KCE

SAFE NURSE STAFFING LEVELS IN ACUTE HOSPITALS

.be

KCE

Federaal Kenniscentrum voor de Gezondheidszorg
Centre Fédéral d'Expertise des Soins de Santé
Belgian Health Care Knowledge Centre

SAFE NURSE STAFFING LEVELS IN ACUTE HOSPITALS

KOEN VAN DEN HEEDE, LUK BRUYNEEL, DORIEN BEECKMANS, NIELS BOON, NICOLAS BOUCKAERT, JUSTIEN CORNELIS, DORIEN DOSSCHE, CARINE VAN DE VOORDE, WALTER SERMEUS

2019

www.kce.fgov.be

How to refer to this document?

This document is available on the website of the Belgian Health Care Knowledge Centre.

■ TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

■ SCIENTIFIC REPORT

1   INTRODUCTION AND BACKGROUND

1.1   Background: a changing hospital context

There are important well-documented (inter)national evolutions in the hospital care environment which are relevant for nurse staffing levels in Belgian acute hospitals. In this section we briefly describe the most prominent evolutions and provide the context in which this study is performed.

1.1.1   Hospital landscape and evolutions in type of hospital stays

Large hospital capacity and use compared to other countries

As extensively documented in previous KCE-reports[1], the Belgian healthcare system is characterized by a dense hospital landscape with a high number of acute beds per population and high utilization of hospital services. Examples are:

- the relatively high number of licensed acute-care hospital beds (5.7 acute hospital beds per 1 000 population versus 3.6 for the OECD average in 2014),

- a decreasing but still high average length of stay (LOS) and

- a large number of hospital admission rates per population.

The latter two result in a high number of nursing days per inhabitant per year.[2] Moreover, Belgian hospitals are mainly operating as stand-alone organisations providing the full range of services, including very specialized and complex services. This results in duplication and fragmentation of services.[1-4] Thus, it is important to assess Belgian nurse staffing levels in this context of a dense hospital landscape with fragmented hospital services.

Ageing hospital population

The number of inpatient stays in Belgian hospitals increased between 2003 and 2014 with 6.5%. Yet, the projection that was made in KCE report 289 indicates that inpatient stays are expected to increase at an even faster pace between 2014 and 2025, with an estimated increase of 11.8% (215 000 inpatient stays). This growth is caused by population growth (+5.3%), changing demographics (+4.3%) and evolutions in admission rates (+2.2%).[2] Still, the real challenges are situated beyond 2025, since ageing starts to peak from 2030 onwards. To anticipate this, KCE report 289 also computed alternative projections of inpatient stays using an accelerated ageing scenario in which the pace of ageing was doubled from 2017 onwards to be in line with the projected demographic evolution up to 2034. In this scenario, an additional 93 000 inpatient stays are expected on top of the baseline projections.[2] It is important to note that this upward trend in admissions can be lowered if substantial investments in *hospital alternatives* (e.g. hospital at home, ambulant rehabilitation) are made to avoid hospital admissions.[5] In absence of such drastic policy measures the projection results show that not only the number of inpatient hospital admissions will rise, but also the proportion of older patients (≥75 years) will increase. In fact, while the proportion of inpatient stays by older patients was 25% in 2014, this is expected to increase towards 27.5% by 2025 and even towards 32.5% in the accelerated ageing scenario.[2]

Length of hospital stay continues to decrease

As in most industrialized countries, in Belgium the average length of stay (LOS) for acute in-hospital stays decreased. Between 2003 and 2014 the LOS decreased from 8.26 days to 6.99 days.[2] This downward trend is expected to continue, ending in a predicted average LOS of 5.94 days by 2025.[2] Although this trend can be observed for almost all patient groups, the shortening of hospital stays is more pronounced for surgical stays and stays with a lower severity of illness.[2]

Substitution from inpatient to day-care admissions

Apart from an increase in the number of *inpatient* stays, an important increase in *day-care* stays is expected by 2025. This growth in day-care admission rates includes substitution from inpatient and ambulatory care to day care, as well as a net growth in medical practice.[2]

Nursing care of the remaining hospitalization days is expected to intensify

Early hospital discharge is an objective for several reasons (e.g. cost containment, societal trend to move care from hospital to home environment). This reduction in LOS is mainly realized by reducing days of care at the low-intensity end of a hospital stay. The association between LOS and patient outcomes is complex.[6] However, the higher patient turnover (i.e. more day-care and more but shorter inpatient stays) in combination with the ageing hospital population are (together with other factors such as increased administrative burden) expected to have a profound impact on the intensity of nursing care: the intensity of the remaining hospitalization days is expected to increase. Such an increase in the intensity of nursing care was already observed in the past[7-9] but is expected to accelerate in the near future. As such, even when the nurse staffing levels (expressed as 'Nursing Hours per Patient Day (NHPPD)' or 'patient-to-nurse ratio') remain(ed) stable, it might well be that the actual nursing workload increase(d).[10]

A major reform of the Belgian hospital sector is in the starting blocks

In 2015 the Minister of Public Health started a reform of the hospital landscape aiming to enhance task distribution between hospitals (e.g. concentration of complex care or high-cost technologies in a more limited number of hospitals) and rationalize the supply of general hospital services. An important policy lever to achieve these goals is the introduction of geographically defined hospital collaborations, the so called 'loco-regional clinical networks'. Indeed, early 2019 a law was voted that makes it compulsory for hospitals to be part of a loco-regional hospital network from 2020 onwards. These loco-regional networks (max. 25 for the Belgian territory) will have to make arrangements about hospital services such as

maternity wards, paediatric services, emergency departments, etc. In addition, the law stipulates that for certain services (e.g. complex cancer surgery) loco-regional hospital networks have to make arrangements with hospitals outside the network. These are called 'supra-regional' collaborations.[11]

In addition to these hospital networks there is a strong policy emphasis to reduce inpatient stays and to further reduce the LOS. This might affect the intensity of nursing care. Moreover, this will require investments in hospital alternatives (e.g. ambulatory rehabilitation capacity, day-care facilities for the elderly, nursing home capacity, intensified nursing home services, etc.). The Flemish government already announced such a policy shift for the near future.[12] As the organisation of these alternative services is (for the largest part) the competency of the federated entities, it is possible that the implementation form and pace will differ across the federated entities. In any case, these evolutions will have an indisputable impact on the need for nursing care of the remaining inpatient hospital stays and days as well as on the allocation of nursing resources (e.g. additional needs in ambulatory care and nursing homes).

1.1.2 Nurse staffing levels: the hospital budget and bedside staffing levels

Hospital budgets are insufficient to cover actual staffing costs

In Belgium, nurse staffing levels in hospitals are hugely determined by the hospital payment system. In fact, hospitals receive a basic budget for nurse staffing (see Chapter 4 for more details) that is based on the number of justified beds, and the minimal nursing staff ratios that have been set in the past for various types of nursing wards (e.g. 12 full-time equivalents (FTE) per 30 justified beds). In addition to this basic budget, hospitals receive a budget based on the intensity of nursing care (i.e. calculated via the Belgian Nursing Minimum Data Set, B-NMDS), type of hospital (i.e. compensation for academic hospitals), collective labour agreements and other policy measures (e.g. payment for 'floating staff': a pool of nurses that can be allocated in a flexible way to different nursing wards within the same hospital based on the nursing needs), project funding (part B4 of the hospital

budget), etc. Nevertheless the perception in the sector is that nurse staffing levels have not followed the evolution in the intensity of nursing care.[13, 14] Strikingly, the budget for nurse staffing foreseen in the 'Budget of Financial Means' (BFM) per FTE is lower than the actual salary costs for 1 FTE.[3] Although there are some measures to guarantee a minimum nurse staffing budget when minimal numbers are not being met, hospitals might have to downsize their staffing levels or use other resources to finance nursing care (e.g. increased patient supplements and/or deductions on physician fees).[3]

Bedside nurse staffing levels are low in a European context

A large European study (i.e. 'RN4CAST') conducted in 2009 in 488 hospitals in 12 European countries, together with studies conducted in the United States (US) allow to compare bedside nurse staffing levels in Belgium in an international perspective. All data were collected directly from nurses in inpatient care roles through a standardized survey methodology across countries.

Table 1 shows that in Belgian general surgical or internal medicine wards, one nurse is on average responsible for 10.7 patients. Only Germany and Spain have a higher workload as measured by the number of patients per nurse. What's more, the Belgian nurse staffing ratio is far above the European mean of 8.3 patients per nurse. The data shown in Table 1 present a general measure of nurse staffing across all shifts. If we look at the details for night shift staffing, with an average nurse staffing ratio of 20.7, Belgium performed much lower in comparison to all other countries. Second highest was Spain with 16.3 patients per nurse during night shifts. Belgian patient-to-nurse ratios in morning and afternoon shifts were 7.8 and 9.7, respectively. For both shifts, this is the eight highest among RN4CAST countries.

The RN4CAST study also showed that in Belgium 55% of bedside hospital nurses (general surgery and internal medicine) were educated at Bachelor level. Yet, this percentage varies from 26% to 86% across Belgian hospitals. It is slightly higher compared to the European average of 52%. The variation within the RN4CAST study was reported to go from 0 to 100%.[15]

Table 1 – Mean nurse staffing ratios in 12 European countries and the US

Country	Nurse staffing ratio: patients to professional registered nurses
Belgium	10.7
England	8.6
Finland	8.3
Germany	13.0
Greece	10.2
Ireland	6.9
Netherlands	7.0
Norway	5.4
Poland	10.5
Spain	12.6
Sweden	7.7
Switzerland	7.9
US	5.3

Source: Aiken et al. (2012)[16]

1.2 The impact of nurse staffing levels on nurse and patient outcomes

1.2.1 Nurse staffing and outcomes are associated but the relationship is complex

A series of reviews confirm the (complex) relationships between nurse staffing levels (and related factors) and patient and nurse outcomes (see Appendix 1).

Nurse staffing levels and patient and nurse outcomes: number and educational level

A large body of evidence supports associations between nurse staffing levels with both patient and nurse outcomes.[17-26] The body of evidence concerns both the nurse staffing levels as well as the educational level of the nursing staff. It is sufficiently demonstrated that there is a relationship between the number of registered nurses (RNs) and patient outcomes (e.g. mortality) and between educational level (proportion of RNs with a Bachelor's degree) and patient outcomes. This association has been mainly studied *via cross-sectional study designs* in international as well as in Belgian studies.[15, 27, 28] Although these studies illustrate fairly consistently that lower staffing levels (e.g. a higher patient load per nurse, higher nursing hours per patient day, a lower percentage of Bachelor's prepared nurses) are associated with a higher risk of worse patient outcomes (e.g. mortality, failure-to-rescue, hospital-acquired infections) and worse nurse outcomes (e.g. burnout, job dissatisfaction, intention-to-leave), the cross-sectional nature of the study designs hamper causal inferences.[29] Yet, studies with *longitudinal study designs*, and studies that link the 'nursing dose (i.e. amount of nursing care that is given to a patient)' at the individual patient level, to patient outcomes start to emerge. These studies confirm these relationships.[30-33] Another limitation of the body of evidence is that most of the research is conducted on general surgical and internal medicine wards or ICU (intensive care wards).[29] Yet, evidence about a relationship between poor staffing levels and worse outcomes is growing in other domains as well.[34, 35]

The importance of missed nursing care

Recent efforts have further aligned clinical reasoning with theoretical models and statistical analysis to gain a more causal insight in the association between nurse staffing and patient outcomes. There is emerging evidence that 'missed nursing care' (also referred to as 'care left undone', 'omissions in nursing care', or 'implicit rationing of nursing care') is a mediating factor explaining the association between nurse staffing levels and patient

outcomes. Indeed, nurses ration[a] care implicitly in function of their workload. As such the 'care left undone' increases when staffing levels are lower and as a consequence the workload is higher.[36-40]

The role of supporting staff

The role of healthcare assistants is less clear. While some studies demonstrate that working with healthcare assistants (at any level of RN staffing) increases the risk of worse outcomes,[41] there is a recent longitudinal study.[42] The authors found that healthcare assistant levels were significantly associated with a lower risk of mortality up to a certain level. Above that threshold level the risk of mortality increased (i.e. adding more healthcare assistants increased the risk of mortality). The U-shape relationship that was found suggests that there are increased harms when there are both too few or too many healthcare assistants.[42, 43] Furthermore, there is little evidence that adding healthcare assistants to the team reduced omissions in nursing care.[38] Although the evidence about healthcare assistants is not as well established as that about nurse staffing levels, it clearly shows that healthcare assistants cannot act as substitutes for RNs.[43]

Nursing work environment

The complexity of the staffing – outcome relationship is also illustrated by the body of evidence that links factors of the nursing work environment (e.g. shift lengths, physician-nurse relationships, leadership style) with patient outcomes. It is possible that the relationship between nurse staffing levels and patient/nurse outcomes is influenced by the quality of the work environment. After all, there is compelling evidence for an association between lower nurse staffing levels and/or poorer 'nursing work environments' with poorer patient and nurse outcomes (i.e. lower nurse retention, lower job satisfaction, higher burnout).[24, 44-49] In other words, it is possible that the effect of allocating more staff disappears in poor nursing work environments. The evidence also suggests that the factors that

influence nurse retention and well-being tend to be multifactorial and include non-pay rewards and nursing ward climat.[43] Other factors that might interfere with the staffing-outcome relationship are the staffing models used (e.g. primary versus team nursing)[50], physician staffing[29], etc.

1.2.2　International safe nurse staffing policies

Starting from the same body of evidence but using different approaches

Despite the consistent, cumulative evidence about relationships between nurse staffing levels and patient and nurse outcomes, several fundamental questions remain largely unanswered: 'How many nurses are needed?', 'What kind of skill mix?', 'Are staffing ratios the solution?'.[51] These issues are pertinent for the real-world application of a policy on nurse staffing levels.

Starting from the body of evidence described above, safe staffing policies attempt to realize the gains in patient and nurse outcomes by setting mandatory or non-mandatory nurse staffing levels to assure that they are in line with patients' needs. We studied safe staffing policies in several countries and/or regions. Although they start from the same premise, the implementation of policy measures varies across countries and regions. In the US for example, one approach is to require from hospitals to have a nurse driven staffing committee responsible for creating staffing plans. Another approach is to require hospitals to disclose staffing levels to a regulatory body or to the public. Generic minimal nurse staffing ratios are a third approach. While the minimal nurse staffing ratios in California have been implemented at all times at the level of individual nurses (a maximum patient caseload per nurse) other regions such as Victoria and Queensland in Australia, implement ratios at the nursing ward level (average maximum patient caseload per nurse for a particular nursing ward, which might vary by shift and hospital type). In the UK[52], a non-compulsory safe staffing guideline from the National Institute for Health and Care Excellence (NICE)

---

a　　The withholding or failure to carry out necessary nursing tasks due to inadequate time, staffing level, etc.

suggested to adjust staffing levels based on patient acuity measurements. Ireland decided on implementing a framework for safe nurse staffing and skill mix in general and specialist medical and surgical care settings in adult hospitals.[53] This framework has three main axes: skill-mix thresholds, adjusting the actual nurse staffing levels based on required staffing levels and staffing nursing managers supernumerary. In Part III, these policies are described with the intention to identify best-practices and lessons learned for the Belgian situation.

1.3 Definitions and terminology

Nursing professionals and related occupations

For the purpose of the present study, we use the definition of 'nurse' adopted by the International Labour Organization (ILO) in order to be clear about what is meant by 'nurse staffing levels'. The definition of ILO (ISCO-08 standard) is as follows: '*Nursing and midwifery professionals provide treatment and care services for people who are physically or mentally ill, disabled or infirm, and others in need of care due to potential risks to health including before, during and after childbirth. They assume responsibility for the planning, management and evaluation of the care of patients, including the supervision of other health care workers, working autonomously or in teams with medical doctors and others in the practical application of preventive and curative measures.*'[54]

In addition, it is important to clarify what we mean by Registered Nurses, Licensed Practice Nurses, Healthcare Assistant and Advance Practice Nurses:

- A Registered Nurse (RN) is a nurse who has met the criteria for a nursing license defined by their country's (or state's) statute. They are independently accountable for their decisions and actions.[43] This corresponds with the ISCO-08 standard '2221 nursing professionals'.[54]

- An associate nurse level corresponds with titles such as enrolled nurses (EN), Licensed Practice Nurse (LPN), Licensed Vocational Nurse (LVN), etc. They undertake training of one or two years and are responsible for providing fundamental nursing care and usually work

under the supervision of an RN. It corresponds with ISCO-08 standard '3221 nursing associate professionals'. The ILO definition is as follows '*Nursing associate professionals provide basic nursing and personal care for people in need of such care due to effects of ageing, illness, injury, or other physical or mental impairment. They generally work under the supervision of, and in support of, implementation of health care, treatment and referrals plans established by medical, nursing and other health professionals.*'[54]

- A Healthcare Assistant (HCA) works under the guidance of a qualified healthcare professional (usually a RN). Sometimes staff working in HCA roles are known as nursing aides, nursing auxiliaries, or nursing assistants.[43] This level corresponds with ISCO-08 '5321 Health Care Assistants' defined as: '*Health care assistants provide direct personal care and assistance with activities of daily living to patients and residents in a variety of health care settings such as hospitals, clinics and residential nursing care facilities. They generally work in implementation of established care plans and practices, and under the direct supervision of medical, nursing or other health professionals or associate professionals.*'[54]

- Advanced Practice Nurse (APN) are nurses working in advanced roles beyond the traditional registered nurses' scope-of-practice, after additional training (Master level).[55, 56] According to the International Council of Nurses they are defined as: '*A Nurse Practitioner/Advanced Practice Nurse is a RN who has acquired the expert knowledge base, complex decision-making skills and clinical competencies for expanded practice, the characteristics of which are shaped by the context and/or country in which s/he is credentialed to practice. A Master's degree is recommended for entry level.*'[57] In the ISCO-08 classification, APNs are included in the category 'nursing professional' level.

Nurse staffing levels – number of available nurses for direct nursing care

Nurse staffing levels are expressed in various ways. To determine the nurse staffing establishment of a nursing ward on a yearly basis the most commonly used measure is the number of 'Full-time-equivalent' (FTE) nurses. Yet safe staffing policies require measurement of 'productive nursing hours'. Productive hours refer to hours of direct patient care actually delivered by nursing staff on a ward, not to paid or scheduled hours. Non-productive hours such as vacation, sick time, orientation time, education leave and committee time are generally not included in calculations of nursing care hours.[58] Measures that compute nurse staffing levels by dividing the total number of FTE nursing staff members by patient days (e.g. total number of days any one patient stays in the hospital ward during a calendar month) or by the total number of beds are too crude.[58] Other measures are used of which we describe the two most commonly used ones here:

- Patient-to-nurse ratio: is the number of patients cared for by one nurse.[58]

- Nursing Hours per Patient Day (NHPPD): is the sum of the staffed hours of RNs involved in direct patient care divided by the number of inpatient days per nursing ward per observation day.[59]

In addition to these measures a series of other measures are used: e.g. caring hours per patient day (including care assistant productive hours), nurse perceived staffing adequacy (via nurse survey's), etc.[59]

Nurse staffing levels – skill Mix

The skill mix is generally computed as the proportion of total productive nursing hours provided by each skill mix category (RNs, healthcare assistants, etc.).[58] A measure that is commonly used (because there is evidence linking it to patient safety) is the 'proportion of RNs with a Bachelor's degree'.[58]

Intensity of nursing care – nursing workload

Terms such as 'intensity of nursing care'; 'patient acuity'; 'nursing workload' 'complexity of care' and 'severity of illness' are often used interchangeably in the literature without a consensus on how to define each of these concepts.[60-62] Therefore, concept clarification is needed. The different concepts are described below in the way we will use them throughout the report (see Figure 1):

- *Nursing work* includes both patient-related care activities and non-patient related care activities (e.g. coaching new nurses, meetings). The patient-related activities can be divided in:

  o *Direct patient care activities* which can be defined as all nursing-care activities performed in the presence of patients and/or their families: e.g. measurement and observation; medication administration; respiration; nutrition; hygiene; elimination.

  o *Indirect patient care activities* which can be defined as nursing-care activities performed away from patients but specifically on their behalf: e.g. preparing medications, nursing recording, making a phone call on behalf of the patient, etc.)[62]

- *Intensity of nursing care* is the amount of direct and indirect patient care activity required to carry out the nursing function and the factors that have an impact on the level of work required to perform that activity.[60] The intensity of nursing care has several attributes such as patient dependency; the complexity of care (e.g. sudden changes in care needs, activities that need to be combined at a particular moment, activities requiring high levels of technical or theoretical expertise; the physical-mental-emotional exertion, etc.).[62] Patient acuity is a very similar concept as 'intensity of nursing care'.[63]

- *Patient acuity* is often used in the context of 'patient classification systems for nursing care' that aim to determine the amount of nursing time needed to meet the nursing care requirements of patients. Patient classification tools have been used since the 1960s, yet there is no consensus on the best methods to determine the optimal amount of time for completion of specific nursing activities or nursing needs.

Although intensity of nursing care is multidimensional, it is often treated as a unidimensional construct that aggregates the volume of nursing care per unit of time. This volume of nursing care is measured in different ways as the number of nursing activities, the time or length of nursing care, the extent and complexity of nursing activities, or required intellectual activities.[60] These patient classification systems for nursing care are designed to link nursing resources (i.e., nursing care hours) to 'intensity of nursing care' or 'patient acuity'.[64] Although not perfect, factoring patient acuity into staffing decisions is often reported to be a more refined approach than relying solely on nurse-patient ratios or budgeted FTE, to determine ward-level nurse staffing needs.[63]

- *Nursing workload* encompasses both nursing intensity and non-patient care-related nursing activities. It is the amount of time and care that a nurse can devote (directly and indirectly) towards patients, workplace, and professional development at a given time period linked to the available resources (number and competencies).[62] Indeed, for the same number of available resources of nursing staff, the adequacy of nurse staffing can be different depending on the intensity of nursing care, the amount of non-patient related care, the competencies of the nurses, patient turnover (patient inflow and outflow generated from admissions, discharges, transfers in, and transfers out on nursing wards)[65] etc. Frail patients, bedridden patients, and patients requiring close monitoring all require, for instance, more nursing time. One hospital may be adequately staffed for its nursing intensity at a certain number of nursing hours per patient day, while another is short-staffed. Adjustment is necessary if comparisons are to be made across hospitals.

Figure 1 – Concept clarification: intensity of nursing care
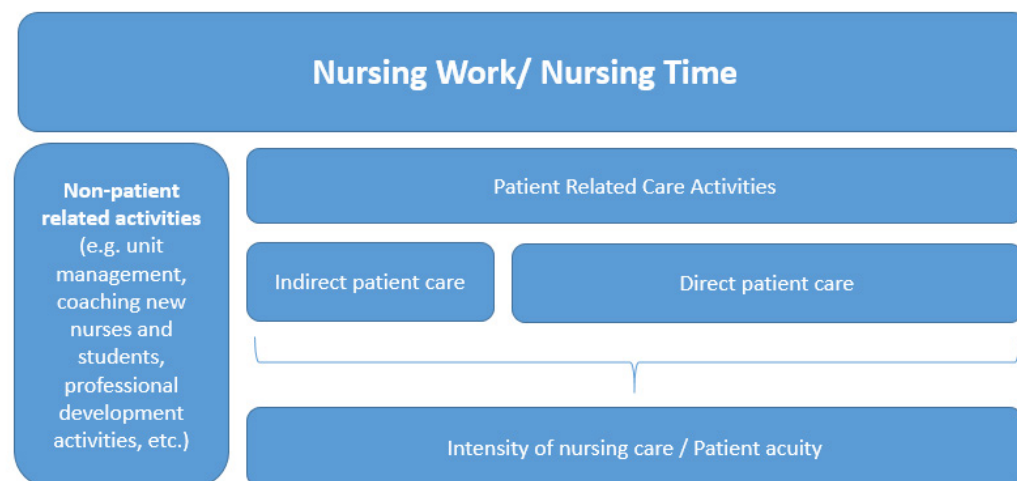
Source: adapted from Alghamdi (2016)[62]

Missed nursing care

When the nursing workload is too high there are indications that nurses start to set priorities in care and do not deliver all the care that is required.[66] There are three approaches identified in the literature that try to inquiry for unfinished care: the tasks left undone, the implicit rationing approach, and the missed care approach. It may be a key mechanism through which nurse staffing has an effect on patient outcomes.[36] Missed care has indeed been confirmed as a mediator for the association between nurse staffing and patient-reported experience.[37]

1.4 Research questions and study approach

The main aim of this study is to evaluate if the current nurse staffing standards (i.e. staffing levels as included in legislation and payment system) for Belgian acute hospitals are still appropriate in the light of the changing hospital context (e.g. reductions in length of stay, ageing population). The three main topics addressed in this study are:

- the evaluation if staffing levels were adapted to changes in intensity of nursing care;

- the evaluation if key variables (e.g. patient-to-nurse ratios, skill mix, missed nursing care, job satisfaction, burnout, intention-to-leave) as measured by the RN4CAST-study (2009) changed compared to 10 years ago;

- what lessons can be learned from safe staffing policies abroad.

The scientific report is structured accordingly in three parts including 9 different chapters (see Table 2). To enable to draw lessons from the international examples in part three, we first describe the Belgian context in depth. We focus throughout the report on 'nurse staffing levels' that are required for safe patient care, as well as to ensure that hospitals are attractive places to work. It is beyond the scope of the report to address issues such as 'advanced practice nursing roles' and other specialized nursing roles, staffing levels for other healthcare professionals (e.g. physician staffing), etc.

Table 2 – Research questions – study approach – structure of the report

Research question	Study approach	Structure
How is nurse staffing organised and regulated in Belgium?	Document review and expert consultation	Part I (Chapter 2)
What is the evolution in Nursing Hours per Patient Day and intensity of nursing care in Belgian acute hospitals between 2008 and 2016?	Analysis administrative data	Part I (Chapter 3)
Which budget do Belgian hospitals receive for nurse staffing?	Data from SPF and document review	Part I (Chapter 4)
How do patient-to-nurse ratios, educational level of nurses, nurse perceived staffing levels, nursing work environment, care left undone and nurse outcomes in Belgian acute hospitals in 2019 compare with the variables measured in 2009?	Survey	Part II (Chapter 5)
What lessons can be learned from policies abroad that aim to ensure safe staffing ratios?	Document review and expert consultation	Part III (Chapters 6 -11)

PART I: BELGIUM

2 NURSING EDUCATION AND PRACTICE IN BELGIUM

2.1 Origin and evolution

The history of nursing education: from origin a practice-oriented profession

The education of the nursing profession in Belgium was originally (early 20th century) a practice-based training programme organised by hospitals, similar to the English model pioneered by Florence Nightingale.[67] The duration of the education was at the start 2 years (1 year of theory and clinical practice; and 1 year of clinical training). Since the 1920s the first year of education was common with thereafter specialization possibilities in hospital care (2 years) or psychiatric care (1 year). It lasted, however, until 1931 that the term 'nurse' was introduced.[68] Since 1946 the title 'nurse' received legal protection and since 1974 the practice of nursing is legally protected (see section 1.1).[67, 68]

After the Second World War the nursing education was reformed and consisted, for hospital nurses, of three years of education (two years for psychiatric nursing and three years for 'social hygiene nurse'). The inflow into the education decreased after this reform. As a reaction to the subsequent nursing shortage, the nursing assistants were introduced. This education consisted of 3 months of theory and 12 months of clinical training.[67, 68]

The 1957-reform: professionalization of nursing education programmes

In 1957 the nursing education was drastically reformed with two tracks: a three-year education to become a nurse, organised at the level of 'Higher Technical Education' and a two-year track, organized at vocational level, to become a nursing assistant.[68] At that time, there was thus a clear policy choice to educate nurses at the level of 'Higher Technical Education' (later known as A1-level). Similar to the 1920 reform, this reform caused a decrease in the inflow into the nursing education. Therefore, from 1960 onwards, the option was introduced for graduating nursing assistants to become a nurse by following an additional year of training ('gebrevetteerde verpleegkundige', 'brevet infirmier'), later known as A2-level. Although initially introduced as a temporary measure, today the two educational pathways in nursing are still in place.[67, 68] The possibility to become a 'nursing assistant' after two years of training was stopped in 1996.

Box 1 – EU treaties and directives which influence nursing education programmes

- The Treaty of Rome (1957) intended to provide free movement of individuals. Yet, EU Member States were not obliged to recognize professional qualifications acquired in other Member States, and often did not do so. National legislation adopted by the Member States hampered a free movement of healthcare professionals.

- With the Directives 77/452 (1977)[69] a free movement of people was aimed for by mutual recognition of formal qualifications of six healthcare professions. For nurses, the education and training minima were set at three years, 4 600 hours of practice and theory, and an entry level after at least 10 years of general education.

- The Directive 89/595/EEC (1989)[70] specified that the content of the programme included at least 1/3 of theoretical instruction and 1/2 of clinical instruction (i.e. ≥2 300 hours).

- Directive 2005/36/EC[71] implemented the Bologna Declaration of 1999 and was introduced after the expansion of the EU. It aimed to further harmonize the nursing profession and to shift from a practice discipline towards a profession. After all, the educational level of nurses of many of the new Member States was low compared to the rest of Europe.

- In 2013, with the Directive 2013/55/EU[72], the minimum criteria were increased. This directive aims to:

  o increase free movement of people (the possibility to keep two main educational pathways to become a nurse is maintained);

  o further harmonize nursing education programmes (by specifying additional criteria for educational length):

    ▪ entry levels attested by a diploma or certificate of general education with a distinction between higher education studies: 12 years of general study and vocational training programmes, 10 years of general education;

    ▪ nursing education has a duration of at least three years with a minimum of 4 600 hours (at least 1/3 theoretical[b] and at least 2 300 hours clinical training).

To ensure patient safety additional requirements were added regarding language requirements, certification of the profession and the introduction of a list of eight core competencies that need to be met regardless of the educational pathway that is followed (e.g. autonomous nursing diagnosis; collaborate with other healthcare professionals; support a healthy lifestyle; live-saving interventions in emergency situations).

Source: Sermeus et al. 2018[67]

2.2 Two (pre-)registration educational pathways

Federated entities are competent for nursing education

The federal level regulates the practice of nurses, not the education of nurses. At the federal level graduates of a nursing education programme that complies with the minimal qualification criteria as specified in article 45 of the coordinated law (Royal Decree of 10 May 2015)[73] that regulates the healthcare professionals' practice in Belgium (see 1.1) are considered as nurses. It should be noted that there are differences in the implementation of these legal requirements between the Belgian Communities (the federated entities) who are responsible for organising education in Belgium.[74]

Nowadays, there is a distinction between Bachelor-level nurses ('Bachelor-verpleegkundigen'/'Bachelier d'infirmier[ère]') and Diploma-level nurses[c] ('HBO-5 verpleegkundigen' in Flanders and 'brevet d'infirmier/ère' in the French-speaking community).[74] In this report we will not detail the different terminology that was used for both educational pathways throughout the different reforms. Yet, we can state that the two educational pathways are still often called by their former names: Bachelor (previously known as A1) and Diploma level (previously known as A2). In the remainder of this report we refer to the 'Bachelor level' and the 'Diploma level'.

Diploma level

In all Communities, the diploma-degree programmes were until recently organised through a three-year vocational training programme following secondary level education. Yet, in the French community it was decided to extend the education (with an additional 6 months) to comply with the EU directives. In the Flemish community there was no such reform. As such, it is unclear if the HBO-5 level is in accordance with the EU directives. Some nursing schools organising the HBO-5 level state that, by being creative with the clinical training hours, they will comply with the EU directive. Other

---

[b] This corresponds with at least 1 534 hours.

[c] Organised at the level of the 'secondary school': 'Hoger secundair beroepsonderwijs'/' Formation de niveau secondaire complémentaire'.

nursing schools state[d] that they comply with the Belgian legislation but that it will not be possible for new graduates to work as a nurse in other EU countries. Until now an official position of a Belgian Minister responsible for Public Health or Education is lacking.[75]

Bachelor level

The Bachelor education is organised by Higher Education Institutions linked at universities (called university colleges). To comply with EU Directive 2013/55/EU, starting from the academic year 2016-2017, the 180 ECTS (European Credit Transfer System) three-year programme was reformed to a 240 ECTS four-year programme. Whereas the previous programme foresaw on average 1 400 hours of practical training, the current programme covers the required 2 300 hours of practical training.

Two educational pathways to become a nurse: not exceptional in a European context

Today there are two educational pathways to become a nurse in Belgium. This is not exceptional in a European context as in the majority of European countries two educational pathways exist to become a nurse.[74] Yet, in most of these countries the chosen educational pathway determined (or still determines) the scope of practice, which can be quite different. In Belgium, there is no difference in scope of practice in nursing care, which is rather exceptional and also no legal framework that enforces this differentiation. Moreover, over the course of years the number of countries with two educational pathways has decreased. Under the impulse of EU regulation (Box 9) an upscaling of the nursing education took place throughout Europe. The predecessor countries (e.g. Ireland, England, Spain) already reformed their nursing education programmes to the Bachelor level. In the majority of these countries the nursing education is organised at the university level.[67]

2.3 Post-registration education

After graduation as a nurse there are several possibilities to further educate oneself and deepen or broaden nursing skills and expertise.[74] We describe some of these options below without being exhaustive:

- Diploma-level nurses can enrol into a 'bridging programme' to become a Bachelor-level nurse (previously 120 European Credit Transfer System (ECTS) units; since 2016 150 ECTS units).

- Several specialized courses are organised to deepen the expertise of nurses within a specific domain (e.g. intensive care and emergency care; oncology; care for the elderly; wound care; diabetes educator; palliative care). The ECTS-points for these courses vary between 20 and 60. While some of these programmes (e.g. intensive and emergency care) were organised as a 'Second Bachelor' programme, many of these programmes were (after the introduction of the 4-year Bachelor education), in Flanders, reformed to 'post-graduate courses'. Moreover, from 2020-2021 onwards the Flemish budgets for organising the 'Second Bachelor' programmes are stopped. In the French community there are still 'Second Bachelor' programmes (e.g. radiotherapy; oncology; paediatrics; operating department nursing; public health; mental healthcare and psychiatry; and intensive and emergency care).

- Some of these 'post-graduate courses' are also accessible for Diploma-level nurses. After graduation they do not receive a 'post-graduate level' but a 'certificate'.

- Some of these qualifications are required to access the 'special titles' (for Bachelor-level nurses) ['bijzondere beroepstite'l/ 'titres professionnels particuliers'] or 'special competencies' (for Diploma-level

---

d   HBO-5 programmes are evaluated via a self-assessment report, Bachelor programmes via an external audit from the NVAO (Accreditation Organisation of the Netherlands and Flanders – 'Nederlands-Vlaamse Accreditatieorganisatie'

nurses) ['bijzondere beroepsbekwaamheid'/ 'qualifications professionnels particuliers'] - see section 2.8.2.2).

- Nurses can also obtain a Master degree. In Flanders, for instance, the professional bachelor can follow a Master degree in Nursing sciences after having completed a bridging programme (1-year programme) at university level. The French Community offers within the master degree in public health the opportunity to specialize (e.g. health promotion,

health management, intensive and emergency care, and cardio-vascular expertise).

- After successfully obtaining a master degree, access to a doctoral programme is possible.[74]

Figure 2 – Educational pathways in nursing
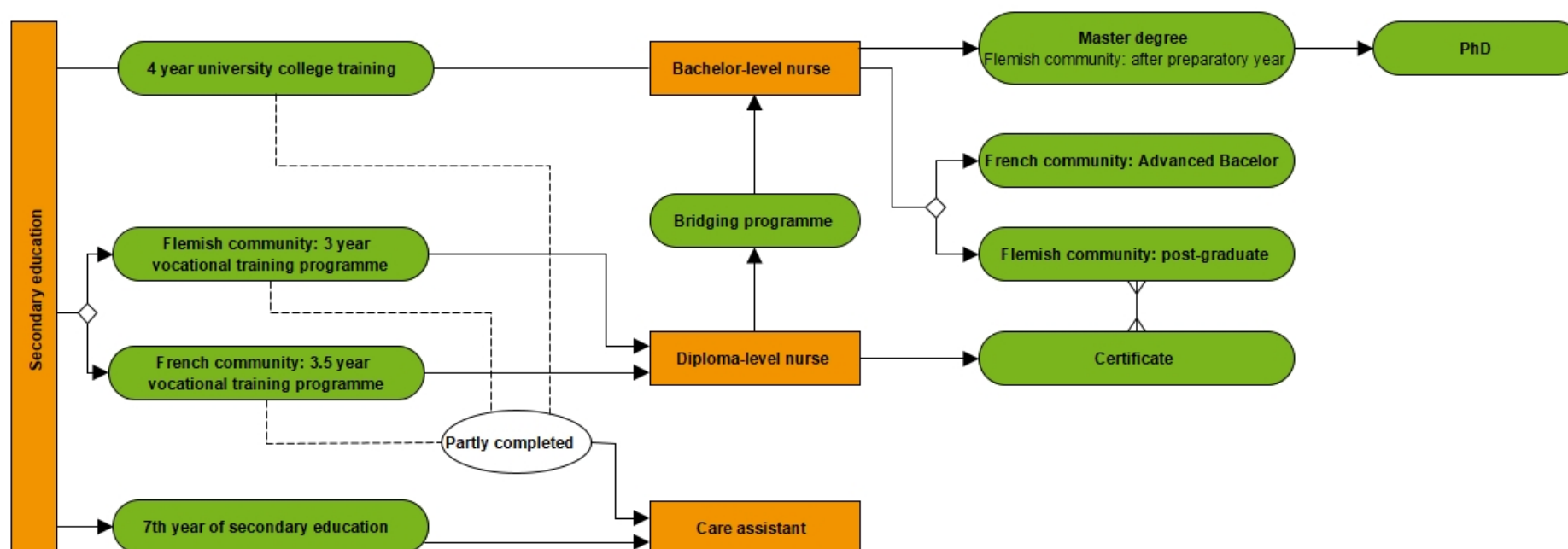
2.4 Regulation of nursing practice

The law on healthcare professionals regulates the nursing profession

The nursing profession is regulated by the coordinated law (Royal Decree of 10 May 2015)[73] that regulates the healthcare professionals' practice in Belgium (replacing the RD of 10 November 1967, known as RD No 78). Very recently a new law has been approved embedding the 'advanced practice nursing' ('verpleegkundig specialist' or 'infirmier de pratique avancée') roles in the law.[76]

Since 1974 the title 'nurse' is legally protected. The law stipulates the necessary conditions that need to be met to be able to practice nursing. With the publication of two Royal Decrees (27 June and 18 June 2016)[77] the requirements changed from 18 July 2016 onwards to comply with EU regulations (see Box 1). Until 18 July 2016, nursing was limited to holders of a specific diploma or title (e.g. 'diploma of titel gegradueerde verpleger of verpleegster'/ 'diplôme ou titre d'infirmier gradué ou d'infirmière graduée'). Since 18 July 2016, nursing practice is limited to holders of a degree or title of nursing obtained after an education (minimal three years or ECTS equivalent) that entailed at least 4 600 hours of clinical and theoretical education. In addition, at least 1/3 of these hours include theoretical education and at least 1/2 includes clinical training. The 'titles or the degrees' requirement was replaced by a requirement of an educational level that meets certain criteria. A specification of activities that need to be conducted during the education was included in the law, as well as competencies to be obtained at the end of the education. These legal changes (both the 4 600 hours requirements and the requirement to include additional competencies in the curricula) also triggered changes in the nursing education programmes (starting in the academic year 2016-2017, see above) which will have an effect in practice on graduating nurses from 2019 onwards.

License to practice

Nursing can only be practiced when the diplomas are certified by the medical commission authorized for the territory where the nurses practice (Organised by the Federal Public Services (FPS) of Public Health per province). Nurses can certify their diploma in more than one province.

In addition, in the Royal Decree of 27 September 2006[78], the 'professional titles' (e.g. 'verpleegkundige gespecialiseerd in de pediatrie en in de neonatologie'/ 'infirmier spécialisé en pédiatrie et néonatologie'; 'verpleegkundige gespecialiseerd in de geestelijke gezondheidszorg en psychiatrie'/ 'infirmier spécialisé en santé mentale et psychiatrie'); and competencies (e.g. 'verpleegkundige met een bijzondere deskundigheid in de geestelijke gezondheidszorg en psychiatrie'/ 'infirmier ayant une expertise particulière en santé mentale et psychiatrie'; 'verpleegkundige met een bijzondere deskundigheid in de geriatrie'/ 'infirmier ayant une expertise particulière en gériatrie)' that can be obtained by Bachelor- and Diploma-level nurses, respectively are listed. Since the 6th State reform it belongs to the competencies of the federated entities to license these special titles and competencies.

Scope of practice

The Royal Decree that regulates healthcare professions[73] also stipulates (in art. 46) the scope of nursing practice (previously regulated by the RD of 18 June 1990)[79]. A distinction is made between three types of activity:

- Activities regarding the nursing process which nurses can autonomously practice (previously called A-activities). This concerns observation of patients; identifying nursing diagnoses; contributing to the medical diagnosis and treatment of the physician; informing and advising patients, etc.

- Technical nursing activities with a distinction between activities with (previously called B2-activities) or without (previously called B1-activities) the necessity of a medical prescription. These nursing activities can be related to the diagnosis of the physician, the treatment prescribed by the physician or activities in the context of preventive medicine. Examples of activities are:

  o B1: aspiration of airways; cardiopulmonary resuscitation (CPR) without invasive means; insertion of IV catheter and IV perfusion with isotonic fluids; manual extraction of faecaloma; enteral fluid and food administration; measuring vital parameters; etc.

- o B2: use and monitoring of a thorax drain; CPR with invasive means; enema; parenteral nutrition; venepuncture; etc.

- Activities delegated by a physician (previously called C-activities). This concerns activities such as the preparation and administration of chemotherapy; debridement of pressure ulcers; changing external trachea cannula; blood sampling via arterial puncture; etc.

There is a legal obligation to report all activities in the patient record.

Nurses holding a license in intensive and emergency care are allowed to perform additional activities such as CPR with invasive means without prescription (B1) and intraosseous catheterization (C).[74, 80]

A specific and disappearing category of professionals, the 'nursing assistants' ('ziekenhuisassistenten'/' assistants en soins hospitaliers') is allowed to perform B1- and B2-activities. They can also perform C-activities when they are allowed so via the so-called art.54bis (Ministerial Letter of 19 May 1995).

