2	PhotoVoice	C	I

13-12-2022		Action research team	A	1,50
14-12-2022		Action research team	C	1,50
16-12-2022	2	PhotoVoice	C	I
21-12-2022		Action research team	B	1,50
30-12-2022	2	PhotoVoice	C	I
4-1-2023		Action research team	B	1,50
11-1-2023		Action research team	C	1,50
18-1-2023	2	Observation	A	4
18-1-2023		Action research team	B	1,50
18-1-2023	2	Interview	B	0,50
19-1-2023	2	Observation	A	4
19-1-2023		Action research team	A	1,50
19-1-2023	2	Unit managers	A	I
19-1-2023	2	Interview	B	0,50
20-1-2023	2	Observation	A	4
25-1-2023	2	Unit managers	B	I
25-1-2023		Action research team	C	I
27-1-2023	2	Observation	A	8
30-1-2023		Action research team	A	1,50
31-1-2023	2	Interview	B	0,50
1-2-2023	2	Interview	B	0,50
1-2-2023	2	Interview 06	C	0,50
3-2-2023	2	Interview 09	C	0,50
8-2-2023		Action research team	C	1,50
8-2-2023	2	Unit managers	C	I
10-2-2023	2	PhotoVoice	A	I
10-2-2023	2	Interview 08	C	0,50
17-2-2023	2	PhotoVoice	A	I
24-2-2023		Action research team	B	I
24-2-2023	2	Interview 07	C	0,50
24-2-2023	2	Interview 10	C	0,50
1-3-2023		Action research team	A	1,50
8-3-2023		Action research team	C	1,50
15-3-2023		Action research team	A	1,50
16-3-2023		Action research team	B	I
17-3-2023	2	Interview 11	A	0,50

23-3-2023	3	Team workshop	C	2,25
28-3-2023	2	Interview 12	A	0,50
28-3-2023	3	Team workshop	C	2,25
29-3-2023		Action research team	B	1
30-3-2023		Action research team	A	1,50
5-4-2023		Action research team	C	1,50
7-4-2023	2	Interview 14	A	0,50
11-4-2023	2	Interview 15	A	0,50
11-4-2023	2	Interview 16	A	0,50
12-4-2023		Action research team	B	1
13-4-2023		Action research team	A	1,50
18-4-2023	2	Interview 13	A	0,50
21-4-2023		Action research team	C	1,50
26-4-2023		Action research team	B	1
2-5-2023		Action research team	A	1,50
5-5-2023		Action research team	C	1,50
8-5-2023		Update about the research project and share the findings and actions with cluster managers		0,5
19-5-2023		Action research team	C	1,50
25-5-2023		Action research team	B	1
26-5-2023	4	Evaluation	A	1
30-5-2023		Update about the research project and share the findings and actions with cluster managers		0,5
2-6-2023		Action research team	C	1,50
7-6-2023		Action research team	B	1
16-6-2023		Action research team	C	1,50
20-6-2023	4	Information session with nurses to provide information about the research	A	1
30-6-2023	3	(Team) workshop 'Art of changing' for action research team nurses and other interested nurses	all	2,50
6-7-2023	4	Evaluation	B	1
14-7-2023		Action research team	C	1,50
25-8-2023		Action research team	C	1
21-9-2023		Action research team	C	1
10-10-2023	4	Evaluation	C	1

Notes | a. (1) pre-orientation (2) orientation (3) planning and testing actions 3; (4) evaluations.

## Supplementary file 2 | Interview guides

### Ward A

1. How do you personally handle problems you encounter during your workday? What helps and what doesn't help in this regard?
2. In what ways do you engage in quality improvement projects during your work? What challenges or motivates you? What hinders you?
3. Can you mention a quality improvement project where you have played a role yourself? Go through it from A to Z (as reflection), where did you have influence?
4. What do you think is needed within your team to systematically address problems and quality improvement projects?
5. The Photovoice sessions revealed frequent issues or areas for improvement on the ward. If you wish to tackle these, what do you perceive as aspects you can influence? Additionally, what do you view as factors beyond your control?



### Ward B




1. What was the last change project you were involved in? How did it go? What challenged or motivated you? What hindered you?
2. What was the trigger for that project and what was its goal?
3. Who initiated the project, and who were responsible for its execution?
4. What do you need in change projects to make it run successfully?

### Ward C

1. We have been exploring your nursing work environment. We had two introductory meetings, conducted various observations, and we organized three Photovoice sessions where we reflected on the work environment. From this, several issues have emerged, all with one overarching theme: engagement with and connection to each other during work.
2. Do you recognize this theme? Why or why not?
3. What is your opinion on the engagement within the team? How do you see this in relation to management?
4. What do you personally do to stimulate engagement? What helps or what doesn't help?
5. We noticed that the department has many rules and protocols. What are your experiences with this? Do you think this could be related to engagement?
6. In the PhotoVoice sessions, multiple strategies emerged to enhance engagement, with the buddy system being one of them. Could you elaborate on how this system operates in your ward? Additionally, what are your thoughts on its effectiveness? What aspects of the system do you find effective, and are there any shortcomings?

### Supplementary file 3 | Themes, codes, descriptions & representative observations and quotes

Observations, PhotoVoice & Interviews <sup>a</sup>		Action Research Team <sup>a</sup>
Theme: collaborative working	Description	
Good atmosphere	<p>Social interactions and a sense of belonging during nurses' work</p> <ul style="list-style-type: none"> <li>Between the patient tasks that needed to be done, there was a lot of room for informal contact; breaks were coordinated, so they happened together.</li> <li>Memo of researcher: "Staff is cheerful, team leader is energetic and friendly towards all nurses." 3/11, OBSERVATION, WARD C</li> <li>One nurse started her coffee break alone, but she did not mind: "That way I can respond to patients' calls for my colleagues, so they don't have to keep interrupting their break." 27/1, OBSERVATION, NURSE, WARD A</li> <li>"We have a nice team and nice colleagues, we support each other; this influences the quality of care. Patients also appreciate and experience this" 9/11, PHOTO-VOICE, NURSE, WARD B</li> </ul>  	
Feeling valued by colleagues, managers, patients, and by the organization	<p>Feeling valued by colleagues, managers, patients, and by the organization</p> <ul style="list-style-type: none"> <li>Social interaction was mentioned as a contributing factor to good cooperation.</li> <li>"Colleagues are part of your life, your work life. In that sense I think it [involvement] is important. Especially because if you have good mutual contact, patient care will be better." 10/2, INTERVIEW 8, NURSE, WARD C</li> <li>Treats from colleagues and patients were appreciated by all ward nurses, positive messages in the coffee room created a pleasant working atmosphere. The fruit, delivered to the ward by the organization, was also appreciated. GENERAL OBSERVATION</li> <li>Nurses linked the photo with sweets and treats to coziness, sweetness, enjoyment, making the break more pleasant, positive energy, being taken seriously, and being seen.</li> <li>"Having put in your utmost effort for three weeks straight, appreciation is truly welcomed. Delightful treats then help to turn things around." 9/11, PHOTOVOICE, NURSE, WARD B</li> </ul>	

Engagement	<p>The level of involvement, interest, and commitment that nurses have towards a task and towards each other. It involves mutual relationships, making and keeping agreements</p> <ul style="list-style-type: none"> <li>All teams emphasized the importance of teamwork. However, large teams made it more difficult to connect with each other. Ward C had a very large team; there was not much connection/collaboration between different units within one ward. The mental well-being of colleagues was not always known, and many nurses experienced challenges as it could influence their way of working and interactions. GENERAL OBSERVATION</li> <li>"Colleagues often do not volunteer if a colleague wants to exchange a shift. Sometimes there is no involvement with each other." 17/11, OBSERVATION, NURSE, WARD C</li> <li>"Due to the hard work, we don't always have time for each other or even to take care of ourselves." 16/12, PHOTOVOICE, NURSE, WARD C</li> <li>"You don't know what's going on with everyone, because it's a big team. [...] Sometimes there is a get-well card for someone, but you don't know why." 1/2, INTERVIEW 6, NURSE, WARD C</li> <li>It became apparent that commitment of a team to making changes in the workplace can be a challenge.</li> <li>"The next day I'm on a different team again. Let someone else figure out the problem." 16/12, PHOTOVOICE, NURSE, WARD C</li> <li>"There's a problem, a solution is being sought. That is presented to the team. And then it slowly fades away. [...] If you're going to change something, it's for a reason. So, then you have to keep it up. I'm also trying to see for myself: does this work? I have sometimes gone back to such a group: This is decided, but I am running into problems here and there." 18/1, INTERVIEW 1, NURSE, WARD B</li> </ul>	  
	<ul style="list-style-type: none"> <li>It was a challenge to keep all action research team nurses informed of the progress within the action research team. This required action from both the present and absent action research team nurses during meetings. Minutes and app groups were mostly used for communication. Ward A had a large action research team, which should have had the advantage that there was always someone present. The disadvantage was that people found it difficult to keep each other informed. The action research team in ward C was smaller, and members seemed to keep each other better informed. Yet, in all wards, 'I wasn't there last time, so I don't know exactly...' was heard regularly.</li> <li>All action research teams had difficulty keeping their appointments within the set time and distributing the tasks properly. It was accepted because everyone seemed to experience the same reasons for this (lack of time, different prioritization, not seeing each other in between, and irregular schedules).</li> <li>"Sometimes you are there and other times you are not, then you miss the feeling. If you see the whole group regularly you feel more connected, which creates more energy to tackle the work." 26/5, EVALUATION, ACTION RESEARCH TEAM NURSE, WARD A</li> <li>"At a crucial moment, the working group did not proceed twice in a row. Then you lose each other for a while." 26/5, EVALUATION, ACTION RESEARCH TEAM NURSE, WARD A</li> <li>"What we particularly struggled with was the irregularity. We were only able to plan the entire group together after 3 months." 26/5, EVALUATION, ACTION RESEARCH TEAM NURSE, WARD A</li> <li>"Make sure that there are one or two people who are always there and the others around them. Two who are in charge, who monitor the red line and keep everyone informed about the activities and progress. Who have an overview." 26/5, EVALUATION, ACTION RESEARCH TEAM NURSE, WARD A</li> </ul>	

<p>Dividing tasks</p> <p>Allocating specific responsibilities and assignments among nurses</p>	<ul style="list-style-type: none"> <li>• Ward nurses had a clear task distribution throughout the day and sometimes discussed patient care with each other in between. In some wards, the patient allocation was made the evening before, while in other wards it was done during the handover. While making this allocation, nurses on a ward could also schedule time to work on quality projects. GENERAL OBSERVATION</li> <li>• <i>"Having your own patients provides an experience of more control over the patient. You are responsible for the entire process."</i> 3/11, OBSERVATION, NURSE, WARD C</li> <li>• Nurses linked a photo of a white planning board at the ward to maintain an overview of all zones within the ward. Colleagues know whether they need/can offer assistance and what the situation is in the ward. This improves collaboration. 9/11, PHOTOVOICE, WARD B</li> </ul>
<p>Teaming up</p> <p>The desire to work (physically) on something together instead of alone, receiving support from colleagues</p>	<ul style="list-style-type: none"> <li>• Ward nurses enjoyed working collaboratively. Buddy systems existed in two wards to stimulate collaboration: conducting double medication checks, distributing breaks, discussing specific details with each other, and supporting each other in the patient tasks. GENERAL OBSERVATION</li> <li>• <i>"I think it makes you more involved with each other. [...] Because if you are really buddies, then you are together more. I would find it more enjoyable to work together more. And safer too, I think. Especially for the young people, that they have someone to lean on."</i> 24/2, INTERVIEW 7, SENIOR NURSE, WARD C</li> </ul>