It is important to note that the scope of practice will be regulated by a new law (Royal Decree of 22 April 2019) from July 2021 onwards.[81] This new law focuses less on 'individual acts and activities'. Instead, care providers need to hold a portfolio in which it is documented for which care they are competent. There will also be a central registry (accessible for patient and caregivers) in which it is registered who delivers what type of care. The law also foresees some criteria to ensure that an adequate patient record is kept and specifies some prerequisites to perform activities at risk (anaesthetics procedures).[81]

2.5 Care assistants

Care assistants support nurses with patient care, health promotion and logistic activities. They are employed in hospitals, nursing homes and home care. There are various possibilities to become a care assistant. Care assistants can obtain a certificate at secondary school (technical or professional) obtained after an additional year ('7th year') in a direction 'care for persons' (e.g. care for the older persons). It is also possible that the authorities approve previously acquired competencies, for example students

who completed a first year of Bachelor in Nursing in combination with theoretical and clinical training in 'care for the older persons' (can be part of nursing education) and at least 150 hours of bedside training including care for the elderly (can be part of nursing education) can be licensed as care assistants (see Royal Decree of 6 June 2018[82]).

Care assistants have to register their certificate with the concerned federated entities (Royal Decree of 12 January 2006[83]). The FPS Public Health organises their 'license to practice'.

- The scope of practice of care assistants is limited via the Royal Decree of 12 January 2006.[83] Nurses can delegate the following activities (under their supervision) to care assistants:

  - o Observe and identify changes regarding physical, psychological and social aspects within the context of 'Activities of Daily Living (ADL)';

  - o Inform and advise the patient and his family according to the care plan, regarding the care activities that can be performed by a care assistant;

  - o Assist the patient and his relatives at difficult moments;

  - o Mouth care;

  - o Remove and bring on stockings for prevention and/or treatment of venous conditions (compression therapy with elastic bandages are excluded);

  - o Observe the functioning of the urinary catheter and signal problems;

  - o Hygiene care of a complete stoma (without giving wound care);

  - o Surveillance of oral fluid intake and signal problems;

  - o Support the patients with intake of per os (oral) medication (after the medicine was made ready and personalized for administration by a distribution system, a nurse or a pharmacist);

o Assist with intake of food and fluids (per os) with the exception of enteral tube feeding and in case of swallowing problems;

o Bring the patient in a functional position (with technical aids) and follow-up his position, conform the care plan;

o Hygiene care, conform the care plan;

o Transport (cf. care plan);

o Measures (cf. care plan) to prevent physical injuries, infections, pressure ulcers;

o Measure pulse, temperature and communicate results;

o Assist the patient with a non-sterile sample of body excretions and fluids.

A recent Royal Decree (27 February 2019)[84] expanded the scope of practice on the condition that 'care assistants' comply with the educational requirements:

• care assistants with a certification from September 2019 onwards: a programme that includes 150 hours of education dedicated to perform the additional nursing activities of which maximum 50% clinical training;

• care assistants with a certificate before September 2019 can perform the newly delegated activities if they follow an additional education of 150 hours dedicated to perform these activities of which maximum 50% clinical training.[84]

The additional activities include:

• Measure parameters regarding several biological/functional domains: including glucose via capillar blood sampling; the care assistant is required to communicate the results accurately and timely to the nurse;

• Administration of medication (excluding sedative drugs) which are prepared by a nurse or pharmacist via oral, rectal, eye (drops), nose (drops), percutaneous, subcutaneous (only fractionated heparin);

• Feeding and fluid administration per os;

• Manual removal of faecaloma;

• Remove and bring on stockings for prevention and/or treatment of venous conditions.[84]

2.6 Facts and figures on the Belgian nursing workforce

2.6.1 Nurse density in Belgium is higher than EU-average

In 2016 there were 202 402 nurses licensed to practice in Belgium. This includes all nurses who have obtained a licensed qualification in nursing. Of these nurses 143 470 are active (55% bachelor level; 35% diploma level; 3% nursing assistants[e]; 7% with a foreign degree) on the Belgian labour market (all possible sectors) and 124 196 nurses ('practising nurses') are working in the healthcare sector[f].[85]

In the most recent 'Health at a Glance' publication, 11 nurses per 1 000 inhabitants are reported which is higher than the OECD-36 average of 8.8. Belgium is ranked 11th (5th place of EU-28 countries).[86]

---

e   Old category of nurses that was stopped in 1996.

f   This includes hospitals, nursing homes, home nursing, etc. It should be noted that (while not indicated in the OECD-reports) this includes not only nurses involved in bedside care but also managers, nurses in administrative roles, etc.

2.6.2 Most nurses work in hospitals – the working percentage is lower than in other countries

Like in most EU countries, the majority of nurses in Belgium (around 75 000 nurses) work in hospitals. Relative to the overall size of the population, the number of nurses working in hospitals, when measured both in absolute numbers and full-time equivalents, has increased over the past decade in Belgium like in many countries.[87] Yet, while in many countries the ratio of full-time equivalent nurses to the absolute number remained stable around

0.80 to 0.95, this ratio is much lower in Belgium and Germany (0.70 to 0.75).[87] This indicates that nurses in Belgium and Germany generally work fewer hours than in the other countries. This finding is not in line with the average working percentage (85%) reported for practising nurses working in the healthcare sector.[88] Therefore, we calculated the working time for bedside nurses (based on EMPLOPER – MZG/RHM). In 2016, the head count and FTE of nurses in hospitals involved in direct patient care was used to calculate the average working time. This varied from 77% on paediatric wards to 83% on intensive care wards.

Figure 3 – Nurses working in hospitals, head count versus full-time equivalent, 2006 and 2016 (or nearest year)
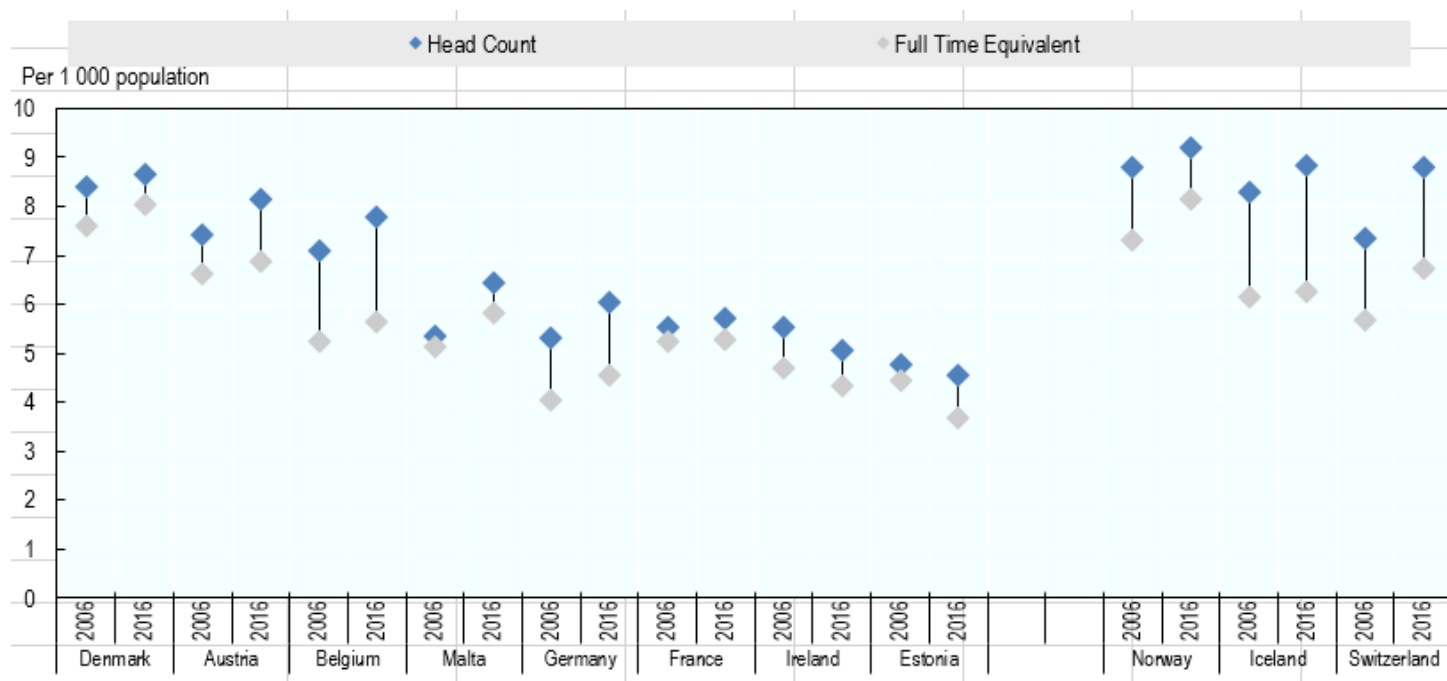
Source: OECD, Health at a glance 2018[87]

2.6.3   Other macro-level indicators on the nursing workforce

In this paragraph we briefly describe some macro-level data about the nursing workforce.

Age structure

About one third of Belgian nurses is aged 50 years or above (33.4%). 15% of Belgian (professionally active) nurses was aged between 50 and 55 years in 2016. There are regional differences with the largest share of 50+ nurses in Brussels (35.2%) followed by Flanders (34.1%) and Wallonia (31.3%).[88] The age structure of the nursing workforce is also depicted in Figure 4.

Figure 4 – Number and percentage of professionally active nurses per age group and region of activity (2016)
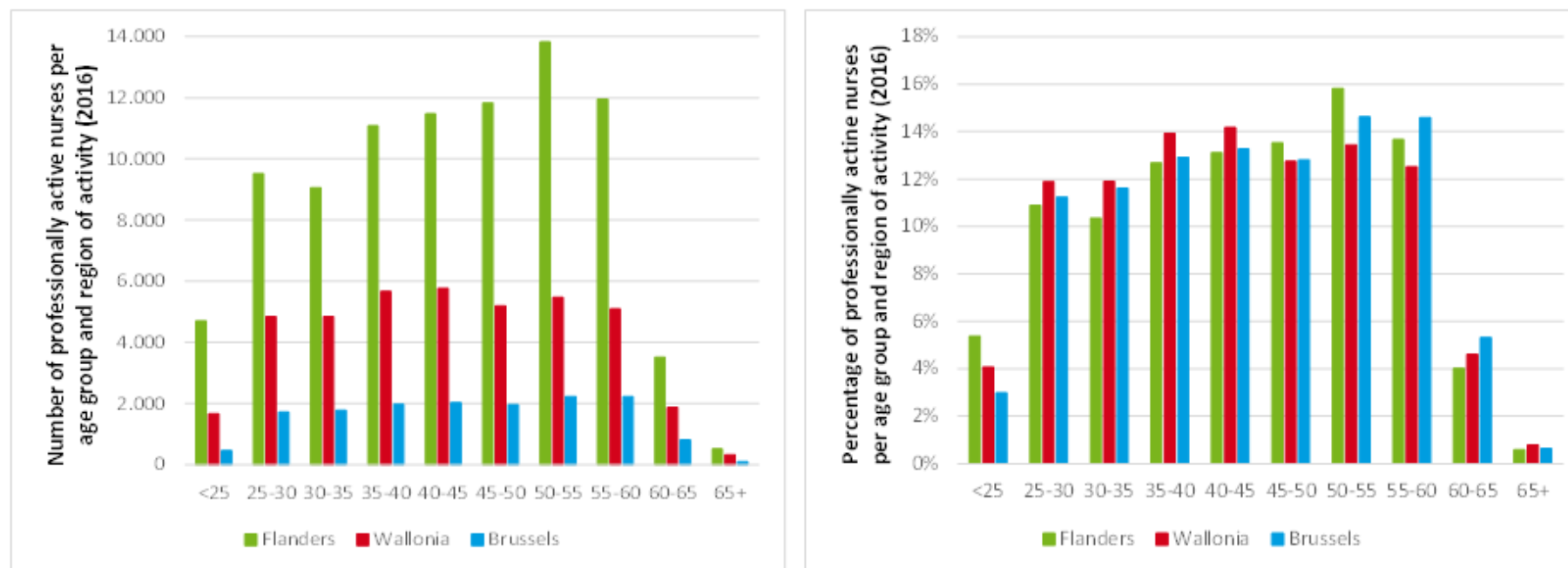
Source: PlanCAD Nurses 2019[85]; KCE calculation report 313[88]

Foreign-trained nurses

The share of foreign-trained nurses (based on licensed to practice) increased drastically from 0.5% in 2000 to 3.5% (n=7 248) in 2017. Of these foreign-trained nurses 31.4% reside abroad.

Nursing graduates

- The number of new nursing graduates (Bachelor- and Diploma-level nurses that receive a 'certification' [visum] for the first time) increased from 5 130 in 2013 towards 6 357 in 2017. This results in a density of 50 nursing graduates per 100 000 inhabitants which is higher than the EU-13 average of 42/100 000[88] or OECD-average of 46/100 000.[87]

- Of these new graduates 57% graduated from schools in the Flemish community and 43% in the French community. In the Flemish community there are as many (about 1 800) Bachelor- as there are Diploma-level graduates.[88] In the French community the percentage of Diploma-level graduates is much lower (35%).

- The proportion of foreign graduates in the French community is substantial (32% based on nationality and 16% based on place of residence). In the Flemish community this percentage is much lower (<5%).[88]

2.7 Licensing standards: nurse staffing

In this section of the report we describe the licensing standards that are relevant in a 'safe staffing context'. The general hospital licensing standards describe among other things the required staffing of nursing wards.[89] We focus (conform the scope of the current report) on staffing standards that concern general nurse staffing levels on acute hospital nursing wards (intensive care, paediatric wards, geriatric care, internal medicine and surgery). Also the staffing standards of chronic care (Sp) hospitalization beds are described. Licensing standards for psychiatric hospitals/nursing wards/care programmes and other specific wards or programmes (e.g. emergency department, etc.) are not discussed. It is worthwhile to note that these licensing standards are quite generic. A variety of nursing ward types are covered by one single type of nursing ward. A nursing ward 'D' for example can refer to a general mixed internal medicine nursing ward, a general oncology ward, a specialized nursing ward in haematology, etc.

In addition to these legal 'licensing standards' hospitals also apply for certification of generic hospital-wide quality accreditation programmes (e.g. NIAZ-Qmentum; Joint Commission International) or nursing ward or care programme specific accreditation programmes (e.g. JACIE for haematology nursing wards – 'Joint Accreditation Committee of the International Society' for Cellular Therapy'[90]). While these accreditation programmes also include standards regarding 'safe staffing' (e.g. 'adequate and appropriate staffing'; 'a method and strategy to ensure that planned and actual staffing are monitored and adjusted where required'; 'adjust staffing based on acuity needs') they do not include patient-to-nurse ratios. Yet, this does not imply that accreditation bodies do not question the Belgian patient-to-nurse ratios. Since in Belgium the number of patients per nurse is, in general, higher compared to most other European countries, accreditation bodies ask hospitals during an accreditation process to illustrate how they guarantee safe patient care with the actual patient-to-nurse ratios.[91] These accreditation programmes are not entirely free of obligations. In Flanders, for instance, it exempts the hospitals that (voluntarily) apply for an accreditation from the obligatory 'system inspection' ('systeemtoezicht').[92] In addition, for some service types (e.g. haematology) it is a prerequisite to be eligible to receive payment from the public authorities to apply for accreditation with such an external body (e.g. JACIE for haematology).[93]

2.7.1 Overall licensing standards

2.7.1.1 General licensing standards

The Royal Decree of 23 October 1964[89] requires the following **general licensing standards** for nurse staffing in the nursing ward:

- One nursing ward manager for each nursing ward: the nursing ward manager holds a bachelor degree in nursing or midwifery and received a certificate in nursing management, or a supplementary education at university level concerning nursing management, or a master of science in nursing and midwifery, a master of science in healthcare

management, or a master of science in health education and health promotion.

- All days of the year, in order to assure continuity and quality of care, and supplementary to the nursing ward manager, the nursing ward should have, at all times, one nurse staffed (diploma or bachelor in nursing and midwifery) per 30 patients.

- The proportion of full- and part-time nurses is established as such that continuity and quality of care is ensured.

- The nursing care is organised as such that at any given moment in time it is possible to identify which nurse is responsible for the care of a particular patient.

2.7.1.2   *Licensing standards for 'floating pools'*

Each hospital has a 'floating pool' ('mobiele equipe'/'équipe mobile'), not related to the architectural, structural or functional unit. A floating pool consists of at least 70% nurses. The recruitment of the staff for this pool is additional to the existing licensing standards and financial standards. Staff financed by the public authorities for other reasons cannot be used to staff the floating pools. The Royal Decree states that floating pools cannot be used to fulfil the minimum staffing standards of hospital services, functions, nursing wards, care programmes, medical-technical services, and medical services.[89] Floating pools consist of:

- Since 1 January 1999, for general hospitals: 0.5 FTE for 30 C- (diagnostics & surgery), D- (diagnostics & medical treatment), E- (paediatrics), H-(or CD-) (general hospitalization) and Sp- (specialized rehabilitation) beds.

- Since 1 January 2000: An additional 0.5 FTE is added following the same criteria as in January 1999.

2.7.1.3   *Licensing standards for C & D wards in university hospitals*

The Royal Decree of 15 December 1978[94] states the following licensing standards for C & D wards in university hospitals:

- For each occupied bed, at least 0.6 FTE of the nursing staff and care assistants are needed, of which at least 75% qualified staff (bachelor nurse, diploma nurse, care assistant). The nursing ward manager is included in this number.

Also for other ward types, licensing standards for university hospitals are defined (see RD of 15 December 1978).

2.7.1.4   *Licensing standards for specialized wards or functions*

Several Royal Decrees also state minimum staffing standards for **specific nursing wards or functions** such as:

- Geriatrics: Per 24 beds, the nursing ward holds 14.13 FTE nurses, allied health professionals and/or care assistants. The nursing ward has a nursing ward manager (holding a special professional title in geriatrics). Per 24 licensed beds, the ward has 5 FTE nurses and 4 FTE nurses holding a 'special professional title or competence ('bijzondere beroepstitel of bekwaamheid'/ 'titres et qualifications professionnels particuliers') in geriatrics. In each nursing ward, at least one nurse should be available at all times. Also 1.33 FTE for allied health professionals (occupational therapy, psychology, speech therapy) are included in the licensing standards.[95]

- Intensive care: The nursing ward manager holds a 'special professional title ('bijzondere beroepstitel'/ 'titres professionnel particulier') in intensive and emergency care, or is a bachelor or diploma nurse with at least 5 years proven experience (at the implementation of this Royal Decree) in this function. Experience should be obtained:

  o   in a licensed ward for intensive care, or

  o   in a ward for intensive treatment which corresponds with the description in appendix 3 of the Royal Decree of

28 November 1986 containing the standards to which a service for medical imaging with transversal axial tomography has to comply to be licensed as medical-technical unit, or

o   in an emergency department which corresponds to the description of appendix 1 of the Royal Decree of 28 November 1986.

The function holds an own specific nursing team in which a 24h/7d permanence is assured by at least two nurses per 6 beds (in the 'requirement framework' of the Flemish government it is specified that each intensive care ward should have at least 2 nurses present = basic permanence) of which at least one holds a special professional title in intensive and emergency care, or is a bachelor or diploma nurse with at least 5 years proven experience in one of the units listed in article 17, second paragraph. For every additional 6 beds that are opened, the number of nurses should be adjusted proportionally according to the number of beds. The nursing team should be adjusted based on the intensive care activities.[96] This means that the ratio IC patients / nurses should be 3/1 (mathematically completed i.e. for 7 patients, 2 nurses are sufficient but for 8 patients, 3 nurses are needed, etc.). Supplementary staff can be care assistants, administrative or logistic help. In case the nursing ward manager is effectively (partially) scheduled in direct care, the hours can be calculated in care.[97]

The staffing framework for the intensive care wards should have at least 12 FTE nurses per full disk of 6 licensed intensive care beds, of which at least 6 FTE hold a special professional title of nurse specialised in intensive care and emergency care, unless the nurse can proof that (s)he on 29 July 1998, had at least 5 years proven experience in one of the units listed in article 17, second paragraph of the Royal Decree of 27 April 1998. This fixed/own team can be complemented with staff out of the floating pools, temporary work force, etc. For every additional 6 beds the FTE nurses should be adjusted in proportion to the number of beds.[97]

- Sp (psychogeriatric): The nursing ward manager preferably holds a special professional title 'specialized nurse in geriatrics' or 'in mental health and psychiatrics'. For 30 occupied beds, the ward should staff

minimum 8 nurses (preferably holding a special professional title or a special professional competence in geriatrics or mental health and psychiatry) and 6 care assistants.[89]

- Sp (palliative): Including the nursing ward manager, the ward needs to staff 1.5 FTE nurses per licensed bed, assisted by sufficient care assistants. The nursing team consists of at least 2/3 bachelor nurses. Minimum 66% of the bachelor nurses is holding a special professional competence in palliative care.[89]

- Sp (cardiopulmonary): Per nursing ward, and especially per 30 beds with an occupation rate of 80%, the nursing ward has a nursing ward manager (with a specialty in the management of patients with cardiopulmonary disorders). On top of the nursing ward manager, per 30 beds with an occupation rate of 80%, the ward is staffed with 8 FTE nurses of which minimum 5 bachelor nurses, and 7 FTE care assistants.[89]

- Sp (neurology): Per 30 beds with an occupation rate of 80%, the nursing ward has a nursing ward manager (with a specialty in the management of patients with neurologic disorders) and 8 FTE nurses of which minimum 5 bachelor nurses, and 6 FTE care assistants.[89]

- Sp (locomotor): Per 30 beds with an occupation rate of 80%, the nursing ward has a nursing ward manager (with a specialty in the management of patients with locomotor disorders) and 8 FTE nurses of which minimum 5 bachelor nurses, and 6 FTE care assistants.[89]

- Sp (chronic): Per 30 beds with an occupation rate of 80%, the nursing ward has a nursing ward manager (with a specialty in the management of patients with chronic disorders) and 8 FTE nurses of which minimum 5 bachelor nurses, and 7 FTE care assistants.[89]

2.7.1.5   Licensing standards for care programmes

The specific care programmes for which different minimum staffing standards are imposed:

- Geriatrics: The care programme consists of a pluridisciplinary geriatric team including at least 2 nurses holding a 'special professional title or competence' in geriatrics, including the responsible nurse for the care programme as described in article 8 of the RD.[95]

- Cardiac pathology: There are sufficient professional nurses 24/7 of which the number and qualification can be adjusted to the nature and volume of the patient problems. There are 3 nurses with a special professional competence or experience in cardiac surgery in the operating theatre.[98]

- Oncology: The nursing care of patients with oncologic conditions should be coordinated by nurses experienced and competent in the integral care of such patients and in palliative care. The administration of chemotherapy occurs under supervision of nurses licensed or in training for a special professional competence in oncology or nurses who have at least 5 years of experience in caring for patients with oncologic conditions. The administration of therapies with open radioactive sources should be performed by experienced nurses, under the supervision of a medical specialist. They are also responsible for removing the radioactive waste products.[99]

- Breast cancer: The nursing care for patients with breast cancer should be coordinated by a nurse who holds either a special professional title in oncology or has at least 5 years of professional experience in caring for these patients. It concerns one FTE nurse affiliated with the coordinating breast clinic, who can show that (s)he participated in training activities in the field of breast cancer. The coordinating breast clinic affiliates 2 FTE nurses. The nurse has the task to guide the patients and to verify if the care plan is followed by the breast clinic, to coordinate the care plan, and to verify it the patients received sufficient information about the different aspects of care provided by the breast clinic. In the satellite breast clinic, 0.5 FTE nurse of the breast clinic is staffed.[100]

- Paediatrics: The Royal Decree of 2 April 2014 was cancelled by the Council of State (judgment of 8 December 2016).

- Paediatric haemato-oncology: The specialized care programme for paediatric oncology contains at least 22 FTE nurses (at least 50% are bachelor nurses with a special professional title in paediatrics and neonatology or oncology) who are adjusted by qualification and the need for care. The administration of chemotherapy only occurs under the supervision of bachelor nurses with a special professional title in oncology. The nursing staff is educated in the evaluation and treatment of pain in children. The coordination of the specialized care programme is done by 1 FTE bachelor in nursing and has a special professional title in paediatrics and neonatology, with an experience of at least 5 years in paediatric haemato-oncology. At least one multidisciplinary consult is organised in which one bachelor in nursing with a special professional title in paediatrics and neonatology is involved. The specialized care programme includes a ward for stem cell transplantation, which is staffed with 4 FTE nurses, and is adjusted based on the activity level of the ward for stem cell transplantation. The satellite care programme for paediatric haemato-oncology contains the same quotas as the ones that apply for the specialized care programme for paediatric haemato-oncology except for the fact that there are at least 10 FTE nurses.[101]

- Stroke: A ward is permanently staffed with 1 FTE bachelor nurse with acquired and maintained competence and at least 5 years of experience in neurovascular care. For (the first of) each 6 supplementary patients, 1 FTE nurse (with the same competences as described earlier) is staffed. The specialized care programme on 'acute stroke care with invasive procedures' has sufficient nurses who have acquired and maintained competence and have at least 3 years of experience in angiography.[102]

2.8　Attraction and retention

2.8.1　Chronological overview of attraction and retention measures in Belgium

In order to attract nurses and care assistants and retain them in the profession, several waves of action often followed by policy measures can be observed over the last 20 years. A chronological (non-exhaustive) representation is given in Figure 5.

Figure 5 – Chronological overview of attraction and retention measures
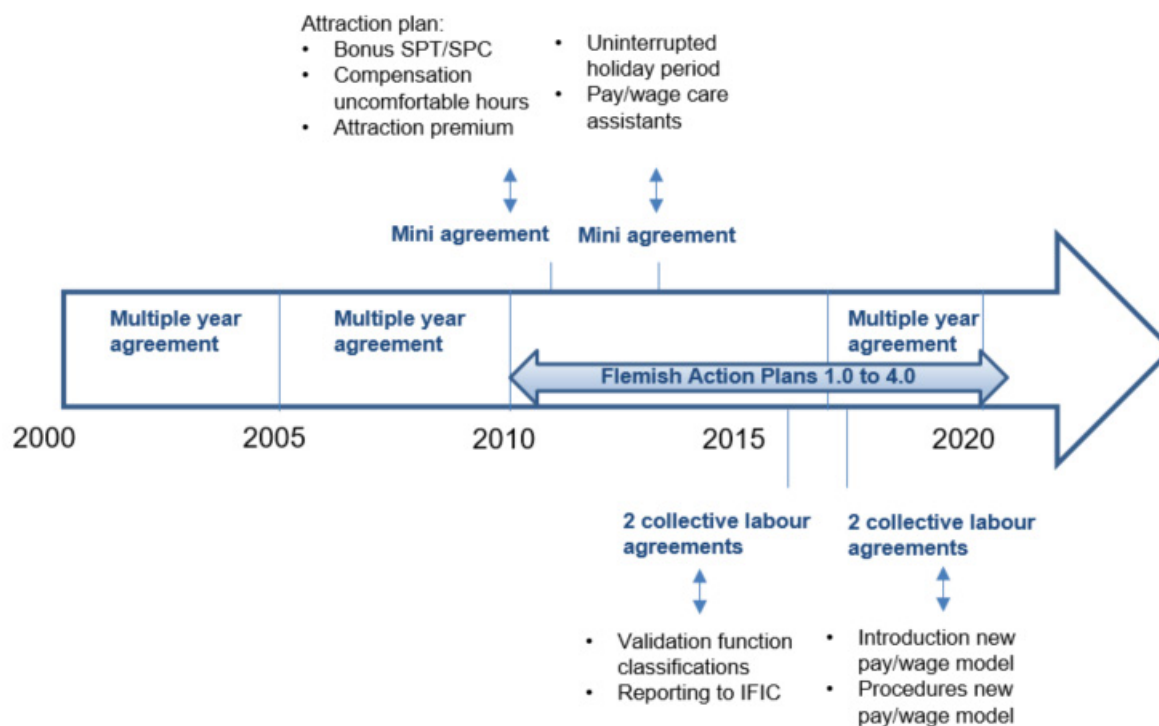
Multiple-year agreements (enhancing attraction and retention) between the labour unions and the government for the federal health services were concluded for the years 2000-2005 (e.g. project 600 (1 March 2000), acquisition of the relevant years worked by new employers (27 October 2003), etc. and 2005-2010.[103]

The global financial crisis in 2008, followed by the Belgian political crisis in 2010 and the European debt crisis in 2012, hindered the labour unions and government to agree on a new multiple-year plan. Therefore it lasted until 9 October 2017 before a new multiple-year agreement for 2017-2020[103, 104] was adopted. However, as specified in the Royal Decree of 28 December 2011 (mini agreement), an attraction plan for nurses was introduced in 2010 which, among others, contained (i) annual bonuses for special professional titles and special professional competences, (ii) the integration of a compensation for 'uncomfortable' working hours (evening hours), and (iii) an attraction premium.[105]

A mini agreement was also made in 2013 which, among others, included (i) a guaranteed uninterrupted holiday period and (ii) a harmonized pay/wage scheme for care assistants (because of the crisis, there was no budget for all care professionals).[106]

On 28 September 2016, the social partners of the 'joint committee 330' (see for the institutions concerned Box 2) signed two collective labour agreements: one on the validation of the function classification (federal and federated sectors) and one on reporting to the non-profit Institute for Function Classification (IF-IC, 'Het Instituut voor Functieclassificatie'/ 'L'Institut de Classification de Fonctions') (federal sectors).[107, 108] These measures will gradually change the function classifications for all people working in the health sector (thus also technicians, managers, etc.). In the first phase, these function classifications will imply solely the institutions of the federal private health sector (Box 2). Thereafter, it is planned to implement the same model for the federated sectors (in Flanders through the VIA 4 agreement for 5 different Joint Committees) and public sectors.

On 11 December 2017, two new collective labour agreements were signed by the Joint Committee 330 concerning the new sectoral function classifications for the private federal institutions specifically. With these, they agreed on the procedures and the introduction of the new pay/wage scheme

for the private federal health services.[109, 110] The implementation includes (a partial introduction) of a new pay/wage scheme from May 2018 onwards, and the partial abolishment of previous measures.

Besides these measures for federal health services, the Flemish government has made since 2010 multiple-year action plans to enhance the attraction of healthcare professionals through campaigns and other policy measures.[111] Recently, a concept note of the 4th action plan has been drawn.[112] In Wallonia, we are not aware of such specific action plans.

Box 2 – Federal institutions under the Joint Committee 330.01

Collective labour agreements of the Joint Committee 330.01 imply all workers in the following healthcare institutions or services:

- institutions who are subjected to the law on hospitals (general, university, private and psychiatric hospitals);
- home nursing;
- community health centres;
- federal rehabilitation centres;
- forensic psychiatric centres;
- services for Blood of the Belgian Red Cross;
- psychiatric care institutions*;
- categorical hospitals*;
- elderly care*;
- autonomous rehabilitation centres*;
- initiatives for sheltered living*.

*With the 6th State reform of 1 July 2014, these services are federated (under the jurisdiction of a region). At the moment of writing this report, the IF-IC function codes do not imply these services.

Source: IFIC vzw[113]

The above stated actions towards attraction and retention will be briefly discussed in section 2.8.2.

2.8.2 Short description of the several attraction and retention measures

Nurses have many additional advantages, of which the majority are part of the work regulations for all employees of the public and private sectors: leave for familial reasons, transport compensation (e.g. bike commuting allowance, public transport allowance), thematic leave (e.g. parental leave, palliative leave, etc.), end-year premium, holiday premium, etc. The requirements of all these measures can differ by sector, company, etc. Therefore, they are not discussed in detail.

Through the years, several instances in Belgium, such as the Planning Committee Medical Supply, gave their advice to strengthen the supply of nurses (e.g. with attraction plans, focussing activity grade, retention measures, etc.).[114] We focus in this section on the developed and implemented attraction and retention measures for nurses only, policy advices as such are not discussed.

2.8.2.1 Several multiple-year agreements and collective labour agreements between 2000 and 2020

During the last two decades, three multiple-year agreements (2000-2005, 2005-2010, and 2017-2020) and several collective labour agreements were enrolled for the federal health services. These agreements include some measures regarding the attraction and especially retention of nurses. We will briefly discuss the most important measures here.

Project 600: A nursing training project to attract nurses

This project for the public sector is organised by the 'Fonds Sociale Maribel' / 'Fonds Maribel social' of the Federal Public Service Employment, Labour and Social Dialogue by the National Social Security Office (Box 3). It was endorsed by the multiple-year agreement of 1 March 2000, with references in the collective labour agreements of 13 May 2013 and 12 March 2018.[115, 116] The project offers employees of the federal health sectors the possibility to enrol in a Bachelor or HBO-5 education in nursing. In meantime, the

participants maintain their full salary and social advantages (they do not receive compensation for irregular ('onregelmatige prestaties'/ 'les prestations irrégulière') and uncomfortable hours ('ongemakkelijke prestaties'/ 'les prestations inconfortables'), except for the period July, August and September in which the participants have to work). Each year a decision is taken about the extension of project 600 as well as on the number of participants that can enter the programme (who have to fulfil the admission requirements). In 2016, a second similar project was added targeting care assistants.[115]

Implementation of end-of-career measures

The duration of a career of the nursing and care assistant staff in the health sector is (sometimes) very short. To increase the retention of the caregivers, the government integrated through the Royal Decree of 15 September 2006 end-of-career measures.[117] These measures allow two options: (i) working time reduction with salary retention, starting from a certain age category, in order to facilitate work, or (ii) working time retention, starting from a certain age category, but with a supplementary bonus in order to make work retention more attractive.

There are three age categories linked to working time reduction or a bonus (calculations made on 1 FTE):

- From 45y on: 96h working time reduction annually (or 2h weekly) or a bonus of 5.26% of the salary;

- From 50y on: 192h working time reduction annually (or 4h weekly) or a bonus of 10.52% of the salary;

- From 55y on: 288h working time reduction annually (or 6h weekly) or a bonus of 15.78% of the salary.

Box 3 – 'Social Maribel'

The purpose of the 'Social Maribel' ('Sociale Maribel'/ 'Maribel Sociale') is to endorse the employment in (especially) the non-profit sector through the creation of extra jobs. Employers receive a compensation for the wages/cost of new jobs. This specific trust is funded by the National Social Security Office.[118]

Second pillar of the pension: free supplementary pension

In Belgium, every employee builds up the rights for a pension during his/her career. This is the legal pension and is called the first pillar of the pension model. However, companies or self-employed staff can decide to save for an additional pension scheme. The amount saved is given at once at the end of the career. This is the 2nd pillar of the pension model. Since 2010 (in the light of the multiple-year agreement 2005-2010), hospitals started to provide a limited 2nd pillar pension compensation to the nurse employees which was varying between € 7 and € 11.25 per trimester between 2010 and 2018. With the multiple-year agreement of 2017-2020, the budget for supplementary pension has been tripled towards 0.60% of the gross payroll of the sector.[103]

General base for scheduled working time

The working time as a nurse (or care assistant) is in general 38 hours per week for one FTE. For nurses in general hospitals, a 24h staff is needed. The length of a shift can vary, with a minimum of 3h. On average 38h should be performed per week on a time period of 13 weeks (trimester), of which maximum 11h per day may be worked, but it cannot exceed 50h per week (unless the 38h average is reached in a period of 4 weeks), following the EU's Working Time Directive (2003/88/EC). Per trimester, the over-time hours are limited to 143h. In case this is exceeded, compensation rest should be given immediately. Every hour that exceeds 143h should be financially compensated at 150%.

Compensation for 'irregular' working hours

'Irregular' working hours ('onregelmatige prestaties'/ 'les prestations irrégulière') were and are still subject to compensation, next to the 'uncomfortable' working hours ('ongemakkelijke prestaties'/ 'les prestations inconfortables') mentioned below. The percentages that are mentioned here, are minimal percentages. Thus the hospital can decide to increase the compensation. For example, hospitals can decide to pay a 100% premium (instead of the minimum 56% supplement) for work on Sundays.[119] In Table 3 an overview is given of the minimum supplement for irregular hours and uncomfortable hours (between 7 p.m. and 8 p.m.). They are here mentioned together since they were now integrated in the IF-IC model as 'irregular' working hours. Under certain circumstances, supplements (minimum 50% of the salary (or 100% for extra hours on Sundays and bank holidays)) are received in case of overtime. Moreover, in case the service is interrupted (during at least 4h), a supplement of 50% for the hours worked before and after the interruption is given.

Table 3 – Overview of the supplements for irregular and uncomfortable working hours

	Day 6 a.m. – 7 p.m.	Evening 7 p.m. – 8 p.m.	Night 8 p.m. – 6 a.m.*
Monday-Friday	No supplement	20%	35%
Saturday	26%	26%	35%
Sunday	56%	56%	56%
Bank holiday	56%	56%	56%
Interrupted shift	50%	50%	50%

In case the shift starts before 8 p.m. and crosses midnight, the supplement is given also for the hours before 8 p.m.

Multiple-year agreement 2017-2020: obtaining a modern career policy for nurses by the implementation of a new payment model and function classification

A task force was endorsed by the multiple-year agreement 2017-2020 to develop a modern career policy for the employees. Several (minor) measures were taken such as:

- In case there is place for a new FTE, the job should be offered first to employees working part-time or with a fixed term contract.[103]

- A more flexible rest period between shifts: The rest period between two shifts is decreased from 11 hours to 9 hours making it possible that the employee (if he/she agrees) works consequently a late shift and a morning shift. Also more flexibility in making the time schedule and the right to receive payment for overtime is induced.[103]

- Strengthening of the floating pools: The resources of the Social Maribel (Task Shift) are used to enforce the floating pool with more than 400 FTEs.[103]

However, the multiple-year agreement of 2017-2020 is especially focussing on the implementation of the IF-IC payment model and function classifications.

The federal classification of functions was constructed in the '80s of the previous century, contained around 50 function classifications and was outdated. The social partners in the 'joint committee 330' signed two collective labour agreements on 28 September 2016, one about the validation of the function classification (for all (federal and federated) sectors of the joint committee 330) and a second on reporting to the IFIC.[107, 108] This non-profit organisation is managed by the social partners. Since 2018, IF-IC is the name of the new function classifications and salary scales.

The social agreement with the federal health services on 25 October 2017 foresees (i) the progressive entry of new sectoral job classifications of IFIC, and (ii) a new wage model for the federal care institutions.[104] The two additional collective labour agreements signed on 11 December 2017 by the social members of the 'joint committee 330' contain all necessary measures to phase in the implementation of the new sectoral function classification

from 1 May 2018 onwards and on the stepwise integration of a new payment model for the federal health services.[103, 109, 110]

The goal of the IF-IC was to pay the employees of the private federal health services, not based on their degree / education, but on their function. For that, different IF-IC codes were given to the 'referentiebarema'/ 'barème de référence', i.e. reference scales (old model) and linked to a 'doelbarema'/ 'barèmes cibles' i.e. pay rate (expressed in monthly salary).[109] The pay rate is affected by yearly increases based on 'total years of relevant employment'. An example of the employment description with accompanying rank is given in Table 4.

For the IF-IC 14(B) code however, a differential reference pay scheme is given based on their degree: IF-IC 14 for nurses and educators who have a bachelor degree or higher, and IF-IC 14B for nurses and educators who have a lower level of education (e.g. diploma level). Nevertheless, it is possible that lower educated nurses receive a higher IFIC-code (and higher salary) compared to bachelor nurses. For example if the diploma nurse is working at the intensive care ward (s)he will have (according to the IF-IC scheme) a higher salary compared to a bachelor nurse working at geriatrics. This could create the incentive to attract more nurses (e.g. higher salary on intensive care makes this an attractive area to work in) to specific areas and less to other areas (e.g. geriatric care is less competitive because of a lower salary). It should be evaluated if these incentives match the needs. It is clear that the increase in salary is not linearly incremental and is depending on the assigned function. Employees working in the healthcare sector at the time of implementation (1 May 2018), were given the choice to adopt the new IF-IC model, while new employees are obliged to immediately adopt the new functions (as the IF-IC is phased in, phase I is counted for 18.25%). In each phase of implementation the employee can choose to adopt the model or not. Employees who already received a compensation for their special professional title or competence, could not adopt the IF-IC model yet (phase I) and still receive their bonus. However, in the new IF-IC model, the bonuses for special professional titles and/or special professional competences are not yet incorporated and it is not yet clear if these will be compensated in another way.

Table 4 – IF-IC description with accompanying rank and code

Rank	Description	IFIC Code
Nursing manager (management)	Coordination and guidance of nursing ward managers and organising care to patients to optimize the quality in the different wards	19
Nursing ward manager (coordinator)	To assure the functioning of a large nursing ward, divided in several entities, to optimize the quality of care	18
Nursing ward manager (hospital)	To assure the functioning of the ward to optimize the quality of care	17
Reference nurse **Coordinator care policy** **Nursing ward manager (hospital – small unit)** **Assisting nursing ward manager (hospital)**	Support to different wards; to assure the functioning of the ward to optimize the quality of care; support to nursing ward manager (hospital)	16
Nurse – first responsible **Reference nurse within a ward** **Study nurse** **Emergency nurse** **Intensive care nurse** **Operating theatre nurse** **Nurse intensive neonatal care** **Midwife** **Transplant coordinator**	Temporary replacement of the nursing ward manager; nurses with certain specialisations or responsibilities	15
Guidance nursing (re)inflow and practice students **Responsible internal patient transport** **Nurse (hospital)** **Nurse educator diabetology** **Midwife postpartum** **Nurse consultation** **Nurse applying casks** **Nurse oncology** **Nurse oncology day hospital** **Nurse haemodialysis** **Nurse palliative care** **Nurse paediatrics** **Nurse geriatrics**	General nurse, or nurses with specific specialisations or responsibilities	14 or 14B

Care assistant (hospital)	11
Logistic collaborator (ward) **Collaborator patient transport**	8

2.8.2.2 Mini agreement 2010: a federal plan to attract nurses

Via the Royal Decree of 28 December 2011,[105] a set of measures to attract nurses towards the nursing profession was turned into legislation. This includes the possibility for nurses who obtained a 'special professional title' and/or a 'special professional competence', to receive an annual bonus. Moreover, also a compensation for 'uncomfortable work', as well as an 'attraction premium' were part of the policy measures.

Annual bonuses for special professional titles and special professional competences

Since 2010, a yearly supplementary bonus of € 3 341.50 submitted to indexation (amount last index on 1 September 2018: €3 838.33), can be allocated to nurses holding a special professional title. These six 'special professional titles' including their needed qualifications are listed in the RD of 27 September 2006:[78] (i) mental healthcare and psychiatry, (ii) geriatrics, (iii) intensive and emergency care, (iv) oncology, (v) paediatrics and neonatology, and (vi) peri-operative care. In the same Royal Decree, four 'special professional competences' (annual bonus is € 1 113.80, submitted to indexation (amount last index on 1 September 2018: € 1 279.40)[105]) including their needed qualifications were also listed: (i) mental healthcare and psychiatry, (ii) geriatrics, (iii) diabetology, and (iv) palliative care.[78] In the IFIC-model, these bonuses are integrated and are not payed separately anymore.

Compensation for 'uncomfortable work'

A compensation for 'uncomfortable work' (other than 'irregular work'), in order to appreciate the uncomfortable work at evenings, is integrated: a supplement of 20% is provided for evening work between 7 and 8 p.m. In the IFIC-model, this uncomfortable work was integrated in the irregular working hours (as mentioned above).

Attraction premium

The premium is paid once a year. An example of the calculation is given in Box 4. However, in the Royal Decree of 30 July 2018[120] it was decided that nurses who were licensed for a special professional title or competence, will not receive this attraction premium anymore, as the new IF-IC function descriptions and wages should integrate this premium.

Box 4 – Example of attraction premium

2016: Fixed indexed part = € 636.46 + variable indexed part = 0.53% of gross annual salary

2017: Fixed indexed part = amount in 2016 * (index October 2017 / index October 2016) + variable indexed part = 0.53% of gross annual salary

2.8.2.3 Mini agreement 2013: federal measures, indications of the future harmonization of the function classifications for healthcare professionals

By means of the RD of 11 December 2013,[106] a set of measures to attract nurses towards the nursing profession was turned into legislation.

The guaranteed interrupted holiday period

During the period from May until October, a nurse has the guarantee of three free weekends when taking two weeks of holidays.

Harmonization of the function and salaries for care assistants

This regulation was part of the mini agreement, but was confirmed on 7 November 2013 in the collective labour agreement which states that care assistants receive scale 1.35 in federal non-profit sectors.

2.8.2.4 A call for action in Flanders: creating action plans to enhance attraction towards the care sector since 2010

Action plan 1.0 and 2.0: goals, actions, and results

Within Flanders' Care (a platform created by the Flemish government to endorse innovation and entrepreneurship in healthcare) is one of the main goals 'care for talent'. This refers to the commitment of the Flemish government to make a job in healthcare (all healthcare professions) more attractive. The Flemish government assigned a 'care ambassador' and launched on 21 May 2010 its first action plan 'making work of working in the care sector'. The first campaign 'word zorgverlener' (become healthcare professional) was successful and therefore it was extended to all bottleneck professions in healthcare and to invest in more campaigning. The 1st of December 2011, the campaign 'Een zorgjob – ik ga ervoor' (a job in healthcare – I go for it) was launched, with the creation of the website www.ikgaervoor.be, which is up until today active and successful.

By July 2013 the action plan 2.0 was launched building on the actions of the first plan. It actualized some actions and structured some ongoing initiatives. There were three important pillars: increasing the inflow of staff, to embed the staff more efficiently and effectively, and to expand the HR-policy towards recruitment, retention and career planning of the employees. These two action plans contributed to an increase of healthcare professionals between 2010 and 2015 and an increase of 3 264 nurse students (or 24%). Also a decrease in open positions and vacancies for nurses was noted from 1 750 in 2011 to 990 in 2014. This was also seen for qualified care assistants (592 versus 113). Moreover, the requests for an immersion moment for possible new student applicants (to get an awareness about the nursing profession) increased from 13/month in 2012 to 135/month by 2014 (this initiative was positively evaluated through a survey). This was also reflected in a positive evolution of the number of registered care assistants (25%) and nurses (5.7%), a total increase of 51% by 2014 compared to 2010.[111]

Goals and actions of action plan 3.0: aiming for continuity and proceeding the policy direction

Action plan 3.0 (launched in May 2015) continues the policy direction and builds on the changing context and the results of the past plans. The main objective is to have sufficient inflow by 2020 and to create new education and organisation models to meet the need for care. There were four important pillars: (i) increasing or retaining the inflow and quality of staff, (ii) organisation of care and well-being, (iii) employment policy, (iv) professionalizing charts and indicators to collect data on the in- and outflow more effectively.[111]

A concept note was developed for the implementation of action plan 4.0

The concept note for action plan 4.0 contains some basic ideas concerning attraction and retention of care professionals and especially nurses.[112] The basic ideas are:

- Attraction / inflow: Which other groups can we attract and how?

- Retention: How can we keep nurses into the profession? A study (Verso6) points out that the attrition (under 55 years of age) is 8.5%, which is a notable loss of potential manpower. Reasons that are stated are involuntary part-time labour (especially in social profit), working conditions (too high pressure, not workable), and lack of motivation (because they cannot offer the same quality of care anymore).

- A fourth year of nursing education: To comply with the EU regulations, a fourth Bachelor year was introduced (first fourth year students in academic year 2019-2020). In that year, the inflow of nurses to the health sector will decrease.

3 NURSE STAFFING AND INTENTSITY OF NURSING CARE BASED ON THE BELGIAN NURSING MINIMUM DATA SET

3.1 Background

Mandatory registration of nursing data since 1988

A mandatory registration of nursing activities and nursing staff (until 2016) exists since 1988 in Belgium. This resulted in a large amount of data available for exploitation in, amongst others, the domains of the hospital payment system (see Chapter 4) and nurse staffing.

Belgium is one of few countries with such a nationwide uniform registration, called 'Nursing Minimum Data Set' (NMDS).[121] The registration is mandatory for all acute hospitals and is executed during the first 15 days of March, June, September and December. The first version was used for almost 20 years (without noticeable changes). In 2008 a major update took place. The different versions are described as B-NMDS I and B-NMDS II throughout the text. In this chapter, data from 2009[g] onwards (B-NMDS II) are used. Belgium is via this registration, worldwide, in a unique position regarding the availability of data about nurse staffing and nursing activities.

This section describes the database and the main applications in the domain of safe staffing policies. In section 3.4, a detailed data analysis (of the years 2009-2016) is presented. In Chapter 4, the use in the hospital payment system is described.

---

[g]   2008 data were available but as this was the first year of the registration (learning effects) it was decided to discard these data in further analyses.

3.1.1 The Belgian Nursing Minimum Data Set – version I

3.1.1.1 B-NMDS I: 23 nursing activities and data about nursing staff

Sixty days of registration per year: 20 days submitted to the FPS Public Health

The B-NMDS I was registered during 60 days. Yet, a balanced sample of only 20 registration days (5 random days per registration period, of which 1 weekend day per registration period) was submitted to the FPS Public Health. The B-NMDS I registration consisted of nurse-staffing variables and nursing interventions (nursing activities):

- Every 24 hours during the registration period for each nursing ward, staffed nursing hours (direct and indirect hours of staff involved in direct care) were coded. These nursing hours were registered for 5 different staff categories (i.e. nurses with at least a bachelor's degree, nurses trained at the diploma level, care assistants, assistants not involved in direct nursing care, and nursing students).

- The B-NMDS I also registered 23 interventions (e.g. hygiene care, tube feeding, monitoring of vital signs, traumatic wound care, frequency of special mouth care, etc.) with different response categories.

In 2000, common identifiers were included in the B-NMDS I and the Hospital Discharge Data Set (MKG – RCM or 'Minimale Klinische Gegevens'/ 'Résumé Clinique Minimum') which made it possible to link both data sets from 2000 onwards.

Calibration of the nursing activities

The use of patient classifications in nurse staffing decisions requires that the patient classification systems are calibrated. There are two main approaches:

1. Based on a *patient classification system*, patients (patient days[h]) are categorized (e.g. the San Joaquin patient classification system categorizes patients in 4 categories from 'I self-care' to 'IV intensive care'). Each category of patients is calibrated in terms of required nursing time. The total resulting required nursing staff is calculated by multiplying the number of patients in each patient category in a nursing ward with the standard required nursing time for that patient category.

2. The different *nursing activities* performed per patient are registered. Each nursing activity is calibrated (required time to perform the activity) and by summing up all nursing activities (performed per patient, patient day, nursing ward, etc.) the required nursing staff can be estimated. It is assumed that the estimated required time as calculated by a comprehensive summative task, is consistently higher than estimated time for a patient case as a whole. The main reasons are the interactions between nursing interventions and the competence to do multiple tasks simultaneously (e.g. hygienic care, education, and emotional assistance).[121]

Different methods exist to calibrate time estimations. These methods include *direct time measurement* (self-reporting; use of direct observation via continuous observation or multi-moment observation) or *indirect time measurement*. The latter includes a Delphi-approach (e.g. experts rate the required time for a nursing activity or patient category relative to each other), and calibration via other instruments.

---

h   Patient days are used here in the sense of hospitalization days (inpatient days).

The B-NMDS I was calibrated via another measurement tool i.e. the San Joaquin Patient Classification System. By means of non-linear principal component analysis, Sermeus et al. (2008)[7] illustrated that the 23 nursing activities could be aggregated into one measure per inpatient day that describes the 'intensity of nursing care'. The 'intensity-of-nursing-care measure' can be used to calculate the required nursing staff at different aggregation levels (e.g. inpatient day, nursing ward per registration day, nursing ward, groups of nursing wards, hospitals).[7, 121]

Limitation: the B-NMDS measures performed and not required activities

The B-NMDS I (and also B-NMDS II) measures the activities that are actually performed, not the care that is required. As such, it is possible that both *undercare* (e.g. care left undone because a workload that is too high) and *overcare* (e.g. care given which is not required) are present in the data. Therefore it does not allow to evaluate if nurse staffing is adequate (or optimal) given the intensity of nursing care.

3.1.1.2   B-NMDS I and applications within the domain of staffing

Besides its use in the hospital payment system (see Chapter 4), the main application area of the B-NMDS is in de domain of staffing. This section explains the (potential) use of the B-NMDS I to support staffing decisions.

Allocating nursing staff

Allocation of nursing staff is a complex undertaking at different decisional levels. The B-NMDS I can be used in various ways to support this:

- *Budget and planning at the hospital level.* The board of directors of a hospital has to decide each year (mostly twice) upon the budget for nursing staff. This decision is complex and has to take into account several factors (e.g. recruitment, retention, expertise, 24/7 availability).

One of the factors that can be used in this decision-making process is the comparison between the required and actual nursing staff allocated to the different nursing wards. As described above, the B-NMDS I could be used to calculate the required[i] nursing staff per nursing ward. In Figure 6, this is illustrated by an example. For this hospital, the average required nursing staff per nursing ward is depicted, varying from nearly 30 to more than 90 hours per day. This information (together with the available nursing staff) can be used to decide on the number of FTE assigned to these nursing wards.

Figure 6 – Example of a hospital with average required nursing staff per nursing ward
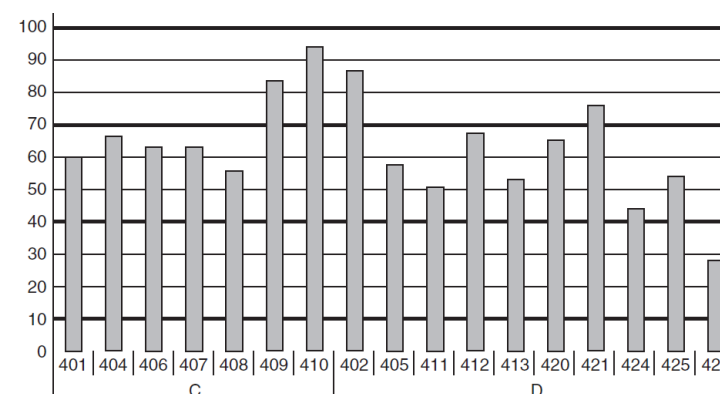
Source: Sermeus (2003)[122]. On the vertical axis the required nursing staff hours are depicted per nursing ward (horizontal axis: each number from 401-428 represents a nursing ward). C: surgical wards; D: internal medicine wards.

- Analysing required nursing staff at the nursing ward level. The B-NMDS I can also be used to analyse patterns in required nursing staff (e.g. seasonal effects, differences between days of the week) to be

---

[i]   Estimate based on allocating 'available staff' to nursing wards based on 'intensity of nursing care' (as calculated based on the B-NMDS I).

used in *operational (mid-term) decisions* (e.g. other number of staff allocated on weekdays and weekend days). In Figure 7 an example is given with the difference on weekdays and weekend days for a particular nursing ward. It is clear that the required nursing staff on weekdays and weekend days differs. As the required nursing staff is higher on weekdays than on weekend days it seems obvious to staff higher on weekdays. A possible approach is to staff below the required nursing staff and work with a pool of nursing staff ('floating pools') for several nursing wards. This pool can be allocated to deal with peaks in the nursing activity on a daily basis.

The use of the B-NMDS I in staffing decisions has been mainly restricted to the level of budgeting and planning by hospital management.[122]

Figure 7 – Differences between weekdays and weekend days in required nursing staff (expressed as hours) for a surgical nursing ward
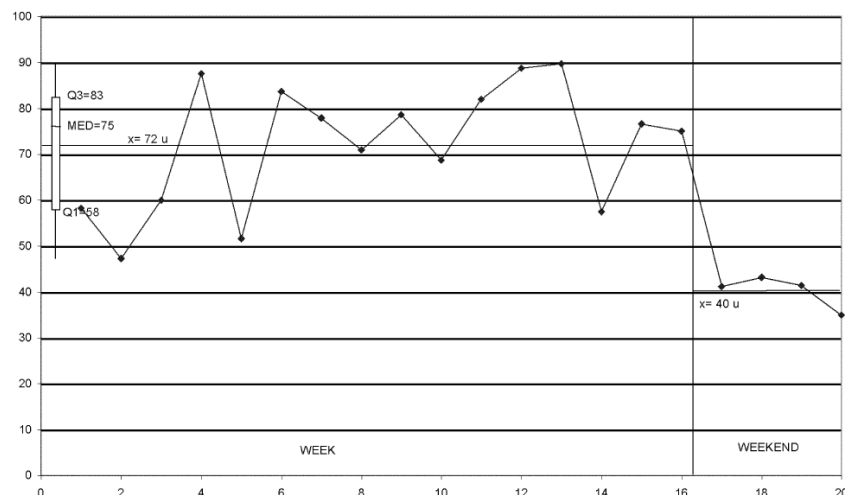
Source: Sermeus (2003)[122]. On the vertical axis the required nursing staff hours (based on B-NMDS I data) are depicted per day for this nursing ward (horizontal axis: days 1-16: weekdays; days 17-20: weekend days).

Nationwide feedback on nurse staffing levels and intensity of nursing care

As all nursing wards from all acute hospitals register both the nursing interventions and staffing data systematically in a standardized way, this information was used to organise a national feedback on nurse staffing levels. Feedback was given on both the 'nursing activities' and the 'staffing levels' separately (as was done by the FPS Public Health.[123, 124] Yet, it is also possible to give feedback on 'nurse staffing levels' that are corrected for differences in intensity of nursing care. A nationwide feedback tool was developed based on the B-NMDS I but was not implemented.[10]

The FPS Public Health also published a report containing data from the first compulsory 10 years of registration (1988-1998). This feedback illustrated a clear trend of increased intensity of nursing care.[125] This report on the evolution of the intensity of nursing care over time was a 'one shot' publication.

Research on staffing and outcomes

The B-NMDS I data was also used in the research domain of nurse staffing and patient outcomes. A study showed that for patients undergoing cardiac surgery, increased nurse staffing in postoperative general nursing wards was significantly associated with decreased mortality.[27]

3.1.2 The B-NMDS version II

Substantial revision in 2008: B-NMDS items – data structure – staffing variables

The B-NMDS underwent a substantial revision in 2008.[126] The B-NMDS items were revised by making use of the international Nursing Interventions Classification (NIC) as a guiding framework. This resulted in a new instrument (B-NMDS II) composed of 78 items.[126] The items are structured in six groups:

1. Care related to basic physiological functions
2. Complex physiological functions

3. Behaviour

4. Safety

5. Family and relatives and

6. Healthcare management.

Each group consists of different subcategories such as 'Personal care support', 'Mobility care' and 'Care related to drug use'. Although it is an open registration (all items can be coded on all types of nursing wards), specific item groups (e.g. intensive care, paediatric care, maternity care) were also developed. This was done to adjust the B-NMDS II to the increased level of specialization in nursing care. Nevertheless, this increase in the number of items did not result in a substantial increase in the number of coded items per patient day (e.g. in 2015 there was a median of 12 coded B-NMDS II items per care episode which was in line with previous registration years).[127]

Another change is that, since 2008, the B-NMDS II is together with the Hospital Discharge Data Set (MKG – RCM) integrated in one administrative database: 'the Minimal Hospital Data' (MZG – RHM). While the registration period remained the same, all 60 days of registration were now submitted to the FPS Public Health.

Furthermore, the unit of registration changed from patient day towards '*care episode*'. Each patient day consists of one or more care episodes. Each time a patient changes wards during a day, a new care episode starts and amounts to the time the patient actually stays in that ward. Hence, during a single day, a patient can have multiple care episodes, even multiple care episodes on the same nursing ward (e.g. on day of surgery a patient can have a pre- and post-surgery care episode on the same surgical ward). However, if a patient remains on the same nursing ward from midnight to midnight, there is only one care episode that coincides with the patient day.

Also the content of the nurse staffing registration changed. While a registration of direct nursing staff hours per day of registration ('EMPLODAY') remained it was complemented with an additional registration per registration period ('EMPLOPER'). This additional registration includes the number of persons and full-time equivalents per function and qualification level on the level of the nursing ward.

Revision of the B-NMDS II in 2017

Since the *update of 2008*, some smaller changes in the coding of the B-NMDS II items have been introduced, consolidated in the coding *manual version 1.6.*[128] Yet, a more important change (i.e. reduction of the number of items and response categories by deleting items and by adding two or more items in one single item) was introduced from *September 2017* onwards with the introduction of *coding manual version 2.0.*[129] These choices were mainly based on coding problems (e.g. different interpretation, manifest upcoding of some VG-MZG items).

As only data from before these last changes are used in the current study, it is beyond the scope of research to describe the new changes in full. Nevertheless, some of the same B-NMDS II items will be removed from the 'intensity of nursing care' measure as calculated in the current chapter for the same reasons. All analysis options are documented in section 3.3.2.

Since 2017, the registration of nurse staffing variables (EMPLODAY, EMPLOPER) is no longer compulsory. As such, feedback and benchmarking of staffing levels at the national level is no longer possible.

The use of B-NMDS II for staffing decisions

The B-NMDS II has the same potential to be used in staffing decisions as the B-NMDS I. The FPS Public health also provided a national feedback[127] on the *staffing levels* (e.g. Nursing Hours per Patient Day). Since 2017 this national feedback is no longer possible because the registration of nurse staffing data is no longer compulsory.

A separate feedback on *specific nursing data* (e.g. number of items, most frequently coded items, etc.) is also given[130] as well as a feedback-tool on '*Nursing Related Groups (NRG)*'.

Several research projects[121, 131-134] were set up to develop staffing applications based on B-NMDS II. Myny et al. (2009)[132] showed that the B-NMDS II covered about half of the total time spent by nurses on nursing activities. However, when using B-NMDS (or other patient classification systems) for staffing decisions the percentage of direct and indirect care is more important than the total time allotted for nursing. The coverage by the

B-NMDS II of 70% of the direct and indirect patient care was considered as acceptable for a nursing workload tool. The studies that tried to calibrate the B-NMDS II items in function of the 'intensity of nursing care' developed either '*standard times*'[131] or '*relative nursing intensity points*'[133] for each of the items (and response categories). Although a variety of methods was used (e.g. time measurement via work sampling observations, vs. Delphi-approach, respectively) the output of these studies is very similar. Sermeus et al. (2009)[133] demonstrated that the different calibration methods were highly correlated.

KCE points

This report opts to use the **relative points method** as it is also used by the FPS Public Health. There are several versions. The initial version of relative points was developed and validated in the context of a KCE-report.[121] For each of the B-NMDS II items it was asked (via a Delphi-approach) how much time a nursing team spends on average in caring for a typical patient to ensure quality of care. The results were transformed in 'relative points' by using 'five minutes' as denominator. As a consequence, each relative point corresponds to about 5 minutes of nursing care. Within this study the 'relative points' were cross-validated with a rating of required nursing time for 112 individual (written) patient cases. These scores (required nursing time per case) were compared with the relative points (for each case a NMDS II was coded). The relative points were very highly correlated with the ratings of 'required nursing time per case'. Yet, the 'required nursing time' based on the *summation of the individual item scores* (mean of 465 minutes – SD 291) was higher than the 'required nursing time *rated per case*' (mean of 285 minutes – SD 229). This was expected because summing up individual item scores ignores the fact that nurses perform some of the nursing interventions simultaneously.

FPS time points

In subsequent research[135] commissioned by the FPS Public Health, using a similar method (i.e. Delphi-approach), the relative points were updated. In addition, points per item were developed to capture the 'required nursing competency level'. These points are called '*FPS time points*' and '*FPS*

competency points' throughout the report. The combination of these points is called '*FPS total points*'.[136, 137]

Box 5 – Interpretation of KCE relative points 'intensity of nursing care'

There are solid grounds to use 'relative points' to calculate the 'intensity of nursing care'. In the interpretation one such point equals about 5 minutes of nursing time. Yet, when summing up the scores of several individual items a downward correction (e.g. 285/465 or 0.61) needs to be applied. In this report we will refer to the KCE points as 'relative points'.

3.2 Study objective

The aim of this chapter is to describe the evolution between 2009 and 2016 of:

- Intensity of nursing care, and
- Nurse staffing levels

in Belgian acute hospitals. In addition, the chapter provides an evaluation of whether nurse staffing levels were adjusted to 'intensity of care' (e.g. over time, across different types of nursing wards, across hospital types, week- versus weekend days) in that period. And furthermore, it investigates to what extent nurse staffing levels fall below a threshold that is generally accepted as an unsafe nurse staffing level i.e. a caseload of more than 8 patients per nurse on general hospital wards.

3.3   Methods

3.3.1   Data Selection

Data sources

Data were obtained via the TCT ('Technical Cell'/'Cellule Technique' (see Box 6)). All subsequent analyses are based on the Hospital Discharge Data Set (B-HDDS/MZG – RHM); more in particular the B-NMDS II (VG-MZG/DI-RHM) and the staffing data (EMPLODAY) for the years 2009-2014 and 2016.

The data of *2008* (first year of registration B-NMDS II) were not used as this was the first year of the B-NMDS II registration (learning effect in the coding; intermediate changes to coding manual).

In addition, the year *2015* was not available via the TCT since the Belgian Hospital Discharge Data Set (B-HDDS) was not linked to the reimbursement data as in 2015 the B-HDDS underwent a major reform (move from ICD-9-CM to ICD-10-BE for coding of medical diagnoses and procedures).

Box 6 – TCT

The 'Technical Cell'/'Cellule Technique' or TCT (https://tct.fgov.be) was created by the Law of 29 April 1996. It is a common service of RIZIV – INAMI and FPS Public Health. Its mission is to collect, link, validate, and anonymize data relating to hospitals. The TCT links the Minimal Hospital Data (MZG – RHM) to the sickness funds' reimbursement data (relating to hospitals) for the analysis of links between reimbursements by health insurance and the treated condition and for the elaboration of financing rules, accreditation standards and quality conditions in the context of an effective health policy. Access by the KCE to the Technical Cell data is regulated in the same law (29 April 1996).

In- and exclusion criteria

- Acute hospitals. Each 'number of licence' is counted as a separate hospital. Hospitals can have more than one site. As only acute hospitals are within the scope of the current study, only hospital sites with hospital bed types that can be considered as 'acute' are included i.e. the hospital sites with at least one of the following licensed bed types: 'C' (Surgical); 'D' (Medical); 'CD' (Mixed Medical-Surgical); 'E' (Paediatric care); 'M' (Maternity care). As a consequence, sites with, for instance, only Sp- and-/or G-beds were excluded.

- Hospital wards with a B-NMDS II registration. In the current report the following ward types from acute hospital wards were included:
  o Internal medicine ('D');
  o Surgery ('C');
  o Mixed internal medicine/surgery ('H', 'CD' or equal share in 'C' and 'D' beds);
  o Geriatrics ('G');
  o Paediatrics ('E');
  o Rehabilitation (S1 = cardiopulmonary rehabilitation; S2 = rehabilitation of the locomotor system; S3 = neurologic rehabilitation; S4 = palliative care; S5 = chronic poly-pathologies; S6 = psycho-geriatrics; Mixed S = combination of different S-bed types);
  o Intensive care and burn care centres ('I' and 'BR').

Following ward types with a B-NMDS II registration were excluded:

  o Maternity care ('M'): due to specific nursing care activities and the important role of midwives in nursing;
  o Specific ward types (out-of-scope) such as recovery ('RE'); neonatology ('N'; 'NIC');
  o Day-care wards (non-classic hospitalization).

Nursing wards without a registration of B-NMDS II items were excluded:

- o Psychiatry ('A', 'K', 'T');
- o Emergency department ('U', 'TU');
- o Operation theatre ('OP').

It should be noted that several nursing wards have more than one 'bed type'. In these cases, the dominant bed type was used to label the 'nursing ward'. A detailed description of the labelling of ward types is available upon request.

Nursing wards with less than 10 licensed beds (except for intensive care) were excluded in order to filter out very specific nursing wards in our sample (e.g. sleep clinics).

Data cleaning rules

Observation days of nursing wards with extreme outlying values for nurse staffing or patient activity were excluded. The following two data cleaning rules were applied:

- **Nurse staffing level:** During the observation day the nursing ward has to be staffed with at least 1 RN (at least 24 hours of nursing staff registered in EMPLODAY)[j];
- **Bed occupancy rate**: The bed occupancy rate for a particular observation day is more than 10%. This criterion is met when both during the morning (patient census at 10 AM) and afternoon (patient census at 2 PM) more than 10% of the licensed beds are occupied.

Single registration days that did not comply with the cleaning rules were excluded. However if >33% of the observation days of a particular registration month for a particular ward were flagged as having problems with either the 'nurse staffing level' or the 'bed occupancy rate', the entire nursing ward was excluded for the particular month of registration. (See 0 for the final sample).

Observation level

The unit of analysis is *'nursing ward' per 'observation day'*. As there are 60 B-NMDS registration/observation days per year, a nursing ward can have a maximum of sixty data points. Both floating staff as well as fixed staffing hours are included in the calculation of the staffing time measures below.

3.3.2 Measures

3.3.2.1 Intensity of nursing care

Care Intensity per Patient Day or CIPPD

This measure is calculated as the number of intensity points per patient day:

- Numerator (1):
  - o The sum of KCE-points for a selection of B-NMDS II items (see Box 7).
  - o For a sub-set of items (see Box 7) these points are weighted for the duration of the care episode in which they occurred.
- Denominator:
  - o The 'care episodes' (see 3.1.2) per nursing ward per observation day
  - o Calculation of patient day: Sum of duration of all care episodes in day in ward /24.

---

[j] Cf. minimal staffing requirement licensing standards (Chapter 2).

In order to check the robustness of this approach, the numerator was calculated in three other ways: (2) using KCE-points, but based on all B-NMDS II items, (3) using FPS time points, based on all B-NMDS II items and (4) using FPS time points, for a selection of B-NMDS II items (as above, see Box 7). Correlation coefficients were calculated between these four calculation options for each ward type, within each year (for all years 2009-2016). The four calculation results were systematically highly correlated (>0.91). In the end it was decided to work with KCE-points for the selection of B-NMDS II items (i.e. the first option).

Box 7 – Selection of B-NMDS II items and weighing items for care episode time

Since the introduction of the B-NMDS II it became clear that coding practices varied over hospitals for the different B-NMDS II items. The e-audits performed by the FPS Public Health[69] showed that for some items there was a recurrent problem of systematic upcoding or very heterogeneous coding. As a result the FPS Public Health recently decided to remove some items out of the B-NMDS II coding manual version 2.0[k]. In this study the following B-NMDS II items with manifest coding problems were removed: A100; B600; C200; D500; E200-E400; F200; O100-O200; R110-R120; S100; Y100. This decision was made based on an evaluation of e-audits and was validated by the consultation of a content expert. A detailed description per item with the reasons for exclusion is available upon request. In addition, items regarding labour and delivery (W100-W500) were removed in the current study because maternity care was out of scope.

A second manipulation, in comparison with the original calculation method of the KCE-points, was the weighing of certain items according to the duration of the care episode in which they occurred. Not all care episodes last 24 hours. This is not a problem for items where the 'relative points' involve frequency of occurrence (e.g. number of times an intermittent urinary catheter is introduced).Yet, for other interventions the relative points are calibrated on a 24h basis. This might have an influence. After all, the intensity of care (required time for the nurses) for a same level of 'support with feeding', might be very different for patients with a care episode of 1h (less nursing time required), compared to patients who stayed 24h (more nursing time required). As such, a correction for care episode duration was applied to the items originally calibrated on a 24h basis. This was done for the same items that are also corrected by the FPS Public Health in their calculation of NRGs. It concerns the following items: B100, B210-B250, B410-B440, B500, C110-C120, C400, D110-D130, D200, D300, D400, G200, G300, G400, I200, K100, K200, K300, L100, M100, N200, N600, N700, P100, Q100, S100, S200, V100, V300, V600, V700, X100. The weighing for duration of care episode was executed according to the care episode categories used by the FPS Public Health[137]: 0-3h; 3-7h; 7-11h; 11-15h; 15-24h. In specific, the upper limit of each time category serves as a weight to adjust in comparison to the intended 24 hour (e.g. care episodes of 12.5 hours fall in the 11-15h category, resulting in a 15/24 weight adjustment).

---

[k]   In addition to the removal of some items, other items were integrated in one single item or coding categories were changed. Also, rarely coded items were not included in the NRG calculation. Since we use the B-NMDS II (2009-2016) with items coded according to coding manual 1.6, not all changes are included. We only removed items with known problematic coding quality.

Patient turnover

Patient turnover is the patient inflow and outflow generated from hospital admissions, hospital discharges, and internal transfers between nursing wards. It is calculated as the total count of patient movements for each available registration day per nursing ward. This count is standardised by dividing by the total patient time on the ward that day.

- Numerator:
  - o Admission in hospital (counted on the first nursing ward);
  - o Discharge from hospital (counted on the last nursing ward from which the patient is discharged from the hospital or where patient is deceased);
  - o Internal patient transfer (movement from one hospital ward to another hospital ward) is counted in 2 parts:
    - The outgoing transfer ('Transfer out'): 1 count for the sending ward
    - The incoming transfer ('Transfer in'): 1 count for the receiving ward
- Denominator (cf. CIPPD):
  - o Calculation of patient day: Sum of duration of all care episodes in ward in day /24.

Box 8 – Overview staffing types in MZG – RHM registration

Not counting trainees (which are discarded as they are not fully trained staff, and not only offer help but require time investment and supervision as well), in the Belgian Hospital Discharge Data set (B-HDDS/ MZG – RHM) registration staff associated with hospital wards is segmented in 5 separate classes:

- Category 1 (CAT001): Nursing staff* with a university degree (master, PhD)
- Category 2 (CAT002): Nursing staff* with a degree higher education (bachelor level)
- Category 3 (CAT003): Nursing staff*with a degree of secondary education (diploma level)
- Category 4 (CAT004): Healthcare assistants, personnel art. 54bis, hospital assistant
- Category 5 (CAT005): Supporting staff, not in the sense of nursing*, e.g. logistic staff, administrative staff, child care worker, etc.

(*) according to Royal Decree 78, Chapter 1 ter and art. 54bis

3.3.2.2 Nurse staffing levels

Proportion of Bachelor prepared nurses

This is the proportion of RNs hours in each nursing ward provided by nurses with at least a Bachelor's degree. The measure is calculated per year, per nursing ward. Based on EMPLODAY it is calculated as:

- Numerator:
  - o Sum of staffed time provided by nurses with at least a Bachelor's degree (CAT001; CAT002)
- Denominator:
  - o Sum of staffed time provided by RNs (CAT001, CAT002, CAT003)

Nursing Hours per Patient Day

Nursing Hours per Patient Day (NHPPD) is the sum of the staffed hours of RNs (Bachelor's degree prepared and diploma level nurses) divided by the number of patient days. It is calculated for each available registration day, per nursing ward:

- Numerator:
  - Source: EMPLODAY
  - Included staff categories: Nurses with at least a Bachelor level of education (CAT001: nurses or midwives with a university degree; CAT002: nurses or midwives with a Bachelor degree; CAT003: nurses with a diploma degree). Both mobile team and fixed team nursing hours are included.
  - Calculation: Sum of staffed time in ward in day.
- Denominator (cf. CIPPD):
  - Calculation of patient day: Sum of duration of all care episodes in ward in day/24.

Note: Staffing hours for ward managers are included in the coding (whereas ward managers tend to be occupied more with management tasks, and less with actual bedside care for patients). Therefore, an alternative measure was calculated as well: 'NHPPD*' corrected for presence of ward managers (assumption: on weekdays ward managers are present for 7.6 hours).

3.3.2.3 Supporting staff and total staff

This section describes the measures calculated to measure the non-nursing staff or the total nursing and care-related staff (see Figure 8):

- SHPPD (Supporting staff Hours per Patient Day):

  idem as NHPPD but only including the categories: CAT004 ('care assistant') and CAT005 ('other supporting staff').

- C4PPD (Healthcare assistant Hours per Patient Day):

  idem as NHPPD but only including the category: CAT004 ('care assistant').

- C5PPD (Supporting Staff Hours per Patient Day):

  idem as NHPPD but only including the category: CAT005 ('other supporting staff').

- THPPD (Total staff Hours per Patient Day):

  idem as NHPPD but including all 5 categories CAT001 - CAT005 (cf. Box 8).

Figure 8 – Diagram of supporting staff measures in relation to NHPPD
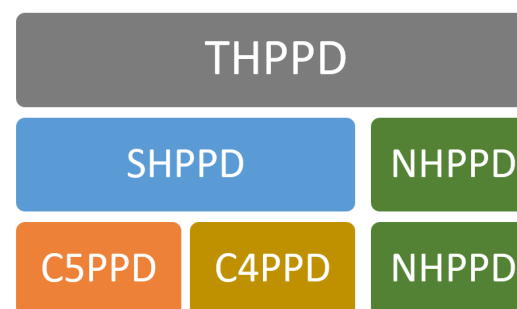
3.3.2.4 Care intensity relative to nursing staff

'Care intensity to staffed nursing hours' (CINURS) is a relative measure. Care Intensity is calculated proportionally to the available staff nursing time to evaluate whether the staffed nursing hours evolve in a similar way as the 'intensity of nursing care'. This measure is calculated per ward, per observation day.

- Numerator:
  - The sum of KCE-points for a selection of B-NMDS II items (cf. Box 7);
- Denominator:
  - Available nursing staff (CAT001; CAT002; CAT003) time.

3.3.2.5 Patient-to-nurse ratio

The VG-MZG does not allow calculations per shift of patient-to-nurse ratios. Yet, the patient-to-nurse ratio can be calculated as an average over 24 hours, which gives a representative measure on day level. The available hours of nursing staff (i.e. the sum of nursing staff CAT001, CAT002 and CAT003) are corrected for the presence of ward managers. The worktime of nursing ward managers is registered in EMPLODAY but (according to international standards – see chapters 6-11) cannot be counted as *direct* nursing staff. Therefore ward manager time is deducted (by 7.6 hours on weekdays per nursing ward[I]) from registered nursing staff hours on the ward.

- **The patient-to-nurse ratio is calculated as:**

  - Numerator: Average patient census (the average of 24 hourly censuses over the day);
  - Denominator: Available nursing time (available hours of nursing staff for direct care / 24 hours).

- **Proportion of days with unsafe staffing ratios:**

Although there is no evidence to determine optimal and safe staffing levels, it is generally accepted based on the available evidence that a caseload of more than 8 patients per nurse (especially during daytime hours)[138] on general hospital wards is unsafe (see part III). The patient-to-nurse ratio measure also allows to evaluate per nursing ward on how many days a staffing level falls below an unsafe threshold (i.e. more than 8 patients per nurse). This is not the same as 'safe or optimal staffing' levels. Patient-to-nurse ratios above such a level can be considered as an indicator signalling an 'unsafe care environment'. The measure is calculated for general wards only (i.e. medical/ surgical/ mixed/ geriatrics/ paediatrics/ rehabilitation).

3.3.3 Statistical analysis and data presentation

Analysis nursing ward (per observation day) and hospital level

The majority of the analyses is descriptive. Boxplots visualise the variability (e.g. between nursing ward types). In addition, tables with statistics (P_{10} – P_{25} – P_{50} – P_{75} – P_{90}; Mean and standard deviation) provide exact reference information.

The data are presented in following order:

- General internal medicine and surgical nursing wards (i.e. surgical/ internal medicine/ mixed surgical and internal medicine);
  - Overall (boxplots with evolution per year);
  - Last available year: bar chart with mean per hospital; ranked by value; hospitals are colour-coded by region.
- Acute hospital wards – per ward type (i.e. surgical/internal medicine/ mixed surgical/internal medicine/ geriatrics/ paediatrics/ rehabilitation) and intensive care wards:

[I]   This correction is not done when the total nurse staffing hours on a nursing ward is ≤24 hours per day.

- o Overall (boxplots with evolution per year per type of nursing ward; Intensive care wards are depicted in a separate figure).

- o Detailed per hospital type (university versus non-university hospitals) and week - versus weekend days (public holidays included).

  - ▪ All ward types except intensive care wards;

  - ▪ Intensive care wards.

For a selection of variables (NHPPD; CIPPD; Bachelor-prepared nurses; patient-to-nurse ratio; CINURS) and wards (internal medicine; surgical; mixed internal medicine/surgical) an average per hospital for the most recent year (2016) was calculated and plotted in a bar chart with colour-coded indication of the region (Brussels, Wallonia, Flanders). ANOVA-statistics are used to test for regional differences.

Pathology groups

The change in intensity of nursing care is also evaluated for a selection of pathology groups. A comparison between 2009 and 2014 is made for the following 'All Patient Refined Diagnosis Related Groups' (APR-DRG):

- Surgical DRGs:

  - o APR-DRG 163 – Cardiac valve procedures without cardiac catheterization

  - o APR-DRG 228 – Inguinal, femoral and umbilical hernia procedures

  - o APR-DRG 263 – Laparoscopic cholecystectomy

  - o APR-DRG 302 – Knee joint replacement

- Medical DRGs

  - o APR-DRG 138 – Bronchiolitis, Respiratory Syncytial Virus (RSV), Pneumonia

  - o APR-DRG 140 – Chronic Obstructive Pulmonary Disease (COPD)

  - o APR-DRG 194 – Heart Failure (HF)

This evaluation does not aim to be exhaustive. It aims to illustrate how care patterns changed over time for a selection of medical and surgical APR-DRGs. This selection is based on a previous KCE-report.[139] The pathology groups were chosen in terms of 'clinical recognisability', volume, reduction in length of stay.

The 2016 data were not used as in 2016 a new version (v34 instead of v28) of the APR-DRG grouping system was used.

The intensity points (KCE-points) are combined per patient day irrespective of ward. The observations are limited to the 60 registration days of the VG-MZG. For the selected DRGs, all stays with at least one patient day in the registration period are included. Each patient day is given a relative rank depending on the day of admission (e.g. day of admission = 0, next day = 1 etc.). The number of relative days are capped for visualization at max 40 days. The days with less than 10 observations are dropped and relative days are included up to cumulative density of 95% of all relative days (i.e. the 5% days with the highest relative rank are dropped).

3.4 Study population

Hospitals

The total number of hospitals (based on 'number of licences') in our sample varies between 102 (2016) and 111 (2009). The number of university hospitals is constant (n=7).

Table 5 – Number of acute hospitals per year

Year	2009	2010	2011	2012	2013	2014	2016
Number of hospitals with acute sites							
• University hospitals	7	7	7	7	7	7	7
• Non-university hospitals	104	100	98	98	98	97	95

Nursing wards

In Figure 9, the selection process of nursing wards is illustrated for the second semester of 2016.

Based on the in- and exclusion criteria there were 1 648 eligible nursing wards (in 150 hospital sites and 102 hospitals). Based on data-cleaning 28 nursing wards were excluded. As a result, the sample consists of:

- 458 medical wards;
- 69 mixed wards (medical/surgical);
- 406 surgical wards;
- 243 geriatric wards;
- 122 rehabilitation wards;
- 115 paediatric wards;
- 207 intensive care wards.

In Figure 9 the number of in- and excluded eligible nursing wards per year, per semester are shown per ward type.

This section describes the evolution and variability in care intensity and nurse staffing levels for general internal medicine and surgical wards. In Figure 10 the evolution of 'Care Intensity per Patient Day' (CIPPD) as well as 'Nursing Hours per Patient Day' (NHPPD) is shown. Both CIPPD and NHPPD slightly increased between 2009 and 2016 and vary considerable across nursing wards per observation day.