<p>Communication about changes</p> <p>Involves sharing information regarding any changes within nurses' work (environment), such as updates, or alterations in procedures, protocols, or the overall workflow.</p>	<ul style="list-style-type: none"> <li>• During handovers, attention was given to mainly patient care related changes or modifications, such as maintaining new score lists or a new method for distributing medication. GENERAL OBSERVATION</li> <li>• What researchers thought that contributes to successful change: good communication within the team about the usefulness, necessity, and content of a change, repeating and addressing colleagues, and creating support. Create sufficient time for workgroups.</li> <li>• <i>"What helps with changes is discussing them during the daily evaluation and continuing to repeat them. We agreed on something last month, how is that going, are you succeeding, are you running into any problems?" Instead, every few months there is a group of people in that working group who post something by email and discuss it once or twice."</i> 18/1, INTERVIEW 1, NURSE, WARD B</li> <li>• <i>"It [the change] was also difficult at first, but those people just kept repeating it over and over again, repeating it, repeating it, and at a certain point everyone had it in their reports. You should especially explain to people who see less of the usefulness of the change. If they say things are going well and you show the figures, you can't ignore that."</i> 19/1, INTERVIEW 2, NURSE, WARD B</li> </ul>
<p>Collaboration with other disciplines</p> <p>Working cooperatively with professionals from different fields</p>	<ul style="list-style-type: none"> <li>• One team had won an innovation award for a digital planning board for the physicians/nurses' visits to patients.</li> <li>• <i>"The board is very useful. This gives you more control over the organization of your day. The patient also knows where he or she stands. We are less dependent on the physician."</i> 18/1, OBSERVATION, NURSE, WARD A</li> <li>• Collaboration with and appreciation of the physician was discussed (<i>"They don't understand what nursing looks like"</i>), the other way around a physician said: <i>"Nurses don't realize all we do."</i> Collaboration with the pharmacy was also not optimal (<i>"Their staff shortage is made into our problem"</i>). But showing leadership to optimize collaboration is not widely shown 9/11, PHOTOVOICE, WARD B</li> </ul>

<p>Feedback</p> <p>Giving feedback, asking questions, and addressing each other about responsibilities</p>	<ul style="list-style-type: none"> <li>All teams worked well together, but hardly any feedback was given or requested. Colleagues also did not often speak to each other about undesirable behavior, for example, about tasks that had (not) been completed. GENERAL OBSERVATION</li> <li>"Addressing each other also remains an issue. It's best to tell someone if they have forgotten something. Or you say: maybe you can do it this way next time. That rarely happens. And then they talk about it behind each other's backs. Nobody learns anything from that." 27/11, INTERVIEW 3, NURSE, WARD B</li> <li>"I think everyone gets along really well and it's a lot of fun. What doesn't really happen is providing structured feedback to each other [...] that could be done differently. That we dare to speak to each other without anyone feeling attacked." 31/1, INTERVIEW 4, NURSE, WARD B</li> <li>"It is easier to address each other if you know each other better." 24/2, INTERVIEW 10, NURSE, WARD C</li> </ul> <p>Theme: developing competence</p> <p>Skills related to patient care</p> <p>A diverse set of abilities for providing high-quality patient care</p> <ul style="list-style-type: none"> <li>The delivery of patient care is streamlined, and ward nurses knew well what they needed to do. They seek each other out for questions. Clinical lessons on common medical conditions are also regularly organized. GENERAL OBSERVATION</li> <li>"I know what needs to be done, so I don't worry" 22/11, OBSERVATION, NURSE, WARD C</li> <li>"I've been in the business for a while. I have already seen and experienced a lot. This combination of theoretical knowledge and experience makes me flexible and agile. I adapt and I see what needs to be done." 7/4, INTERVIEW 14, NURSE, WARD A</li> </ul>
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<p>Skills related to methodical work</p> <p>The ability to follow established procedures, protocols, and methodologies in patient care</p>	<ul style="list-style-type: none"> <li>The emphasis on working methodically was different among the three wards. In one ward, all nurses had received a basic LEAN training, while in the other, this integration was less pronounced. Experience with the LEAN method gives structure but can sometimes stand in the way of creativity. The LEAN expertise seems to be easier to apply to practical problems in the ward, not to more abstract issues. GENERAL OBSERVATION</li> <li>"Where is the methodical nursing process? I feel good patient care starts with a profound nursing process, but I see on our ward there is no proper interpretation of the nursing process." 17/2, PHOTOVOICE, NURSE, WARD A</li> <li>The systematic working approach in the project appeared to be new for the action research team nurses. Action research team nurses found it difficult to make a good planning. One action research team was regularly surprised by the tasks that had to be done. This seemed to occur due to a lack of foresight on the part of the action research team nurses. Their expectations of the timeline were amiss, and their planning was not specific enough. Another action research team found the time between meetings (two weeks) too short and felt rushed. Action research team nurses sometimes did not speak to each other in between meetings and only took up tasks shortly before a meeting. The third action research team tended to skip steps due to the need for proper planning. In all wards, nurses did not know that certain tasks were part of the role of an action research team nurse.             <ul style="list-style-type: none"> <li>"Above all, planning was not done properly, we did not think ahead well enough. Maybe we didn't know either. We started every meeting from the beginning again." 26/5, EVALUATION, ACTION RESEARCH TEAM NURSE, WARD A</li> <li>Guidance/support to take the right steps was necessary to help nurses better deal with methodical work.</li> <li>"I've had an afternoon course of project management, but I find it challenging to link that to this project." 10/10, EVALUATION, ACTION RESEARCH TEAM SENIOR NURSE, WARD C</li> <li>"I am a vocationally trained nurse. Maybe it's different for a bachelor nurse, but I didn't really have that [project skills] at school, for example. In the beginning I found it quite difficult, so to speak, because I didn't really know what was expected of us and how that [a project] works, because I've never done anything like this before." 10/10, EVALUATION, ACTION RESEARCH TEAM NURSE, WARD C</li> </ul> </li> </ul>
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<p>Skills related to chairmanship</p> <p>The ability to lead and coordinate projects. To guide and oversee the execution.</p>	<ul style="list-style-type: none"> <li>All action research team nurses encountered the problem of there being no good agreements in the beginning about the division of tasks in the team. It was unclear who the chairman and minute taker were, and no clear working agreements had been made. This caused uncertainty, which meant all action research teams felt the need to arrange this property. A plan was made for the chairmanship and secretary and what actions were expected from them. In all action research teams, the roles of chairman and minute taker rotated. Not every action research team nurse felt confident in the role of chairman.</li> <li><i>"That [leading projects] is indeed often the responsibility of team managers and then employees certainly go along to projects, but they are mainly there for the content, thinking along and carrying out tasks, but it is different from taking on a project yourself. I don't think that's the case just for the project group (action research team), but actually for the entire ward."</i> 10/10, EVALUATION, MANAGER, NURSE, WARD C</li> <li><i>"I found it a bit difficult at times what kind of role I had as a senior nurse and I still sometimes think: should I really take that leadership role or that chairman's role or not? Yes, I always have doubts about that. Should I just let someone else have chance to learn it?"</i> 10/10, EVALUATION, ACTION RESEARCH TEAM SENIOR NURSE, WARD C</li> <li><i>"As a working group we were in the lead, but this [size of the project] was too difficult for us."</i> 26/5, EVALUATION, ACTION RESEARCH TEAM NURSE, WARD A</li> <li>In the action research teams, we noticed that nurses were not used to 'zooming out' when a problem occurred and reflecting on it on order to learn from it.</li> </ul>
<p>Skills related to problem identification</p> <p>Recognizing issues during practice and prioritizing these challenges</p>	<ul style="list-style-type: none"> <li>During the PhotoVoices, ward nurses took many pictures of issues like disorderly wards, unclean beds, the absence of materials, or disorganized or improperly stored medication. Nurses' reflections on these photos varied from disorganization, chaos, waste, extra time, and irritation to a waste of money.</li> <li><i>"There's a shared responsibility for cleaning up the mess."</i> 16/12, PHOTOVOICE, NURSE, WARD C</li> <li><i>"Leaving things tidy conveys a sense of calm and control."</i> 30/12, PHOTOVOICE, NURSE, WARD C</li> <li><i>"I don't enjoy working in an environment where I think this could be better or more efficient. And because of my training I know how to improve things or how to get things different. That's why I enjoy improving it."</i> 17/3, INTERVIEW II, NURSE, WARD A</li> </ul>



<p>Skills related to problem solving and initiating change</p> <p>The ability to adapt and implement changes within the practice settings</p>	<ul style="list-style-type: none"> <li>Memo of researcher: 'Ward nurses are discussing the absence of catheter bags. "Maybe we should go shopping for them," one suggests. Nurses express surprise that this issue hasn't been addressed, as it was the same four days ago. However, none of them indicate an intention to take charge and resolve or investigate the matter.' 19/1, OBSERVATION, WARD A</li> <li>A cyclical learning and improvement process seemed to be absent among the ward nurses. We observed empty improvement boards at the wards, and several explanations were given, such as:             <ul style="list-style-type: none"> <li><i>"We do not use it, because this is too much of a hassle"</i> 27/1, OBSERVATION, NURSE, WARD A</li> <li><i>"If you put it [an issue] up there yourself, you also have to deal with it yourself. Nurses are hesitant to do so because it is perceived as cumbersome. Additionally, the large team makes it challenging to implement changes."</i> 3/11, OBSERVATION, NURSE, WARD C</li> <li><i>"I want to solve things as quickly and efficiently as possible and not make it bigger than it is. I don't want to take the problem home with me."</i> 7/4, INTERVIEW 14, NURSE, WARD A</li> </ul> </li> <li>During the PhotoVoice and interviews we learned that problem solving was mainly based on one's own expertise and opinions and was mainly done for short-term solutions. There was little knowledge in the teams about what is needed to successfully change.             <ul style="list-style-type: none"> <li><i>"Are we going to invest our energy in untangling the wires of ECG machines? I think it's a waste of my time."</i> 9/11, PHOTOVOICE, NURSE, WARD B</li> <li><i>"The point is that it is solved quickly, not that it is solved with good quality. I think that a structural approach, for something that works in the longer term, often fails to occur."</i> 17/3, INTERVIEW II, NURSE, WARD A</li> </ul> </li> <li>Skills related to research were not yet generally available or used in nursing teams, but more and more attention was paid to it. Deploying EBP skills in the workplace still had challenges.             <ul style="list-style-type: none"> <li><i>"I think that we work very little evidence-based, because some things need to be addressed very quickly. I also noticed this while doing my research. I wanted to approach it completely systematically, researching it carefully first. Yes, the managers were of course not happy that it would take me six months to write a solid plan that I think works. I think that could be better."</i> 11/4, INTERVIEW 15, NURSE, WARD A</li> <li><i>"I think it's great that the nursing profession as a whole is developing towards more scientifically substantiated, more EBP. Not every nurse has to be able to do this, take the lead, or be good at it. But they must feel that they are the professionals and that they understand what they do within their own field."</i> 17/3, INTERVIEW II, NURSE, WARD A</li> </ul> </li> </ul>
<p>Skills related to research and evidence-based practice (EBP)</p> <p>The ability to critically analyze and apply research findings to (clinical) decisions</p>	<ul style="list-style-type: none"> <li>The action research teams had many questions about how to get the team on board with changes. One action research team started investigating which issues could contribute to change management by nurses within their team. Based on literature, observations and interviews, this resulted in an evidence-based overview. This document contained 'Ten golden rules for change in nursing teams'. The rules emphasized the importance of adding value, team involvement, clear communication, respecting norms and values, feasibility, a systematic approach, extensive communication, leadership support, and continuous attention to the change process.             <ul style="list-style-type: none"> <li><i>"I have come to appreciate the process of change more, instead of the result. Because the process determines success."</i> 6/7, EVALUATION, ACTION RESEARCH TEAM NURSE, WARD B</li> </ul> </li> <li>Clear communication about planning and timelines from researchers appeared to be important.             <ul style="list-style-type: none"> <li><i>"If you notice from the research that it [the project] is not clear, you can intervene earlier. Because at a certain point the energy is gone and then it no longer gets off the ground and that is a shame."</i> 26/5, EVALUATION, MANAGER, WARD A</li> </ul> </li> <li>Being able to look up and apply literature was not self-evident for most action research team members. Almost all action research team members had difficulty with this, including translating the results into their own context. They found it very challenging to do this independently, but also asked for little or no help from the researchers (despite this being offered).             <ul style="list-style-type: none"> <li>Most action research team members had little experience and, above all, little confidence in their own research abilities, with the exception of an action research team nurse with a focus area EBP in Ward B.</li> <li>A vocationally trained nurse searched very hard for her role within the action research team with regard to research.             <ul style="list-style-type: none"> <li><i>"I finally found it in the practical input and translation into practice."</i> 6/7, EVALUATION, ACTION RESEARCH TEAM NURSE, WARD B</li> </ul> </li> </ul> </li> </ul>