Figure 9 – Flow chart describing the selection process of nursing wards (semester 2 – 2016)
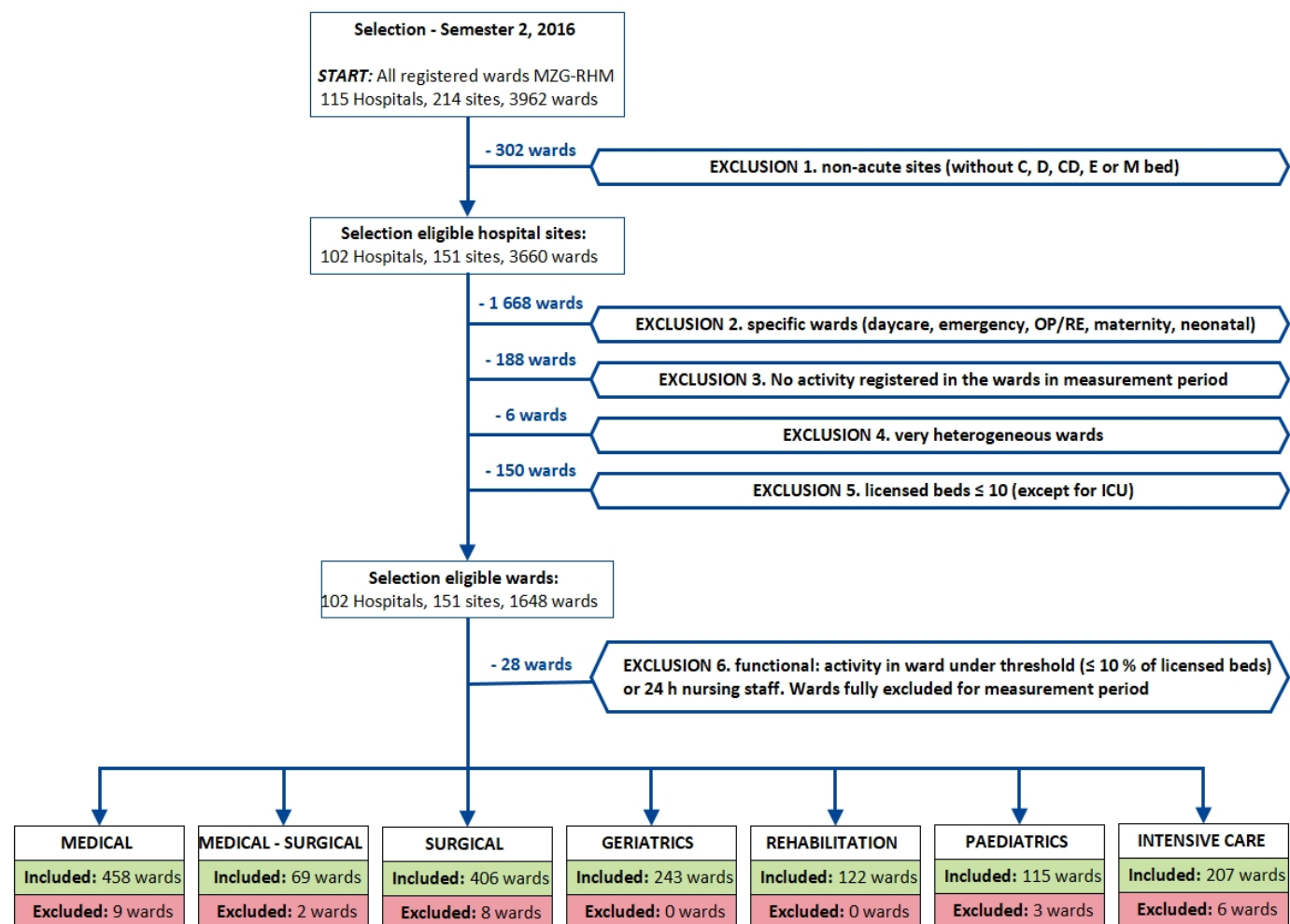
Table 6 – In- and excluded eligible nursing wards per year, per semester (S)

Year	2009*		2010		2011		2012		2013		2014		2016	
	S1	S2	S1	S2	S1	S2	S1	S2	S1	S2	S1	S2	S1	S2
Medical wards														
Included	432	432	461	454	457	465	456	456	448	437	453	449	444	458
Excluded	26	26	15	11	6	12	10	12	7	9	8	7	6	9
Surgical wards														
Included	413	418	440	436	437	450	440	431	422	416	418	414	399	406
Excluded	22	23	19	14	8	12	8	12	10	10	17	14	12	8
Medical/Surgical wards														
Included	67	72	75	77	75	77	73	78	77	75	71	72	72	69
Excluded	8	9	3	4	1	1	2	2	2	3	5	1	2	2
Geriatric wards														
Included	191	197	200	203	203	203	208	211	210	207	217	218	239	243
Excluded	10	13	7	5	2	3	5	4	5	6	9	6	3	0
Paediatric wards														
Included	110	108	118	116	115	116	116	119	116	114	113	115	110	115
Excluded	7	9	6	5	6	5	4	3	4	2	5	0	4	3
Rehabilitation wards														
Included	89	89	94	92	93	96	104	109	102	104	106	107	123	122
Excluded	6	5	8	9	4	6	4	2	3	3	3	3	0	0
Intensive care wards														
Included	204	206	211	209	214	210	211	211	214	208	209	210	203	207
Excluded	10	7	11	8	3	3	5	3	3	3	6	4	7	6
Total wards														
Included	1506	1522	1599	1587	1594	1617	1608	1615	1589	1561	1587	1585	1590	1620
Excluded	89	92	69	56	30	42	38	38	34	36	53	35	34	28

*One large hospital was removed from the analyses in 2009 due to structural data reasons: due to a registration exception, the 'care episode' durations could not be calculated. Additionally, as 2009 is the very start of registration, a learning curve in the data coding may be present. As such, this can result in more data cleaning: indeed for three hospitals, the registrations in 2009 showed strong irregularities in terms of patient/ staffing registrations. This issue was resolved in the subsequent year 2010 (apart from 1 hospital where the issues were resolved in 2011).

3.4.1 Care Intensity per Patient Day

Ward level per observation day

The average CIPPD increased steadily from 47.6 points (median: 46.7) in 2009 towards 52 points (median 51.2) in 2016. It is difficult to quantify[m] this measure in an exact time estimate in minutes (see section 3.3.2.1). Theoretically, this concept measures the care intensity per patient day in wards. For assessing the increase/ decrease in the workload of nurses, it is preferable to look at another concept: the evolution of intensity of nursing care, relative to staffed nursing hours (i.e. CINURS).

It is shown that, for each year, there is a lot of variability in CIPPD between days. In 2016, for instance, the inter-quartile difference is 18 points (P75: 60.26 – P25: 42.23). From Figure 11 it can be observed that CIPPD is higher on weekdays compared to weekend days (e.g. average CIPPD in 2016 of 53 on weekdays and 49.3 on weekend days). In addition, the increase in CIPPD on weekdays is somewhat steeper than on weekend days.

Figure 12 illustrates that the average CIPPD is higher in university hospitals (2016: 56.6 CIPPD) compared to general hospitals (2016: 51 CIPPD). However, note that the data also indicate that there are nursing wards in general hospitals with a higher CIPPD than the average CIPPD in university hospitals. And vice versa, there are observation days in university hospitals with nursing wards clearly below the average CIPPD of general hospitals.

---

[m]   A rough formula can be applied (1 point equals 5 minutes and the required nursing time is 0.61 of the sum of KCE-points), the increase of 4.4 points corresponds, more or less, with an increase of between 12.5 and 20.5 minutes (direct and indirect patient care) per patient day.

Figure 10 – Care Intensity per Patient Day (CIPPD) and Nursing Hours per Patient Day (NHPPD) for general surgical and internal medicine wards

CIPPD

NHPPD
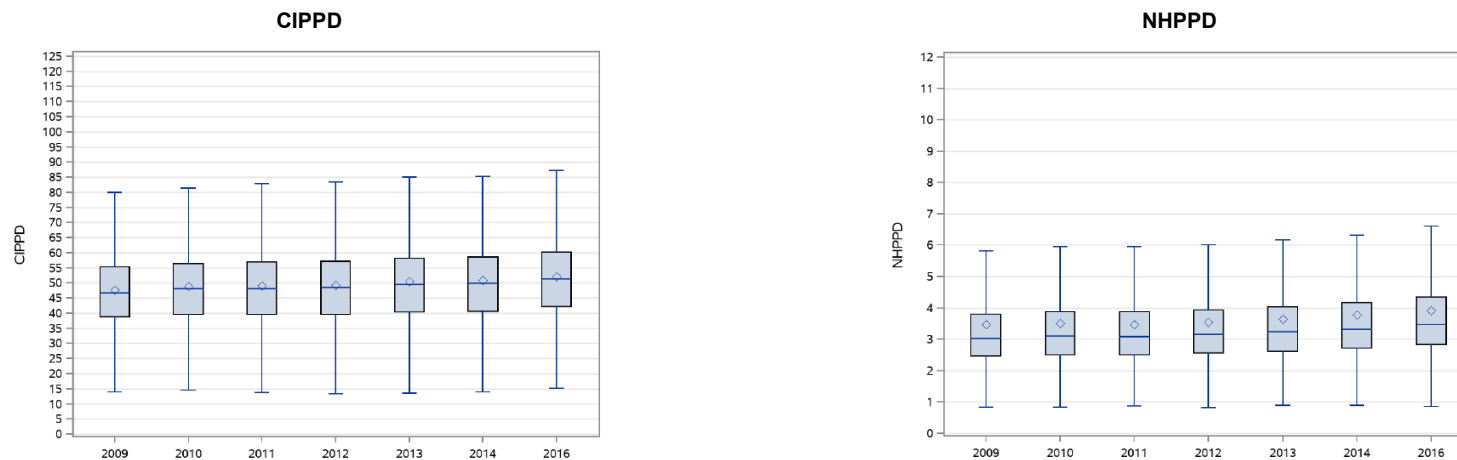
year	N Obs	10th Pctl	25th Pctl	50th Pctl	75th Pctl	90th Pctl	Std Dev	Mean
2009	52 293	32.06	38.75	46.72	55.26	63.71	13.74	47.64
2010	55 039	32.29	39.54	47.97	56.25	65.08	15.12	48.79
2011	54 666	32.11	39.62	48.15	56.87	65.78	15.40	49.09
2012	54 264	32.35	39.65	48.40	57.18	66.02	15.70	49.34
2013	53 128	32.79	40.30	49.39	58.17	67.30	18.00	50.40
2014	52 552	32.47	40.66	49.79	58.50	67.04	21.93	50.80
2016	51 785	34.26	42.23	51.22	60.26	69.59	15.43	52.02

year	N Obs	10th Pctl	25th Pctl	50th Pctl	75th Pctl	90th Pctl	Std Dev	Mean
2009	52 293	2.04	2.46	3.03	3.81	4.87	2.87	3.46
2010	55 039	2.06	2.50	3.09	3.88	4.98	2.64	3.50
2011	54 666	2.07	2.50	3.09	3.88	4.95	2.67	3.48
2012	54 264	2.12	2.56	3.16	3.94	5.00	2.48	3.54
2013	53 128	2.17	2.62	3.23	4.04	5.14	2.46	3.64
2014	52 552	2.26	2.72	3.32	4.16	5.32	2.87	3.77
2016	51 785	2.34	2.82	3.47	4.34	5.60	2.43	3.92

Note: CIPPD and NHPPD are calculated per nursing ward per observation day; general and internal medicine wards include the following nursing wards: surgical wards are wards with predominantly C-beds; internal medicine wards are wards with predominantly D-beds; mixed wards are wards with predominantly CD-beds. The year 2015 is not included in the figure since these data were not available for analysis. Outlying values are not shown in the figure.

Figure 11 – Care Intensity per Patient Day (CIPPD) and Nursing Hours per Patient Day (NHPPD) for general surgical and internal medicine wards: weekdays versus weekend days
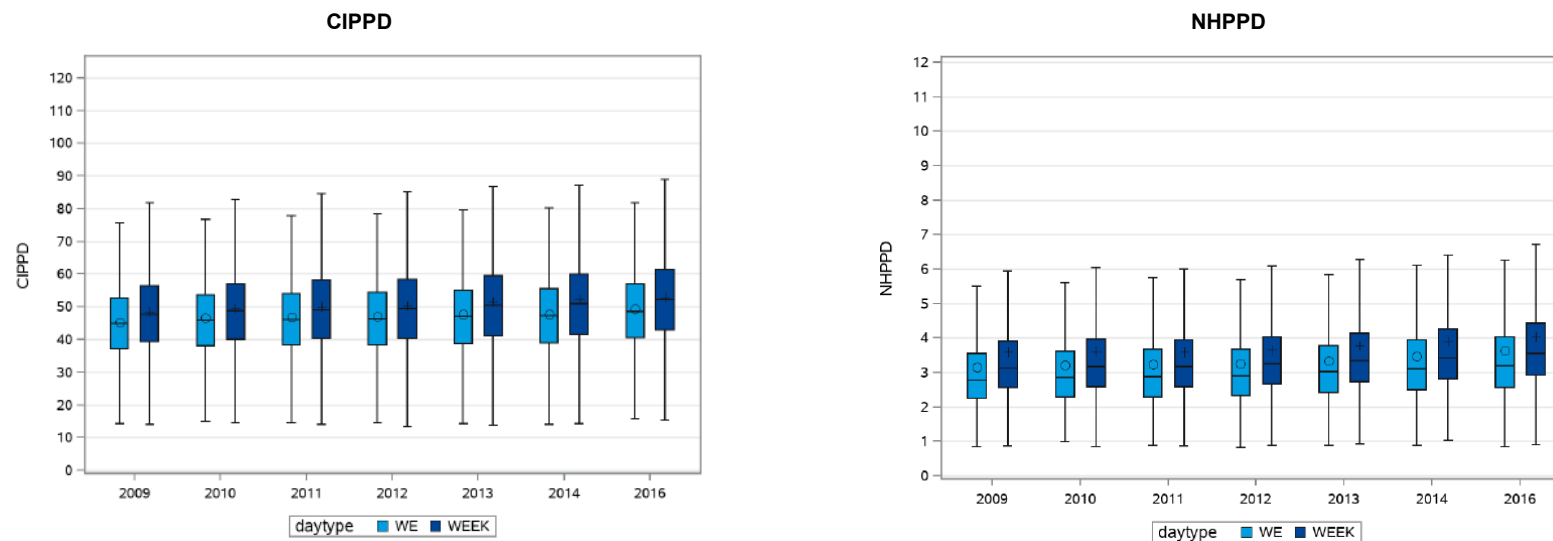
Note: CIPPD is calculated per nursing ward per observation day; general and internal medicine wards include the following nursing wards: surgical wards are wards with predominantly C-beds; internal medicine wards are wards with predominantly D-beds; mixed wards are wards with predominantly CD-beds. The year 2015 is not included in the figure since these data were not available for analysis. 'WEEK'=weekdays; 'WE'=weekend days including public holidays. Outlying values are not shown in the figure.

Figure 12 – Care Intensity per Patient Day (CIPPD) and Nursing Hours per Patient Day (NHPPD) for general surgical and internal medicine wards, university versus general hospitals
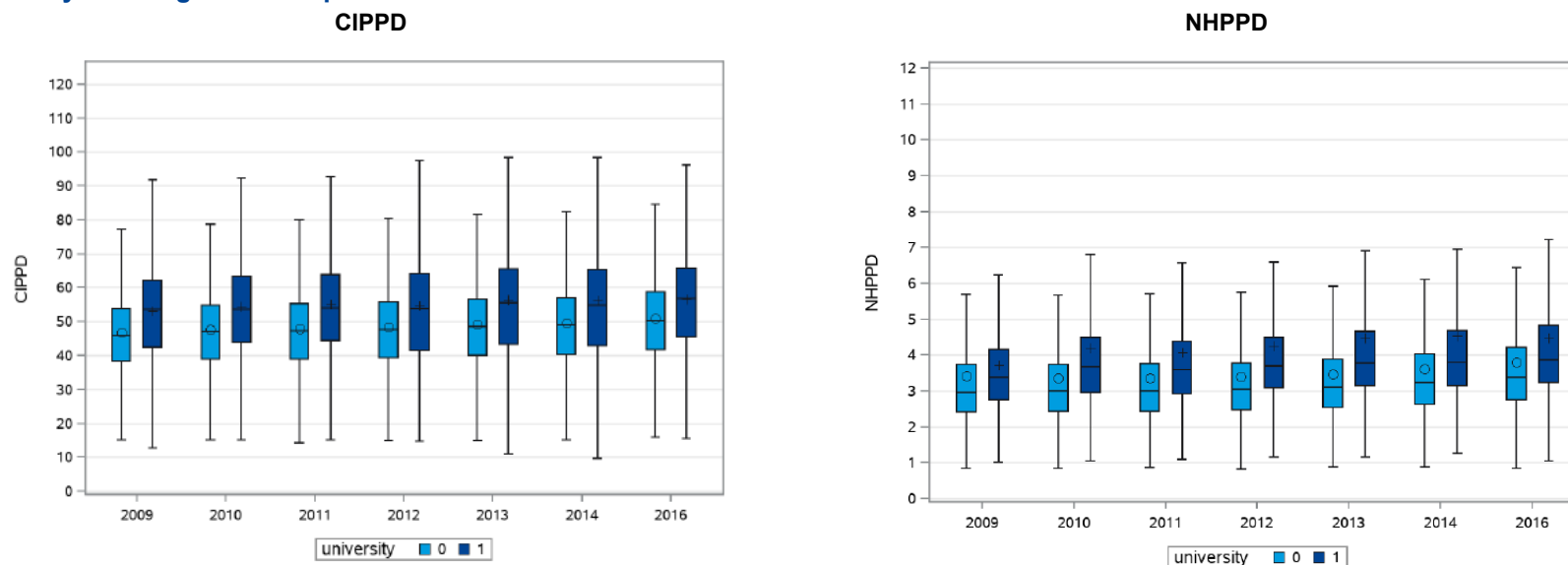
CIPPD

NHPPD

Note: CIPPD is calculated per nursing ward per observation day; general and internal medicine wards include the following nursing wards: surgical wards are wards with predominantly C-beds; internal medicine wards are wards with predominantly D-beds; mixed wards are wards with predominantly CD-beds. The year 2015 is not included in the figure since these data were not available for analysis. '0'=general hospitals; '1'=university hospitals. Outlying values are not shown in the figure.

Hospital level (2016)

The national average for CIPPD is 49.93 (ranging from 21.15 over 76.46 over hospitals; P_{25}: 42.69 – P_{50}: 50.78 – P_{75}: 56.75) (see Figure 13).

Figure 13 – Average Care Intensity per Patient Day (CIPPD) at the hospital level (2016)
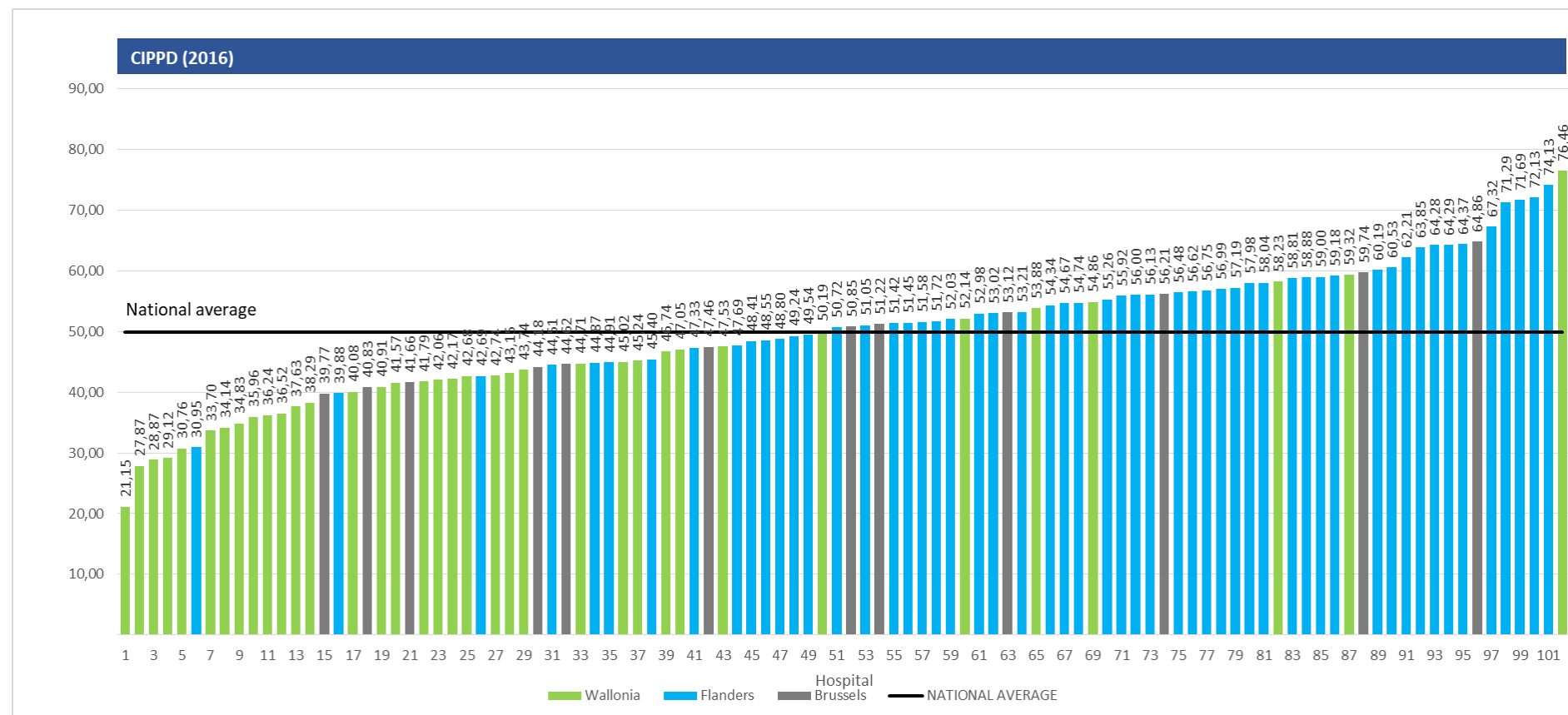
3.4.2 Patient turnover

Ward level per observation day

In addition to 'care intensity' as measured by the B-NMDS II, the number of admissions-discharges-transfers per patient day (ADT) was calculated. This gives complementary information as 'patient turnover' not only generates additional nursing activities (as measured by the B-NMDS II: e.g. assessment, discharge planning, multidisciplinary concertation, patient education, etc.), it also increases the *administrative and logistic burden* not measured by the B-NMDS II.

The average ADT rate per patient day on general surgical and internal medicine wards increased from 0.86 (median:0.59) in 2009 to 0.98 (median:0.71) in 2016. The substantial difference between the mean and median is due to a skewed distribution with some nursing wards with very high ADT-rates. The ADT on weekdays is higher than on weekend days (see Figure 14).

Figure 14 – Admissions-discharge-transfers per patient day (ADT) for general surgical and internal medicine wards per type of day
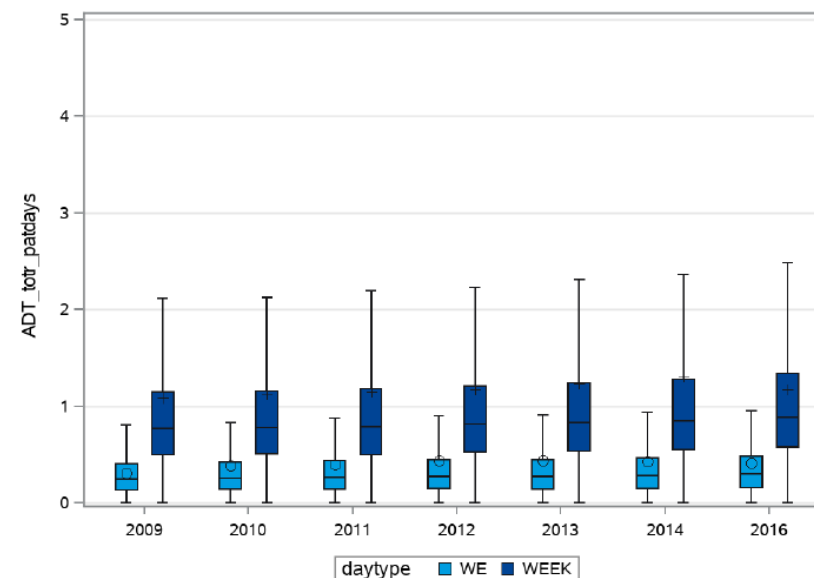
Note: ADT (admission-discharge-transfer) per patient day is calculated per nursing ward per observation day; general and internal medicine wards include the following nursing wards: surgical wards are wards with predominantly C-beds; internal medicine wards are wards with predominantly D-beds; mixed wards are wards with predominantly CD-beds. The year 2015 is not included in the figure since these data were not available for analysis. 'WEEK'=week days; 'WE'=weekend days including public holidays. Outlying values are not shown on the figure.

3.4.3 Nursing Hours per Patient Day

Ward level per observation day

Average NHPPD increased steadily from 3.46 NHPPD in 2009 (median 3.03) towards 3.92 NHPPD in 2016 (median 3.47). This increase of 0.46 NHPPD corresponds with 27 minutes of additional nursing staff (direct and indirect patient care; non-patient related care). There is a lot of variability in the NHPPD, in each of the years, across nursing wards and observation days. In 2016, for instance, the interquartile difference is 2 NHPPD (P_{75}: 4.34 NHPPD; P_{25}: 2.34 NHPPD).

The NHPPD in university hospitals (4.5 NHPPD in 2016) is on average higher compared to general hospitals (3.8 NHPPD in 2016). Yet, there are wards in general hospitals that are staffed above the average of university hospitals, and vice versa.

The NHPPD on weekdays are on average higher (2016: 4 NHPPD) than on weekend days (2016: 3.6 NHPPD) (see Figure 11).Yet, it should be noted that nursing ward managers do, in general, work on weekdays. As their 'staffed hours' are also registered in EMPLODAY, the available staff for direct care is overestimated. When the NHPPD are corrected for the presence of nursing ward managers the averages on weekend and weekdays are similar (weekdays: average of 3.58 NHPPD* [median: 3.17 NHPPD*]; weekend days: average of 3.62 NHPPD* [median: 3.20 NHPPD*]).

Hospital level (2016)

The average national percentage of NHPPD is 3.79 (ranging from 2.34 to 7.40 over hospitals; P_{25}: 3.29 – P_{50}: 3.66 – P_{75}: 4.07) (see Figure 15).

Figure 15 – Average Nursing Hours per Patient Day (NHPPD) at the hospital level (2016)

NHPPD (2016)
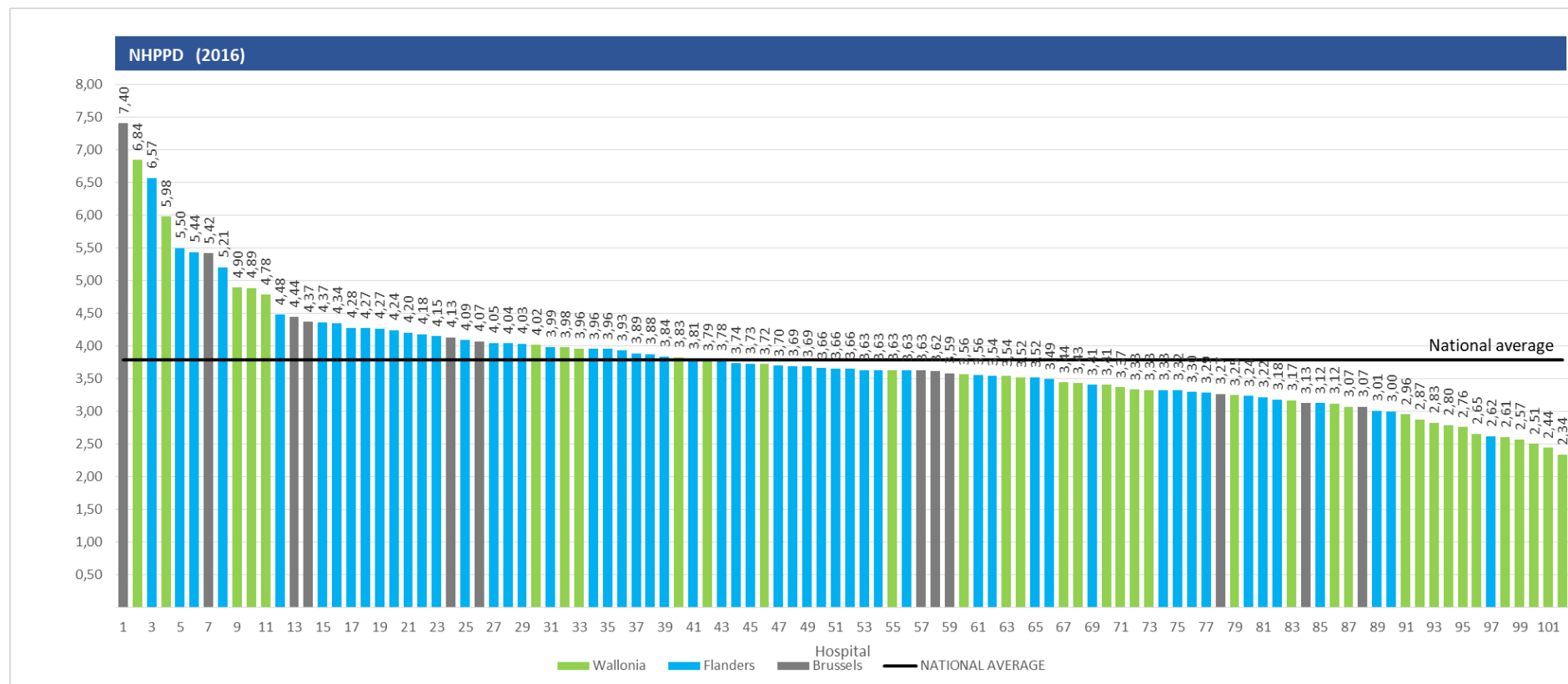
3.4.4 Care Intensity relative to staffed nursing hours

Ward level per observation day

Comparing nursing time evolution based on CIPPD or NHPPD has some methodological limitations when used to assess evolutions in work burden (see 3.3.2). As such 'care intensity relative to the staffed nursing hours' was calculated in addition. This gives an indication if the staffing hours are, in relative terms, in line with the intensity of nursing care. However, it does not allow to evaluate if staffing levels are adequate nor optimal.

Assessing this relative measure (CINURS), it appears that there is not much evolution over time on general internal medicine and surgical wards:

- 2009: average 0.26 (P_{25}: 0.19 – P_{50}: 0.25 – P_{75}: 0.32)

- 2016: average 0.25 (P_{25}: 0.18 – P_{50}: 0.24 – P_{75}: 0.31).

Within each year of observation it is clear that the intensity of nursing care is relatively higher on some nursing wards (higher CINURS) compared to others (lower CINURS). Comparing week- versus weekend days it seems that the differences in staffing levels[n] compensate, more or less, for the differences in care intensity (e.g. average CINURS in 2016: 0.25 on weekdays and 0.26 on weekend days). The same observation is made for the differences in staffing and intensity of care between university and general hospitals (e.g. average CINURS in 2016: 0.24 in university hospitals; 0.25 in general hospitals).

Hospital level

The average national percentage of CINURS is 0.25 (ranging from 0.12 to 0.40 over hospitals; P_{25}: 0.21 – P_{50}: 0.25 – P_{75}: 0.28) (see Figure 16).

---

[n]   Staffing levels not corrected for nursing ward managers time.

Figure 16 – Average care intensity relative to staffed nursing hours at the hospital level (2016)
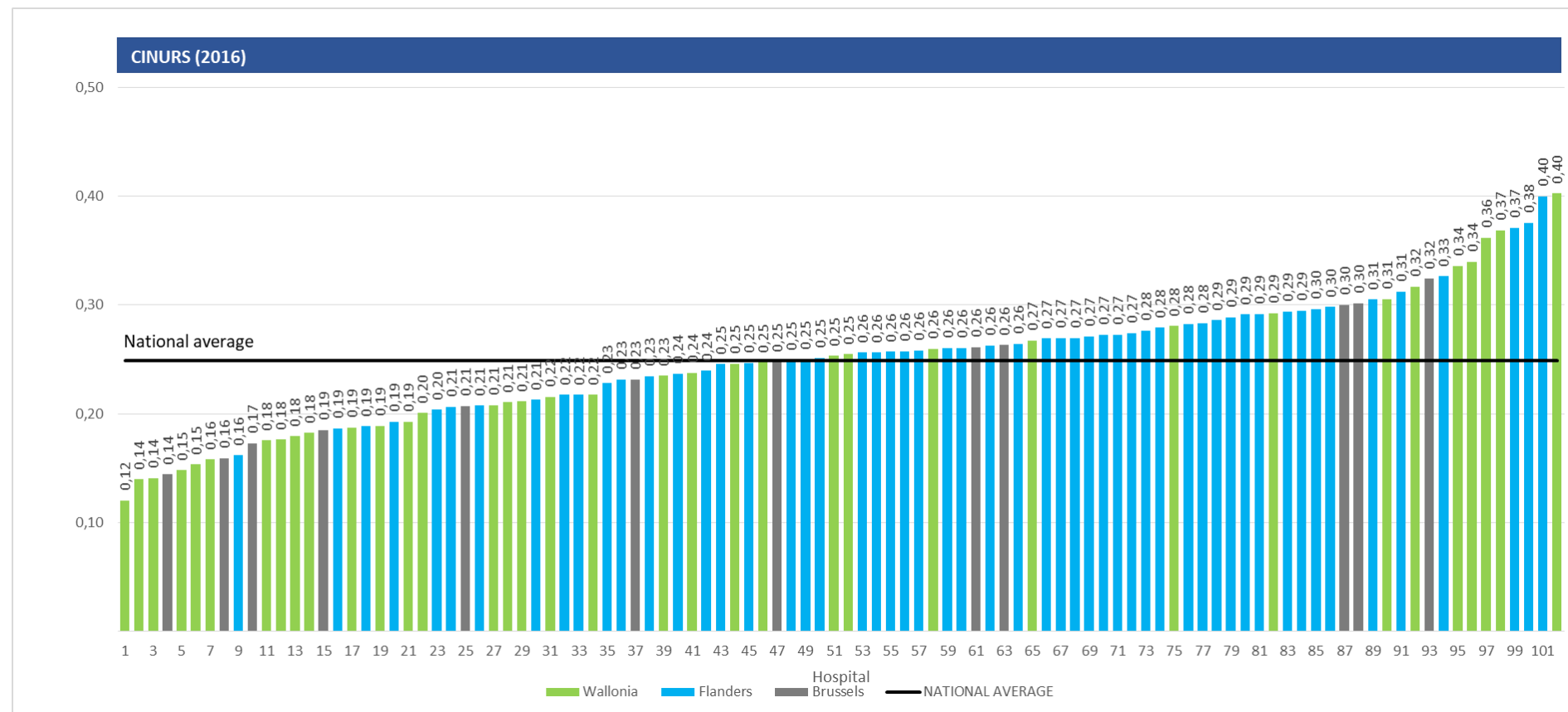
3.4.5 Patient-to-nurse ratio

Ward level per observation day

Administrative MZG – RHM data (Belgian Hospital Discharge Data Set) are used to estimate the patient-to-nurse (P2N) ratios in this chapter. The figures may differ from the survey data presented in Chapter 5. This can be related to the method used (administrative data vs nurse survey) as well as the selection of nursing wards (population vs sample).

Based on administrative data, the average patient-to-nurse ratio decreased from 9.04 in 2009 (median: 8.70) towards 7.87 (median: 7.57) in 2016 (see Figure 18 –left panel).

The patient-to-nurse ratio is lower in university hospitals compared to general hospitals. In 2016, for instance, the average patient-to-nurse ratio in university hospitals was 6.83 (median: 6.71) for university hospitals and 8.10 (median: 7.79) in general hospitals. Differences between week- and weekend days are negligible. In 2016, the average on weekdays was 7.89 (median: 7.58) versus 7.83 (median: 7.51) on weekend days.

In Figure 18 (right panel) the proportion of days with a patient-to-nurse ratio of more than 8 is shown per nursing ward. There is considerable variation across nursing wards within each year. In 2016, for instance, the proportion of days with a patient-nurse ratio above 8 varied from 0 (P10) to 0.85 (P90).

This proportion seems to drop over time. The average proportion of days per nursing ward with a patient-to-nurse ratio above 8 dropped from 0.59 (median 0.67) in 2009 to 0.42 (median 0.40) in 2016. This is a positive evolution, but not a positive finding. It means that, in 2016, still in 50% of the general internal medicine and surgical wards, in 40% of the days (e.g. 24 out of 60 observation days in the B-NMDS) an unsafe patient-to-nurse ratio is present.

Hospital level

The national average of P2N over hospitals is 8.12 (ranging from 4.63 to 12.22; P_{25}: 7.18 – P_{50}: 7.98 – P_{75}: 8.79) (see Figure 17).

Figure 17 – Patient-to-nurse ratio at the hospital level (2016)
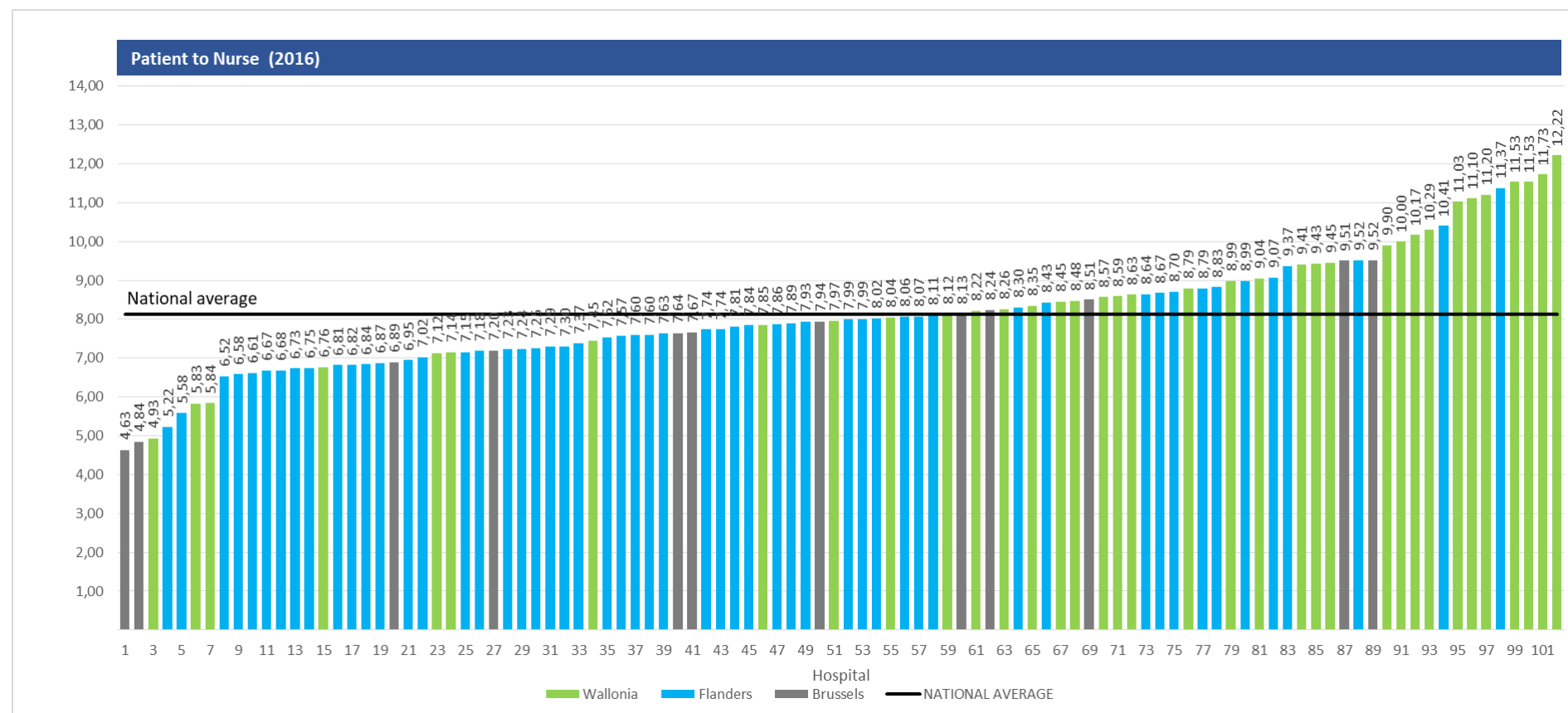
Figure 18 – Patient-to-nurse ratio for general surgical and internal medicine wards

Per observation day

Proportion of days per nursing ward with a patient-to-nurse ratio of >8
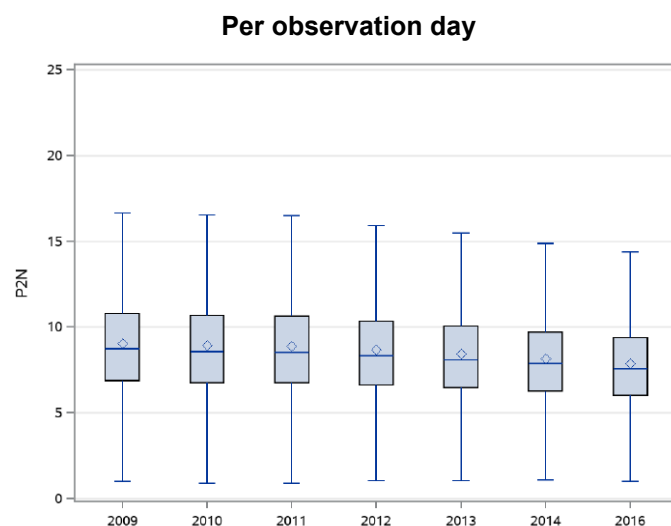
year	N Obs	10th Pctl	25th Pctl	50th Pctl	75th Pctl	90th Pctl	Std Dev	Mean
2009	52 293	5.36	6.87	8.70	10.77	13.14	3.29	9.04
2010	55 039	5.23	6.74	8.55	10.65	13.10	3.30	8.92
2011	54 666	5.26	6.73	8.53	10.63	12.98	3.25	8.90
2012	54 264	5.20	6.63	8.32	10.34	12.59	3.12	8.68
2013	53 128	5.05	6.45	8.10	10.06	12.26	3.05	8.46
2014	52 552	4.87	6.25	7.88	9.69	11.73	2.85	8.15
2016	51 785	4.65	6.01	7.57	9.35	11.40	2.88	7.87
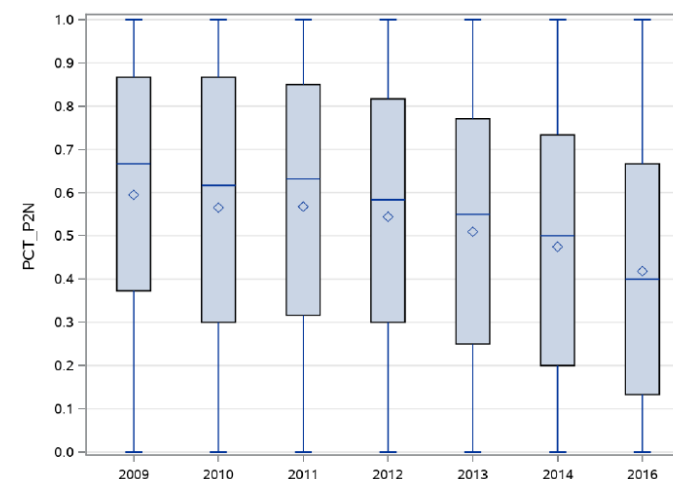
year	N Obs	10th Pctl	25th Pctl	50th Pctl	75th Pctl	90th Pctl	Std Dev	Mean
2009	977	0.08	0.37	0.67	0.87	0.97	0.31	0.59
2010	1 033	0.03	0.30	0.62	0.87	0.97	0.33	0.57
2011	1 067	0.05	0.32	0.63	0.85	0.96	0.32	0.57
2012	1 043	0.04	0.30	0.58	0.82	0.95	0.31	0.54
2013	1 020	0.03	0.25	0.55	0.77	0.93	0.31	0.51
2014	1 063	0.02	0.20	0.50	0.73	0.90	0.31	0.47
2016	1 032	0.00	0.13	0.40	0.67	0.85	0.30	0.42

Note: Patient-to-nurse-ratio (P2N) is calculated per nursing ward per observation day; general and internal medicine wards include the following nursing wards: surgical wards are wards with predominantly C-beds; internal medicine wards are wards with predominantly D-beds; mixed wards are wards with predominantly CD-beds. The year 2015 is not included in the figure since these data were not available for analysis. Outlying values are not shown in the figure.

3.4.6 Proportion of Bachelor-prepared nurses

Ward level

The average proportion of Bachelor-prepared nurses increased from 0.58 (median: 0.56) in 2009 to 0.62 (median 0.61) in 2016 (see Figure 19).

Figure 19 – Proportion of Bachelor-prepared nurses per nursing ward (general surgical and internal medicine)
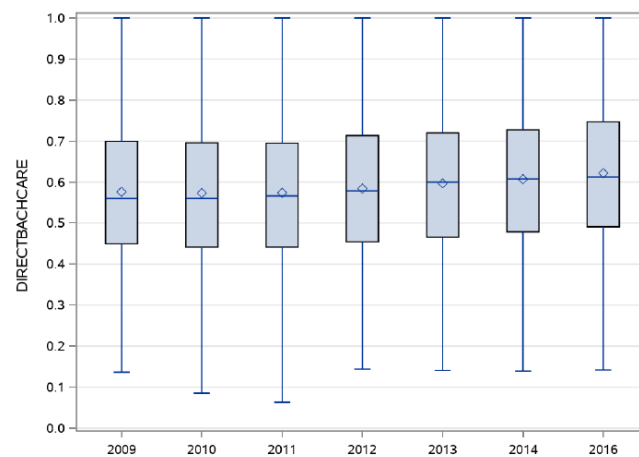
year	N Obs	10th Pctl	25th Pctl	50th Pctl	75th Pctl	90th Pctl	Std Dev	Mean
2009	977	0.34	0.45	0.56	0.70	0.82	0.19	0.58
2010	1 033	0.35	0.44	0.56	0.70	0.83	0.18	0.57
2011	1 067	0.35	0.44	0.57	0.69	0.82	0.18	0.57
2012	1 043	0.36	0.45	0.58	0.71	0.82	0.18	0.58
2013	1 020	0.37	0.47	0.60	0.72	0.83	0.17	0.60
2014	1 063	0.38	0.48	0.61	0.73	0.84	0.17	0.61
2016	1 032	0.39	0.49	0.61	0.75	0.88	0.18	0.62

Note: The proportion of Bachelor-prepared nurses (DIRECTBACHCARE) is calculated per nursing ward per year; general and internal medicine wards include the following nursing wards: surgical wards are wards with predominantly C-beds; internal medicine wards are wards with predominantly D-beds; mixed wards are wards with predominantly CD-beds. The year 2015 is not included in the figure since these data were not available for analysis. Outlying values are not shown on the figure.

Hospital level

The national average proportion of Bachelor-prepared nurses is 0.60 (ranging over hospitals from 0.35 to 0.95; P_{25}: 0.51 – P_{50}: 0.60 – P_{75}: 0.68 (see Figure 20).

Figure 20 – Proportion of Bachelor-prepared nurses at the hospital level (2016)

PERCENTAGE BACHELOR PREPARED NURSES (2016)
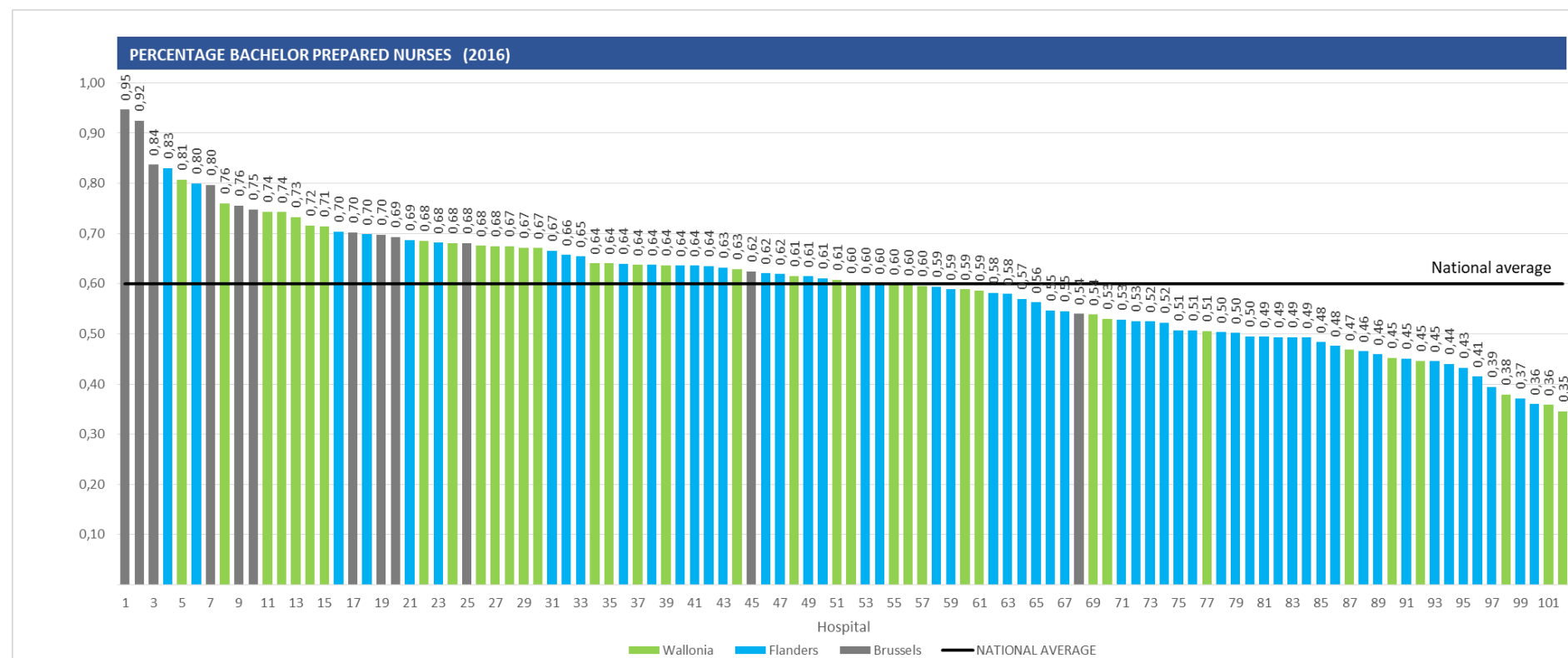
3.4.8 Supporting staff

Although supporting staff cannot be used as a substitute for nursing staff, they can alleviate the workload from nurses by shifting non-nursing tasks to supporting staff. The presence of healthcare assistants (C4PPD) and non-caring staff (C5PPD) combined forms the variable 'Supporting staff Hours per Patient Day (SHPPD) – Figure 8. For surgical and internal medicine wards there is no clear trend in SHPPD over time (Table 7).

The average SHPPD was 0.77 from 2009-2011, increased slightly in 2012 (0.79 SHPPD) and then started to drop to 0.68 SHPPD in 2016. The number of supporting staff is higher in university hospitals (0.91 SHPPD in 2016) compared to non-university hospitals (0.63 SHPPD in 2016). The level of supporting staff is also higher on weekdays (0.76 SHPPD in 2016) compared to weekends (0.45 SHPPD in 2016). During the week, the difference between university and non-university hospitals is most pronounced (Figure 21).

Table 7 – Evolution of Supporting staff Hours per Patient Day (SHPPD)

year	P₂₅	P₅₀	P₇₅	Mean
2009	0.34	0.66	1.06	0.77
2010	0.35	0.66	1.06	0.77
2011	0.35	0.66	1.05	0.77
2012	0.34	0.67	1.07	0.79
2013	0.32	0.63	1.03	0.74
2014	0.30	0.59	1.00	0.71
2016	0.26	0.56	0.98	0.68

It was assumed by the consulted experts (expert meeting of 23 September 2019) that more supporting staff is available on larger wards. This assumption was checked in the data but could not be confirmed: larger wards (measured by the average patient census in the ward during the day) are not necessarily associated with a higher proportion of supporting staff (as measured by the proportion of time for supporting staff relative to the total staffing time on the ward) in either medical or surgical wards.

Figure 21 – Supporting staff Hours per Patient Day (SHPPD) by university status * WE/weekday
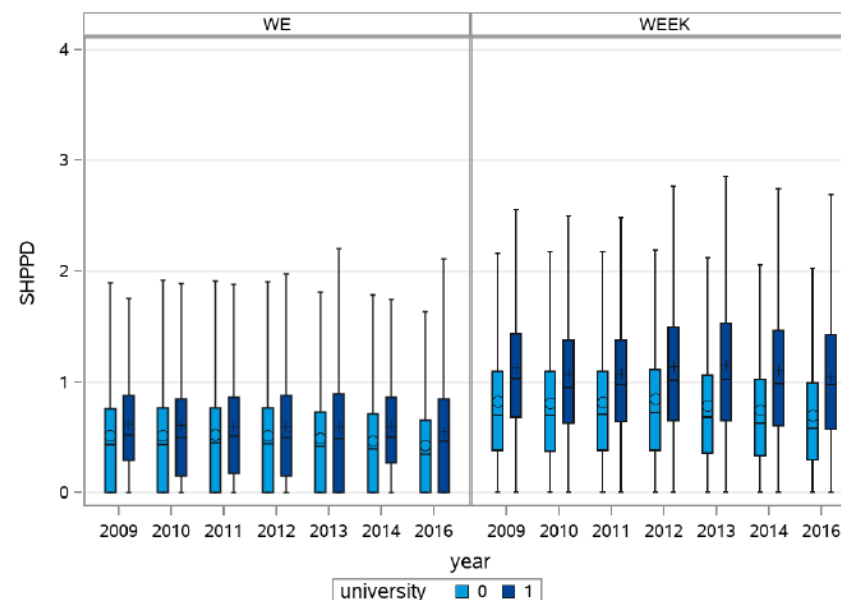
3.4.9 Regional differences

Observed regional differences in the hospital level figures (see Figure 13, Figure 15, Figure 16, Figure 17 and Figure 20) were checked for statistical significance:

- The average percentage of CIPPD (cf. Figure 13) is overall significantly different over the regions: $F_{(2,99)}=20.93$; $p<.01$ (Flanders 55%; Brussels 49.5%; Wallonia 42%). In specific, this regional significance is caused by the significant difference between Flanders (higher) and Wallonia (lower). Brussels is not significantly different from Flanders or Wallonia.

- The difference in NHPPD (cf. Figure 15) is not significantly different over the regions: $F_{(2,99)}=3.14$; $p=.05$ (Brussels 4.18; Flanders 3.88; Wallonia 3.53).

- The average percentage of CINURS (cf. Figure 16) is not significantly different over the regions: $F_{(2.28)}=3.15$; p=.06 (Flanders 0.26; Brussels 0.23; Wallonia 0.23).

- The average percentage of patient-to-nurse ratio (cf. Figure 17) is overall significantly different over the regions: $F_{(2.27)}=6.78$; p<.005 (Brussels 7.56; Flanders 7.72; Wallonia 8.90). The difference between Wallonia (higher) and Flanders ($t_{(53)}=0.34$; p<.01) is significant.

- The average percentage of proportion of bachelor-prepared nurses (Figure 20) is overall significantly different over the regions: $F_{(2.99)}=15.06$; p<.0001 (Brussels 0.75; Flanders 0.56; Wallonia 0.61). The largest regional difference exists between Brussels (higher) and Flanders (lower) and is statistically significant, as was the difference between Brussels (higher) and Wallonia (lower). The difference between Flanders and Wallonia was not statistically significant.

Table 8 – Overview ANOVA tests regional differences for resources and staffing burden

Variable	National average	Regional average			F Value	η2	P Value	Differences between regional means (confidence limits)		
		Brussels	Flanders	Wallonia				Brussels vs Flanders	Brussels vs Wallonia	Wallonia vs Flanders
CIPPD	49.93	49.5	55.0	42.4	20.93*	0.30	<.0001	-5.480	7.116	-12.597*
								(-12.354 to 1.394)	(-0.063 to 14.296)	(-17.231 to -7.962)
ⱡ CINURS	0.25	0.23	0.26	0.23	3.15	- (0.06)	0.06	0.02965	0.00045	-0.02920
								(-0.018 to 0.078)	(-0.052 to 0.053)	(-0.061 to 0.003)
ⱡ P2N	8.12	7.56	7.72	8.90	6.78*	- (0.15)	<0.005	0.16	1.34	1.18*
								(-1.0715 to 1.4)	(0.0027 to 2.7)	(0.3958 to 2.0)
Percentage Bachelor-prepared nurses	0.60	0.75	0.56	0.61	15.06*	0.23	<.0001	0.18612*	0.13580*	0.05032
								(0.10466 to 0.26757)	(0.05073 to 0.22087)	(-0.00460 to 0.10523)
NHPPD	3.79	4.18	3.88	3.53	3.14	0.06	0.05	0.3016	0.6441	-0.3425
								(-0.3458 to 0.9490)	(-0.0321 to 1.3202)	(-0.7789 to 0.0940)

sign at <0.05 level
ⱡ *variable has a significant Levene test for homogeneity of variance, consequently Welch correction for F-test and Games Howell instead of Tukey tests are reported. Ŋ2 is indicative; All tests performed on 102 hospitals in Belgium in 2016, spread over 3 regions (Brussels, Flanders, Wallonia)*

3.5 Results per ward type

This section describes the key concepts per ward type. Discussion is segmented in accordance to ward type: surgical wards, internal medicine wards, mixed wards (internal medicine and surgical), geriatric wards, rehabilitation wards and paediatric wards. Intensive care wards are discussed in a separate section (see 3.6) as they deviate both in terms of staffing levels and intensity of nursing care from the other ward types.

Figure 22 – Care Intensity per Patient Day (CIPPD) and Nursing Hours per Patient Day (NHPPD) per ward type
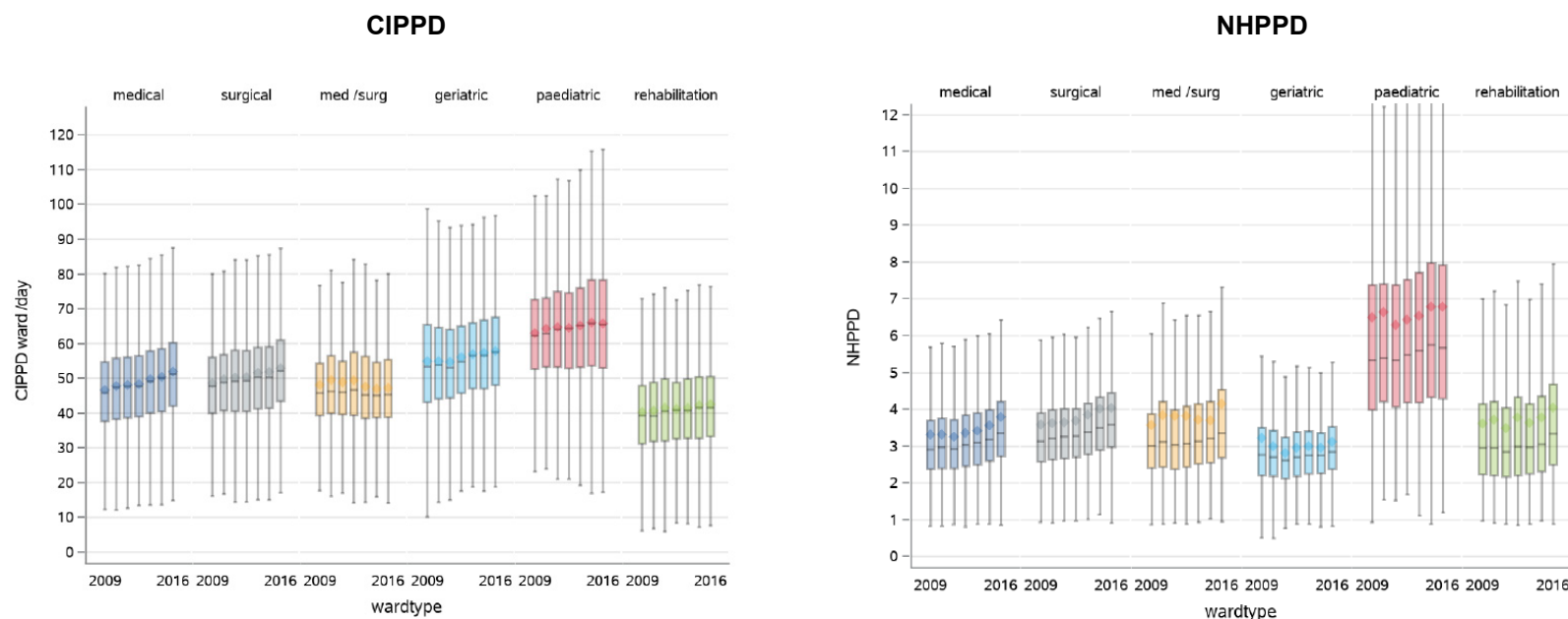
Note: CIPPD and NHPPD are calculated per nursing ward per observation day. The data are shown per ward type: medical wards (D); surgical wards (C); med/surg (CD); geriatric wards (G); rehabilitation (S1-S6; Sp); paediatric (E). The year 2015 is not included in the figure since these data were not available for analysis. Outlying values are not shown in the figure.

Nurse staffing levels and care intensity

On average, the CIPPD as well as the NHPPD increased for all ward types, except for mixed wards (see Figure 23 and Table 9). In addition, the following observations can be made:

- The average NHPPD and CIPPD on paediatric wards are higher compared to other ward types. The relative care intensity compared to nurse staffing on paediatric wards is on average (0.20 CINURS in 2016) lower than on most other ward types (ranging from 0.24 on mixed wards to 0.35 on geriatric wards).

- On ward types with a higher (average) NHPPD, also a higher (average) CIPPD can be observed. This observation does not count for geriatric wards where the average of 57.89 CIPPD (in 2016) is higher than on most other ward types (except for paediatric care). As a consequence the care intensity relative to staffed nursing hours on geriatric wards is higher than on most wards. When adding 'healthcare assistants' to the staffed hours, the differences between geriatric wards and other wards still exist but become smaller. This implies that geriatric wards make more use of healthcare assistants than other ward types.

- The ADT per patient day increases over time (see Figure 23). The ADT per patient day is the highest on paediatric wards followed by surgical wards. On rehabilitation and geriatric wards the ADT per patient day is low.

Figure 23 – Admissions-Discharges-Transfers per patient day
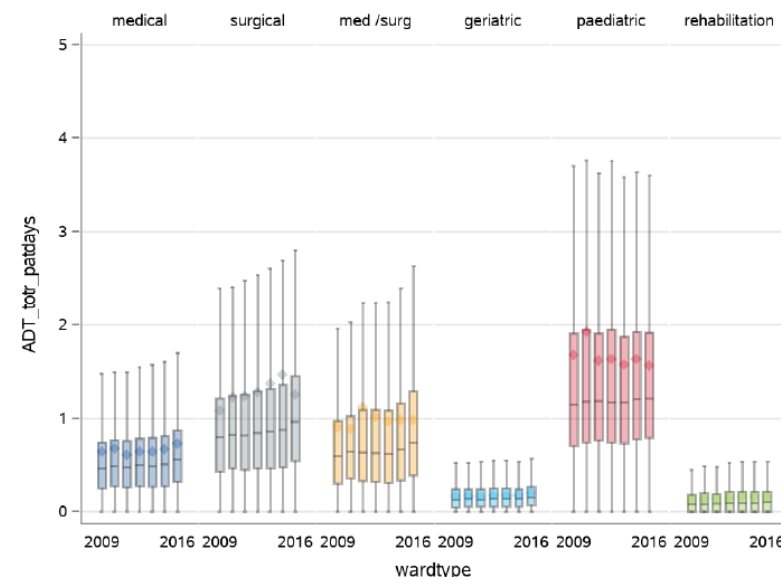
Note: ADT is calculated per nursing ward per observation day. The data are shown per ward type: medical wards (D); surgical wards (C); med/surg (CD); geriatric wards (G); rehabilitation (S1-S6; Sp); paediatric (E). The year 2015 is not included in the figure since these data were not available for analysis. Outlying values are not shown in the figure.

Table 9 – CIPPD – NHPPD – CINURS per ward type (2009 and 2016)

	Average CIPPD (P25- P75)		Average NHPPD (P25- P75)		Average CINURS (P25- P75)	
	2009	**2016**	**2009**	**2016**	**2009**	**2016**
Medical	46.67 (37.62-54.66)	51.94 (42.05-60.26)	3.33 (2.36-3.69)	3.79 (2.73-4.21)	0.27 (0.20-0.33)	0.26 (0.19-0.31)
Surgical	48.59 (39.98-56.01)	52.95 (43.42-60.97)	3.59 (2.59-3.91)	4.04 (2.96-4.45)	0.26 (0.19-0.32)	0.25 (0.19-0.30)
Mixed	48.13 (39.34-54.30)	47.22 (38.81-55.35)	3.56 (2.41-3.87)	4.14 (2.69-4.54)	0.26 (0.20-0.32)	0.23 (0.15-0.30)
Geriatric	54.90 (43.12-65.39)	57.89 (48.05-67.55)	3.22 (2.21-3.51)	3.11 (2.36-3.53)	0.34 (0.24-0.42)	0.35 (0.25-0.42)
Paediatric	62.98 (52.72-72.64)	65.77 (52.98-78.28)	6.50 (3.98-7.38)	6.79 (4.29-7.92)	0.21 (0.13-0.27)	0.20 (0.12-0.26)
Rehabilitation	40.34 (31.19-47.88)	42.53 (33.29-50.50)	3.62 (2.23-4.14)	4.04 (2.50-4.68)	0.24 (0.14-0.31)	0.22 (0.14-0.29)

Patient-to-nurse ratio

In Figure 24 the patient-to-nurse ratio is depicted per ward type (left panel). In addition, the proportion of days with a patient-to-nurse ratio higher than 8 is shown (right panel).

Figure 24 – Patient-to-nurse ratio per ward type
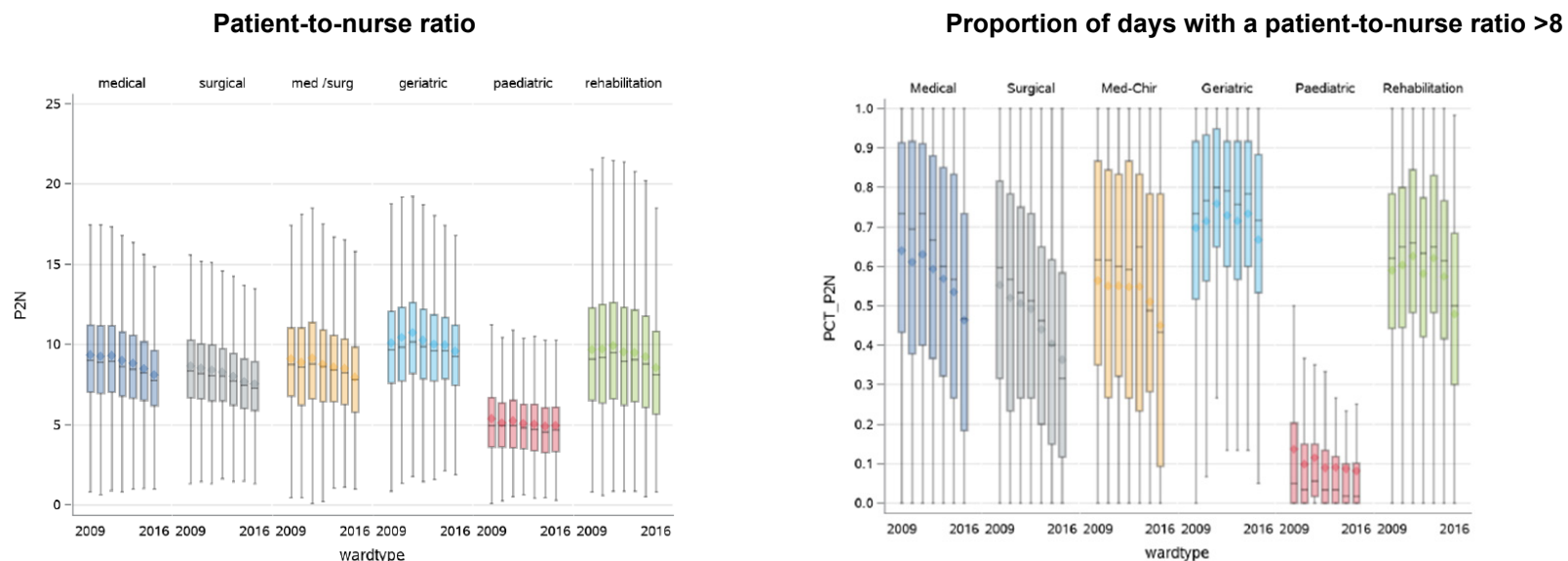
	Average patient-to-nurse ratio (P$_{25}$-P$_{50}$)		Average proportion of days with a patient-to-nurse ratio >8 (P$_{25}$-P$_{50}$)	
	2009	**2016**	**2009**	**2016**
Medical wards	9.39 (7.07-11.23)	8.14 (6.17-9.64)	0.64 (0.43-0.91)	0.46 (0.18-0.73)
Surgical wards	8.66 (6.69-10.25)	7.56 (5.88-8.93)	0.55 (0.32-0.82)	0.36 (0.12-0.58)
Mixed wards	9.09 (6.80-11.06)	7.97 (5.82-9.84)	0.56 (0.35-0.87)	0.45 (0.09-0.78)
Geriatric wards	10.09 (7.58-12.06)	9.60 (0.43-0.65)	0.70 (0.52-0.92)	0.67 (0.53-0.88)
Paediatric wards	5.36 (3.61 -6.68)	4.93 (3.33-6.12)	0.14 (0.00-0.20)	0.08 (0.00-0.10)
Rehabilitation wards	9.68 (6.52-12.29)	8.57 (5.67-10.82)	0.59 (0.44-0.78)	0.48 (0.30-0.68)

The results indicate that:

- Patient-to-nurse ratios decrease over time as well as the proportion of days with patient-to-nurse ratios >8. The decrease in the proportion of days with unsafe staffing is most pronounced on surgical wards (and very small for paediatric wards);

- In line with what is expected based on the NHPPD-results, the patient-to-nurse ratios are the lowest for paediatric wards and the highest for geriatric wards;

- The patient-to-nurse ratios vary within in each ward type;

- On each ward type there are nursing wards with staffing levels that can be considered as unsafe (> 8 patients per nurse[o]). This proportion of days with unsafe staffing is the lowest on paediatric wards (in 2016 an average proportion of 0.08 or 8 on 100 days) and the highest on geriatric wards (in 2016 an average proportion of 0.67 or 67 on 100 days).

Proportion of Bachelor-prepared nurses

In Figure 25 the proportion of Bachelor-prepared nurses is depicted per ward type. The data indicate that:

- Over time and for all ward types the proportion of Bachelor-prepared nurses increases;

- The proportion of Bachelor-prepared nurses is the highest on paediatric wards[p] (average of 0.92 in 2016) and the lowest on geriatric (average of 0.54 in 2016) and rehabilitation wards (average of 0.51 in 2016);

- There is considerable variation across nursing wards. The variation is the lowest on the ward types with a high proportion of Bachelor-prepared nurses (paediatric wards and intensive care wards).

---

[o]   The NICE-guideline is less strict stating that 8 patients per nurse is harmful when present during day-time hours.

[p]   Except intensive care wards.

Figure 25 – Proportion of Bachelor-prepared nurses per ward type
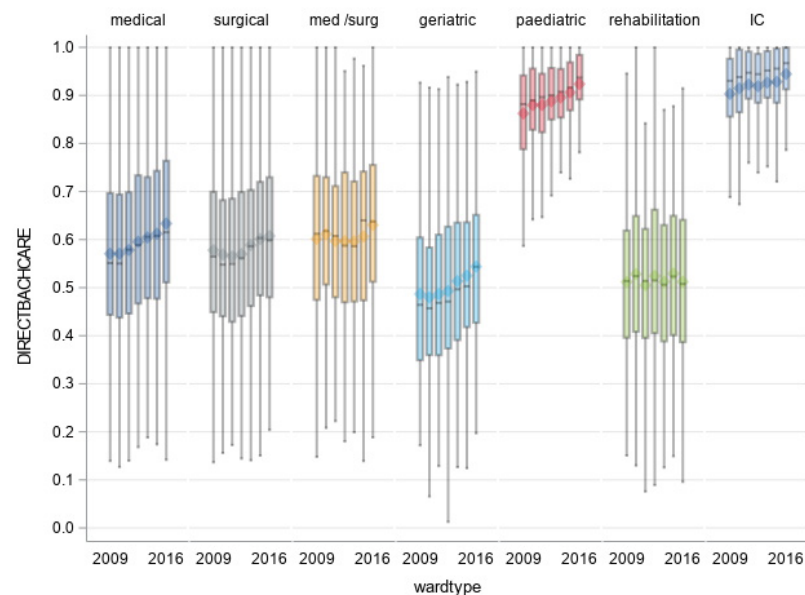
Mean proportion of Bachelor-prepared nurses (P_{25}- P_{75})		
	2009	**2016**
Medical wards	0.57 (0.44-0.70)	0.63 (0.51-0.76)
Surgical wards	0.58 (0.45-0.70)	0.61 (0.48-0.73)
Mixed wards	0.60 (0.47-0.73)	0.63 (0.51-0.76)
Geriatric wards	0.49 (0.35-0.60)	0.54 (0.43-0.65)
Paediatric wards	0.86 (0.79 -0.94)	0.92 (0.89-0.98)
Rehabilitation wards	0.51 (0.40-0.62)	0.51 (0.39-0.64)
Intensive care wards	0.90 (0.86-0.98)	0.94 (0.91-1.00)

Supporting staff

It is clear that the level of supporting staff is the highest on geriatric wards (steadily decreased from 1.14 SHPPD in 2009 to 0.91 SHPPD in 2016), rehabilitation wards (steadily decreased from 1.27 SHPPD in 2009 to 1.07 SHPPD in 2016) and paediatric wards (steadily decreased from 1.06 SHPPD in 2009 to 0.92 SHPPD in 2016).

The level of support staff is lower on surgical wards (0.74 SHPPD in 2009 and 0.67 SHPPD in 2016) and medical wards (0.78 SHPPD in 2009; 0.67 SHPPD in 2016). On weekdays, there seems to be more supporting hours available for medical and surgical wards in university hospitals than in general hospitals (Figure 28).

When looking at the healthcare assistants (C4PPD) and non-caring staff (C5PPD) separately, C5PPD seems more typical for paediatric wards, whereas C4PPD seems more typical for geriatric and rehabilitation wards (Figure 27).

Figure 26 – Evolution SHPPD (supporting staff hours) per ward type
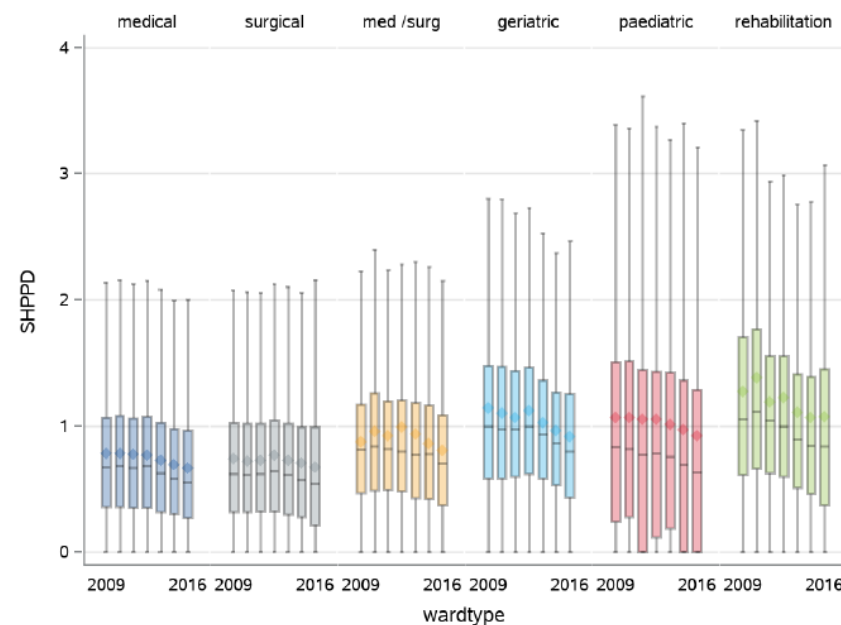
Figure 27 – Evolution of C4HPPD (healthcare assistants) & C5HPPD (supporting staff) per ward type
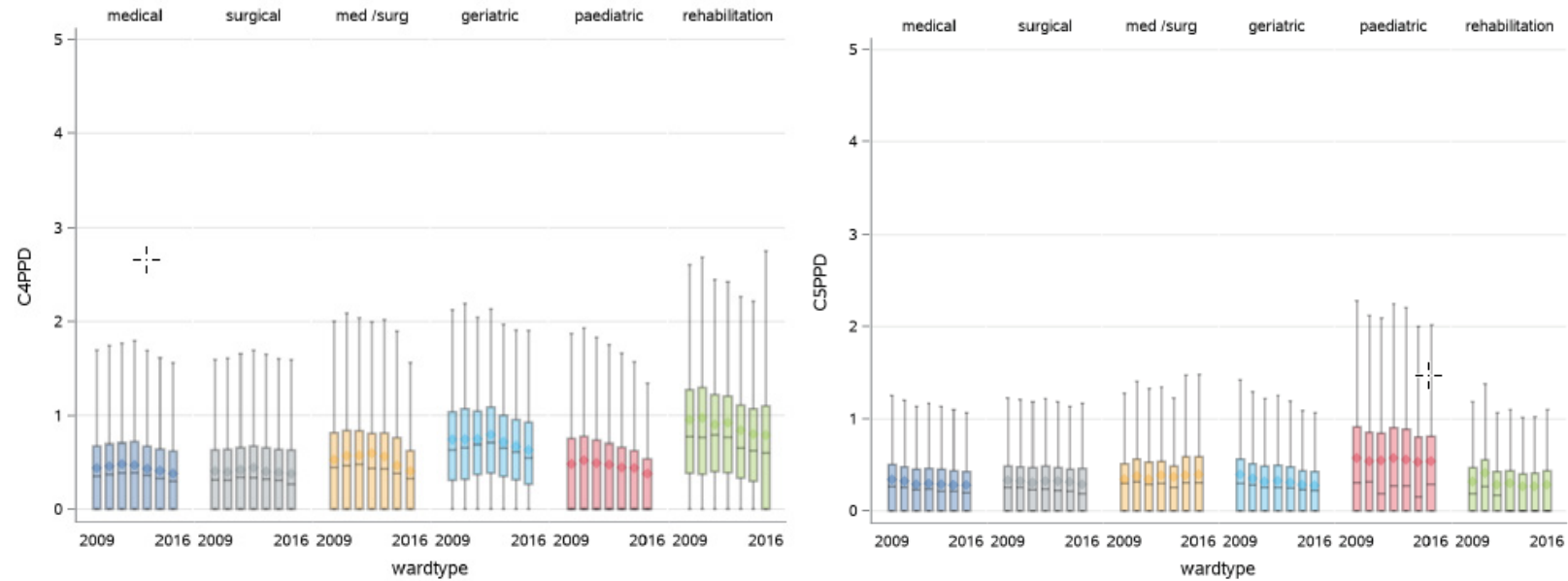
Figure 28 – SHPPD on weekdays and weekends per ward type and university status (2016)
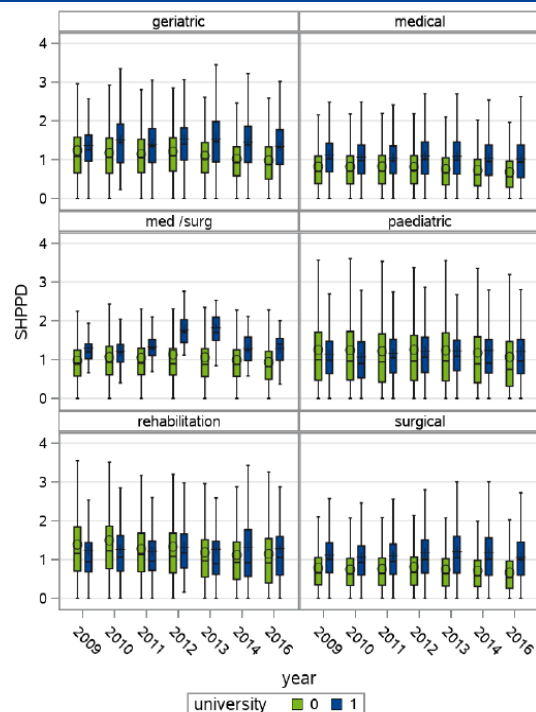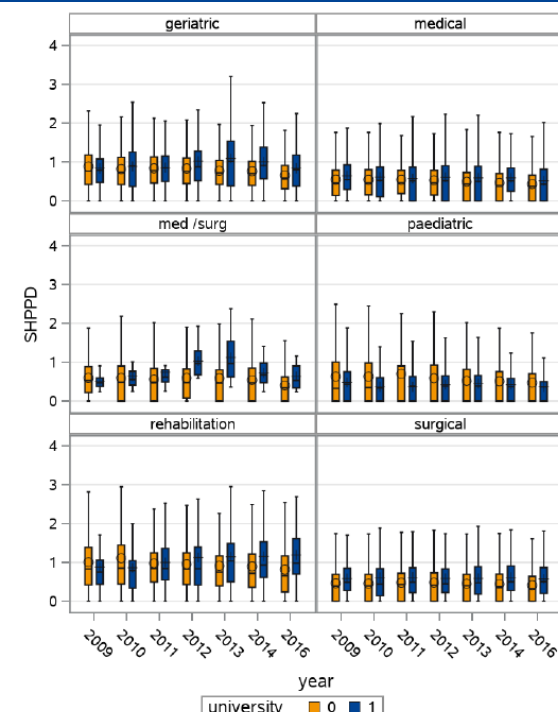
Note: Medical/surgical wards tend to occur more in general hospitals, and less so in university hospitals. In specific: in 2009, 2010 and 2011 there were only 2 university hospitals with medical/surgical wards. From 2012 – 2016 there is only one university hospital with medical/surgical wards. As a result, comparisons between university and general hospitals for medical/surgical wards tend to be extremely tentative due to sparse data.

Total Hours per Patient Day

The average THPPD is the highest on paediatric wards and the lowest on geriatric wards (Table 10).

Table 10 – Total Hours per Patient Day (THPPD) for 2009 and 2016, per ward type

category	year	P25	P50	P75	Std Dev	Mean
geriatric	2009	3.13	3.80	4.71	5.05	4.36
geriatric	2016	3.10	3.71	4.54	2.04	4.03
medical	2009	3.01	3.64	4.51	2.61	4.11
medical	2016	3.27	3.98	4.95	2.59	4.45
medical_surgical	2009	3.20	3.83	4.90	2.33	4.44
medical_surgical	2016	3.32	4.11	5.43	2.90	4.95
paediatric	2009	4.75	6.31	8.67	6.22	7.56
paediatric	2016	4.85	6.52	8.98	4.92	7.71
rehabilitation	2009	3.13	4.10	5.73	2.81	4.88
rehabilitation	2016	3.22	4.26	5.97	3.11	5.12
surgical	2009	3.18	3.81	4.68	3.65	4.33
surgical	2016	3.50	4.20	5.20	2.53	4.71

3.6 Intensive care wards

It is clear from Figure 29 that both the intensity of nursing care and the nurse staffing levels on intensive care wards are higher compared to all other ward types. In fact, in 2016 the average CIPPD was 146.6 points (Figure 29) compared to an average ranging from 42.5 points on rehabilitation wards to 66 points on paediatric wards (see Figure 22). The intensity of nursing care on intensive care wards seems to increase over time (from an average of 114 points in 2009 towards an average of 146.6 points in 2016). The variability of CIPPD across intensive care wards is substantial (e.g. for the year 2016, P_{25}: 123 points – P_{75}: 171 points) but stable over time.

Patient turnover (ADT per patient day) is on average 0.74 (median 0.63) in 2016 (Figure 30) which is lower than on internal medicine and surgical wards (Figure 23).

Also the NHPPD (in 2016: average of 18.27 NHPPD) from intensive care wards (Figure 29) are substantially higher than on all other ward types (ranging from 3.11 on geriatric wards to 6.79 on paediatric wards) (see Figure 22). The average NHPPD on intensive care wards increased slightly from 17.68 NHPPD in 2009 (median of 14.77) towards 18.27 NHPPD in 2016 (median of 15.49). The variability across wards is substantial (in 2016: P_{25} of 12.22 NHPPD; P_{75} of 20.73 NHPPD).

When considering the intensity of nursing care relative to the staffed hours it seems that there is not much evolution over time (average of 0.17 in 2009 versus 0.16 in 2016). Compared to other ward types this is quite low (2016 average values per ward type: 0.26 on medical wards; 0.25 on surgical wards; 0.23 on mixed medical/surgical wards; 0.35 on geriatric wards; 0.22 on rehabilitation wards). This can be, partly, explained by the importance of 24/7 availability even if 'activity on the IC ward is lower'.

The average SHPPD (supporting staff: both healthcare assistants and non-caring staff) was 0.97 in 2009 and in 2016. The THPPD (total hours per patient day: NHPPD + SHPPD) was on average 18.65 in 2009 and 19.24 in 2016.

The proportion of Bachelor-prepared nurses on intensive care wards is higher compared to other wards (average in 2016 of 0.94; see Figure 25).