<p>Transitioning from an abstract concept to a concrete outcome</p>	<p>Translating high-level or abstract ideas into tangible, practical results</p>	<ul style="list-style-type: none"> <li>Ward nurses found it difficult to look creatively and out-of-the-box at structural solutions to problems unless it was very practical (workarounds, which do not solve the underlying problem) <small>OBSERVATIONS AND PHOTOVOICES ALL WARDS</small></li> <li><i>“What encourages me is that the work you put into it yields something. I like lacking something in a results-oriented manner and that makes me happy.”</i> <small>II/4, INTERVIEW 15, NURSE, WARD A</small></li> </ul>
<p>Learning and development opportunities</p>	<p>Educational opportunities and professional growth activities, learning from the research project</p>	<ul style="list-style-type: none"> <li>During the Photovoice session on Ward B, it was highlighted as a positive aspect that there are ample learning and development opportunities available on the ward.</li> <li>However, not all experiences regarding educational opportunities were positive.</li> <li><i>“I arrange a varied learning program for students and nurses. Where student attendance is good, only a handful of nurses attend, for example, file or case discussions. I miss the feeling that everyone wants to keep learning.”</i> <small>16/12, PHOTOVOICE, NURSE EDUCATOR, WARD C</small></li> </ul>

<p>Insecurity about the task</p>	<p>Lack of confidence or uncertainty regarding nurses' ability to successfully perform a specific task</p>	<ul style="list-style-type: none"> <li>During a multidisciplinary meeting, the nurses do not sit at the table with the physicians, but on a chair on the 'second row'. A nurse shakes with her hands when she is speaking. Although the physicians are informal and seem to see the nurses as part of the team. <small>17/11, OBSERVATION, WARD B</small></li> <li><i>“Some nurses still feel reluctant to say something to a physician, for example if they disagree with something. [...] I think we can really speak out against a physician to stand up for a patient, for example, or to exchange ideas.”</i> <small>3/1, INTERVIEW 4, NURSE, WARD B</small></li> </ul>  <ul style="list-style-type: none"> <li>The action research teams indicated that the responsibility they had been given was a big step compared to what they were used to. All managers had taken a step back and that was not easy for the action research teams. They were used to more guidance, especially at the start. This created uncertainty.</li> <li><i>“As a group we needed more coaching. Who will take us by the hand?”</i> <small>26/5, EVALUATION, ACTION RESEARCH TEAM NURSE, WARD A</small></li> <li>Self-confidence and positive experiences were needed to handle the responsibility.</li> <li>Ward C was most successful in developing this self-confidence and increasingly taking responsibility. The perseverance of the working group and the attitude of the manager seemed to play an important role in this.</li> <li>Action research team nurses experienced a lack of clarity about the tasks. As tasks became clearer to them and they felt more confident, there was more preparation.</li> <li><i>“At the beginning, I didn't really know what to do, but as I got further into the process, I just knew what was expected of me, and did that, and I really enjoyed seeing that I got better and better at it.”</i> <small>10/10, EVALUATION, ACTION RESEARCH TEAM SENIOR NURSE, WARD C</small></li> </ul>
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Theme: accountability	
Proactive attitude	<ul style="list-style-type: none"> <li>• Proactivity and taking responsibility seemed to come easier when it concerned daily patient care than with indirect patient care activities.</li> <li>• <i>"I always schedule an early shift the day before the medical grand rounds to be adequately prepared. With just the handover and a quick overview, you do not have enough information."</i> 17/11, OBSERVATION, NURSE, WARD B</li> <li>• Ward nurses were able to come up with solutions to problems they experienced, but ideas were quickly dismissed because they did not consider it as their task or responsibility.</li> <li>• <i>"Before we can use the device, we spend a considerable amount of time untangling the cords. [...] We use this device multiple times a day, and a better design would help us use it more effectively."</i> 9/11, NURSE, PHOTOVOICE, WARD B</li> <li>• To bring about change, nurses needed ownership and a sense of urgency and interest in the subject.</li> <li>• <i>"If they don't see the importance of what needs to be addressed, then I don't think they're going to do it. Then maybe they will do something to please us. For a while, but not for long."</i> 11/4, INTERVIEW 15, NURSE, WARD A</li> <li>• <i>"I am also working on medication identification with scanning the patient's wristband, so that you immediately have your two people identification, that change goes a lot better. I think they [the team] just see the need for that more."</i> 31/1, INTERVIEW 4, NURSE, WARD B</li> <li>• In the process of improving the working environment, it also turned out that individualism often prevailed in a ward (<i>"I don't have a problem, so why does something need to change?"</i>)</li> </ul>

Taking a leading role	<ul style="list-style-type: none"> <li>• Nurses were used to taking responsibility in daily practice. However, they found it much harder to handle responsibilities beyond direct nursing care.</li> <li>• <i>"The team disengages and is difficult to reach, but for the patient, they do everything."</i> 14/12, ACTION RESEARCH TEAM NURSE, WARD C</li> <li>• <i>"I think it is positive when nurses take the lead in changes. We are also at the bedside, and if we have to change things, it would be nice if we determine the bottlenecks ourselves. It can be determined from above, but then it [the solutions] is not always feasible."</i> 19/1, INTERVIEW 2, NURSE, WARD B</li> <li>• <i>"What I mainly saw is that nurses actually indicate that they really want to have a say, but they don't actually know how to do that effectively. They [nurses] want leadership and control, but would like to invest that [responsibility] elsewhere."</i> 10/10, EVALUATION, MANAGER, WARD C</li> </ul>
Taking responsibility that go beyond direct patient care	<ul style="list-style-type: none"> <li>• Most action research team nurses had a wait-and-see attitude. However, there were differences between nurses. In every action research team, there was someone who naturally had a more leading role. In ward C, taking a leading role seemed to get easier as the group gained more control and ownership of the project. They increasingly succeeded in thinking outside the existing rules and becoming more creative. First version 'utopias' were guided by the limitations of the current situation instead of starting from the desirable situation.</li> <li>• <i>"Towards the end of the project, I got the idea that we had taken more control ourselves, and I think we learned a lot from that."</i> 10/10, EVALUATION, ACTION RESEARCH TEAM SENIOR NURSE, WARD C</li> <li>• The research project was perceived as an assignment by the action research team nurses, lacking a sense of ownership and fostering a wait-and-see attitude. While ownership increased on some wards, more initiative was displayed, and action research team nurses took a leading role. However, there was still uncertainty about whether individual ideas would meet expectations, which constrained out-of-the-box thinking, as observed by the researchers.</li> <li>• <i>"Of course, you [the researchers] come from externally. It actually seems more like you are the ones who are leading the way, so they [action research team] don't take the role. How can you turn that around?"</i> 25/1, CONVERSATION RESEARCHERS WITH MANAGERS, MANAGER, WARD B</li> </ul>
Sense of influence	<ul style="list-style-type: none"> <li>• Nurses made many assumptions when it came to possibilities. Often, they did not start change because the expectation was that it would not be successful. OBSERVATION RESEARCHERS</li> <li>• To get rid of negative points nurses indicated that they needed good cooperation with other disciplines. Many nurses did not feel they had sufficient influence on identified challenges and issues. <i>"Things are arranged from higher up."</i> 17/2, PHOTOVOICE, NURSE, WARD A</li> <li>• <i>"During the PhotoVoice sessions, I noticed remarks like, 'I'm not happy about this, but I have no influence over it.' However, I believe that, in some cases, these were matters where nurses could exert influence if they knew which routes to explore or with whom to engage in conversation."</i> 17/3, INTERVIEW 11, NURSE, WARD A</li> <li>• <i>"The design of the hospital was simply a choice. So I can say that I want an extra cupboard in the room, but... I won't even start with that. That won't happen anyway."</i> 18/1, INTERVIEW 1, NURSE, WARD B</li> <li>• <i>"Nurses do not determine policy but participate in its execution."</i> 10/10, EVALUATION, ACTION RESEARCH TEAM NURSE, WARD C</li> </ul>

Dealing with setbacks

- Learn from setbacks and adapt to unexpected situations
- "I'm quite flexible about it. If there are changes, I think we can always try. And if it doesn't catch on, it doesn't catch on. At least we tried. And if it does work, it can only be a good thing." 19/1, INTERVIEW 2, NURSE, WARD B
- Action research teams dealt with setbacks differently. In ward A, the group quickly came to terms with what was not possible. Some action research team members spoke out quite strongly about impossibilities and set the atmosphere. Others in the group hardly objected. The action research team of ward C excelled in resilience. They had a major setback after the ward meeting, with part of the team turning against them. The action research team reflected on this together and determined that they supported their choices and wanted to continue with them. This even caused strengthened motivation and the connection between the action research team members.
- Being able to deal with setbacks was important to make progress in improving the working environment. Overcoming setbacks together could also create a connection.
- "We faced challenging moments because the team was sometimes difficult to bring along, but it is also rewarding when you eventually succeed. [...] A learning point for myself was indeed not to focus on those who are negative but rather on those who are willing to embrace the change." 10/10, EVALUATION, ACTION RESEARCH TEAM NURSE, WARD C

Reflection

Thoughtful analysis of experiences, actions, and decisions

- Reflection, essential to achieve improvements together, appeared to take up virtually no space in all three wards. Within the teams, reflection was mainly about the division of labor. Nurses were not familiar with reflection methods or 1st-3rd order learning.
- "After an acute situation you notice the adrenaline in the nurses. They talk about the situation with each other. They all ask each other how things are going. Very collegial. But it is an evaluation, not a reflection." 19/1, OBSERVATION, NURSE, WARD A
- Working days were mainly focused on getting patient care completed. Nurses evaluated their work at the end of the day, but this was not focused on learning together.
- "At the end of the day, there is an evaluation. But no one actually tells it like it is. [...] we all say 'yes, nice job'. Everyone is just done, and we won't go into it any more. I think we miss out on a lot there." 1/2, INTERVIEW 6, NURSE, WARD C
- Reflection was not part of the action research team working method, unless there was specific time for this with the researchers. Sometimes reflection took place, such as in ward A when things did not run smoothly (this led to new work agreements) but often the reflection remained superficial, or action research team nurses placed matters outside themselves. At the end of the project, there were reflections with action research team members from each ward, where they critically looked at their own roles and reflected on them. This provided insights into how things could be done differently next time, both personally and for the group.
- "At the beginning we discussed that we would rotate (chairman role ed.), but after that I never really clearly discussed my struggle whether this was a good choice or not." 10/10, EVALUATION, ACTION RESEARCH TEAM SENIOR NURSE, WARD C
- "We should have looked more specifically at what was expected of us in the timeline and renewed the goals from the start (...) so that we could plan on time." 26/5, EVALUATION, ACTION RESEARCH TEAM NURSE, WARD A
- In ward C, after the ward meeting (where a part of the team presented itself negatively), this working group was able to reflect very well on what had happened, how it affected them personally and what they learned from it. They reflected on what their own actions had done to others and what they thought about it.
- "The team meeting was a turning point. Then we thought, okay, we really have to keep it much closer to the team, but we also really have to play our role in that." 10/10, EVALUATION, ACTION RESEARCH TEAM SENIOR NURSE, WARD C
- "It is nice that it works out in the end. When you look back on it like this, you really realize what you have learned." 10/10, EVALUATION, ACTION RESEARCH TEAM NURSE, WARD C

Attributing problems to external factors

- When things didn't work out or didn't go well, the first reaction was usually that it was due to someone else or to a process, such as workload, lack of support, or processes of not designed for nursing work. Everyone was annoyed by certain things (such as mess), but no one seemed to take responsibility, and almost no one did anything about it. That caused extra annoyance (kind of a vicious circle). GENERAL OBSERVATION
- "We came up with this project to increase quality in the ward. However, we notice that we cannot achieve this due to staffing levels. These are all external factors that simply make it extremely difficult to implement the plan we have." 11/4, INTERVIEW 15, NURSE, WARD A

Complaining behavior

- At the Photo Voice meeting, it was said that there was complaining in order to 'get it out of the system' instead of reflecting to improve or change.
- "There is a 'resignation in complaining.' People complain to clear their heads instead of wanting to change something." 10/2, PHOTOVOICE, NURSE, WARD A

Theme: support from manager

Level of support

The extent to which nurses receive guidance, encouragement, and resources from their managers

- In interviews, the level of support by managers was discussed.
- "I think they are the biggest incentive to make us feel professional. They certainly play a role, both in organizing days for quality work and in strengthening our professional sense 17/3. INTERVIEW 11, NURSE, WARD A
- "Changes have also been made in other wards where I have worked, but they were not really encouraged by the managers, and that does happen here. [...] I see it as an important stimulating factor if managers also support a change. They can certainly achieve more with changes than if I were the only one to start." 19/1, INTERVIEW 2, NURSE, WARD B
- "When I started my master education, I approached my managers to ask how we could structure or implement it. I asked, 'Do you have any use for me?' Well, that was all quite challenging, simply because it's unfamiliar territory. So, I didn't feel much cooperation there, and I still don't always." 17/3, INTERVIEW 11, NURSE, WARD A

Degree of visibility	<ul style="list-style-type: none"> <li>How frequently and actively a manager is present and engaged in the daily activities and interactions within the team</li> <li>The presence of managers at the start of the day was common and was experienced as positive. This not only made managers visible, but it also helped to emphasize the importance of certain matters. <small>GENERAL OBSERVATION</small></li> <li>"At the start of the day, they [the managers] also emphasized: 'scan that medication' [current improvement project]. They are very involved, and I think it stresses the importance." <small>31/1, INTERVIEW 4, NURSE, WARD B</small></li> <li>"The managers are involved in the team, but they don't always show it that way, because they sit in the back in an office. Recently a few [managers] were just in white in the ward, a few times when it was busy, and that benefits the cooperation. And it also benefits the understanding, because they see the need and they respond to it." <small>24/2, INTERVIEW 10, NURSE, WARD C</small></li> </ul>	<ul style="list-style-type: none"> <li>Managers were very willing to facilitate the action research teams. However, some managers waited for explicit requests for help, which were not always made.</li> <li>Action research team nurses in ward A sometimes felt unsupported, and there were numerous assumptions about the limitations in facilitating their work. Managers took the instruction to 'let go' very literally and did not interfere with the action research team. When they noticed that things were not going well, they asked the researchers for information, not the action research team. They later indicated that they thought they had fulfilled the assignment well by acting like that, even though it sometimes did not feel quite right. In ward B, additional facilitation was considered when needed, and also discussed with the researchers.</li> <li>Relying solely on waiting for requests may not be sufficient to offer the necessary support. Proactively offering assistance, verifying understanding by asking clarifying questions, and ensuring that help resources are easily accessible are successful strategies.</li> </ul>
Mirroring responsibility and ownership	<ul style="list-style-type: none"> <li>We have only seen this behavior in ward C by the manager. She regularly reflected on the behavior exhibited by both the action research team and the team. This appeared to help change behavior in a positive way.</li> </ul>	<ul style="list-style-type: none"> <li>There was a clear difference between wards. Mirroring did not happen in ward A, in ward B only minimally towards the action research team and in ward C this happened towards both the action research team and the team. The manager of ward C recognized undesirable or counterproductive behavior during the project and spoke to people about this by mirroring and providing insight into the effect of this behavior. The manager asked active questions about which support was needed. The manager complimented the team, and she provided support about the process by questioning the action research team nurses. How do we get through this? The action research team nurses consciously continued with the project. Continuing when things got difficult brought a lot to the nurses (= leadership, longer term, wanting the best for your employees).</li> <li>"From the halfway point onwards, we also had her [the manager] more as a source of information and then we just started sparring with her and you learned things from that." <small>10/10, EVALUATION, ACTION RESEARCH TEAM NURSE, WARD C</small></li> </ul>
Balancing between providing guidance and allowing autonomy	<ul style="list-style-type: none"> <li>Offering guidance while also granting autonomy to nurses, ensuring a supportive and independent work environment</li> </ul>	<ul style="list-style-type: none"> <li>This was quite a challenge and quest for all managers. Ultimately, there appeared to be a major difference in how this was implemented. Ward A let go of too much, which led to 'swimming' and the lack of requests for help. Ward B let go, but had tried to stay in touch with the action research team about progress and to provide assistance where necessary. There had been limited guidance and more attention had been paid to the researchers. Ward C eventually had the right balance between managing and letting go. The action research team was released on the content, although the feasibility of choices was coordinated with the manager. The team was guided regarding process and behavior. The action research team felt supported by the manager, partly because it stood up for them when (part of) the team turned against the action research team.</li> </ul>

Notes | a. date format DD/MM is used.

# Chapter 7

## Summary, reflections, and future perspectives

A stimulating nursing work environment improves patient outcomes and nurse well-being, enhances the effectiveness of healthcare organizations, and contributes to higher job satisfaction and nurse retention. Recognizing the critical impact of the work environment, this thesis explores the various elements comprising the nursing work environment, how these elements are interconnected, and how they can be improved. Using qualitative and quantitative methods, we conducted a thorough investigation into all critical aspects of the nursing work environment, specifically emphasizing how the work environment influences differentiating nursing practices. Differentiated nursing practices involve structuring a nurse's roles and responsibilities based on their educational background and experience. This thesis provides unique insights into the nursing work environment during the transition to differentiated nursing practice, across five chapters. In this chapter, we summarize the main findings, reflect on these insights, and discuss the methodological considerations and implications for future practice, policy, education, and research.

## Summary of the main findings

**Chapter 2** examined the characteristics of nurse education programs around the globe. A scoping review of records published between January 2016 and July 2021 was conducted, and 117 records were extracted to identify characteristics of nursing educational programs. We found a significant variety in degrees, nursing titles, study load, and practice hours within and between countries. In Western countries, there are 86 undergraduate and 82 postgraduate programs, which together lead to 60 different nursing titles. The review highlighted how this diversity in nursing education programs and titles fragments our understanding of the nursing profession and what nurses can offer. It underscored the importance of globally standardizing nurse education programs and titles to enhance mobility, collaboration, and career development opportunities. This standardization would set the stage for exploring new nursing roles and functions and promoting a more unified approach to nursing care worldwide. This uniformity may also increase nurses' participation in shaping healthcare policies, enabling them to influence and improve their own work environment. Therefore, it is therefore crucial to consider how these changes could improve the positioning of nurses and to determine what is necessary for a stimulating work environment.

Through 50 interviews with project managers responsible for introducing differentiated nursing practice in their hospitals, we revealed in **Chapter 3** that the

transition towards differentiated nursing practice is marked by uncertainty and complexity. These findings highlighted three critical phases in the transition: 1) call to action, (2) sitting and waiting, and (3) new beginnings and open ends. Initially driven by new legislation, hospitals began restructuring nursing roles. This was followed by a period of inactivity due to uncertainties about new requirements and job descriptions, which delayed progress. After the legislation was withdrawn, hospitals were newly motivated to develop local strategies and increase nurse involvement in the change processes. Differentiated nursing practice was a catalyst for advancing the nursing profession and enhancing the quality of patient care and nurse well-being. Beyond creating new nursing roles and functions, our findings underscored the need to position nurses at the forefront of these changes. Visionary leadership and engagement at all organizational levels are essential for influencing the system and ensuring the successful implementation of these changes. We also found that the nursing work environment must dynamically adjust to support the evolving roles and positions of nurses within the healthcare system. To fully understand the impact of these changes, it is crucial to examine the nursing work environment and how it adapts during the transition towards differentiated nursing practice.

In **Chapter 4**, we delved into the perceived characteristics of the nursing work environment, considering it a complex and multifaceted system. Based on 42 semi-structured interviews with nurses and managers from various Dutch hospitals, the study highlighted the dynamic nature of this work environment, particularly during times of transition. We revealed that nurses face challenges in balancing direct patient care with broader healthcare responsibilities, which was reflected in four overarching themes: (1) direct patient care is a standard feature of nursing work; (2) nurses need to be flexible for hospital productivity; (3) interdependencies decrease autonomous nursing practices; and (4) organizational structures help nurses to shape their work. The first theme revealed that the focus on direct patient care often overshadowed indirect tasks such as quality improvement, despite the need for a broader perspective on these nursing responsibilities. The second theme emphasized how nurses need to be flexible to manage fluctuating workload demands. The specific needs of nurses to integrate direct and indirect care tasks were often overlooked and hospitals were primarily focused on production rates. The third theme highlighted how extensive interdependencies among nursing tasks, departments, and disciplines reduced autonomy among nurses and affected their ability to manage their workload and execute indirect care activities. The fourth theme addressed how rigid organizational structures and centralized decision-making reduced nurses' ability to balance direct and indirect care tasks.

Although nurses are remarkably flexible and dedicated to delivering high-quality care, nurses frequently face rigid structures, interdependencies in their work, and experience a strong emphasis on direct patient care. These factors create a tension between the nurses' desire to engage in broader nursing roles and the realities of their current work environment, revealing a gap between the ideal vision of the nursing profession and current practice. The findings emphasized the need for a systemic approach to address the various factors that impact a nurse's work and to recognize the role of nursing beyond bedside care for professional enhancement and better quality care.

In the longitudinal cohort study described in **Chapter 5**, we explored the impact of differentiated nursing practice on the nursing work environment and turnover intention among nurses in hospital settings. We tested three key hypotheses. Our first hypothesis was that differentiated nursing practice would positively impact the work environment. We found that introducing differentiated practices modestly improved nurses' perceptions of their work environment ( $\beta=0.054$ , 95% CI 0.027 to 0.081). Specifically, nurses reported enhanced satisfaction with staffing and resource adequacy ( $\beta=0.054$ , 95% CI 0.009 to 0.098), better collegial relationships with physicians ( $\beta=0.065$ , 95% CI 0.030 to 0.101), and increased participation in hospital affairs ( $\beta=0.099$ , 95% CI 0.060 to 0.139). However, improvements were not observed in managerial support ( $\beta=0.007$ , 95% CI -0.038 to 0.053) and foundational elements necessary to deliver high-quality care ( $\beta=0.026$ , 95% CI -0.005 to 0.056). Our second hypothesis was that differentiated nursing practice would reduce turnover intention among nurses. This hypothesis was rejected because we observed no change in turnover intention after differentiated practices were introduced ( $\beta=-0.051$ ,  $SE=0.087$ , 95% CI -0.221 to 0.119), and the proportion of nurses intending to leave their organizations remained stable at around 24%, even though the introduction of differentiated nursing practice improved the work environment. Our third hypothesis was that the work environment would mediate the relationship between differentiated nursing practice and turnover intention. This hypothesis was also not supported by our findings ( $\beta=0.069$ , 95% CI -0.113 to 0.252). The work environment did not act as a mediator; improvements in the work environment resulting from differentiated practices did not translate into changes in turnover intention among nurses. In conclusion, while differentiated nursing practice improved the work environment, it did not affect turnover intention, nor did it do so through changes in the work environment. These findings underscore the complexity of changing the work environment and the ongoing challenge of achieving systemic adjustments across all facets. It is possible that gaining stronger positions and having input into policy decisions gives nurses a

more comprehensive view of their work environment, making them more critical of it. This raises the need for further insights into how nurses could take a more proactive role in positively shaping their work environment.

In **Chapter 6**, we used participatory action research to shed light on the mechanisms that facilitate or hinder nurse-led changes in their work environment. This study was conducted across three nursing wards in a Dutch academic hospital, and identified three key themes that influence a nurse's ability to drive change in their work environment: (1) strengthening relationships, (2) taking the lead, and (3) being up to the task. The first theme was that strengthening relationships and building a sense of community were essential for effective change. Positive social interactions and collaborative problem-solving improved teamwork. The second theme was that taking the lead in improvement and change was vital, but nurses often needed help extending their responsibilities beyond patient care. The third theme was that a nurse's perceived competence influenced their willingness to take on new responsibilities. Nurses who felt confident and skilled in project management and initiating change were more proactive in addressing challenges and leading improvements. Managers played an important role in supporting and guiding nurses through these processes, impacting how effective and engaged nurses were in change initiatives. In this context, enhancing the resilience and ability of nurses to manage uncertainty is crucial. This study highlighted that a work environment with clearly defined tasks and responsibilities, supportive processes and structures, and strong relationships with colleagues, managers, and other disciplines and departments are essential for effectively managing and supporting complex nursing work and ensuring sustainable improvements.

## Reflections on the findings

### The work environment as a complex system

The findings in this thesis consistently underscored the complexity of the nursing work environment. We have conceptualized it not solely as a collection of individual roles and responsibilities but as a dynamic and interconnected system (Chapter 4). This conceptualization aligns with the perspective advocated by the RNAO, which calls for a systemic approach to understanding and improving this environment (Registered Nurses' Association of Ontario, 2013).