Figure 29 – Care Intensity per Patient Day (CIPPD) for intensive care wards
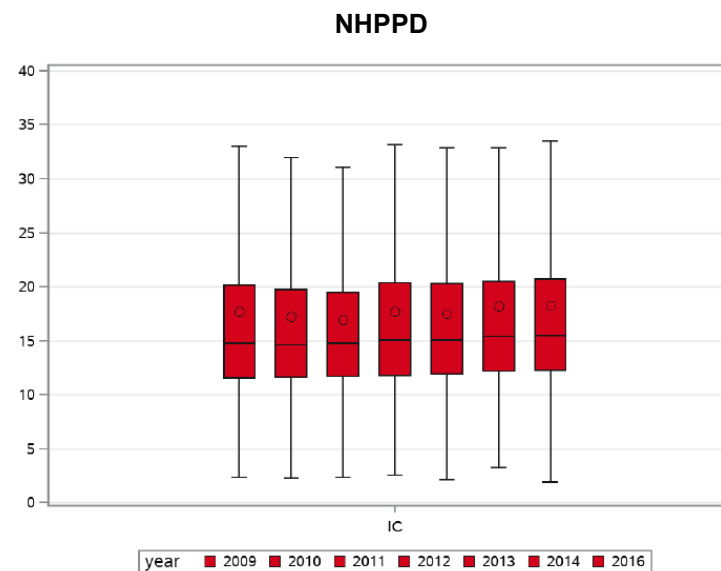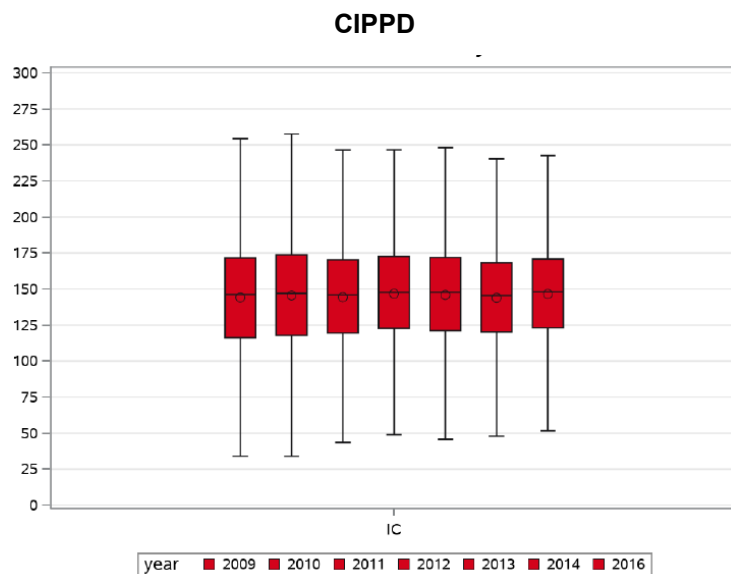
Note: CIPPD and NHPPD are calculated per nursing ward per observation day. IC: intensive care wards (I). The year 2015 is not included in the figure since these data were not available for analysis. Outlying values are not shown in the figure.

Figure 30 – Admissions-Discharge-Transfers per patient day (ADT) for intensive care wards
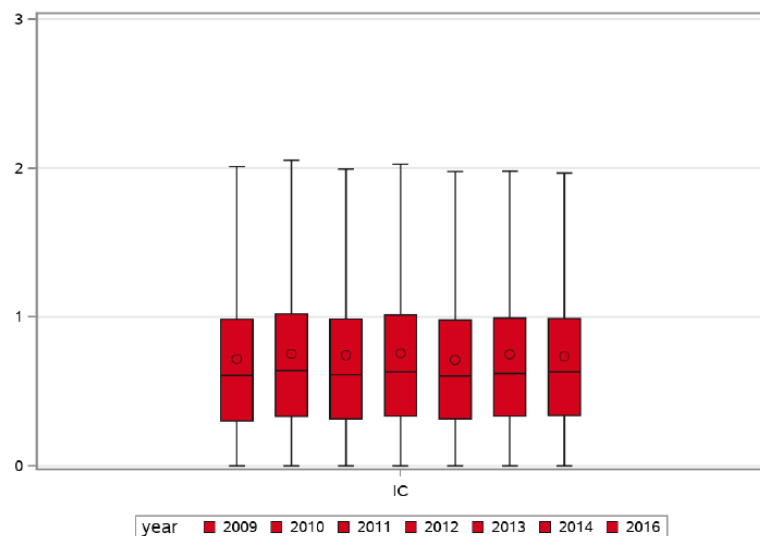
3.7 Care intensity for a selection of pathology groups

3.7.1 Background on evolution in intensity per patient day

Two findings in KCE report 289 indicate that care intensity on a given patient day may have changed over time.[139] First, there was *an important reduction in the average length of stay (ALOS)* in the hospital for inpatient stays between 2002 and 2014. This evolution was not uniform across pathologies and was more pronounced for surgical than medical procedures with a shortening of ALOS of -16.6% and -14.9%, respectively. Shorter ALOS may contribute to an intensification of nursing care (compression of nursing care) on the days patients stay in the hospital as the period in which nursing care can be administered is reduced. Second, there was a *shift of treatment from inpatient care to day care* for certain pathologies, especially at lower levels of severity of illness. This implies that patient acuity and care intensity in the inpatient setting might have increased over time.

A decrease in length of stay: less time to perform activities

Figure 31 and Figure 32 present the evolution in LOS between 2009 and 2014 for the selected surgical and medical DRGs, respectively. The figures indicate the inverse cumulative density of length of stay (LOS) by DRG, i.e. the fraction of stays with a LOS above the value specified on the horizontal axis. If the red line (2014) is below [above] the green line (2009), stays in 2014 are shorter [longer] than in 2009. The boxplot indicates the distribution of LOS for 2009 and 2014. The N in the upper right corner indicates the number of inpatient stays per DRG by year.

There was a reduction in LOS between 2009 and 2014 for all APR-DRGs. The shortening in LOS was, however, neutralized for cardiac valve procedures (APR-DRG 163) and heart failure (APR-DRG 194) and tempered for COPD (APR-DRG 140) by a shift in inpatient stays with low severity (and shorter LOS) to high severity (and longer LOS). Therefore, no reduction in LOS is found for APR-DRG 163 and 194 in Figure 31 and Figure 32. Yet, this changing case-mix may also have an impact on the intensity of nursing care.

Three pathology groups – hernia procedures (APR-DRG 228), laparoscopic cholecystectomy (APR-DRG 263) and bronchiolitis, RSV, pneumonia (APR-DRG 138) – have an average length of stay below 5 in 2009. Nonetheless, a reduction in LOS is realized for all three APR-DRGs. For APR-DRG 138, the shortening of LOS is especially realized for higher severity patients. For APR-DRGs 228 and 263, the reduction is partially the result of a shift from inpatient care to day care for low severity patients (see below).

The decrease in LOS has a direct effect on the organisation of care in the hospital. For surgical procedures, an important element is the **time of operation**. For inpatient cardiac valve procedures (APR-DRG 163), the

operation[q] is generally performed on day 1 (i.e. the day after admission). The fraction of operations on day 0, 1 and 2 was, respectively, 17%, 61% and 10% in 2010[r] compared to 15%, 68% and 5% in 2014. For inpatient hernia procedures (APR-DRG 228), surgery is generally performed on the day of admission. The reduction in LOS has further increased this practice, with 77% of surgeries on the day of admission in 2010 compared to 84% in 2014. Surgery for inpatient laparoscopic cholecystectomy (APR-DRG 263) takes place on the day of admission or the first day after admission, with a fraction of surgeries of 65% and 24%, respectively, in 2010 and of 69% and 19% in 2014. Finally for knee joint replacements (APR-DRG 302), surgery generally takes place on the day after admission, although this is shifting to surgery on the day of admission. In 2010, 33% and 65% of the surgeries took place on, respectively, the day of admission or the first day after admission, while in 2014 the fractions were 42% and 57%.

---

[q] Operation is defined as the first time a patient is transferred to the operating theatre during its hospital stay.

[r] 2010 is used as the registration of dates in the operating theatre was subject to exceptions in 2009.

Figure 31 – Evolution in length of stay (LOS) for selected surgical DRGs
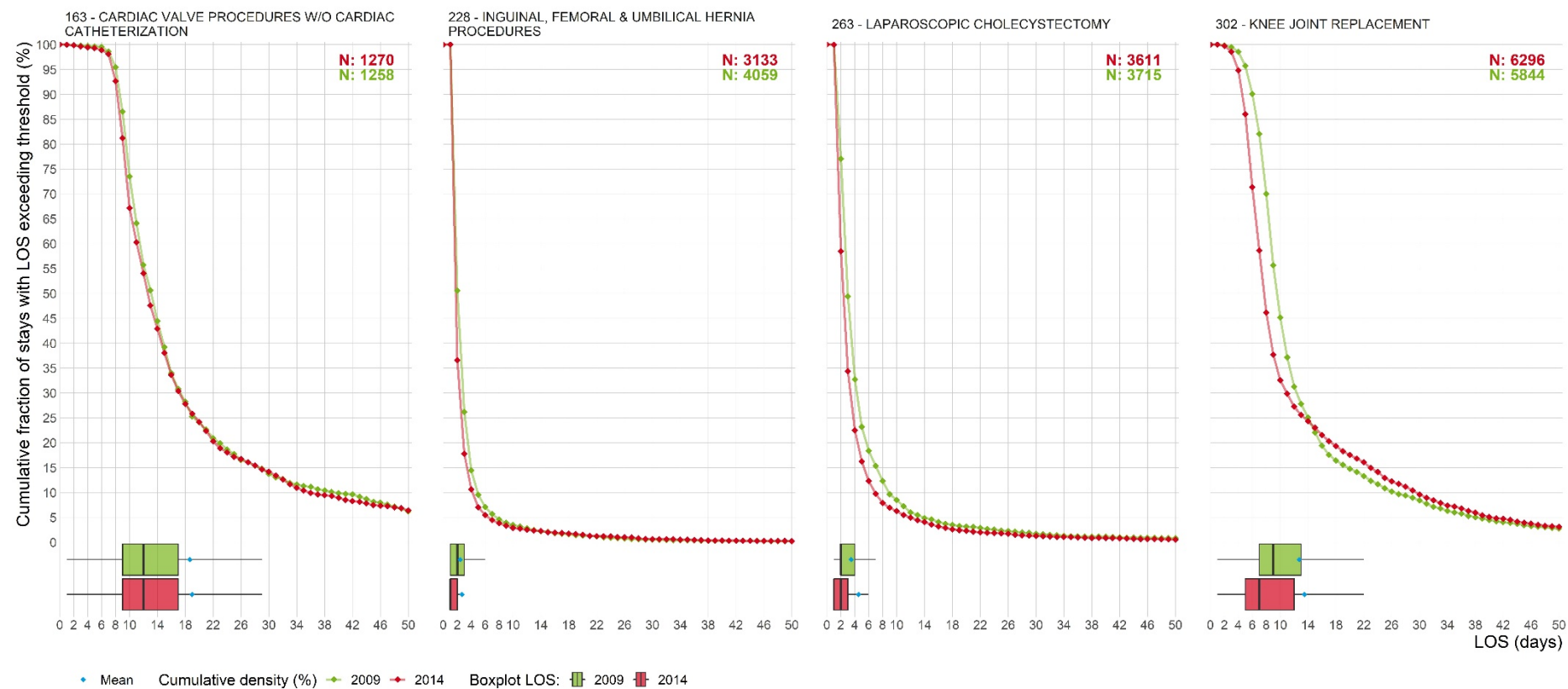
Figure 32 – Evolution in length of stay (LOS) for selected medical DRGs
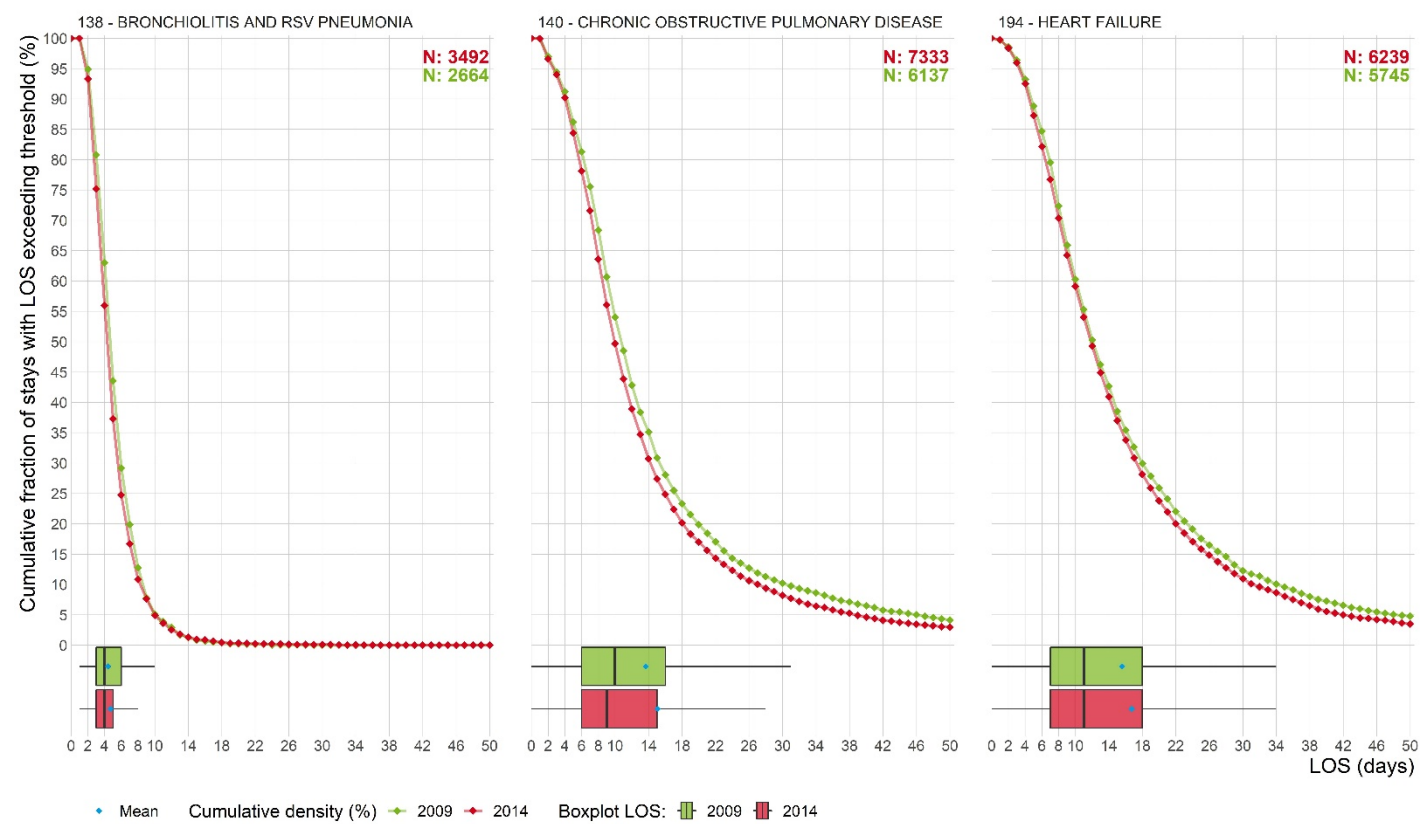
Shift to day care for less complex cases can cause a higher severity for cases that remain in the inpatient setting

Table 11 provides information on the evolution of number of stays (inpatient and day care combined) and the fraction day-care activity by DRG over the period 2009-2014. An increase in activity is observed for the three selected medical DRGs, but only minor changes in the fraction day care. Diverging trends in activity are found for the selected surgical DRGs. There was an upward trend in activity for knee joint replacements (APR-DRG 302), a downward trend for hernia procedures (APR-DRG 228) and a stable evolution for cardiac valve procedures without catheterization (APR-DRG 163) and laparoscopic cholecystectomy (APR-DRG 263). For APR-DRGs 228 and 263, there was an important shift towards more day-care procedures. The reduction in total stays in combination with an increase in the fraction of day care for APR-DRG 228 indicates a strong decline in inpatient activity and hence a potential increase in patient acuity in inpatient wards. Predominantly low severity patients contribute to the important increase in inpatient stays for APR-DRG 302, potentially reducing the required nursing care.

Table 11 – Evolution in the number of stays by DRG and the fraction day-care activity

Medical or Surgical	APR-DRG		2009	2010	2011	2012	2013	2014
Medical	138 – Bronchiolitis, RSV, Pneumonia	N stays	2671	2978	3504	3440	3558	3521
		% day care	0.3%	0.4%	0.6%	0.3%	0.4%	0.8%
	140 – Chronic Obstructive Pulmonary Disease (COPD)	N	6233	6989	7066	7702	7572	7417
		% day care	1.5%	1.6%	1.7%	1.2%	1.1%	1.1%
	194 – Heart failure	N	5763	6180	6032	5930	6080	6267
		% day care	0.3%	0.4%	0.6%	0.5%	0.5%	0.4%
Surgical	163 – Cardiac valve procedures without cardiac catheterization	N	1258	1248	1304	1255	1242	1270
		% day care	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
	228 – Inguinal, femoral and umbilical hernia procedures	N	5504	5768	5564	5745	5333	5116
		% day care	26.3%	29.2%	29.5%	33.1%	36.9%	38.8%
	263 – Laparoscopic cholecystectomy	N	3800	4121	4150	4156	3967	3796
		% day care	2.2%	3.0%	3.0%	3.5%	4.1%	4.9%
	302 – Knee joint replacement	N	5849	6156	6252	6224	6266	6297
		% day care	0.1%	0.1%	0.0%	0.0%	0.0%	0.0%

3.7.2 Evolution in intensity by relative day

The evolution in care intensity by relative day is the result of different effects, which have been discussed above: shortening of LOS, shift in patient's severity of illness, shift to day care, and change in time of the operation for surgical procedures. The different effects – which sometimes go in opposite directions and neutralise each other – influence the evolution in care intensity by relative day, visualized in Figure 33 for surgical APR-DRGs and in Figure 34 for medical APR-DRGs.

Overall, an increase in care intensity by relative day is observed except for bronchiolitis, RSV, pneumonia (APR-DRG 138) and knee joint replacements (APR-DRG 302).

When looking more into detail at the surgical procedures, there is a clear effect of advancing the time of operation. Care intensity on day 0 and 1 increases for APR-DRG 163 and on day 0 for APR-DRG 263 and 302. For APR-DRG 163, also an increase in the intensity of care in day after operation (day 2) is observed. For APR-DRGs 163, 228 and 263, the increase in patient acuity (see above) and reduction in LOS is visible in the higher care intensity towards the end of the stay. For knee joint replacements, the potentially higher care intensity related to the reduction in LOS is countered by the inflow of low severity patients who have a downward effect on the average care intensity. This downward effect is especially visible in the first days of the admission, which makes sense given that the median LOS for low severity patients (severity of illness 1 or 2) is 9 in 2009 and 7 in 2014.

When looking more into detail at the medical procedures, it is clear that not much has changed on the day of admission. For bronchiolitis, RSV, pneumonia (APR-DRG 138), there is almost no evolution in care intensity. This is not surprising given the short LOS in 2009 and the minor reduction in LOS over time. For COPD (APR-DRG 140) and heart failure (APR-DRG 194), an important increase in care intensity is observed, related to both a reduction in LOS and a shift towards patients with a higher severity of illness.

Figure 33 – Comparison CIPPD by relative day for selected surgical APR-DRGs in 2009 and 2014

Mean intensity (range: 95% CI) · 2009 · 2014
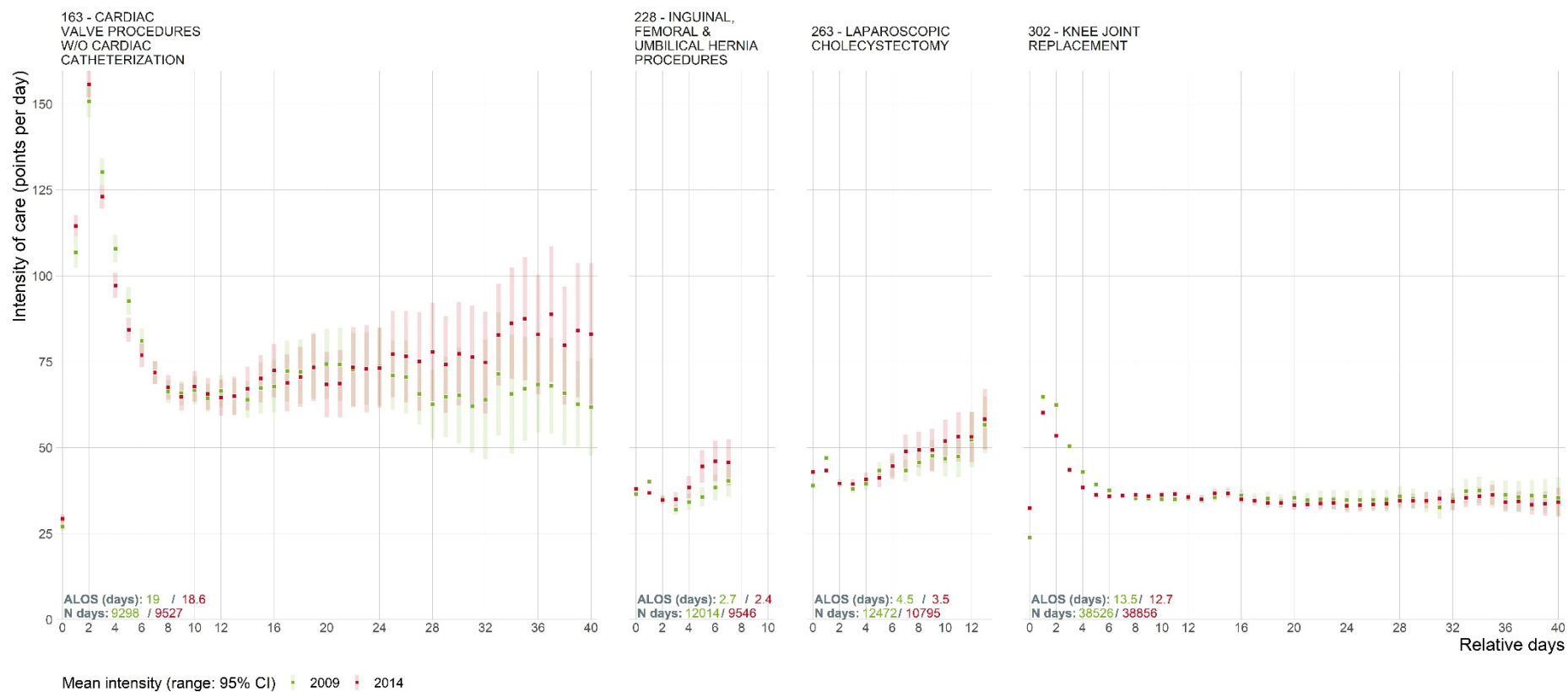
Figure 34 – Comparison CIPPD by relative day for selected medical APR-DRGs in 2009 and 2014
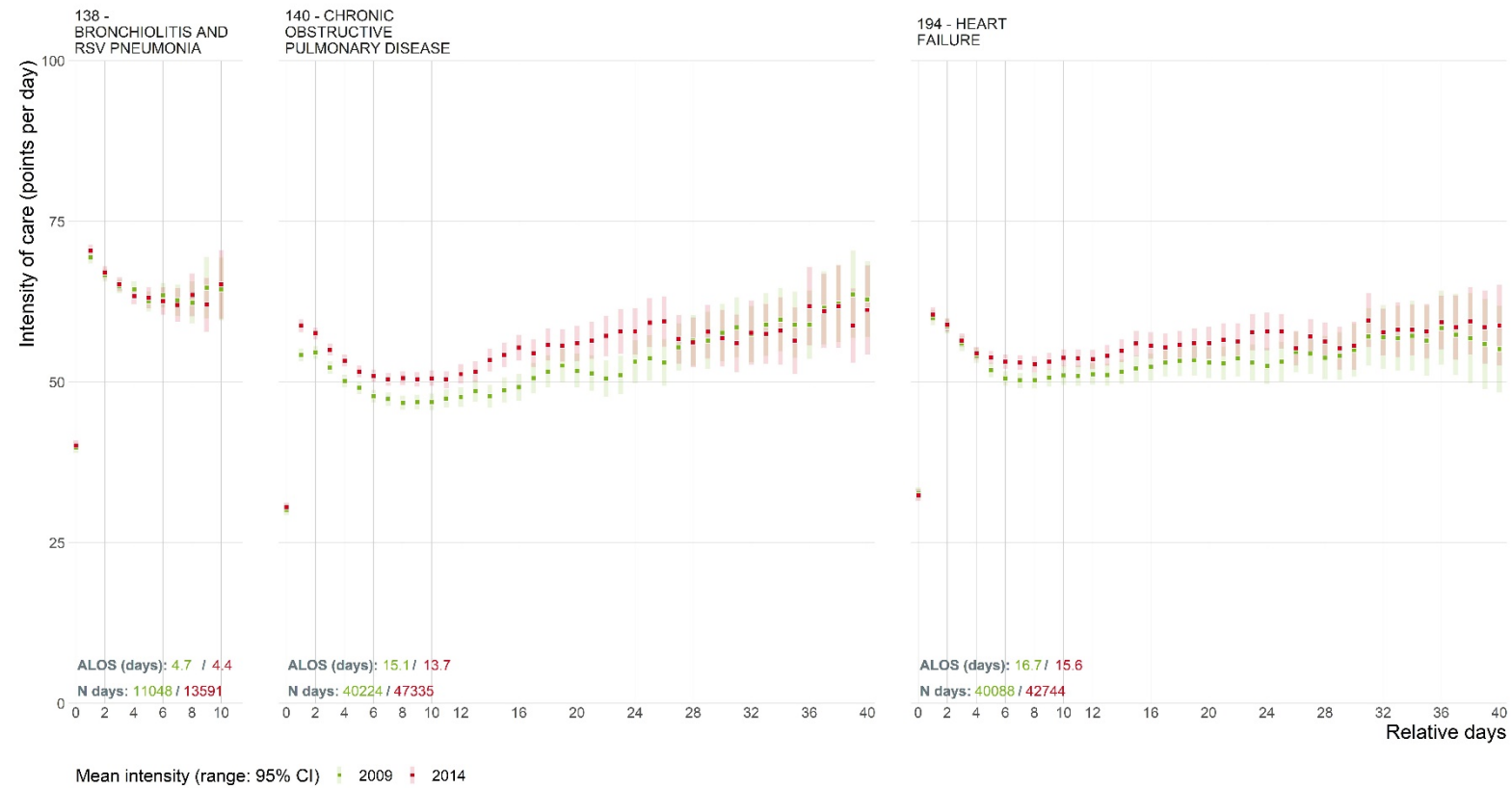
3.8   Key points

Available data

- Belgium has a long tradition with collecting data about nursing activities and nurse staffing with huge potential applications in the domain of staffing. To use the B-NMDS in staffing decisions, the items (nursing activities) need to be calibrated in function of 'the time required to perform them'. Several systems exist to do this. After testing the robustness it was decided to work with the 'KCE-point system' for a selection of 55 B-NMDS II items. These KCE-points concern 'care intensity points' per item and response category where 1 point corresponds with ± 5 minutes. A limitation is that the B-NMDS measures the activities that are actually performed and not the 'required activities'. As such it is possible that both undercare (e.g. care left undone because workload is too high) and overcare (e.g. unnecessary interventions) have an effect.

General surgical and internal medicine wards

- At the hospital level, in 2016, the Nursing Hours per Patient Day (NHPPD) vary between 2.34 and 7.4 with an average of 3.79 NHPPD. Over time a slight increase in NHPPD (ward level – per observation day) can be observed: the average increased from 3.46 NHPPD in 2009 to 3.92 NHPPD in 2016. The NHPPD are higher on weekdays compared to weekend days and in university hospitals compared to general hospitals. When the ward managers' time is deduced from the NHPPD, there is virtually no difference between weekend and weekdays anymore.

- In 2016 the *hospital level* points varied from 21 CIPPD to 76 CIPPD with an average of 49.93 CIPPD. The average CIPPD at the ward level increased slightly over time: from 47.64 CIPPD in 2009 to 52.02 CIPPD in 2016. The CIPPD is higher on weekdays compared to weekend days and in university hospitals compared to general hospitals. The average admission-discharge-transfers per patient day (ADT) increased from 0.86 in 2009 to 0.98 in 2016. The ADT is higher on week- compared to weekend days.

- The care intensity points relative to the nurse staffing hours (CINURS) is on average 0.25 (ranging from 0.12 to 0.40). *Over time* the care intensity relative to the staffed nursing hours remained practically unchanged. This does not mean that staffing levels are adequate or optimal. It merely indicates that the evolution in nurse staffing followed the evolution in intensity of nursing care. The same holds for differences between university and general hospitals and between week- and weekend days. Note that when a correction for ward managers' time on weekdays is made, the intensity of care on weekdays is relatively higher to staffed nursing hours compared to weekend days. Combined with a higher ADT, the workload on weekdays can be considered higher compared to weekend days.

- In 2016, at the *hospital level*, the patient-to-nurse ratio (P2N) is on average 8.12 (ranging from 4.63 to 12.2). The average caseload (per *nursing ward*, and observation day) decreased from 9.04 patients per nurse in 2009 towards 7.87 patients per nurse in 2016. Yet in 2016, still 50% of the nursing wards had at least 4 on 10 days what can be considered as unsafe staffing levels (>8 patients per nurse).

- In 2016 the average proportion of Bachelor-prepared nurses, at the *hospital level,* was 0.60 (ranging from 0.35 to 0.95). *Over time* a slight increase can be observed at the ward level: the average increased from 0.58 Bachelor-prepared nurses in 2009 to 0.62 in 2016.

General observations for intensive care ward and other hospital wards

- All ward types follow, in general, the same trends as general internal medicine and surgical wards. Intensive care wards have substantially higher NHPPD and CIPPD. On general hospital wards the CIPPD and NHPPD are the highest for paediatric wards. NHPPD seem to follow differences in CIPPD across ward types. As a result the average CINURS (estimate of workload) is quite similar for all ward types. Geriatric wards seem to be an exception where the gap between NHPPD and CIPPD is the largest.

- Patient turnover is increasing on all ward types but remains relatively low on geriatric and rehabilitation wards.

- The proportion of Bachelor-prepared nurses is increasing on all ward types with the lowest proportion on rehabilitation and geriatric wards.

Care intensity – pathology groups

- Overall, an increase in care intensity by relative day is observed.

- The changes in care intensity on the 'relative days' of a hospital stay differ between pathology groups. For some surgical procedures the peak in intensity comes sooner after admission suggesting that the pre-surgery pathway during the hospitalization period is shortened.

4 NURSE STAFFING IN HOSPITALS: THE BELGIAN PAYMENT SYSTEM

Nurse staffing levels in Belgian hospitals depend to a large extent on the way hospitals are financed. One of the major critiques on the hospital payment system is that the closed-end budget is not sufficient to cover current staffing numbers, which are already low in international terms. Another critique is that the criteria to calculate sub-budgets and to allocate these budgets to individual hospitals lack transparency. A third critique is that there is no link between the payment and its destination.[3]

In this chapter we describe the main financing sources for nursing staff and assess whether the abovementioned critiques are justified.

4.1 Hospital revenue sources

Hospitals receive their revenue from various sources. The two most important sources are the hospital budget (36.1% in 2018), called the 'Budget of Financial Means (BFM)' and deductions on physician fees (40.9% in 2018).[140] Both revenue sources are (partly) used to pay for nursing staff.

4.1.1 Budget of Financial Means

The BFM is a closed-end budget that is determined prospectively at the national level. It is allocated to hospitals according to specific rules, mostly without any relation to actual costs. It consists of three major parts (A, B and C) which are set separately and are further divided into subparts, all according to different rules and criteria. Broadly speaking, we can say that part A covers investment costs (largely transferred to the federated authorities by the 6th State reform in 2014), part B operational costs and part C adjusts for payments for part B.

A budget year runs from 1 July to 30 June. Hospitals know their budget before a new budget year starts. Only at 1 January the budget can be adapted, e.g. to index changes.

The BFM for acute hospitals amounted to € 6.767 billion in 2019. We refer the interested reader to KCE Report 229 and references therein for a detailed description and evaluation of the BFM.[3] In the current chapter we

focus on the subparts that pay for nursing staff in the wards that were analysed in Chapter 3.

4.1.2 Deductions on physician fees

Most medical specialists working in a hospital are self-employed, in university hospitals medical specialists are mainly salaried. Whatever the employment status of the medical specialist, a central collection of fees is compulsory for all hospitalised patients (including day care) but not for ambulatory patients (Article 147 of the Hospital Act).[141] This central collection of fees can be organised by the hospital or by the Medical Board.

Article 154 of the Hospital Act stipulates that physicians are obliged to finance part of the costs of medical activities in the hospital. However, the compulsory financial agreement between hospital management and the hospitals' physicians about the physician contribution to the operating costs (space, equipment, staff, overhead services) of the medical activities is not regulated by law, which causes a lot of variability in the type of financial agreements across hospitals. Possible forms of the deductions are a fixed percentage of the physician fee, real cost coverage or a mix of both.

Unfortunately, there is no publicly available information on the total amount of deductions nor on the share of the deductions that is spent on nursing staff. Hence, for the remainder of the report, this revenue source for financing nursing staff is not further detailed.

4.2 A DRG-based budget allocation, corrected for nursing care

The largest part of the BFM is the B2-part, mainly covering clinical services of nursing staff and healthcare assistants and most medical consumables. Each year, a closed-end budget for the B2-part is defined at the national level. This national budget is allocated to individual hospitals by dividing it by the total number of B2-points 'earned' by all hospitals. This gives the monetary value of one B2-point. In 2018, this value for acute hospitals was equal to € 27 336.75.

All amounts in section 4.2 cover nursing staff and care assistants. It is not possible to distinguish between both professional groups.

4.2.1 General principle

Since the 1990s, diagnosis-related group (DRG)-based hospital payment systems have become the main mechanism internationally for reimbursement of hospital care. DRG systems classify all patients (cases) treated by a hospital into a limited number of DRGs, which are clinically meaningful and economically homogeneous groups. Under DRG-based payment, hospitals then either receive a fixed amount per case within a certain DRG, i.e. DRG-based case payment, or they receive a budget that is – at least partially – related to the number and type of DRGs (case-mix) provided in one of the previous years, i.e. DRG-based budget allocation.[142] In Belgium a DRG-based budget allocation is applied.

The classification system in Belgium is the All Patient Refined-DRG or APR-DRG system, which extends the basic DRG structure by adding subclasses to each base APR-DRG based on severity of illness (SOI). The APR-DRG and SOI categories are further divided by age categories (i.e. <75 years; 75 years and above). The current system (version 34) has 1 274 APR-DRGs: 318 APR-DRGs each with four SOI-levels and two APR-DRGs without SOI-levels.

The national B2-budget is allocated to individual hospitals (mainly) on the basis of the national average length of stay per APR-DRG-SOI. The basic concept in this DRG-based budget allocation is called 'justified activities' where justified reflects average activity. The number of justified patient-days for a hospital is the result of multiplying the national average LOS per APR-DRG-SOI with the case-mix of the hospital. Per department or group of departments, the number of justified patient-days is multiplied by 365 and the 'normative occupancy rate' to calculate the number of justified beds. For example, this normative occupancy rate is 80% for surgical and internal medicine wards, 70% for paediatric wards and 90% for geriatric wards.

Justified activities are not applied to all hospital wards (for example, rehabilitation wards are financed on the basis of licensed beds).

4.2.2 Justified beds are weighted per department type

Basic points are granted to finance nursing staff. These points are based on the number of justified beds. The surgical ward is taken as reference with one point corresponding to one justified bed. Also for internal medicine and paediatric wards one point corresponds to one justified bed, but this ratio can go up to 3.75 points for maternal intensive care beds and up to 6.25 points for neonatal intensive care beds. For geriatric wards 1.36 points correspond to one justified bed, but the higher budget (compared to surgical, internal medicine and paediatric wards) also has to reimburse occupational therapists and speech therapists.[143]

The difference in the number of points per ward type corresponds to different 'financing standards' in the respective wards. Financing standards are expressed as the number of FTE per number of beds. For example, the B2-part of the hospital budget finances 12 FTE per 30 justified beds for a surgical ward (with C-beds) with an occupancy rate of 80%. This corresponds to 0.4 FTE per justified bed. With a ratio of one point per justified bed, 2.5 points are allotted for 1 FTE. The basic financing standard of 13.33 FTE per 24 beds for geriatric wards consists of 12 FTE per 24 beds for nursing staff and care assistants and 1.33 FTE per 24 beds for allied health professionals (see also section 2.7.1.3).

For paediatric and geriatric wards there is a small difference between the BFM points and the points as derived from staffing standards (1.08 instead of 1 for paediatric wards and 1.39 instead of 1.36 for geriatric wards).

Table 12 – Basic financing standards for selected ward types

Ward type	Basic financing standard	FTE/bed	Basic points per bed
Surgical (C)	12 FTE per 30 beds	0.40	1
Internal medicine (D)	12 FTE per 30 beds	0.40	1
Paediatrics (E)	13 FTE per 30 beds	0.43	1
Geriatrics (G)	12 FTE per 24 beds (+1.33)	0.50	1.36

FTE=full-time equivalent

It should be noted that this 'monetary BFM-value per FTE' does not necessarily correspond to the actual labour cost per FTE since the BFM-value depends on the size of the closed-end macro-level budget and the number of points to be distributed among the hospitals.

To conclude, the main mechanism to allocate the B2-budget among hospitals is a point system which is based on the length of stay per APR-DRG-SOI and is weighted according to ward type.

Supplementary points to adjust nursing staff to intensity of care

On top of the basic points, supplementary points are granted to adjust nursing staff to the intensity of care. For surgery, internal medicine and paediatric wards, hospitals get supplementary points that are based on the medical activity volume and the nursing profile.

First, hospitals receive supplementary points according to their relative position among all hospitals in terms of **medical activity turnover**. To calculate this medical activity turnover, hospitals are ranked according to profile based on surgical and medical interventions in the surgery, internal medicine and paediatric wards. Next, hospitals are divided in deciles (groups of 10% of hospitals) in accordance with their ranking and points are allocated. The number of supplementary points per justified bed that can be allocated varies from 0 points for deciles 1 to 3 up to 0.34 points for the highest decile for surgery and internal medicine and from 0 points for decile 1 to 0.38 points for paediatrics. Hence, for hospitals in the highest decile the concerned subpart of this B2-budget is raised by an amount ranging from 34% to 38%.

Simultaneously, hospitals are ranked according to their **nursing profile** as defined by nursing related groups (NRGs). NRGs are a classification system that assigns patient care delivered at a specific moment (nursing care episode) to a specific nursing care profile (NRG). A weight is assigned to each NRG that depends on the required staffing levels.

In addition, supplementary points are attributed to pay for intensive care beds. More specifically, the number of intensive care beds is calculated as a percentage of the number of C, D and E beds. Three criteria are taken into account: a selected list of resuscitation interventions, the percentage of inpatient days in an intensive care ward standardized per APR-DRG

(Nperciz; national percentage of intensive care per APR-DRG) and intensive nursing profiles throughout the hospital whether patient care is taken up in intensive care wards or not (NRGs). The minimum share of intensive care beds in C, D and E wards equals 2% of justified beds in these wards.

Intensity of care on general wards versus intensive care wards

The budget that corresponds with the total of basic points and supplementary points finances three 'types of care': basic care on general C, D and E wards, intensive care on these wards and intensive care wards. Basic care on C, D and E wards is financed by basic points, intensive care on these wards is financed by part of supplementary points, and intensive care wards are financed by part of the basic and part of the supplementary points. A complex calculation method allocates budgets to the three types of care. For example, given that part of the supplementary points are based on the decile in which a hospital is located, the share of supplementary points in total points differs largely between hospitals.

Correction for average labour cost

The calculation of the final budget for staff in part B2 (including the budget for personnel on emergency departments, operating theatres, etc.) requires some final steps to know the individual hospital budget.[3] The following formula is applied: number of personnel points*(average labour costs of the hospital/national average labour costs).

Average labour costs, in a specific hospital as well as at the national level, are 'theoretical' labour costs as determined in collective labour agreements. Since 1 July 2014, theoretical labour costs are based on personnel statutes. Moreover, also since the same date only personnel paid for by the B2-part of the BFM and extra personnel for university beds are taken into account for the theoretical labour costs, ranking first most qualified personnel and personnel with the most seniority. The average labour cost is based on labour costs of nursing staff, healthcare assistants, paramedical staff, but nurses are the largest group (all educational levels). Each of these staff categories is subdivided according to seniority.

The number of FTEs taken into account for the calculation of the average labour cost correction is obtained by dividing by 2.5 points the sum of the basic points, supplementary points, and points for the day-surgery centre, the operating room staff, the emergency department staff and the sterilization staff. Also the FTEs financed by part B4 (line 4100) and B7 for university beds are taken into account.

4.2.3 Basic and supplementary budget for nursing staff in 2018

Selection criteria for hospitals

On the website of the FOD – SPF the total hospital budget (BFM) and a number of budget items are publicly available. A distinction is made between hospital types, for example acute, burns or geriatric hospitals. Since the focus of the current report is on acute hospitals, and more specifically on the ward types C, D, CD, I, G and E, we asked the FOD – SPF to provide us with the most detailed information on the hospital budget available but only for acute hospitals that have at least one site with bed type C, D, CD, E or M to exclude non-acute hospital sites. Additionally, some hospitals are excluded from the (annual calculation of the) point system and receive the same B2-budget as in previous years. These are hospitals that only provide specialised care to children or for tumours or hospitals with an increase/decrease of 25% in the number of licensed beds between the year for which the data are calculated and the year for which the budget is determined.[143] Hence, the budget for the items that is used in this section (and in the sections on other parts of the BFM) is not the same as the budget on the FOD – SPF website because of the above selection criteria for hospitals.

Large differences in the share of supplementary budget between hospitals

97 hospitals meet our selection criteria in the budget year 2018. As mentioned before, the value of a B2-point was equal to € 27 336.75 in 2018. Table 13 gives the share of basic and supplementary points in total B2-points for nursing wards C, D, CD, I and E. In total, 35 845 points were 'earned' by the selected acute hospitals and for the selected nursing wards. The share in total points in Table 13 is calculated in terms of this total number of points. The budget for nursing management (not included in the

table) was equal to € 35 604 750. The budget for geriatric wards (only basic points) was equal to € 289 653 642.

Table 13 – Basic and supplementary budget for selected nursing wards (2018)

Type of points	N	€	Share in total points (%)
Basic points	26 688	729 563 184	74.45
Supplementary points	9 157	250 333 715	25.55
Total	35 845	979 896 899	100.00

For 97 hospitals fulfilling the selection criteria in 2018. Selected nursing wards: C/D/CD, I and E.

About 25% of the B2-budget for the selected nursing wards is based on supplementary points. This average share of supplementary budget ranges, however, from 10% to more than 40% between hospitals.

University hospitals and non-university hospitals with university beds

The basic and supplementary budget taken together (see Table 13) provides the basic funding of nursing staff in hospitals. University hospitals and non-university hospitals with university beds (hospitals that receive payments for the development, evaluation and implementation of new medical technologies and/or the training of residents) receive additional basic funding to compensate for a change in financing rules in 2002. In the system before 2002 the basic points in part B2 for surgery and internal medicine beds were higher for university hospitals because of extra nurse staffing standards. Since 2002, no distinction in basic points is made between university and non-university hospitals. The difference in budget between both calculation methods was transferred to part B7A for the university hospitals and to part B4 (line 4100, correction in line 4101) and part B7B (lines 250 and 300) for the non-university hospitals with university beds.