The RNAO's viewpoint acknowledges that the nursing work environment is shaped by complex interactions among individual nurses, organizational factors

within healthcare institutions, and external determinants such as healthcare policies and regulations. However, we propose viewing these interactions as elements of a complex interdependent network. Chapters 3, 5, and 6 illustrated how changes toward differentiated nursing practice necessitated coordinated efforts across various dimensions of the healthcare system. These changes underscore the interdependencies among various components of the system, illustrating that improvements in one area can extend to affect improvements in other areas. It highlights the mutual dependence among various aspects of healthcare delivery, where changes in one domain can affect the entire environment (Arnold & Wade, 2015).

Integrating systems-thinking into healthcare practices fosters interconnectedness and acknowledges the systemic effects of individual actions on the broader system. This approach fosters resilience and adaptability within the nursing work environment, enabling nurses, managers, and policymakers to navigate complex challenges more effectively (Swanson et al., 2012; Thelen et al., 2023). By embracing the systemic nature of the work environment, we can foster more integrated and sustainable improvements in nursing practices.

However, these work environments frequently operate within bureaucratic institutions marked by inflexible structures and procedures (Chapter 4). These environments, characterized by complex interactions, high uncertainty, and the need for adaptability, may need more than a bureaucratic framework to achieve sustainable improvements. While professional bureaucracies standardize skills and training to ensure expertise (Mintzberg, 1979), this rigidity can hinder their ability to respond quickly to changes, thereby reducing their effectiveness in managing complex tasks and improving performance (Fjeldstad et al., 2012; Lega & DePietro, 2005).

Understanding why the current system cannot bridge the gap between the existing situation and the ideal work environment is crucial. Healthcare organizations have strived to assign more strategic roles to nurses, but these efforts have not been well integrated into existing hierarchical structures. Challenges like inadequate educational preparation and socio-political dynamics may prevent nurses from fully participating in policy making (Rasheed et al., 2020). Wallenburg et al. (2023) argued that the needs of nurses become unclear when institutions overlook the importance of nurses and their profession. This also prevents nurses from gaining a strong political voice in healthcare and policy making. These complexities raise questions about whether nurses occupying these strategic positions will actually improve the work environment if healthcare organizations fail to adjust their structures accordingly (Hajizadeh et al., 2021).

Adopting decentralized and flexible organizational structures is thus crucial and could better support the dynamic and complex nature of nursing work, allowing for more effective and timely responses to changes and challenges (Achterbergh & Vriens, 2019; Donaldson, 2001). Organizations could reduce bureaucracy and give more authority to frontline nursing staff to enhance their efficiency and effectiveness and better meet the needs of nurses. More involvement of nurses in organizational decision-making enhances nurse retention and improves the quality and safety of patient care (Kutney-Lee et al., 2016). As nursing roles become increasingly specialized and diverse, they need to be clearly defined according to their scope of practice and the professional identity of nurses needs to be explored.

### **The interplay between professional identity, the work environment, and nursing practices**

Professional identity can be defined as “how an individual views himself or herself as a nurse who can provide quality care in a responsible manner” (Rasmussen et al., 2018, p. 229). Professional identity in nursing influences and is influenced by the nursing work environment. The nursing practice environment influences nurses’ understanding of their professional roles and responsibilities and a well-designed and stimulating work environment helps nurses to perform their tasks effectively (Philippa et al., 2021). Conversely, nurses’ views on their roles influence the overall dynamics within their work environment (Hinkley et al., 2023).

The transition towards differentiated nursing practice initiates a deeper exploration of professional identity within the nursing profession (Chapter 3). As nurses navigate this shift and redefine their roles, they face the challenge of refining their professional identity and enhancing their contributions to the healthcare system. Moreover, critically examining how their professional identity influences their involvement in change initiatives to shape healthcare practices becomes increasingly valuable (Hörberg et al., 2019).

This was illustrated in Chapter 6, where we found that nurses predominantly viewed their primary responsibility as providing direct patient care rather than initiating and leading changes within their work environment. Similarly, our studies in Chapters 3 and 4 underscored the perception that the core focus of a nurse’s daily work is crucial to nursing practice. In contrast, organizational skills and quality-control work such as care coordination and quality improvement initiatives often took a secondary role. These perspectives on professional identity significantly influence nurses’ attitudes toward assuming proactive roles in change initiatives (Philippa et al., 2021). Historically, nursing has centered on caring, and

other competencies and aspects of nursing still need to be recognized and facilitated in the work environment (Allen, 2015). Although nurses do not always require strong organizational skills to improve their work environment, their diverse interests at different levels and types create uncertainty about prioritizing and investing in knowledge infrastructures to support their evolving professional identities (Wallenburg et al., 2023).

Numerous actors influence the development of nurses’ roles and their work environment. These actors include nurse leaders, healthcare administrators, policymakers, educational institutions, and professional nursing organizations. Positioning within this context entails an interdependent and collaborative process among these various stakeholders (Verhoeven et al., 2024). The perspectives of these actors on nursing are crucial for nursing work and, consequently, the differentiation of nursing practices.

### **Actors within the dynamic work environment: Who fulfills which role?**

We need to understand the roles and interactions between the various actors within the work environment to be able to distinguish them. The RNAO’s work environment framework can distinguish between individual, organizational, and external system-level factors, with management practices being considered at both the individual and organizational level (Registered Nurses’ Association of Ontario, 2013).

Individual nurses are central players, influencing the work environment through their behavior, interactions, and personal attributes. While effective nursing leadership is crucial (Mabona et al., 2022), the issue is complex and nuanced, as highlighted in Chapters 4 and 6. More than just nursing leadership is required to create a stimulating environment. In addition, nurses need more than their skill or competence as a nurse to navigate the complex dynamics and organizational interactions of their work environment (Verhoeven et al., 2024).

In Chapters 4 and 6, we highlighted the behavior of unit managers as a crucial element at the individual nurse level. Unit managers significantly influence how nurses interact with each other and how they perform within their work (Duffield et al., 2011). For instance, managers who focus on task completion and who adopt a commanding approach may need to focus more on developing and maintaining relationships with their staff to avoid neglecting the emotional needs of nurses, which is crucial for job satisfaction and retention. Cummings et al. (2018) further underscored that a supportive leadership style is crucial for creating a stimulating

work environment and reducing turnover intention among nurses. In Chapter 5, we also emphasized the critical role of management, as the introduction of differentiated nursing practice did not improve managerial support or turnover intention. Enhancing nurses' professional autonomy with strong management support is essential. This support includes providing the necessary time, space, and training for nurses to pursue development activities alongside their clinical patient care duties (Pursio et al., 2023). Creating an empowering workplace with access to support and growth opportunities is essential for achieving quality outcomes (Goedhart et al., 2017).

Unit managers often serve as crucial liaisons between nursing staff and higher administration. They are responsible for communicating the nursing staff's needs, concerns, and suggestions to upper management while relaying the goals, expectations, and strategic directives from upper management to the nurses. However, they need help supporting and promoting nurse activities because of higher level organizational administration and various legal, regulatory, and ethical issues (Pursio et al., 2023). This underscores the often-overlooked role of nurses within the entire organization and highlights the necessity of supporting and empowering unit managers to fulfill their responsibilities. Providing unit managers with the resources, training, and support they need is essential to bridge gaps and facilitate better communication and support for nursing staff across all organizational levels.

At the organizational level, effective management practices are embedded in the broader structure and culture of the organization. They are critical for ensuring that organizational policies align with the needs of nursing staff and simultaneously support a stimulating work environment (Mabona et al., 2022). Effective organizational management requires establishing clear goals and expectations, fostering a culture of ongoing improvement, and maintaining a clear vision for the nursing profession (Morrison & Jensen, 2022). As concluded in Chapter 3, managers with a long-term vision for how nursing practices should be organized, involving the active participation of nurses, emerged as highly important. Visionary managers can foresee future challenges and opportunities within the nursing landscape, plan accordingly, and collaborate among professional groups. To effectively drive changes in the role of nurses and fully realize their potential within the organization, nursing advisory boards, chief nursing officers, and executive hospital boards must work collaboratively and share the organizational vision (Riesch et al., 2023; Verhoeven et al., 2022). However, these partnerships are often complicated by hierarchical structures, differences in education levels, traditional work practices, and existing laws and regulatory standards (Zidek & Medland, 2020).

Nurses are present at all levels and sectors of the healthcare system, uniquely positioning them to lead systemic changes. Despite their deep situational knowledge of individual and community healthcare needs, they need more representation and impact in the government and in boardrooms, and at executive levels of health systems (Anders, 2021). Moreover, more specialized education and dedicated career paths are needed to prepare nurses for such roles. As highlighted in Chapter 2, the Netherlands does not have specific programs or titles for nurses at these levels, which often means they move into management or executive roles without adequate preparation.

## Methodological considerations

This thesis employed a mixed-methods approach to explore the nursing work environment and provide a nuanced understanding of the complex interactions in work environments. Chapter 2 offered a systematic overview of the existing literature; Chapters 3, 4, and 6 used qualitative methods; and Chapter 5 used quantitative analysis. Chapter 6 implemented a participatory action research approach to actively involve nurses in the research process, thereby gaining deeper insights into mechanisms driving nurse-led changes and empowering nurses to drive improvements in their work environment. This combination of different methods allowed us to conduct a thorough exploration of the nursing work environment. The qualitative data provided rich, contextual insights into nurses' and managers' experiences and perceptions, while the quantitative data offered measurable evidence of changes and outcomes. However, several methodological limitations must be acknowledged.

First, contextual changes may have affected the analysis because differentiated nursing practice is a highly relevant topic and subject to continuous evolution. Most data were collected during the COVID-19 pandemic, which created unprecedented challenges for nurses (Buchan et al., 2022). The profound and enduring impact of the pandemic may have influenced the nursing work environment in ways not fully captured by our studies. While we collected qualitative data over four years and conducted long-term measurements of the work environment, we were specifically addressing the long-term effects of differentiated nursing practice and the evolving dynamics of the work environment over time and not the effects of the pandemic. Additionally, our studies concentrated on nursing work environments in Dutch hospitals, so other healthcare settings were not included, such as home care services, mental healthcare facilities, and other healthcare

sectors. Lastly, the study primarily concentrated on the perspectives of nurses and managers, leaving out the viewpoints of other internal stakeholders such as physicians, support staff, and patients. Additionally, our analysis was limited to the work environment at the local hospital level, and did not address regional or national levels, even though these broader levels are also important for conceptualizing the work environment (Registered Nurses' Association of Ontario, 2013).

Second, it is important to consider certain measurement limitations when examining the nursing work environment and differentiated nursing practice. We acknowledge the inherent complexity in studying the nursing work environment and recognize that our theoretical definitions may need to capture its intricate and evolving nature fully. Factors such as technology, innovation, diversity, and inclusion (Maassen et al., 2024) are often excluded from work environment measurements, despite their proven importance. Similarly, while differentiated nursing practice involves customizing roles and responsibilities according to nurses' training, skills, and experience, evaluating its effectiveness is complicated because of variations in implementation across different hospitals and the subjective nature of its impact. Without a strict national protocol, each hospital adapts the intervention to its unique needs, enabling flexible and context-specific implementation.

### Future perspectives: From change to transformation and beyond

The work environment is complex, with many stakeholders involved, and transitioning towards differentiated practices is challenging. We must approach such transitions as a transformation rather than a straightforward change to achieve sustainable improvements. The roles of nurses, patients, physicians, and other healthcare professionals will change, so success relies on a coordinated effort to transform the environment (Salmond & Echevarria, 2017). Differentiated practices have proven to be a powerful catalyst for transformation in the nursing profession (Chapter 3). While small steps have been taken to improve some aspects of the work environment with differentiated practices (Chapter 5), turnover intention is still high among nurses, suggesting a broader systems-thinking perspective is needed (Swanson et al., 2012). Opportunities for further exploration and development exist in daily nursing practice, policy, education, and research. It is important to recognize that these should not be viewed in isolation but as interconnected and mutually influential, shaping the nurses' overall environment.

### Directions for practice, policy, and education

Nurses can learn and apply systems thinking to understand how their actions – whether they involve providing patient care, supporting colleagues, or advocating for healthcare improvement – can potentially enrich their work environment (Stalter & Mota, 2018). Stalter and Mota (2018, p. 34) defined systems thinking as “a process of self-awareness in which the nurse knows boundaries specific to clinical reasoning, personal effort, reliance on authority, and awareness of interdependencies”. Reflection is widely recognized as a crucial component of nursing practice. However, as discussed in Chapter 6, there are instances where reflective practices among nurses were found to be insufficient because of a lack of skills, space, and time. We recommend enhancing nurses' reflective skills through management support, targeted education, and policy improvements (Zarrin et al., 2023). A potential policy enhancement could involve mandating allocated time within nurses' schedules for reflection and professional development, compelling nurses to engage in reflective practice, attend workshops, or participate in ongoing education.