While the budget line 4100 refers to budget for nursing staff and healthcare assistants, part B7A and B7B have a much broader scope (for example, a budget for the development, evaluation and implementation of new medical technologies, a budget to compensate for the extra cost of social security

contributions for the salaried physicians in university hospitals, etc.) (see Table 16).

4.3 Additional budgets for nursing staff

Although the B2-part of the hospital budget is the main revenue source for nursing staff, other subparts provide additional revenue. However, most of these additional revenue sources are not exclusively meant for nursing staff and it is not possible to know which part of the budget is for nursing staff.

We distinguish three types of additional budget, depending on the objective of providing additional budget on top of the B2-part. A first type of budget serves as an additional revenue source to employ extra staff in general nursing wards and can be considered as a basic financing source, just like the B2-part. The second type allocates additional budget towards hospitals for extra staff for specific tasks or patient groups. A third type is to provide better working conditions for existing staff.

In the description of each additional budget we refer to the corresponding budget line in Table 16. Table 16 gives the amount (for the selected hospitals – see section 4.2.3) that was allocated for these additional budgets in 2018.

4.3.1 Additional budgets for extra nursing staff in general nursing wards

In section 4.3.1 we describe measures that were taken to allocate additional budget to the hospitals for extra staff in general nursing wards. For most budget items it was not possible to make a distinction between nursing staff and other staff categories.

4.3.1.1 Collective labour agreements

On 1 June 1991 the basic financing standards (see Table 12) were increased by 1 FTE per 30 licensed beds (see Table 14; the concept of justified bed did not exist in 1991). In 1991, this additional budget belonged to subpart B2, but it was transferred to subpart B4 in 2002. The additional budget has never been included in the system of justified activities, which would have allowed to increase the point value of a bed (Ministerial Decree of 28 November 1990, art. 15bis). The current budget is still based on the number of licensed beds in June 1991.

Table 14 – Financing standards for selected ward types: CLA of 1991

Ward type	Financing standard	FTE/bed
Surgical (C)	+1 FTE per 30 beds	0.43
Internal medicine (D)	+1 FTE per 30 beds	0.43
Paediatrics (E)	+1 FTE per 30 beds	0.47
Geriatrics (G)	+0.8 FTE per 24 beds	0.53

FTE=full-time equivalent; CLA=collective labour agreement

This additional budget is part of budget line 3800 in subpart B4. However, this budget line also includes other collective labour agreements (CLA). For example, on 1 July 1992 an additional budget was allocated to the hospitals for 0.5 FTE administrative or logistics staff per 30 occupied beds and on 1 July 1995 an additional budget was made available for psychiatric wards for children.

4.3.1.2 Floating pools

Another element of budget line 3800 in B4 relates to the floating pool that was introduced on 1 January 1999 (see also section 2.7.1.2): 0.5 FTE per 30 licensed C, D, CD, E and Sp beds. An additional 0.5 FTE was added on 1 January 2000 following the same criteria as in January 1999. The floating pool consists of nursing staff and healthcare assistants, and can be deployed on nursing wards, the emergency department, the operating theatre or in the plaster room.

The budget for floating pools was expanded by 1 FTE per 30 licensed beds in the period 2008-2011 (RD of 25 April 2002, art. 79octies).[143] During that period, 2 309 FTE (nurses, healthcare assistants and paramedical staff) were distributed among the hospitals. In a first phase (starting on 1 January 2008), which was a pilot project, 319 FTE were distributed among the hospitals that participated in the pilot project (€ 46 981.24 euro per FTE was allocated). A second phase started on 1 July 2009; an additional 1 042 FTE were distributed to hospitals that did not participate in the pilot project. Finally, on 1 January 2011 the remaining 948 FTE were distributed among the hospitals to guarantee in each hospital an additional FTE per 30 (for the 3 phases) licensed beds. This budget can be found in budget line 1110 in subpart B9. The budget was allocated based on the number of licensed beds in 2009-2010 and has not been revised since although the number of licensed beds has changed.

Table 15 shows the cumulative financing standards taking into account the B2-part, collective labour agreements and the floating pools.

Table 15 – Financing standards for selected ward types: B2, CLA and floating pools

Ward type	Financing standard	FTE/bed
Surgical (C)	15 FTE per 30 beds	0.50
Internal medicine (D)	15 FTE per 30 beds	0.50
Paediatrics (E)	16 FTE per 30 beds	0.53
Geriatrics (G)	14.4 FTE per 24 beds	0.60

FTE=full-time equivalent; CLA=collective labour agreement

4.3.1.3 Additional staff during the night

Since 1 January 2007 hospitals receive an additional budget to deploy additional staff (nursing staff and healthcare assistants) during night shifts, corresponding to 0.5 FTE per 60 licensed beds (B9 – line 0800). The number of licensed beds equals the number in 2007, no revision was made since then.

4.3.1.4 'Recycling' measure

The 'recycling' measure is a budget for hospitals that voluntarily closed a number of beds during the eighties, nineties and also between 1 July 2002 and 30 June 2004 in the context of a collaboration, grouping, merger, etc. The budget was meant to retain employment despite the closure of beds. This measure is regulated in contracts between the funding authorities and the hospital. Although there is no link anymore with current (justified) activity, hospitals continue to receive this budget for a total amount of more than € 79 million per year (B4 – line 100).

4.3.1.5 First employment

This measure concerns a budget to cover the expenses related to 'first employment' agreements. The number of the first employment staff is limited to 1.8% of the workforce (in FTE). The budget is based on expenses of 2005 and has not been revised since (B4 – line 1700).

4.3.1.6 Subsidized contracts (Interdepartmental Budgetary Fund – IBF)

The labour cost of subsidized contracts is partly financed by the hospital budget (B4 – line 2500) and partly by a premium from the IBF (€ 24 145.63, index 1/7/2018). Since 2019 the resources made available by this fund are totally included in the hospital budget.

4.3.2 Nursing staff for specific wards, patients or tasks

The additional budget that was made available through CLAs or by the introduction of floating pools is not only for extra nursing staff but is also meant for healthcare assistants, administrative or logistics staff, or paramedical staff. The additional nursing staff can be deployed in all nursing wards, but also in the operating theatre, the emergency department, etc. Over the years, new roles for nursing staff were created and hospitals are obliged to deploy staff for these new roles to fulfil specific licensing standards or other legal obligations. We describe the most important measures, without being exhaustive.

Hospital hygiene

A fixed amount per FTE nurse is assigned to each hospital to fulfil legal requirements concerning hospital hygiene (RD of 25 April 2002, art.56).[143] There is a minimum requirement of 1 FTE. The number of FTE is calculated as B x (C/1 000) with B the number of justified beds or licensed beds for bed-types with no calculation of justified activities, and C a coefficient which varies across bed-types. This amount is increased by 10% to cover operational costs. In 2018 the budget per FTE was equal to € 72 8130 (10% for operational costs is included). The budget is adapted annually on the basis of the number of beds. (B4 – line 600)

Internal liaison geriatric care programme

Hospitals with a licensed geriatric ward are allowed a budget to finance an internal liaison team. The budget takes into account an annual labour cost of € 61 550 (index 9/2018) per FTE, and is based on the number of hospital stays of patients of at least 75 years old. The financing is guaranteed for a minimum of 2 FTE and a maximum of 6 FTE. (B4 – line 2015)

Multidisciplinary algology team

Since 1/1/2014, a lump sum budget is allocated to hospitals on the basis of the number of beds (justified or licensed if no justified beds exist) (RD of 25 April 2002, art.63quater).[143] The team consists of medical, nursing and psychological competences. 0.22 FTE nursing staff is financed for hospitals with less than 100 beds and 0.10 FTE for each additional 100 beds. In September 2018 the budget per FTE nurse was equal to € 61 550. (B4 – line 2021)

The team is responsible for the organisation of pain treatment in the hospital.

Haemovigilance function

Since 1/1/2014, hospitals are funded for introducing a quality system for the blood transfusion chain. The multidisciplinary team that is responsible for the quality system consists at least of one reference nurse transfusion, the person in charge of the hospital blood bank and a medical specialist with clinical expertise in the field of blood transfusion (RD of 25 April 2002, art.63quinquies).[143] A fixed budget of € 4 426 800 (value at 1 January 2017)

is distributed among hospitals according to three criteria. First, hospitals receive a lump sum of € 10 200 (value at 1 January 2017) for software to trace and control blood products. Second, an envelope of € 1 020 000 (value at 1 January 2017) is distributed according to the number of blood bags in the hospital. Third, an amount of € 2 346 000 (value at 1 January 2017) is allocated pro rata the number of weighted justified or licensed (for bed-types without justified activities). The weight for surgical, internal medicine and intensive care beds is 2, for geriatric and paediatric beds it is 1. (B4 – line 2022)

Nutrition support team

Since 1 July 2014 all general hospitals receive a budget for a nutrition support team. This team is composed of at least a dietician, a nurse, a medical specialist, a pharmacist and the kitchen manager of the hospital. (B4 – line 2024)

Internal transport of patients

Public hospitals receive a budget for the internal transport of hospitalised patients (0.75 FTE per 30 occupied beds). They receive a fixed amount per FTE. (B4 – line 1300)

National Cancer Plan

Several measures were taken in the context of the National Cancer Plan. Hospitals with a licensed care programme in oncology receive since 1/7/2008 a budget to finance a multidisciplinary team that provides nursing and psychosocial support. The budget is pro rata the number of multidisciplinary oncological consultations (MOCs) (B4 – line 2050). The team consists of 1 FTE master in psychology, 1 FTE nurse specialised in oncology or with practical experience in supporting oncological patients or with a specific training, and 0.5 FTE social worker (all per 250 MOCs).

4.3.3 Additional budgets for better working conditions or higher income of existing staff

Additional budgets do not only serve to recruit extra staff but also to improve the working conditions of existing staff or to increase their income. As was the case for budget items described in section 4.3.1, for most budget items it was not possible to make a distinction between nursing staff and other staff categories.

Continuing professional development

Subpart B4 contains three budget lines that refer to continuing professional development (CPD) of nursing staff (lines 1500, 1510 and 1600). These lines refer to article 58 in the RD of 25 April 2002. Lines 1500 and 1600 refer to a fixed amount that is allocated to hospitals, line 1510 is based on the number of justified beds plus the number of licensed beds for bed types that are not financed on the basis of justified activities. Hence, budget lines 1500 and 1600 are constant over the years, while budget line 1510 is adapted every year.

Higher income to compensate for irregular and uncomfortable working hours

Several attraction and retention measures for nurses were implemented to strengthen the supply of nurses (see section 2.8.2). Most of these measures also apply to other staff categories.

The compensation for uncomfortable hours (part B2 – line 900) is a compensation (+20%) for evening work (between 7p.m. and 8 p.m.) on weekdays. The measure was introduced in 2010 for bedside staff (nurses, healthcare assistants, etc.). A comparable measure was introduced in 2011 for personnel in private and public hospitals not financed by the B2-part (B9 – lines 1300 and 1305).

Annual bonus for special professional qualification and special professional competences

Since 2010, a yearly supplementary bonus of € 3 341.50 submitted to indexation (amount last index on 1 September 2018: €3 838.33), can be allocated to nurses holding a special professional qualification (see section 2.8.2.2). An additional bonus is also provided for four 'special professional competences' (annual bonus is € 1 113.80, submitted to indexation (amount last index on 1 September 2018: € 1 279.40). (B4 – line 5000).

In the IF-IC-model, these bonuses are integrated and are not payed separately anymore.

End of career measures: less working hours for staff aged 45 years and older

End of career measures, introduced by the RD of 15 September 2006 allow two options: (i) working time reduction with salary retention, starting from a certain age category, in order to facilitate work, or (ii) working time retention, starting from a certain age category, but with a supplementary bonus in order to make work retention more attractive (see section 2.8.2.1). (B9 – line 100)

Attraction premium

The attraction premium is a lump sum amount that is granted to all hospital staff (except medical specialists, interim personnel and students) in public and private hospitals. (B9 line 200)

IF-IC

An extensive description of the IF-IC payment model can be found in section 2.8.2.1. The budget is allocated to individual hospitals pro rata the number of FTE.(B9 – line 1310)

Harmonization of the function and salaries for care assistants

This regulation was part of the mini agreement, but was confirmed on 7 November 2013 in the collective labour agreement which states that care assistants receive scale 1.35 in federal non-profit sectors (see section 2.8.2.3). This budget is only for care assistants and not for nursing staff. The budget is allocated to individual hospitals pro rate the number of licensed beds. (B9 – line 1150)

Table 16 – Additional budget for extra staff or better working conditions of existing staff in the BFM of July 2018

Subpart of the BFM	Amount in €
B2	
900 – Uncomfortable hours	40 034 843
B4	
100 – Recycling	79 033 423
600 – Hospital hygiene: nurse	9 126 476
1300 – Internal transport	19 369 037
1500 – Continuing professional development	5 138 088
1510 – Continuing professional development	782 184
1600 – Continuing professional development	202 004
1700 – First employment	67 327 560
2015 – Geriatric care programme internal liaison	19 966 961
2021 – Multidisciplinary algology team	8 118 173
2022 – Haemovigilance function	4 562 459
2024 – Nutrition support team	2 183 893
2050 – Cancer plan: multidisciplinary team	53 720 473
2500 – Subsidized contracts (IBF)	105 344 282
3800 – Collective labour agreements	178 177 987

4100 – University beds in non-university hospitals	8 313 658
4101 – Correction on line 4100	-1 179 979
5000 – Special professional qualification and competences	33 939 729
B7	
250 – B7B non-university hospitals with university beds	9 045 136
300 – Correction on line 250	-1 152 902
900 – B7A university hospitals	148 725 740
B9	
100 – End of career measures	197 344 759
200 – Attraction premium	95 312 745
800 – Night team	24 526 394
1110 – Floating pool	94 295 684
1150 – Collective labour agreement 2013 (scale 1.35)	11 196 899
1300 – Uncomfortable working hours public sector	1 879 469
1305 – Uncomfortable working hours private sector	3 041 494
1310 – IF-IC	50 960 832

4.4 Relationship between nurse staffing levels and the hospital budget

4.4.1 The hospital budget and patient-to-nurse ratio

The budget hospitals receive in line with the financing standards, can be converted to patient-to-nurse ratios. If we take the example of a surgical ward, the minimum financing standard equals 13 FTE per 30 beds. This includes the B2-part and the collective labour agreements of 1991 (see section 4.3.1). This 'minimum' financing standard corresponds to a patient-to-nurse (P2N) ratio of 13.3 (without correction for overlap between shifts) or 14.0 (with correction). The starting point of this calculation is the 13 FTE

per 30 beds. We assume that 1 FTE can be allocated for 200 days in direct patient care (365 days minus weekends and holidays, sickness and educational leave, etc.). Hence, 13 FTE working 200 days gives a total of 2 600 working days or 823 working days per shift (7.6h), and 30 beds times 365 days gives 10 950 patient days, which corresponds to a P2N ratio of 13.3. When we apply the same calculation in a situation with correction for overlap between shifts (7.6h during the day and evening and 10h during the night), the P2N ratio equals 14.0.

Financing standards that also take account of floating pools and the additional staff during the night, equal 15.25 FTE per 30 beds. Applying the same calculation as above gives a P2N ratio of 11.3 without correction for overlap between shifts and of 11.9 with correction.

4.4.2 A maze of rules makes it impossible to know the budget for nurse staffing

For all of the budget items that were described in sections 4.2 and 4.3, the amounts for the individual hospitals were made available by the FOD – SPF for the years 2009-2018. We also know the nursing hours (nursing hours in the administrative data can be extrapolated to 365 days) and the patient-to-nurse ratio for the years 2009-2016. With this information, we tried to analyse the relationship between the hospital budget and nursing hours and between the budget per FTE and patient-to-nurse ratio (for 2016) for surgical and internal medicine wards. We know from the analyses in the previous chapter that the patient-to-nurse ratio at the hospital level varies widely between hospitals and ward types. The main purpose of this analysis was to find out whether hospitals apply different staffing policies or not.

However, the lack of an earmarked budget for nursing staff and the maze of rules that accumulated over time make it impossible to answer the following simple question: what is the budget hospitals receive for nurse staffing in a specific ward type? The following points explain why it was not possible to disentangle the budget for nursing staff on surgical and internal medicine wards from the budget for other professional groups and/or nursing wards.

- The basic and supplementary budget in the B2-part can be assigned to specific ward types (for example surgical and internal medicine wards), but the budget not only finances labour costs of nursing staff but also of healthcare assistants. Since we also know the hours worked by healthcare assistants, we could approximate the part of B2 for nursing stff by applying the share of nursing hours in total hours (nursing staff plus healthcare assistants) to the B2-budget for surgical and internal medicine wards.

- University hospitals (in B7A) and non-university hospitals with university beds (in B7B or B4) receive an additional basic budget, which dates back to a change in financing rules in 2002. The additonal budget for non-university hospitals with university beds is for nursing staff and healthcare assistants on surgical, internal medicine, paediatric and maternity wards. Part B7B for the university hospitals, however, also covers research, new medical technologies, etc.

- Over the years, minimum nurse-to-bed ratios were improved by the introduction of floating teams or through collective labour agreements (CLAs). Also for these additional budgets it is not possible to link them unambiguously to nurse staffing levels. First, some parts of the CLAs relate to logistics and administrative staff and second, the budgets have a broader scope than surgical and internal medicine wards.

- In addition to budgets for extra staff, a number of measures were taken for better working conditions or higher income of existing staff, with a broader scope than nursing staff.

4.4.3 Lack of transparency undermines a safe staffing policy at the macro and micro level

Uncertain value of a point and the impact of deciles in subpart B2

Originally, the budget for nursing staff (and healthcare assistants) was almost exclusively paid via the B2-part which allowed to make a link between the received budget and its destination.[3] Of course, this system creates uncertainty for individual hospitals because the B2-budget depends on the length of stay of other hospitals in a closed-end budget system. Moreover, the calculation method of the supplementary part of the B2-budget is heavily criticised, especially the system of deciles. The decile-system only results in supplementary points from decile four onwards (for surgical and internal medicine beds). Moreover, the curve is exponential resulting in a more than proportional (and thus higher than the difference in workload) budget increase for the higher deciles.

No transparent link between the payment and its destination

A major critique on the allocation of the hospital budget to individual hospitals is that there is no transparent link between the payment and its destination. The budget for nursing staff was originally almost exclusively paid via the point system of the B2-part. A budget injection has an immediate impact on the value of a point in such system. Although this system creates uncertainty (see previous paragraph), it has the advantage that budgets follow justified activities.

In the current system, with budgets for nursing staff in subparts B2, B4, B7 and B9, neither public authorities nor hospitals have a clear view on how much money is spent on nursing staff. The demand for more transparency does not necessarily imply that all calculation methods should be simple. A payment system can make use of complex calculations in the back-office, but these calculations should be made transparent and should be reproducible.

Outdated criteria to allocate additional staff

Over the years, the number of budget items for nursing (and other) staff in subpart B9 and especially in subpart B4 has increased exponentially. A common feature of these measures is that they were not integrated in the point system of subpart B2, in many cases budgets are not indexed; and very often they are based on outdated criteria to allocate additional staff to individual hospitals. For example, the budget for floating pools was expanded by 1 FTE per 30 licensed beds in the period 2008-2011. The number of licensed beds in 2009-2010 is the basis for allocating this budget to individual hospitals; this number has not been revised since. Another example are the collective labour agreements in B4 (line 3800). On average, the budget per FTE in these measures is substantially lower than the budget per FTE in the point system of B2. In part B2 hospitals receive 2.5 points per FTE in a surgical or internal medicine ward, which corresponds to € 68 342 (based on the value of a point in 2018). For the floating pools and CLA the budget per FTE is, on average, about € 50 000.[144]

A more coherent hospital payment system to introduce and monitor safe staffing levels

Although the aim of this study was not to formulate recommendations on the hospital payment system, it is clear from the above description of the many budget items that neither hospitals nor the funding authorities can disentangle the budget for nursing staff from the budget for other staff or other purposes. A reintegration of (some of) the budget items in parts B4 and B9 into part B2 seems appropriate. A discussion of the concrete modalities of this reintegration is out of scope. Of course, if one pursues budget neutrality for public authorities, an integration into the point system will result in a lower value per point for all nursing staff (because the budget per FTE in most of the current measures is lower than the budget per FTE in the point system of B2).

4.4.4 Insufficient hospital budget to cover basic financing standards

As mentioned in the introduction of this chapter, one of the major critiques of the current hospital payment system is that the closed-end budget is not sufficient to cover current staffing numbers. For example, the B2-part of the hospital budget finances 12 FTE per 30 justified beds for a surgical ward with an occupancy rate of 80%. This means that 2.5 points are allotted for 1 FTE. In 2018 the monetary value of one B2-point for acute hospitals was equal to € 27 336.75. Hence, hospitals received about € 68 342 per FTE while the 'theoretical' average labour cost equalled € 73.206 (2019).

Therefore, hospitals might have to downsize their staffing levels, substitute nurses by lower qualified and cheaper staff or use other resources to finance nursing care (e.g. increased patient supplements and/or deductions on physician fees).[3] The latter also holds when hospitals decide to implement higher staffing levels than those based on 'financial standards'.

PART II – NURSE SURVEY

5 EVOLUTION OF NURSE STAFFING AND WORK ENVIRONMENT IN BELGIAN ACUTE HOSPITALS 2009-2019

5.1 Background

Between 2009 and 2011, RN4CAST studied effects of nursing workforce dynamics on nurse wellbeing, patient satisfaction and patient clinical outcomes in 12 European countries. The aim was to inform policy makers' decisions and strategies for avoiding workforce shortages and improving quality and safety of care.[145] The study encompassed 33 731 nurses working in 486 hospitals, 10 866 patients hospitalized in 210 hospitals, and clinical data for about half a million patients in 300 hospitals. Main RN4CAST findings suggested that better patient and nurse job outcomes can be achieved by 1) improving nurse staffing in terms of the percentage of bachelor trained nurses, the number of patients per nurse, and the proportion of nurses among direct care providers; and 2) optimizing the nurse work environment.[15] Important mechanisms in this relationship were the number of tasks nurses performed below their skill level, and the number of nursing tasks left undone because nurses lacked the time to complete them.[37, 146]

Ten years later, the issues highlighted by RN4CAST continue to be relevant. Specific numbers, especially on nurse staffing and its variation between hospitals, are still widely cited. The question arises whether these numbers are still accurate. Several well-documented evolutions (e.g. decreasing length of stay, external accreditation, ageing patient population) are likely to have impacted nurse staffing levels, the quality of nurses' work environment, and nurse wellbeing, but specific evidence is lacking.

Therefore, in 2019 a survey among nurses was conducted to study change in Belgian acute hospitals between 2009 and 2019. We sought to maximize comparability and replicated the 2009 survey methodology as closely as possible.

5.2 Study objective

To describe patient-to-nurse ratios, educational level of nurses, nurse perceived staffing levels, nurse working environment, care left undone and nurse outcomes in Belgian acute hospitals in 2019, and examine how these compare with 2009.

5.3 Study design

The 2009 survey was part of a larger international study also including a patient experience survey and the collection of clinical data. The 2019 study only included a nurse survey.

5.3.1 Participants

All Belgian acute hospitals were informed and invited to participate via e-mail and regular mail. The executive board of 84 acute Belgian hospitals voluntarily registered to participate in the study. The staged inclusion of nursing wards and nurses was identical to the 2009 survey. First, each participating hospital provided a master list of acute general internal medicine and surgery wards to the research team. Four (<500 beds) or six (>500 beds) general surgery, internal medicine and mixed nursing wards were randomly selected for each hospital. Second, a member of the research team visited each hospital to inform the chief nursing officer and the relevant ward managers about the study and their role herein. Ward managers were asked to circulate information letters to their nurses. Only nurses from the selected nursing wards involved in direct nursing care were included in the study. Ward managers, floating nurses, healthcare assistants and nurses on long-term leave (>1 month) were excluded.

5.3.2 Survey methodology

In 2009 as well as in 2019 the questionnaire was available in Dutch, French and German. Unlike the paper-based survey in 2009, in 2019 nurses were invited to complete a web-based survey via Qualtrics Experience Management Platform. The information letters for the nurses included a web link and QR code to access the survey website as well as a unique code that nurses could use to log in and complete the survey. This unique code allowed identification of hospitals and nursing wards for analytic purposes.

Individual nurses could not be identified. After completing the survey, the unique identification could not be reused. Nurses were not required to finish the survey in one sitting. Partial responses could be retrieved using the unique identification so nurses could start where they left off. To test the survey distribution and completion process, a first version of the questionnaire was sent via e-mail and via an anonymous link to 34 members of the Belgian Health Care Knowledge Centre (KCE). Suggestions to improve the content, distribution method and linguistic aspects were incorporated. An improved version was then sent to 20 KCE members for final feedback. Qualtrics predicted a duration of 16.2 minutes to complete the survey. Accordingly, a response burden of 15-20 minutes was indicated in the information letter. All items included a force response option, thereby overcoming the issue of missing data values. Only 100% completed questionnaires were selected for analysis.

Hospital and nursing ward response rates were communicated to the ward managers and/or the chief nursing officer via e-mail on a weekly basis.

On-site information sessions were performed between 13 February 2019 and 15 April 2019. The online questionnaire was available from 6 March 2019 to 9 May 2019.

5.3.3 Measures

Survey questions and derived measures were changed as little as possible and additions were limited. Identical to the 2009 survey, the 2019 survey (available upon request) included items to evaluate the quality of nurses' work environment, nurse staffing, the educational level of nurses, nursing care left undone, nurses' wellbeing, nurses' perception of the quality of care, and a number of tasks performed by nurses during their last shift but which could be performed by lower qualified personnel. In addition, demographic information about the respondent was collected.

Nurse working environment was measured by the 32-item Practice Environment Scale (PES).[147] The measure has been endorsed by the National Quality Forum (United States) and has been used extensively across the globe, in Europe and in Belgium.[148, 149] Better work environments are associated with higher nurse wellbeing, greater patient satisfaction, and lower patient mortality.[24, 150] Respondents were asked to indicate the degree to which various organisational features are present in their practice setting.

The five subscales of the PES are participation in hospital affairs, foundations for quality care, manager ability, leadership, and support, staffing and resource adequacy, and nurse-physician relations. French wording of various PES items was refined without changing their meaning.

Nurse staffing was measured by the number of patients per nurse. Nurses were asked to report on the number of patients they took care for during their last shift (numerator), and the number of nurses present during their last shift (denominator). In prior work, including studies in Europe, the predictive validity of this method of measuring hospital nurse workload has been established.

Nurse education was measured by asking about initial nursing degree obtained and if any further degrees had been obtained since. It is expressed as the percentage of bachelor degree nurses. The section on nursing qualifications obtained was updated to match current qualifications awarded when completing the various educational pathways for nursing.

Nursing care left undone was based on nurses' reports of tasks that were left undone on their last shift because of lack of time, from a list of 13 nursing activities (surveillance, document care, update care plans, plan care, change patient position, skin care, oral hygiene, pain management, comfort patients, educate patients, treatments and procedures, timely medication, prepare discharge). Two underlying dimensions have been identified: clinical nursing care activities left undone, and planning and communication activities left undone.[37]

Measures of nurse wellbeing included burnout, job satisfaction, and intention to leave. Burnout was measured using the 22-item Maslach Burnout Inventory (MBI).[151] The MBI measures three related components of work-related burnout: emotional exhaustion, depersonalization, and lack of personal accomplishment. French wording of various MBI items was refined without changing their meaning. Job satisfaction was measured with a single ordinal measure asking respondents "How satisfied are you with your current job in this hospital?" as well as through 9 questions about satisfaction with specific aspects of the job (advancement opportunity, schedule flexibility, independence at work, annual leave, educational opportunity, sick leave, professional status, study leave, wages). Intent-to-leave was measured by a single item that asked respondents to indicate their intention to leave their current employer within the next year, and if yes, what kind of

job they would look for (nursing in another hospital, nursing outside a hospital, non-nursing job).

Following eight tasks are measured which were performed by nurses during their last shift but which could be performed by lower qualified personnel: distributing food trays, performing non-nursing care, arranging discharge, transporting patients, cleaning, perform non-nursing services, obtaining supplies, and performing clerical duties.

Nurse-perceived quality of care was assessed through several items inquiring about the quality of care on the nursing ward and a nursing ward safety grade, the evolution in the quality of patient care in the hospital, nurses' confidence that management acts to resolve problems in patient care, nurses' confidence that patients are able to manage their own care after discharge. Also included was a list of adverse events, errors and incidents that nurses can report on.

In addition to educational level, demographic characteristics included respondent age, gender and years of experience as a nurse.

An important addition to the survey compared to 2009 was the inclusion of day of the week that nurses reported on for matters related to their last shift. Of specific interest is to study differences in nurse staffing, tasks below nurses' skill level, and nursing care left undone in the weekend compared to weekdays.

5.3.4 Statistical analysis

In the first part of this chapter, all findings related to the 2019 sample of hospitals are reported.

First, all measures mentioned above are included and described overall and at the hospital level. Hospital-level scores are created by averaging reports from nurses within the same hospital at the hospital level. Regional differences are described as well. All graphical displays of findings consistently show hospitals of the Flemish Region in blue, hospitals of the Brussels-Capital Region in grey and hospitals of the Walloon Region in green.

Second, statistical significance of hospital scores across regions is evaluated using one-way ANOVA. Multiple comparisons test (Tukey's studentized range test) for pairwise differences between regions is requested.

Third, multiple logistic regression analysis is conducted to estimate the association between measures reflecting organisation of nursing care on the one hand and nurse wellbeing and care left undone on the other hand. Organisation of nursing care measures are included as hospital-level covariates by averaging reports from nurses within the same hospital at the hospital level. For the patient-to-nurse ratio, hospitals were categorized into quartiles. This analysis accounts for nurse demographics and for the clustering of nurses within hospitals using a generalized estimation equation approach. Also included in this analysis is a hospital-level covariate for care intensity per patient day derived from the B-NMDS (Chapter 3). Least-squares means are reported for all models, setting the coefficients for the weights of the means to be proportional to those in the sample.

Fourth, the Pearson correlation coefficient is used to estimate the degree of linear correlation, at the hospital level, between the patient-to-nurse ratio reported by nurses in the 2019 nurse survey and the patient-to-nurse ratio calculated from the 2016 B-NMDS. Similarly, the degree of linear correlation between nurse education reported by nurses and nurse education from the B-NMDS is calculated.

Fifth, the influence of language in comparing work environment and burnout across Regions is studied. A crucial aspect with regards to the comparison of findings across Regions, are language differences and the implication this may have on drawing a fair comparison. Comparison across Regions, especially with regards to the quality of nurses' work environment and their degree of burnout, might possibly be contaminated. The question is whether observed differences between Regions reflect true differences, or can be attributed to differences in the properties measures by the questionnaire items in the different languages in which the questionnaire is available. If a Dutch and French speaking nurse have the same value for, let's say, a chief nursing officer being equal in power or authority to other top level hospital executives, this is supposed to produce the same score. However, discrepancies in observed scores may partially reflect language issues, influenced by the researchers' translation and the respondents'

interpretation of terms such as power and authority. Broader cultural aspects may be at play to explain this difference in interpretation. One approach to study this issue, which is referred to as measurement (non-)invariance, comes in the form of a multiple indicators multiple causes (MIMIC) model. This technique is also referred to as confirmatory factor analysis (CFA) with covariates, and can be studied in a Bayesian framework.[152] As previously described, the 32 nursing work environment questions can be summarized into five dimensions. For example, the question about chief nursing officer power or authority is conceptually and statistically part of a dimension about nurse participation in hospital affairs. If we study the strength of the association between the 32 questionnaire items and the 5 dimensions, we have the CFA part of the MIMIC model. To this part, we add language (Dutch and French; German is excluded because of the low number of respondents), as a covariate. That is, it is evaluated whether language is associated with questionnaire items and the dimensions reflected by these items. From a mathematical function similar to a mediation analysis we can say that a statistically significant association between the covariate (language) and the questionnaire item (e.g. chief nursing officer power or authority) over and above the effect of the covariate on the respective dimension (e.g. nurse participation in hospital affairs) suggests that the item is non-invariant for the various values of the covariate (Dutch, French). This would suggest that caution is warranted when comparing scores for that item and the dimensions across the values of the covariate.

In the second part of this report a panel data analysis is conducted for the subgroup of hospitals that participated in 2009 as well as in 2019.

- First, findings are again described overall and at the hospital level.

- Second, difference-in-difference analysis is conducted to compare changes in the patient-to-nurse ratio reported by nurses in the 2009 and 2019 nurse survey, with changes in the patient-to-nurse ratio calculated from the 2009 and 2016 B-NMDS. Similarly, the change in nurse education reported by nurses is compared with the change in nurse education calculated from the B-NMDS.

5.3.5 General Data Protection Regulation (GDPR)

The ethics committee of University Hospitals Leuven approved this study (S62436) on 5 March 2019. This study did not fall under the Belgian law of 7 May 2004. The data were processed according to the Belgian law of 30 July 2018 and with Regulation (EU) 2016/679 of 27 April 2016, concerning the protection of natural persons in respect of processing activities and to ensure the free flow of personal data.[153] All nurses were informed via the information letter and electronically signed a Declaration of Consent via the software platform. Only the respondent could link his/her unique identification with his/her answers and had the right of inspection of their own data based on their unique identification by contacting KCE. Nor the research team, nor the hospital knew who participated and who did not. This study design guaranteed the anonymity of the participants as the IP address was not stored. Participants were not identified and the data were analysed only at nursing ward and hospital level.

5.4 Study population

5.4.1 Participating hospitals

Fifty-six acute hospitals participated in the 2009 survey: 37 hospitals in the Flemish Region, 4 hospitals in the Brussels-Capital Region and 15 hospitals in the Walloon Region.

Eighty-four acute hospitals participated in the 2019 survey: 45 hospitals in the Flemish Region, 10 hospitals in the Brussels-Capital Region and 29 hospitals in the Walloon Region.

From here onwards, the 2019 Belgian hospital landscape is our reference period to discuss the hospital participation rate and report findings. Various hospitals participating in 2009 underwent some change between then and 2019, which affects our main objective of studying nurse staffing and outcomes at the hospital level over time. In brief, in Turnhout, Sint-Elisabeth ziekenhuis and AZ Sint-Jozef both participated in the 2009 survey and merged into AZ Turnhout later that year. In Hasselt, Virga Jesse and Salvator merged into Jessa Ziekenhuis in 2010. Both hospitals participated in the 2009 survey. In 2012, CH Epicura originated from a merger between RHMS La Madeleine and Beloeil, RHMS Clinique Louis Caty and Centre

Hospitalier Hornu Frameries. RHMS and Centre Hospitalier Hornu Frameries had participated in the 2009 survey. Centre Hospitalier Chrétien Saint-Joseph and Centre Hospitalier Chrétien Sainte-Elisabeth both participated in the 2009 survey. In the 2019 survey, all six hospital sites of the Centre Hospitalier Chrétien group participated, several with one nursing ward only. For this reason and because these sites are under the same leadership, Centre Hospitalier Chrétien is reported on as one hospital.

Thus, compared to 2009, eight hospitals are reported on as four hospitals in 2019. Furthermore, three hospitals that previously participated in the 2009 survey opted not to do so in 2019. Therefore, the panel analysis comparing 2009 to 2019 findings included 49 (56 minus 4 minus 3) hospitals. Thirty-five hospitals participated in 2019, but not in 2009. Finally, eight hospitals did not participate in 2009 nor in 2019. Figure 35 graphically depicts the participation rates in 2009 and 2109.

5.4.2 Participating nurses

In 2009, the overall response rate was 72%, with 3 186 of 4 421 invited nurses completing the survey. This included 2 153 nurses working in the Flemish Region, 256 nurses working in the Brussels-Capital Region, and 777 nurses working the Walloon Region. One of 56 participating hospitals reached a response rate between 90% and 100%, 14 hospitals reached a response rate between 80% and 89%, 16 hospitals reached a response rate between 70% and 79%, 24 hospitals reached a response rate between 60% and 69% and 1 hospital reached a response rate between 50 and 59%.

In 2019, 5 203 of 6 379 invited nurses completed the questionnaire, corresponding to a response rate of 82%. 2 977 nurses worked in the Flemish Region, 565 in the Brussels-Capital Region and 1 661 in the Walloon Region. Sixteen of 84 participating hospitals reached a response rate between 90% and 100%, 36 hospitals reached a response rate between 80% and 89%, 24 hospitals reached a response rate between 70 and 79%, 7 hospitals reached a response rate between 60 and 69%, and 1 hospital reached a response rate between 50 and 59%.

The 2009-2019 panel analysis involving 49 hospitals comprised 3 035 nurses in 2009 and 3 457 nurses in 2019. Response rates for these subsamples were identical to the response rates for the full 2009 and 2019 samples, equalling 72% and 82%, respectively.

The mean age of the participating nurses working in internal medicine and general surgery nursing wards was 37.9 years (SD 10.7) in 2009 and 37.7 years (SD 11.7) in 2019. The mean number of years that the participating nurses had worked as a registered nurse in their career was 15.2±10.9 years in 2009 and 14.2±11.9 years in 2019. In 2009, 90.5% nurses were female and 57.3% nurses were working full time. This was similar in 2019, with 88.8% nurses being female and 58.7% nurses were working full time.

Figure 35 – Acute Belgian hospitals participating in RN4CAST (2009) and KCE study on nurse staffing (2019)
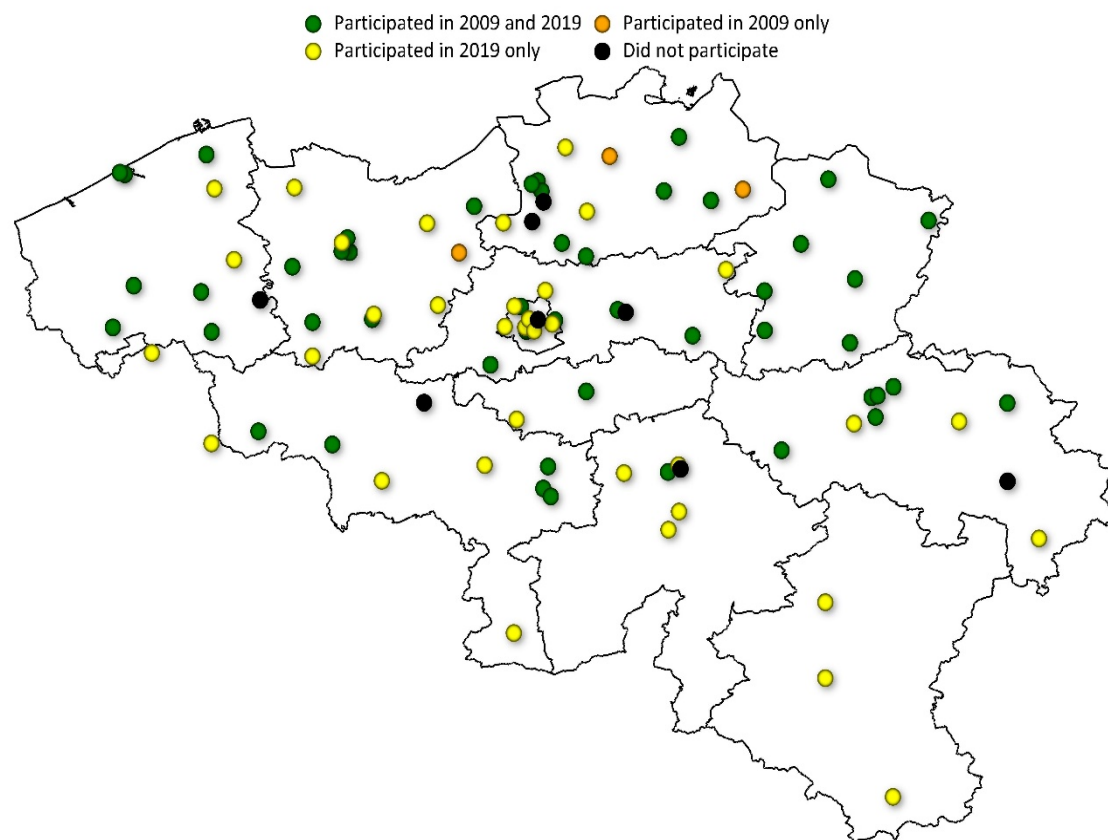
5.5 Results

5.5.1 Findings for the 2019 KCE study on nurse staffing

This section reports on the cross-sectional findings for the 84 hospitals that participated in the 2019 survey.

5.5.1.1 Nurse working environment

Figure 36 displays for each participating hospital the percentage of nurses agreeing or totally agreeing with the 32 PES items used to measure their work environment. Hospitals are on the x-axis and are ranked by the average percentage for all 32 items from left (highest percentage, i.e. 74%) to right (lowest percentage, i.e. 43%). The higher the score, the better. A heatmap is used to express percentages between a range of colours that moves from green (high percentage) over blue (medium percentage) to red (low percentage). This clearly shows overall favourable percentages for items related to foundations for nursing quality, ambiguous findings for items related to nurse-physician relations and leadership, and overall poor findings for participation in hospital affairs and staffing and resources adequacy. For example, with the exception of one hospital obtaining 50%, in all hospitals less than half of nurses agree or totally agree that they participate in policy. The same can be said for having enough nurses to provide quality care, and several other similar observations can be made. Nevertheless, overall, variation across hospitals is substantial, and suggests that several hospitals have implemented successful strategies to optimize aspects of nurses' work environment. Also within organisations variation is often high across items for the same subscale, and this pattern is divergent across hospitals.

Figure 36 – Percentage of nurses agreeing or totally agreeing with presence of positive work environment aspects, at hospital level in 2019

Nurse manager ability, leadership and support of nurses: A supervisory staff that is supportive of nurses; A nurse manager who is a good manager and leader; Praise and recognition for a job well done; A nurse manager who backs up the nursing staff in decision making, even if the conflict is with a physician. *Nurse participation in hospital affairs*: Career development/clinical ladder opportunity; Opportunity for registered nurses to participate in policy decisions; A chief nursing officer who is highly visible and accessible to staff; A chief nursing officer is equal in power and authority to other top level hospital executives; Opportunities for advancement; Management that listens and responds to employee concerns; Registered nurses are involved in the internal governance of the hospital (e.g., practice and policy committees); Registered nurses have the opportunity to serve on hospital and nursing committees. *Nurse-physician relation*: Physicians and nurses have good working relationships; Physicians value nurses' observations and judgments; Physicians recognize nurses' contributions to patient care. A lot of team work between nurses and physicians; Physicians respect nurses as professionals; Collaboration between nurses and physicians; Physicians hold nurses in high esteem. *Nursing foundations for quality of care*: Active staff development or continuing education programs for nurses; High standards of nursing care are expected by the management; A clear philosophy of nursing that pervades the patient care environment; Working with nurses who are clinically competent; An active quality assurance program; A preceptor program for newly hired nurses; Nursing care is based on a nursing rather than a medical model; Written, up-to-date care plans for all patients; Patient care assignments that foster continuity of care (i.e., the same nurse cares for the patient from one day to the next). *Staffing and resource adequacy*: Adequate support services allow me to spend time with my patient; Enough time and opportunity to discuss patient care problems with other nurses; Enough registered nurses on staff to provide quality patient care; Enough staff to get the work done.