To recognize interdependencies, nurses should understand that their team functions within a complex system involving individuals, group dynamics, and the larger healthcare organization (Stalter & Mota, 2018). In practical system-improvement efforts, nurses demonstrate strong leadership and often lead changes. These people, even without formal positions of authority, share their knowledge, challenge existing norms, and foster consensus. They are the systems thinkers who involve others in questioning and enhancing current practices (Trbovich, 2014). Building a resilient nursing environment requires a clear vision and collaboration at all healthcare organization levels, emphasizing the vital contribution of nurses. Empowering nurses to improve their work environment can drive lasting improvements for nurses, organizations, and patients. Enhancing the impact of nursing professionals involves working with individuals both within and outside the nursing field to achieve shared goals (Martini et al., 2023).

At the organizational level, promoting collaborative practices involves fostering effective teamwork, establishing supportive leadership, implementing collaborative systems, and supporting intra-professional practice. Nurses, organizations, and regulatory bodies must collaborate to enhance understanding of each individual's role within the health system (Registered Nurses' Association of Ontario, 2016). As highlighted in Chapter 2, our understanding of nurses' roles is complicated by the significant variation in nursing degrees, titles, study load hours, and practice hours. Therefore, we recommend clarifying the diversity of nursing titles and ed-

educational requirements, so that it is possible to understand how nurses' roles and local actions impact organizational goals and vice versa, along with their broader system-wide consequences (Stalter & Mota, 2018).

Nursing associations and regulatory bodies should also actively promote and strengthen nurses' involvement in political and policy matters. Rasheed et al. (2020) propose that nurses aspiring to leadership roles should participate in policy discussions and conferences. This recommendation aligns with recent Dutch legislation, granting healthcare workers a legal right to influence policy decisions and encouraging their active participation in shaping healthcare policies (Rijksoverheid, 2023). Over the past decade, the Netherlands has also seen other significant developments, such as the appointment of a Chief Nursing Officer at the Ministry of Health, which has enhanced strategic influence on nursing issues at the governmental level (Verpleegkundigen en Verzorgenden Nederland, 2021). Furthermore, individuals with nursing backgrounds have been placed in key roles within the Dutch Healthcare Authority and the National Health Care Institute to advocate for the profession. Despite these advances, a regional gap remains, limiting the impact of these advances on daily nursing practice. Bridging this gap requires improved connectivity and collaboration among nurses across health, government, and policy organizations.

The Dutch Professional Nursing Association has developed a vision to enhance governance structures and networks for nursing professionals and leaders (Verpleegkundigen en Verzorgenden Nederland, 2024). Additionally, the Bachelor of Nursing 2030 initiative is addressing these challenges by emphasizing the role of nurses both within and beyond healthcare organizations. This program focuses not only on theoretical knowledge and practical skills but also on problem-solving, evidence-based practice, and interprofessional collaboration (Landelijk Overleg Opleidingen Verpleegkunde, 2023). As noted in Chapter 6, nursing education needs to equip practitioners with strategies to manage uncertainties and navigate complex healthcare environments (Hörberg et al., 2023). For instance, preparing nursing students to engage in health policy increased their participation in policy-making (Hajizadeh et al., 2021). Continuous critical reflection on how education translates into practice and detailed information for effective workforce planning is necessary to address the various uncertainties nurses may encounter.

To optimize the nursing work environment, the current organizational structures need to be evaluated and refined. We recommend conducting a comprehensive analysis to identify bottlenecks and inefficiencies caused by existing bureaucracy

(Achterbergh & Vriens, 2019). This evaluation should focus on the organizational framework rather than on addressing isolated issues. The goal is to streamline processes and reduce unnecessary bureaucracy to enhance the overall efficiency and responsiveness of the healthcare organization. Given that the work environment extends beyond a single organization into broader networks, it is crucial to design system-level interventions. These interventions should refine internal structures and facilitate collaboration across different sectors and organizations. They should enhance the organization's ability to quickly respond to national dynamics and developments in the nursing profession, ensuring that nurses are better equipped to manage the demands, complexities, and uncertainties they encounter in their roles.

### Directions for research

Building on the findings of this thesis, future research should adopt a systems-thinking approach. This should involve employing mixed evaluation methods to address fundamental and practical research questions, ensuring system-wide robust and practical insights (Trbovich, 2014). Longitudinal analyses could be particularly valuable in understanding the interdependencies within the nursing work environment and in assessing the long-term effects of differentiated nursing practice. It is important to investigate why these practices have only modestly improved the work environment and have not significantly reduced turnover intention among nurses, as discussed in Chapter 5.

Future research should also explore various healthcare sectors, such as home care services and mental health facilities, and consider the transitional spaces between these sectors. In the Netherlands, healthcare services are delivered through an extensive network of facilities, equipment, and resources (Kroneman et al., 2016). Exploring these transitional spaces will provide insights into how nursing practices adapt and evolve across different settings and how these transitions affect both care quality and the nursing work environment.

Additionally, it is crucial to assess the impact of national and international healthcare policy changes on nursing practices and work conditions. For example, shifts in healthcare coverage policy or changes in legislation can significantly influence nursing practices.

To enhance collaboration among stakeholders, research should incorporate multiple perspectives across different levels of analysis. At the individual level, research should focus on the skills nurses need to manage uncertainty and how

these skills influence their practices. This includes examining how technology and innovation can support nurse-led changes. Integrating decision-making and policy development models at the local level can improve collaboration among internal stakeholders, including physicians, hospital management, and support staff while incorporating patients' viewpoints for a comprehensive understanding of the nursing work environment. Expanding the focus to include other sectors and networks is important for understanding how nursing practices evolve. Future research also needs a systemic approach to improve collaboration, inform policy development, and enhance the overall work environment for nurses.

## Overall conclusion

This thesis has significantly advanced our understanding of the nursing work environment and the transition toward differentiated nursing practice. It has emphasized that the work environment should be viewed as a dynamic, interconnected system rather than a mere collection of functions and individual roles. Recognizing differentiated practice as a profound transformation rather than a simple, linear change is crucial for enduring improvements in nursing and the broader healthcare system. This work has also emphasized the importance of tailoring solutions to fit specific local contexts, considering historical, political, and practical factors.

Building a stimulating nursing environment requires a systemic approach from the individual nurse to national healthcare policies. At the individual level, it is crucial to move beyond placing the burden solely on nurses and instead focus on creating supportive structures and processes within organizations. A proactive attitude from nurses is also essential, as their active involvement in decision-making and improvements can drive positive changes. A clear vision and addressing systemic issues can empower nurses to excel in their roles. This involves policy and procedural changes and a cultural shift, which emphasizes the value of investing in the nursing profession. At the organizational level, efforts should promote collaborative practices, clarify nursing roles and educational requirements, and involve nurses in policymaking. Addressing bureaucratic inefficiencies and implementing system-level interventions are crucial for creating a stimulating environment for nurses. On a broader scale, it is imperative to consider how these improvements fit within national and international healthcare systems. This includes recognizing how national policies affect nurses' roles and integrating regional networks to enhance care coordination and drive systemic reforms.

In summary, the insights from this thesis underscore the importance of a systems-thinking approach to improving the nursing work environment. This work emphasizes that, for meaningful long-term improvements, we must look beyond individual organizations. The significant role that nurses can play in driving changes within the healthcare system should be fully acknowledged and leveraged.

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# Chapter 8

## Addendum

## Nederlandse samenvatting

Een stimulerende verpleegkundige werkomgeving verbetert uitkomsten voor patiënten en het welzijn van verpleegkundigen. Daarnaast verhoogt het de effectiviteit van zorginstellingen en draagt bij aan een hogere werktevredenheid en het behoud van verpleegkundigen. De verpleegkundige werkomgeving is meer dan alleen de fysieke ruimte waarin verpleegkundigen zorg verlenen. Het omvat een complex geheel van organisatorische kenmerken, cultuur, processen en structuren die de verpleegkundige praktijk vormgeven en beïnvloeden. Daarnaast zijn er interacties met de omgeving buiten de organisatie, zoals de landelijke visie op zorg of wet- en regelgeving die van invloed zijn op het verpleegkundig werk. Door inzicht te krijgen in de verschillende onderdelen van de verpleegkundige werkomgeving en hoe deze onderling verbonden zijn, wordt het mogelijk om gericht interventies te ontwikkelen die de werkomgeving verbeteren en daarmee de effectiviteit van het verpleegkundig werk bevorderen en uiteindelijk bijdragen aan betere zorguitkomsten. Om die reden hebben we in dit proefschrift onderzocht welke verschillende elementen de verpleegkundige werkomgeving vormen, hoe deze elementen met elkaar verbonden zijn en hoe ze verbeterd kunnen worden.

Door gebruik te maken van zowel kwalitatieve als kwantitatieve onderzoeksmethoden hebben we de essentiële aspecten van de verpleegkundige werkomgeving onderzocht. We hebben specifiek gefocust op de invloed van de werkomgeving op het gedifferentieerd werken in Nederlandse ziekenhuizen. Daarnaast hebben we onderzocht hoe gedifferentieerd werken de werkomgeving beïnvloedt. Gedifferentieerd werken heeft als doel beter gebruik te kunnen maken van de kennis en vaardigheden van verpleegkundigen, hun rol en invloed binnen en buiten de organisatie te versterken en de kwaliteit van zorg te verbeteren. Gedifferentieerd werken draait niet alleen om het verschil tussen verpleegkundigen met een mbo-, in-service- of hbo-opleiding, maar ook om het inzetten van verpleegkundigen op basis van hun opgedane vaardigheden, werkervaring en ambitie.

In **hoofdstuk 2** hebben we de resultaten van een scoping review beschreven waarin verschillende kenmerken van verpleegkundige opleidingsprogramma's wereldwijd zijn onderzocht. In totaal hebben we 117 publicaties tussen januari 2016 en juli 2021 nauwkeurig gescreend om de kenmerken te kunnen identificeren. We vonden een grote variatie in verpleegkundige opleidingen, titels, duur en praktijken, zowel binnen de landen als tussen de verschillende landen. In Westerse landen onderscheiden we 86 initiële opleidingen en 82 erkende vervolgoopleidingen, die samen leiden tot 60 verschillende verpleegkundige titels. De review heeft

laten zien hoe deze diversiteit in opleidingen en titels kan leiden tot een versnipperd beeld van het verpleegkundig beroep en hun bijdragen aan de zorg. We benadrukken daarbij het belang van het wereldwijd standaardiseren van opleidingen en titels om mobiliteit, samenwerking en mogelijkheden voor loopbaanontwikkelingen te verbeteren. De standaardisering kan dienen als een mogelijke basis voor het verkennen van nieuwe verpleegkundige rollen en functies en het bevorderen van een meer uniforme aanpak van verpleegkundige zorg wereldwijd. Deze uniformiteit kan ook de invloed van verpleegkundigen op beleid vergroten, waardoor zij beter in staat zijn hun eigen werkomgeving te beïnvloeden en verbeteren. Daarom is het van cruciaal belang om te overwegen hoe deze veranderingen de positie van verpleegkundigen kunnen verbeteren en te bepalen wat nodig is voor het creëren van een stimulerende werkomgeving

Voor de kwalitatieve studie in **hoofdstuk 3** hebben we 50 interviews afgenomen met projectleiders die verantwoordelijk waren voor de vormgeving en invoering van gedifferentieerd werken in ziekenhuizen, met als doel meer inzicht te krijgen in deze verandering. We zagen dat deze periode werd gekenmerkt door onzekerheid en complexiteit. In de overgang naar een gedifferentieerde verpleegkundige praktijk herkenden we drie fasen: (1) oproep tot actie, (2) afwachten en (3) een nieuw begin met open eind. Aanvankelijk aangestuurd door nieuwe wetgeving, begonnen ziekenhuizen met het herstructureren van verpleegkundige rollen en functies. Hierna ontstond een periode van inactiviteit vanwege onzekerheden over de verwachtingen en de nieuwe rollen en functies. Nadat de wetgeving rondom gedifferentieerd werken werd ingetrokken, zagen we dat ziekenhuizen nieuwe motivatie vonden om verder te gaan met gedifferentieerd werken. Ziekenhuizen ontwikkelden lokale strategieën en verpleegkundigen in de ziekenhuizen werden meer betrokken in de veranderingsprocessen. De invoering van gedifferentieerd werken bleek een katalysator te zijn voor verdere ontwikkeling en professionalisering van de verpleegkundige beroepsgroep en het verbeteren van de patiëntenzorg en het welzijn van verpleegkundigen. Naast het creëren van nieuwe verpleegkundige rollen en functies is het van cruciaal belang om verpleegkundigen centraal te stellen in deze veranderingen. Visie op het vak en betrokkenheid op *alle* niveaus binnen de organisaties zijn nodig om de verandering tot een succes te laten verlopen. De verpleegkundige werkomgeving moet hierbij dynamisch zijn om de veranderende en evoluerende rollen en posities van verpleegkundigen te ondersteunen en te borgen.

Voor de studie beschreven in **hoofdstuk 4** hebben we 42 interviews gehouden met verpleegkundigen en managers uit verschillende Nederlandse ziekenhuizen

om verschillende kenmerken van de verpleegkundige werkomgeving in kaart te brengen. Hierin beschouwden we de werkomgeving als een complex en veelzijdig systeem. De dynamiek van de verpleegkundige werkomgeving werd hierin bevestigd, met name tijdens periodes met veel veranderingen. We zagen dat verpleegkundigen het lastig vonden om de dagelijkse zorg aan patiënten te combineren met overstijgende taken die niet direct aan het bed plaatsvinden. Dit werd weerspiegeld in vier thema's: (1) directe patiëntenzorg is de standaard van verpleegkundig werk, (2) verpleegkundigen moeten flexibel zijn voor productiviteit in het ziekenhuis, (3) onderlinge afhankelijkheden verminderen autonomie in het werk, en (4) organisatiestructuren zijn leidend in hoe verpleegkundigen hun werk vorm kunnen geven. Hoewel verpleegkundigen heel flexibel en toegewijd zijn aan het leveren van goede zorg, hebben ze vaak last van logge organisatiestructuren en veel afhankelijkheden in hun werk. Dit creëert een spanningsveld tussen enerzijds de wens van verpleegkundigen om naast hun uitvoerende zorgtaken een bredere rol te vervullen, en anderzijds de realiteit van hun huidige werkomgeving. Deze bevindingen benadrukken de noodzaak van een systemische aanpak om de verschillende werkomgevingsfactoren die het werk van verpleegkundigen beïnvloeden aan te pakken. Hier is een duidelijke visie op verplegen, met erkenning voor de rol van verpleegkundigen buiten de directe zorg, een belangrijk startpunt. Dit draagt bij aan hun professionele ontwikkeling en een betere kwaliteit van zorg.

Met een longitudinaal cohortonderzoek onderzochten we in de studie in **hoofdstuk 5** de impact van gedifferentieerd werken op de werkomgeving en op de intentie van verpleegkundigen om de organisatie te verlaten. We toetsten hiervoor drie hypothesen. De eerste hypothese was dat gedifferentieerd werken een positieve impact zou hebben op de verpleegkundige werkomgeving. Onze resultaten lieten zien dat de invoering van gedifferentieerd werken de perceptie van verpleegkundigen op de werkomgeving licht verbeterde ( $\beta=0,054$ , 95% CI 0,027 tot 0,081). Verpleegkundigen waren meer tevreden over de beschikbaarheid van voldoende personeel en middelen ( $\beta=0,054$ , 95% CI 0,009 tot 0,098), ervoeren een betere relatie met artsen ( $\beta=0,065$ , 95% CI 0,030 tot 0,101) en een grotere betrokkenheid bij deelname aan ziekenhuisbrede initiatieven ( $\beta=0,099$ , 95% CI 0,060 tot 0,139). We zagen geen verbeteringen in de ondersteuning van het management ( $\beta=0,007$ , 95% CI -0,038 tot 0,053) en in de aanwezigheid van basiselementen voor goede verpleegkundige zorg, zoals een duidelijke verpleegkundige visie en het toepassen van verpleegkundige diagnoses in de zorg aan patiënten ( $\beta=0,026$ , 95% CI -0,005 tot 0,056). Onze tweede hypothese was dat gedifferentieerd werk de intentie van verpleegkundigen om de organisatie te verlaten zou verminderen. Onze resultaten toonden geen verandering ( $\beta=-0,051$ , SE=0,087, 95% CI -0,221

tot 0,119). Het percentage verpleegkundigen dat aangaf de organisatie te willen verlaten bleef stabiel op ongeveer 24%, ondanks dat de invoering van gedifferentieerd werken de werkomgeving verbeterde. De derde hypothese was dat de werkomgeving een mediërende rol zou spelen tussen gedifferentieerd werken en de intentie tot vertrek. Deze hypothese werd ook niet ondersteund door onze bevindingen ( $\beta=0,069$ , 95% CI -0,113 tot 0,252). De werkomgeving speelde dus geen verklarende rol. Hoewel we na de invoering van een gedifferentieerde verpleegkundige praktijk verbeteringen observeerden in de werkomgeving, had dit geen effect op de intentie van verpleegkundigen om de organisatie te verlaten. Deze resultaten illustreren hoe complex het is om veranderingen door te voeren in de werkomgeving. Het blijkt een grote uitdaging om systemische veranderingen door te voeren in alle lagen en onderdelen van de organisatie. Het is mogelijk dat het innemen van sterkere posities en inspraak in beleidsbeslissingen verpleegkundigen een breder inzicht geeft in hun werkomgeving, waardoor ze hier kritischer naar kijken. Daarom is het belangrijk om verder te onderzoeken hoe verpleegkundigen een actievere rol kunnen spelen in het positief vormgeven van hun werkomgeving.

In **hoofdstuk 6** hebben we een participatief actieonderzoek beschreven. Met deze studie wilden we inzicht krijgen in de verschillende mechanismes die van invloed zijn op door verpleegkundigen zelf geïnitieerde veranderingen in de werkomgeving. De studie vond plaats op drie verpleegafdelingen in een Nederlands academisch ziekenhuis. Het vermogen van verpleegkundigen om veranderingen door te voeren kan worden samengevat in drie hoofdthema's: (1) het versterken van relaties, (2) het nemen van de leiding en (3) competenties voor de taak. In het eerste thema bleek dat het versterken van relaties en een sterk gevoel van verbondenheid tussen collega's belangrijk was voor het doorvoeren van veranderingen. Positieve interacties en het gezamenlijk oplossen van problemen verbeterden de onderlinge samenwerking binnen het team. Het tweede thema liet zien dat het belangrijk was dat verpleegkundigen zelf het initiatief namen bij verbeteringen en veranderingen. De focus lag echter vaak nog op directe patiëntenzorg, en verpleegkundigen hadden ondersteuning nodig om hun aandacht te verleggen naar bredere verantwoordelijkheden. In het derde thema bleek dat zelfvertrouwen en vaardigheden van invloed waren op de bereidheid om nieuwe taken op te pakken. Verpleegkundigen die zich zeker voelden en ervaring hadden met project- of verandermanagement, waren meer proactief in het oplossen van problemen en het leiden van verbeteringen en veranderingen. Managers speelden een belangrijke rol in het ondersteunen en begeleiden van verpleegkundigen tijdens deze processen. Dit had invloed op hoe effectief en betrokken verpleegkundigen waren bij

veranderingen. Het vergroten van de veerkracht en het vermogen van verpleegkundigen om met onzekerheden om te gaan is van groot belang. Een werkomgeving met duidelijke taken en verantwoordelijkheden is daarbij essentieel. Ook zijn ondersteunende processen en structuren, evenals sterke relaties met collega's, managers en andere disciplines, belangrijk voor het ondersteunen van complex verpleegkundig werk en het waarborgen van verbeteringen in de werkomgeving.

We eindigen dit proefschrift met een reflectie op de algemene bevindingen en methodologische overwegingen. Ook bespreken we toekomstperspectieven voor de praktijk en onderzoek.

In de **reflectie** benadrukken we dat de verpleegkundige werkomgeving een complex systeem is, waarin verschillende rollen, organisatorische factoren en externe invloeden zoals wet- en regelgeving elkaar voortdurend beïnvloeden. Een verandering zoals de invoering van gedifferentieerd werken vraagt om samenwerking en coördinatie op meerdere niveaus. Een strikte bureaucratische benadering schiet vaak tekort in deze complexe omgevingen. Een flexibelere, meer gedecentraliseerde structuur zou helpend kunnen zijn. Daarnaast bleek professionele identiteit een belangrijk thema. Verpleegkundigen zien de directe patiëntenzorg vaak als hun 'primaire' taak. Hierdoor zijn ze minder betrokken bij bredere organisatie initiatieven. Door een proactieve houding van verpleegkundigen, duidelijke rolomschrijvingen, ondersteuning vanuit het management en meer inspraak in besluitvorming, kunnen verpleegkundigen gestimuleerd worden om een bredere visie op de inhoud en uitvoering van hun werk te ontwikkelen. Verpleegkundigen werken op alle niveaus en in alle delen van de zorg, wat hen een goede positie geeft om veranderingen te leiden. Hoewel ze veel kennis hebben over de behoeften van patiënten, hebben ze meer invloed en vertegenwoordiging nodig in de politiek, op bestuursniveau en bij managers binnen de zorgorganisatie.

In de **methodologische overwegingen** benadrukken we de meerwaarde van het combineren van kwalitatieve en kwantitatieve onderzoeksmethoden om de complexe verpleegkundige werkomgeving te onderzoeken. Deze aanpak leverde waardevolle inzichten op, maar kent ook enkele beperkingen. Ten eerste kunnen contextuele veranderingen de analyse hebben beïnvloed. De meeste gegevens zijn verzameld tijdens de COVID-19-pandemie, die grote uitdagingen voor verpleegkundigen met zich meebracht. Hoewel we vier jaar lang data hebben verzameld voor onze resultaten, kan de pandemie de verpleegkundige werkomgeving op manieren hebben veranderd die niet volledig door onze studies zijn vastgelegd. De studie richtte zich uitsluitend op Nederlandse ziekenhuizen en liet andere

zorgsectoren, zoals verpleeghuizen of GGZ-instellingen, buiten beschouwing. We onderzochten de werkomgeving op het niveau van de ziekenhuizen, zonder data te verzamelen op regionaal of nationaal niveau. Daarnaast zijn belangrijke perspectieven, zoals die van patiënten en artsen, niet uitgebreid meegenomen. Dit kan betekenen dat een volledig beeld van de dynamiek binnen de werkomgeving mogelijk ontbreekt. Ten tweede waren er meetbeperkingen, vooral door de complexiteit van gedifferentieerde verpleegkundige praktijken en het ontbreken van een uniforme nationale standaard voor de introductie ervan. Daarnaast erkennen we dat de veelzijdigheid en complexiteit van de verpleegkundige werkomgeving onze theoretische benaderingen mogelijk heeft beperkt, waardoor niet alle relevante aspecten in het onderzoek volledig zijn belicht.

In de **toekomstperspectieven** erkennen we dat de werkomgeving complex is, met veel invloeden en betrokkenen. De overgang naar gedifferentieerd werken vormt daarbij een grote uitdaging. Om duurzame verbeteringen te realiseren, moeten we deze overgangen benaderen als een transformatie in plaats van een simpele verandering. Dit vereist een effectieve afstemming en integratie van de rollen van verpleegkundigen, patiënten, artsen en andere zorgprofessionals in de constant veranderende werkomgeving. Hoewel gedifferentieerd werken effectief is gebleken voor het verbeteren van de werkomgeving, blijven veel verpleegkundigen van plan de organisatie te verlaten. Dit benadrukt de noodzaak van een systemische aanpak. Door systeemdenken toe te passen kan de complexiteit van de werkomgeving beter worden begrepen en verbeterd, zowel in de organisatie als daarbuiten. Verpleegkundigen, organisaties en toezichthouders moeten samenwerken om beter te begrijpen wat ieders rol is in het zorgsysteem; zowel binnen de organisatie, in de regio als op landelijk niveau. Daarbij is het ook belangrijk dat het onderwijs hierin meebeweegt en verpleegkundig onderwijs moet uitrusten met strategieën om deze omgevingen te navigeren. Om deze ontwikkelingen te ondersteunen zou toekomstig onderzoek een systeemgerichte aanpak moeten hanteren. Hiermee kunnen de onderlinge afhankelijkheden binnen en buiten zorgorganisaties in kaart worden gebracht. Dit biedt verpleegkundigen, samen met beleidsmakers, zorginstellingen en andere zorgprofessionals, handvatten om hun werkomgeving effectief te beïnvloeden.

Onze **conclusie** is dat een stimulerende werkomgeving voor verpleegkundigen een systemische aanpak vraagt, van de individuele verpleegkundige tot op nationaal beleidsniveau. De studies in dit proefschrift hebben ons begrip van de verpleegkundige werkomgeving en de overgang naar gedifferentieerde verpleegkundige praktijken aanzienlijk vergroot. We benadrukken dat de werkomgeving moet

worden gezien als een dynamisch en onderling verbonden systeem, in plaats van een verzameling van losse functies en rollen. In de overgang naar gedifferentieerd werken is het belangrijk dit te zien als een diepgaande transformatie van de gehele organisatie, in plaats van een eenvoudige, plaatselijke implementatie.

Het is belangrijk om niet alleen de verantwoordelijkheid bij de verpleegkundigen zelf te leggen, maar ook om ervoor te zorgen dat binnen en buiten zorgorganisaties ondersteunende structuren en processen aanwezig zijn. Met een duidelijke visie op verplegen en aandacht voor systemische inbedding van verpleegkundig werk in het zorgsysteem, kunnen verpleegkundigen hun werk beter uitvoeren. Dit vraagt om beleids- en procedurele veranderingen, maar ook om een cultuuromslag waarin de waarde van investeren in de verpleging wordt erkend.

Binnen zorgorganisaties moeten samenwerking, duidelijke rolomschrijvingen, bevoegdheden en bekwaamheden van verpleegkundigen worden gestimuleerd. Daarnaast is een proactieve houding van verpleegkundigen zelf essentieel; zij moeten actief betrokken zijn bij beleidsbeslissingen en verbeteringen in de werkomgeving. Het verminderen van bureaucratie en het implementeren van systeemgerichte interventies zijn essentieel. Op bredere schaal is het belangrijk om te overwegen hoe deze verbeteringen passen binnen nationale en internationale zorgsystemen. Dit houdt in dat we erkennen hoe nationale beleidsveranderingen de rol van verpleegkundigen beïnvloeden en regionale netwerken integreren om de samenwerking in de zorg en veranderingen in het zorgsysteem te verbeteren. Duurzame verbeteringen in de werkomgeving vereisen dat we verder kijken dan individuele organisaties en de sleutelrol van verpleegkundigen in het sturen van veranderingen volledig benutten.

## Research Data Management

### Ethics and privacy

This thesis is based on the results of research involving human participants, which were conducted in accordance with the principles of the Declaration of Helsinki, the guideline of Good Clinical Practice, and the general Radboud University policy on research data management. The Medical Ethics Review Committee of the Radboud University Medical Center (Radboudumc) approved the studies (CMO Radboudumc dossier number: 2019-5992), which were exempted from Dutch Medical Research Involving Human Subjects Act (WMO). Digital informed consent was obtained for the qualitative studies (*chapters 3, 4, 6*). The privacy of the participants was warranted using pseudonymization. Consent was granted to potentially share the (pseudonymized) data within the research consortium RN2Blend. The sensitivity and confidentiality of the raw qualitative data makes sharing of the data without compromising confidentiality and privacy impossible, therefore consent for sharing of the raw data was not asked from the participants. For the quantitative study (*chapter 5*), participants provided consent by completing the questionnaire and data were pseudonymized using identification numbers.

The studies were funded the Dutch Ministry of Health, Welfare and Sports (project number 1532566-190809-MEVA). The funder had no role in the designs of the studies, data collection, analyses, manuscript writing, or decisions to publish.

### Data collection and storage

This thesis includes a literature review (*Chapter 2*), qualitative data in the form of interviews and observations (*Chapters 3-5*), and quantitative data from questionnaires (*Chapter 6*). The questionnaires were collected by 'Newcom Research & consultancy', a research firm with ISO 27001 certification to ensure data security. All processed data in this thesis are stored at the secured server of IQ Health science department, Radboudumc, in a secured folder. This folder was only accessible to members of the research project. Informed consents, audio recordings, and pseudonymization keys were stored separately from the research data. Chapters 4-6 involve data that have been collected and analyzed in collaboration with external colleagues, and these (pseudonymized) data were stored and processed in workspaces (Table 1) on the Azure DRE (DRE Portal ([mydre.org](http://mydre.org))). The external colleagues were not authorized to download or remove data from these workspaces. After publication, these workspaces were deactivated and removed.

Table 1 | DRE workspaces.

	Workspace name	Workspace ID
Chapter 4	RN2Blend Work environment	dws-525RN2BLND
Chapter 5	RN2Blend Actieonderzoek	dws-173I-RN2BL
Chapter 6	RN2Blend FDTool	dws-1730-FDTOOL

### Data findability and accessibility

All studies included in this thesis are published open access. The corresponding data will remain available for at least 15 years after termination of the studies. The datasets from chapters 3-6 are published in 'closed access' Data Acquisition Collections (DACs) in the Radboud Data Repository (Table 2). While future research within the RN2Blend consortium can make use of the qualitative (pseudonymized) data (*chapters 3, 4, 6*), they are not made publicly available due to the presence of sensitive information that could compromise the privacy of the participants. Additionally, data obtained from the questionnaires involve participant hospitals, but consent to share these data have not been requested. Requests for access will be checked against the conditions for sharing anonymous data as described in the signed agreements with the hospitals.

Table 2 | Data and research documentation on the Radboud Data Repository.

	DAC
Chapter 3	DOI: <a href="https://doi.org/10.34973/gtmq-pb76">doi.org/10.34973/gtmq-pb76</a>
Chapter 4	DOI: <a href="https://doi.org/10.34973/gdvv-2p84">doi.org/10.34973/gdvv-2p84</a>
Chapter 5	DOI: <a href="https://doi.org/10.34973/wkww-f504">doi.org/10.34973/wkww-f504</a>
Chapter 6	DOI: <a href="https://doi.org/10.34973/zf7h-qd47">doi.org/10.34973/zf7h-qd47</a>

DAC=Data Acquisition Collection.

## Portfolio

Training activities	Hours
<b>Courses</b>	
Literature Review for your PhD: how to search and where to publish? (2020)	5.00
RIHS - Introduction course for PhD candidates (2020)	15.00
Course Action Research (2020)	16.00
Scientific Writing for PhD candidates - Radboud University (2021)	84.00
Design and Illustration - Radboud University (2022)	26.00
e-learning Human-related scientific research in Radboudumc (2023)	2.00
Scientific integrity - Radboudumc (2023)	20.00
Zelfinzicht: de sleutel voor je loopbaan - Radboud University (2023)	7.00
<b>Conferences</b>	
Annual CaRe Days (2021) <i>attendee</i>	16.00
RIHS PhD Retreat (2022) <i>attendee</i>	16.00
RN2Blend-congres: Verpleegkundigen op stoom (2022) <i>workshop</i>	28.00
33th International Nursing Research Congress (2022) <i>oral presentation</i>	28.00
82nd Annual Meeting of the Academy of Management (2022) <i>oral presentation</i>	28.00
8th International Nurse Education conference (2022) <i>poster presentation</i>	28.00
Verpleegkundig congres Over de Bogen (2023) <i>workshop and oral presentation</i>	8.00
RN2Blend eindcongres: Blijf Stromen (2024) <i>workshop</i>	8.00
<b>Other</b>	
Webinar: RN2Blend TV: recept voor een gezonde werkomgeving (2020)	28.00
<b>Teaching activities</b>	
Supervision of internships / other	
Supervision Master Thesis Student (2021, 2023)	56.00
Supervision workgroups Evidence Based Guidelines (2x) (2024)	14.00
<b>Total</b>	<b>441.00</b>

## List of publications

### Scientific publications included in this thesis

- Van Kraaij, J., de Vries, N., Wessel, H., Vermeulen, H., van Oostveen, C., RN2Blend Consortium. (2025). Enhancing work environments and reducing turnover intention: A multicenter longitudinal cohort study on differentiated nursing practices in Dutch hospitals. *BMC Nursing*, 24(39). doi.org/10.1186/s12912-024-02681-7
- Van Kraaij, J., Lalleman, P., Walravens, A., Van Oostveen, C. & RN2Blend consortium (2022). Differentiated nursing practice as a catalyst for transformations in nursing: A multiphase qualitative interview study. *Journal of Advanced Nursing*, 78, 165–175 doi.org/10.1111/jan.15001
- Van Kraaij, J., Spruit-Bentvelzen., L., van Lieshout, F., Vermeulen, H., van Oostveen, C., & RN2Blend Consortium. (2024). Navigating uncertainties for promoting nurse-led changes in work environments: a participatory action research. *International Journal of Nursing Studies Advances*, 7, 100265. doi.org/10.1016/j.ijnsa.2024.100265
- Van Kraaij, J., van Merode, F., Lenssen, E., Vermeulen, H., van Oostveen, C., & RN2Blend Consortium. (2024). Organizational Rigidity and Demands: A Qualitative Study on Nursing Work in Complex Organizations. *Nursing Reports*, 14(4), 3346-3360. doi.org/10.3390/nursrep14040242
- Van Kraaij, J., Veenstra, M., Stalpers, D., Schoonhoven, L., Vermeulen, H., van Oostveen, C., & RN2Blend Consortium (2023). Uniformity along the way: A scoping review on characteristics of nurse education programs worldwide. *Nurse education today*, 120, 105646. doi.org/10.1016/j.nedt.2022.105646

### Other scientific publications and contributions not included in this thesis

- Latzke, M., van der Heijden, B., Akkermans, J., Chan Au, W., Beigi, M., Fox, M., Kainrath, S., Mahoney, C., Shirmohammadi, M. M., Stummer, H., van Kraaij, J., van Oostveen, C., & Vermeulen, H. (2022). Sustainable careers in nursing: Focusing on health, happiness and productivity. *Academy of Management Proceedings*, 2022(1). doi.org/10.5465/AMBPP.2022.13833symposium
- Van Kraaij, J., Bal, R., & Felder, M. (2022). Regieverpleegkundig werk in de praktijk. *TVZ Verpleegkunde in praktijk en wetenschap*, 132, 20-32. doi.org/10.1007/s41184-022-1102-4
- Van Kraaij, J., van Oostveen, C., Vermeulen, H., Heinen, M., Huis, A., Adriaansen, M., & Peters, J. (2020). Nurse practitioners' perceptions of their ability to enact leadership in hospital care. *Journal of Clinical Nursing*, 29(3-4), 447–458. doi.org/10.1111/jocn.15105
- Van Kraaij, J., & van Oostveen, C. (2020). Veranderbereidheid is groter in positieve werkomgeving. *TVZ Verpleegkunde in praktijk en wetenschap*, 130, 50–51. doi.org/10.1007/s41184-020-0828-0
- Walravens, A., Lalleman, P., van Kraaij, J., & van Oostveen, C. (2021). Kritisch bekeken. Differentiatie als katalysator voor verandering. *TVZ Verpleegkunde in praktijk en wetenschap*, 131, 50–51. doi.org/10.1007/s41184-021-1048-y

## About the author



Julia van Kraaij was born in Nijmegen, the Netherlands, on March 31, 1992. After completing her secondary education at Nijmeegse Scholengemeenschap Groenewoud (VWO) in 2010, she took a gap year in Spain to learn about the Spanish language and culture. She then pursued a Bachelor's degree in Nursing at Utrecht University of Applied Sciences. Julia participated in the Honors program and graduated in 2015 with a predicate of excellence.

Following her graduation, she began working as a registered nurse in various mental health departments. In 2016, alongside her work as a registered nurse, she started a Master's program in Communication, Health, and Life Sciences at Wageningen University with a specialization in Health and Society. During her internship and thesis work, she conducted research projects at the IQ Health department of the Radboud University Medical Center in Nijmegen. In 2018, she began a Master's in Business Administration at Radboud University, specializing in Organizational Design and Development. In 2019, she started her PhD trajectory. This research was motivated by her strong wish to make a meaningful contribution to the nursing profession.

In 2025, Julia started working as a postdoctoral researcher at Maastricht University, as part of the Limburg Living Lab on Aging and Long-Term Care. This project, a collaboration with Radboud University and University Knowledge network for Older adult care Nijmegen, investigates how caring communities in long-term care can be evaluated and developed from a multidisciplinary perspective.

Julia is married to Jan, and together they have two children, Lucas (born in 2021) and Olivier (born in 2023).

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