Figures 37 to 41 illustrate the findings for the five dimensions underlying the 32 items: nurse manager ability, leadership, and support of nurses (Figure 37), nurse participation in hospital affairs (Figure 38), nurse foundations for quality of care (Figure 39), nurse-physician relations (Figure 40), and staffing and resource adequacy (Figure 41). The higher the score, the better.

The average percentage of nurses who (totally) agreed with items about manager ability, leadership and support is 63% (22% to 84%) (Figure 37).

Figure 37 – Percentage of nurses agreeing or totally agreeing with the presence of positive work environment aspects related to manager ability, leadership and support, at hospital and regional level in 2019
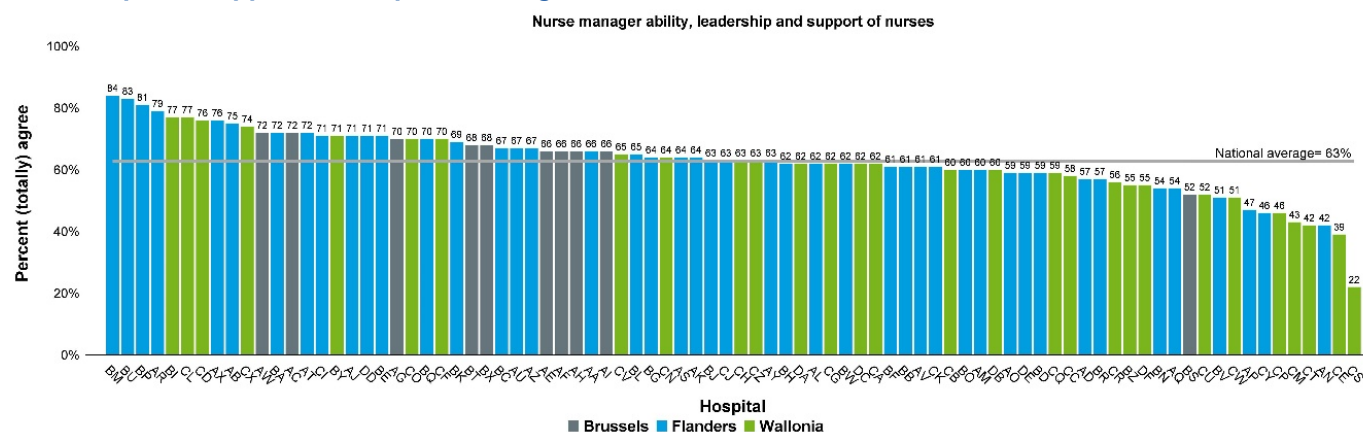
The average percentage of nurses who (totally) agreed with items about participation of nurses in hospital affairs is 40% (23% to 66%) (Figure 38).

Figure 38 – Percentage of nurses agreeing or totally agreeing with the presence of positive work environment aspects related to participation in hospital affairs, at hospital and regional level in 2019
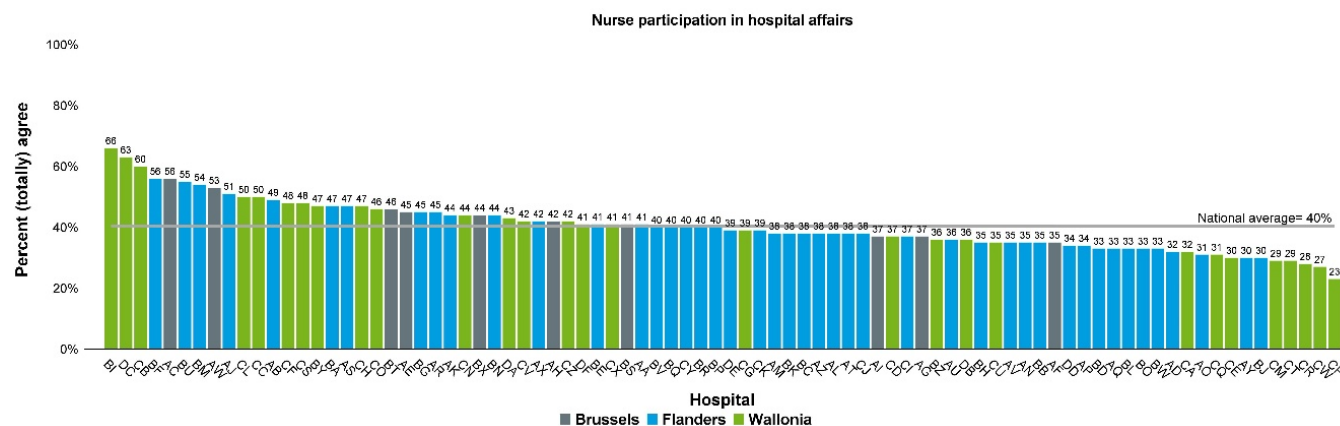
The average percentage of nurses who (totally) agreed with items about foundations of quality care is 74% (54% to 93%) (Figure 39).

Figure 39 – Percentage of nurses agreeing or totally agreeing with presence of positive work environment aspects related to foundations of nursing quality care, at hospital and regional level in 2019
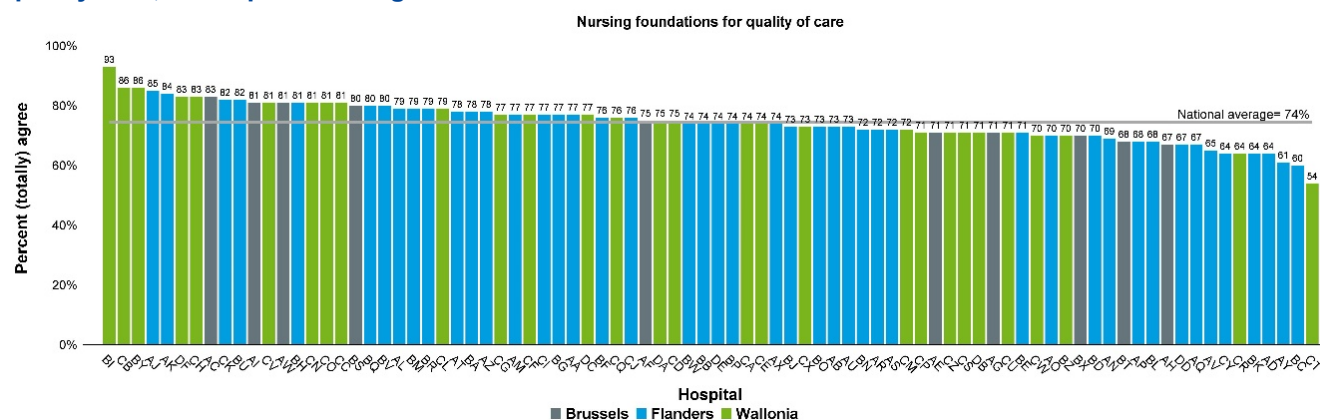
The average percentage of nurses who (totally) agreed that a good and collegiate nurse-physician relationship is present at their nursing ward is 65% (35% to 81%) (Figure 40).

Figure 40 – Percentage of nurses agreeing or totally agreeing with the presence of positive work environment aspects related to nurse-physician collegial relations, at hospital and regional level in 2019
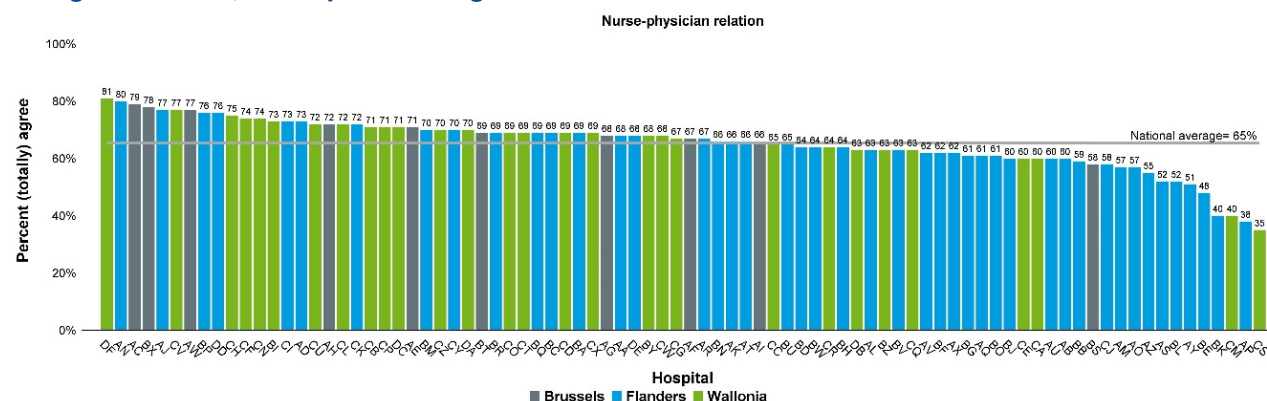
The average percentage of nurses who (totally) agreed that nurse staffing and the presence of resources are adequate is 29% (9% to 58%) (Figure 41).

Figure 41 – Percentage of nurses agreeing or totally agreeing with presence of positive work environment aspects related to staffing and resource adequacy, at hospital and regional level in 2019
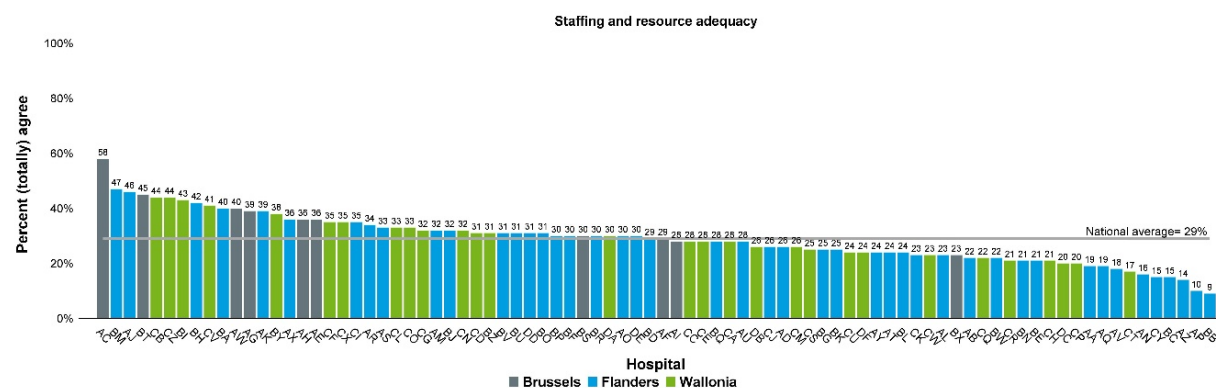
5.5.1.2   Nurse staffing

Figures 42 to 45 display the overall patient-to-nurse ratio and the patient-to-nurse ratio by shift. The lower the patient-to-nurse ratio is, the lower the workload. The overall patient-to-nurse ratio is 9.4 patients per nurse (6.1 to 12.7) (Figure 42).

Figure 42 – Overall patient-to-nurse ratio, at hospital and regional level in 2019
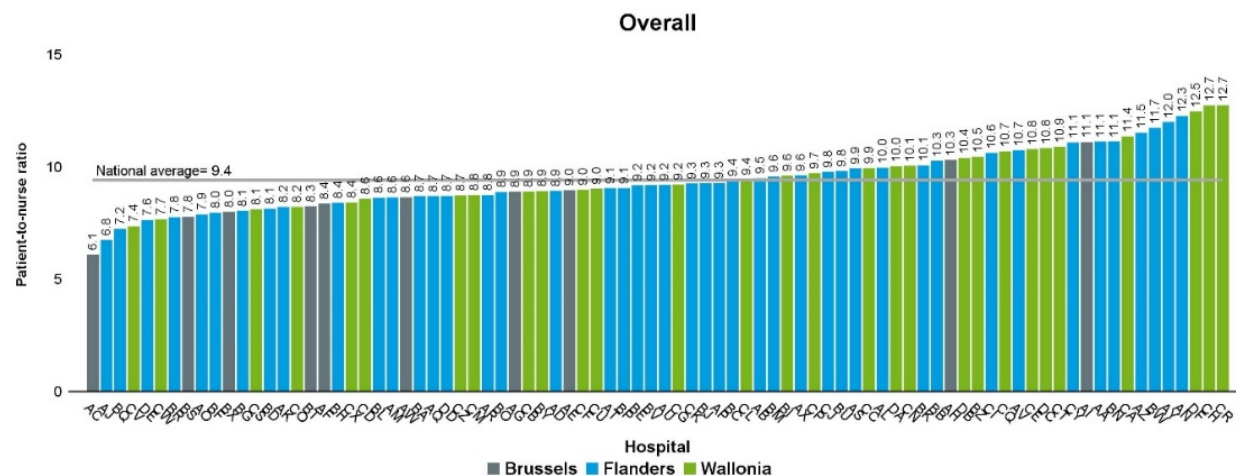
The average patient-to-nurse ratios for the morning/day shift is 7.1 (5.4 to 9.9) (Figure 43).

Figure 43 – Patient-to-nurse ratio during the morning/day shift, at hospital and regional level in 2019
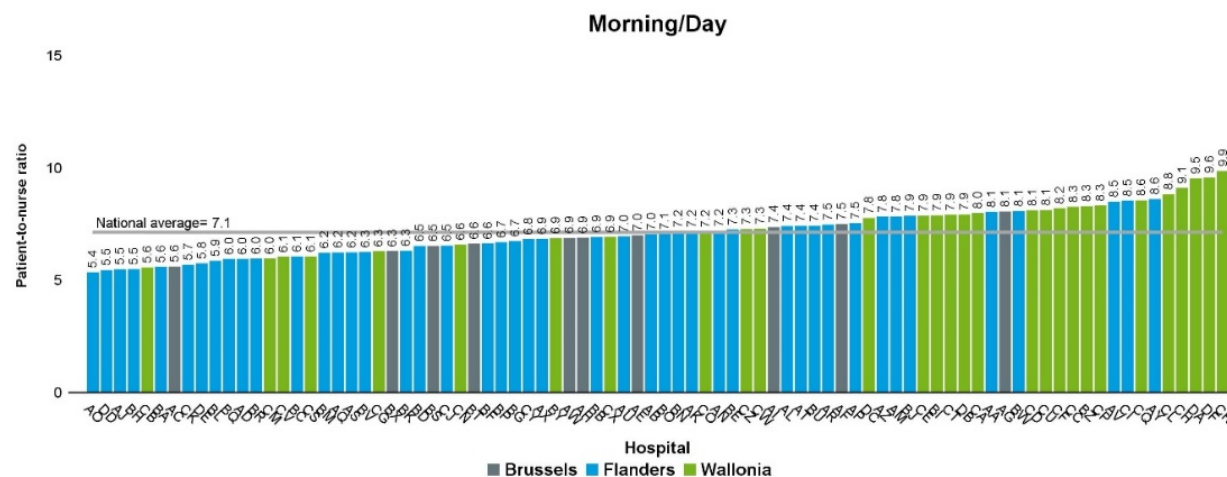
The average patient-to-nurse ratios for the afternoon/evening shift is 8.9 (4.6 to 13.3) (Figure 44).

Figure 44 – Patient-to-nurse ratio during the afternoon/evening shift, at hospital and regional level in 2019
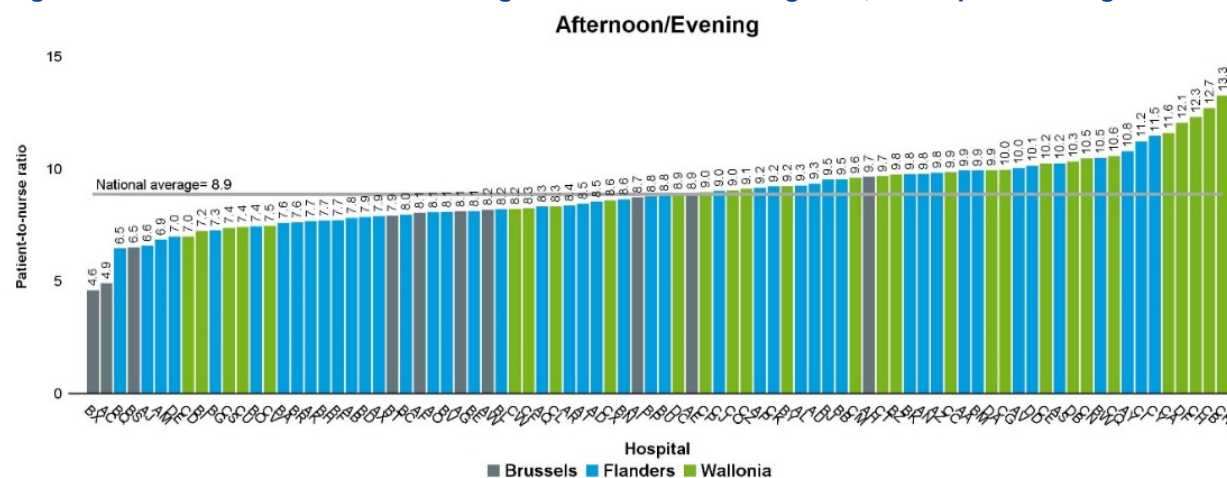
The average patient-to-nurse ratios for the night shift is 18.1 (8.0 to 27.6) (Figure 45).

Figure 45 – Patient-to-nurse ratio during the night shift, at hospital and regional level in 2019
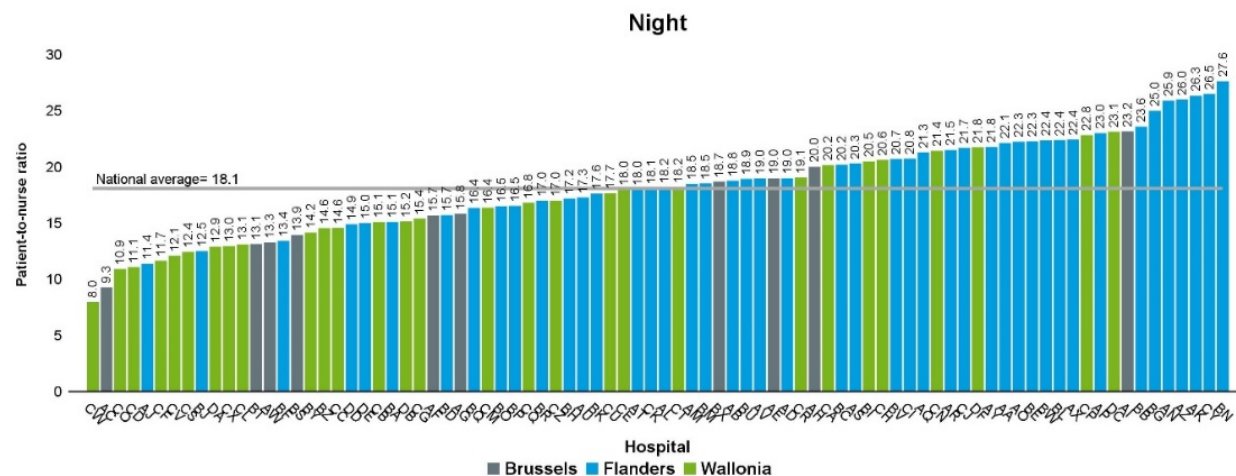
Figure 46 displays the patient-to-nurse ratio for weekdays versus weekend, by type of shift. Overall, patient-to-nurse ratios remain relatively stable comparing weekdays with weekend.

Figure 46 – Patient-to-nurse ratio during weekday versus weekend, by shift in 2019
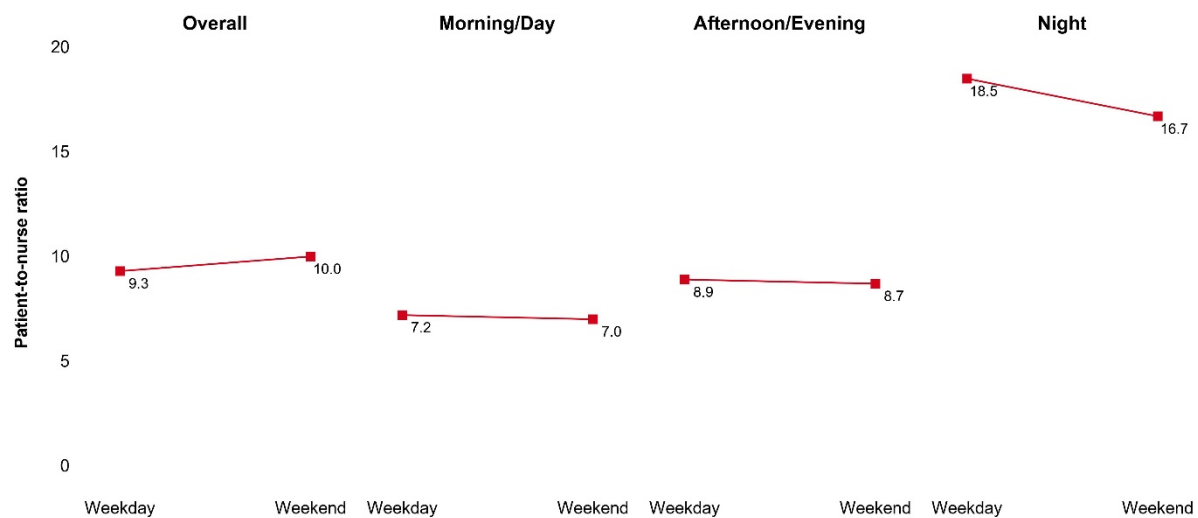
5.5.1.4 Nurse education

The average percentage of Bachelor prepared nurses is 63% (34% - 96%) (Figure 47).

Figure 47 – Percentage of Bachelor prepared nurses, at hospital and regional level in 2019
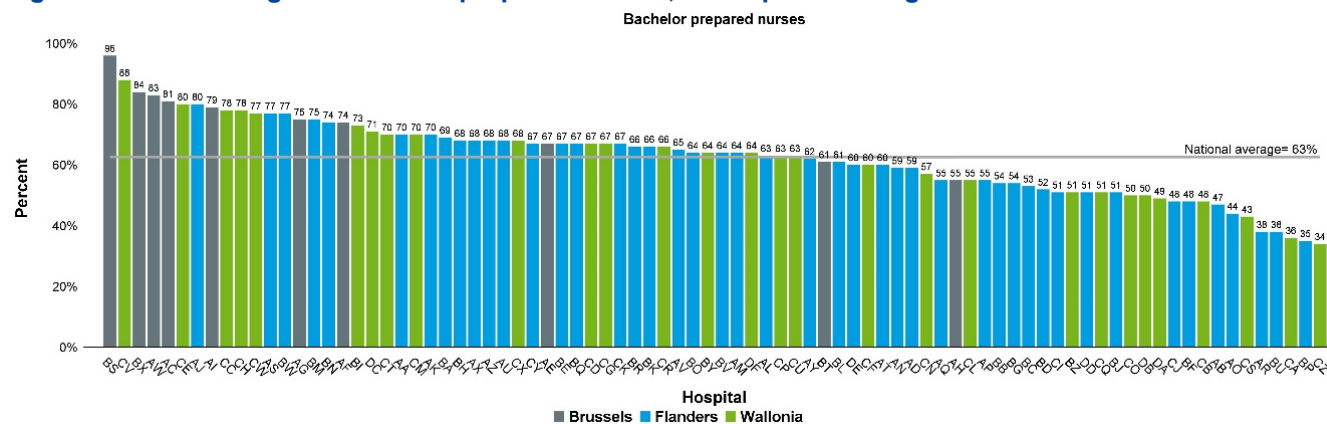
5.5.1.5 Care left undone

Figures 48 to 55 display the findings for the seven items measuring clinical care left undone (adequate patient surveillance, skin care, oral hygiene, pain management, treatments and procedures, administer medications on time, frequent changing of patient position) and the overall dimension of clinical care left undone in terms of the percentage of tasks nurses reported on as being left undone. The lower the score, the better.

The average percentage of nurses who reported leaving adequate patient surveillance undone during their last shift due to lack of time is 37% (13% to 62%) (Figure 48).

Figure 48 – Percentage of nurses who reported leaving adequate patient surveillance undone during the last shift, at hospital and regional level in 2019
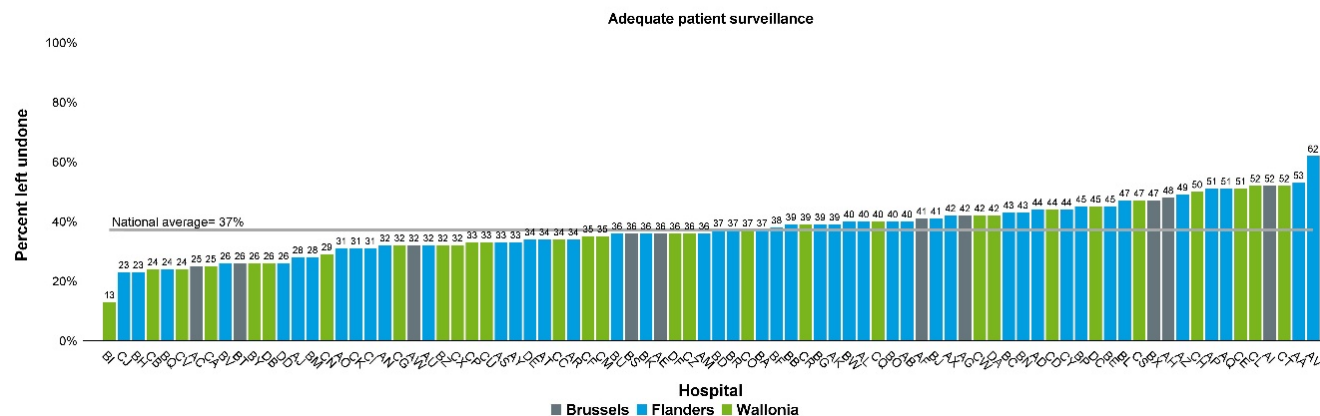
The average percentage of nurses who reported leaving skin care undone during their last shift due to lack of time is 29% (11% to 51%) (Figure 49).

Figure 49 – Percentage of nurses who reported leaving skin care undone during the last shift, at hospital and regional level in 2019
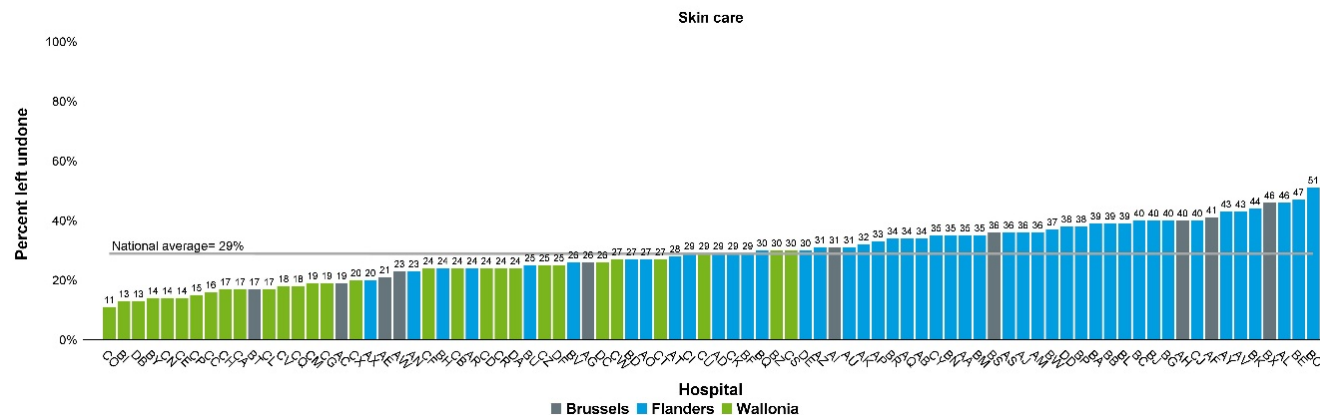
The average percentage of nurses who reported leaving oral hygiene undone during their last shift due to lack of time is 48% (26% to 74%) (Figure 50).

Figure 50 – Percentage of nurses who reported leaving oral hygiene undone during the last shift, at hospital and regional level in 2019
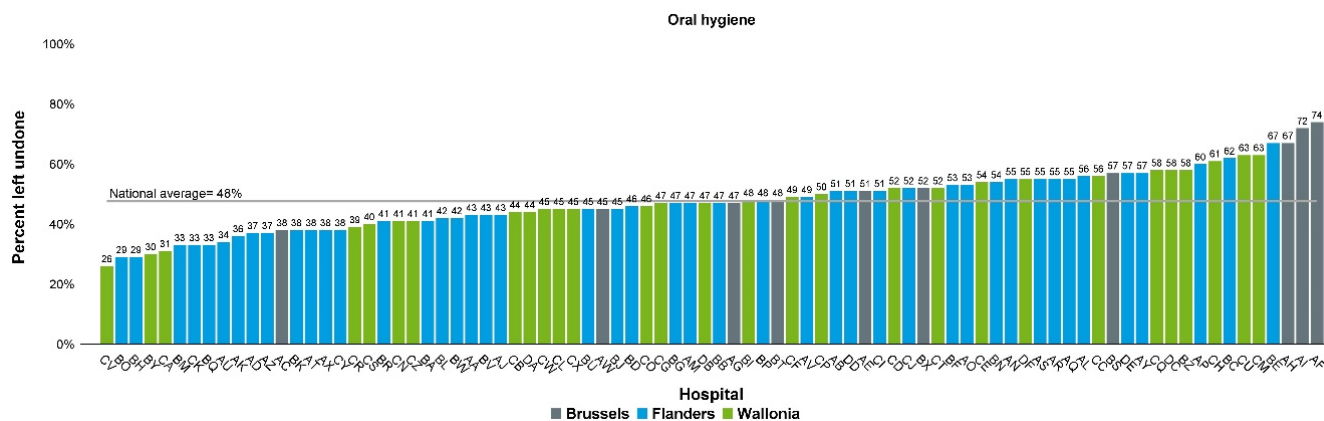
The average percentage of nurses who reported leaving pain management undone during their last shift due to lack of time is 19% (3% to 34%) (Figure 51).

Figure 51 – Percentage of nurses who reported leaving pain management undone during the last shift, at hospital and regional level in 2019
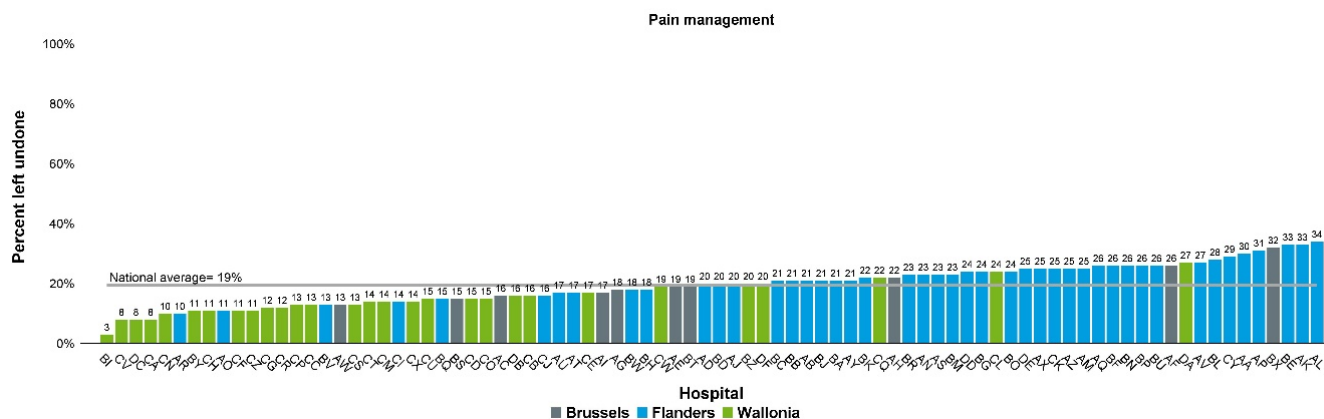
The average percentage of nurses who reported leaving treatments/procedures undone during their last shift due to lack of time is 19% (3% to 52%) (Figure 52).

Figure 52 – Percentage of nurses who reported leaving treatments/procedures undone during the last shift, at hospital and regional level in 2019
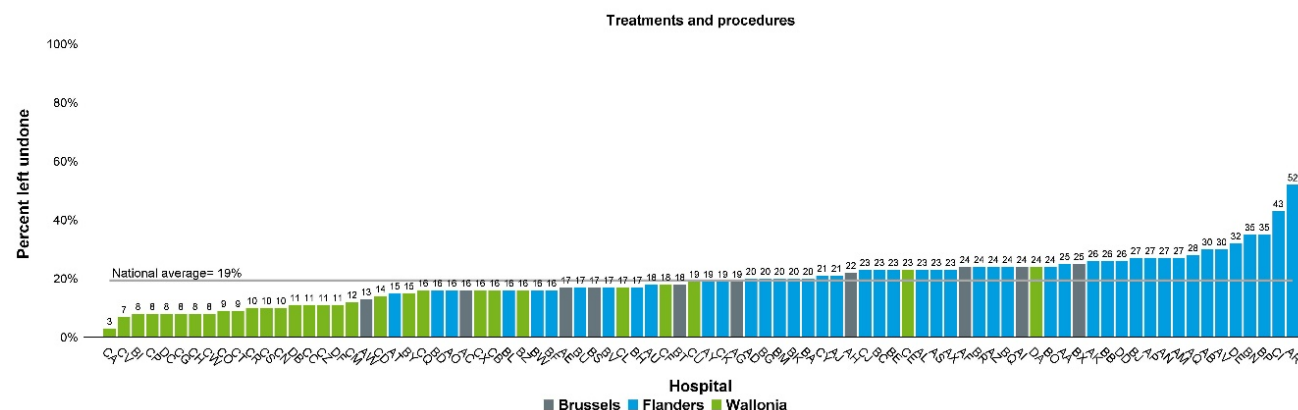
The average percentage of nurses who reported leaving timely medication administration undone during their last shift due to lack of time is 33% (10% to 56%) (Figure 53).

Figure 53 – Percentage of nurses who reported leaving timely medication administration undone during the last shift, at hospital and regional level in 2019
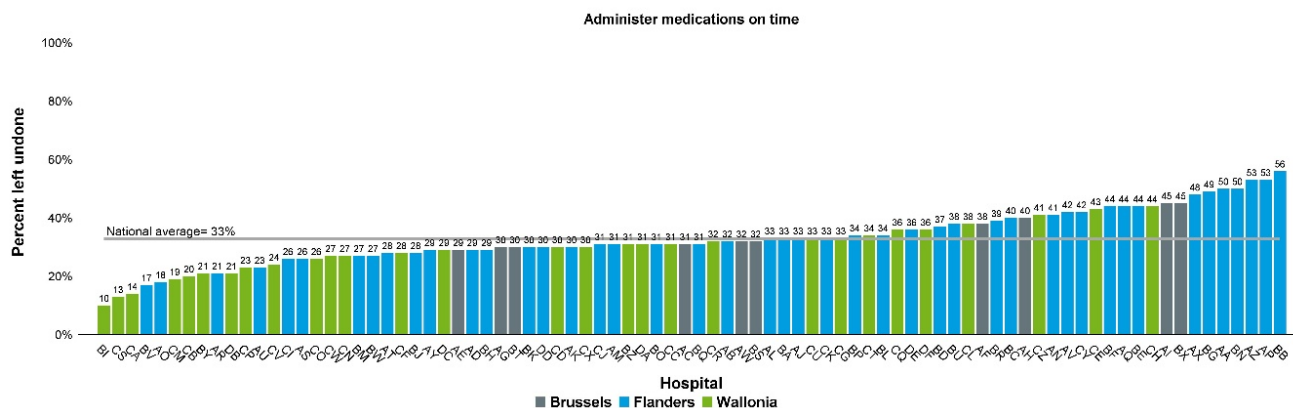
The average percentage of nurses who reported leaving frequent changing of patient position undone during their last shift due to lack of time is 37% (21% to 64%) (Figure 54).

Figure 54 – Percentage of nurses who reported leaving frequent changing patient position undone during the last shift, at hospital and regional level in 2019
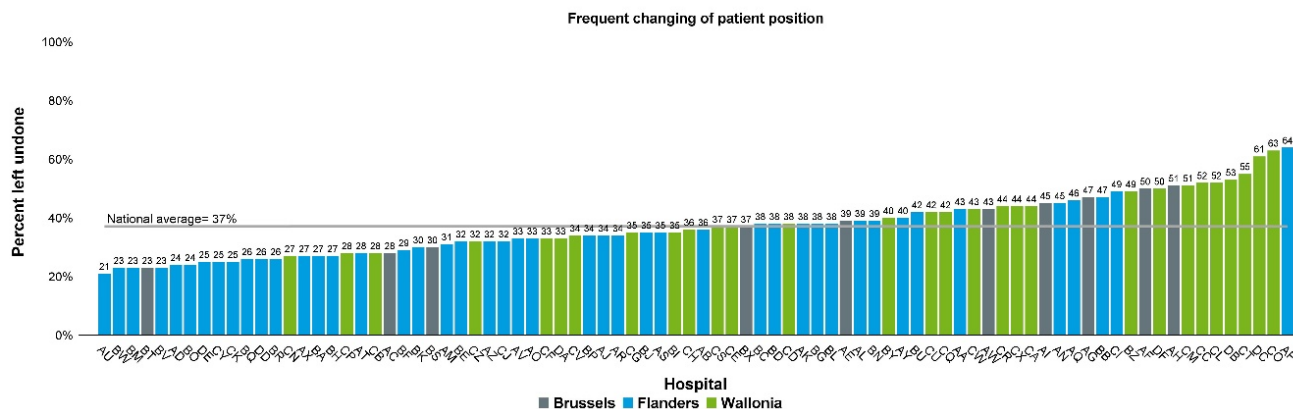
The average percentage of nurses who reported leaving clinical activities left undone during their last shift was 32% (18% to 45%) (Figure 55).

Figure 55 – Percentage of who reported leaving clinical care activities left undone, at hospital and regional level in 2019
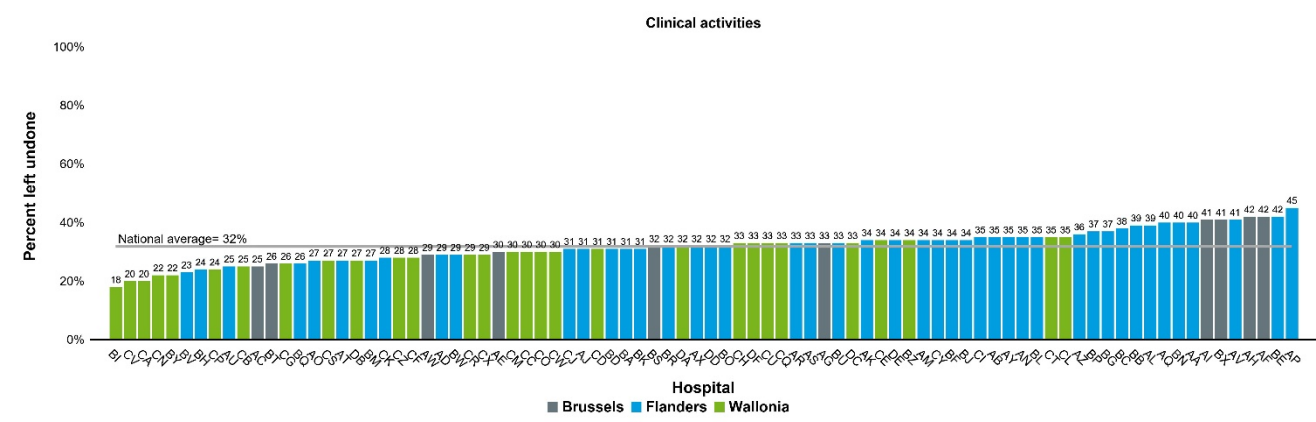
Figures 56 to 61 display the findings for the 5 items measuring planning and communication left undone (comforting and talking with patients, educating patients and family, prepare patients and families for discharge, develop or update nursing care plans or care pathways, planning care) and the overall dimension of planning and communication left undone in terms of the percentage of tasks nurses reported on as being left undone. The lower the score, the better.

The average percentage of nurses who reported leaving comforting patients undone during their last shift due to lack of time is 67% (39% to 89%) (Figure 56).

Figure 56 – Percentage of nurses who reported leaving comforting patients undone during the last shift, at hospital and regional level in 2019
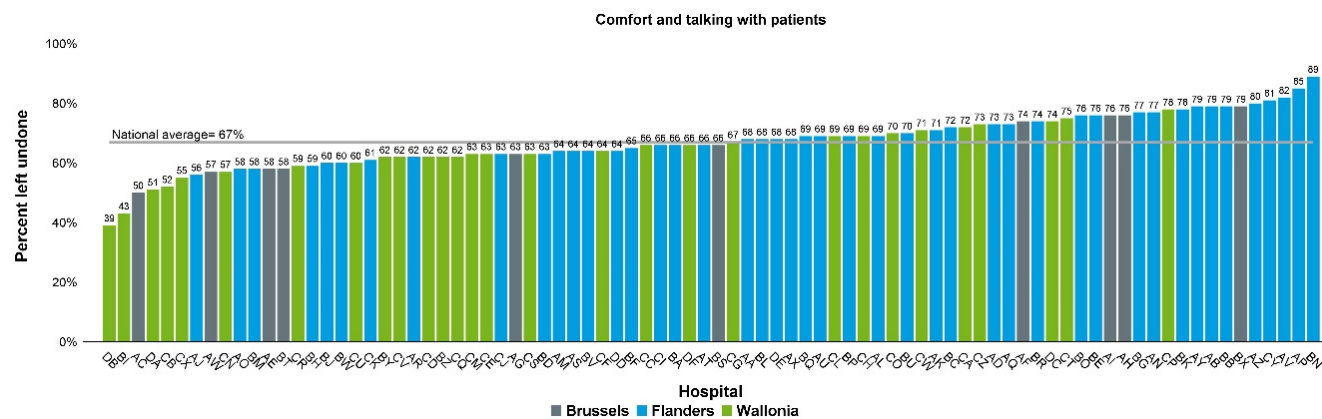
The average percentage of nurses who reported leaving educating patients undone during their last shift due to lack of time is 55% (30% to 77%) (Figure 57).

Figure 57 – Percentage of nurses who reported leaving educating patients undone during the last shift, at hospital and regional level in 2019
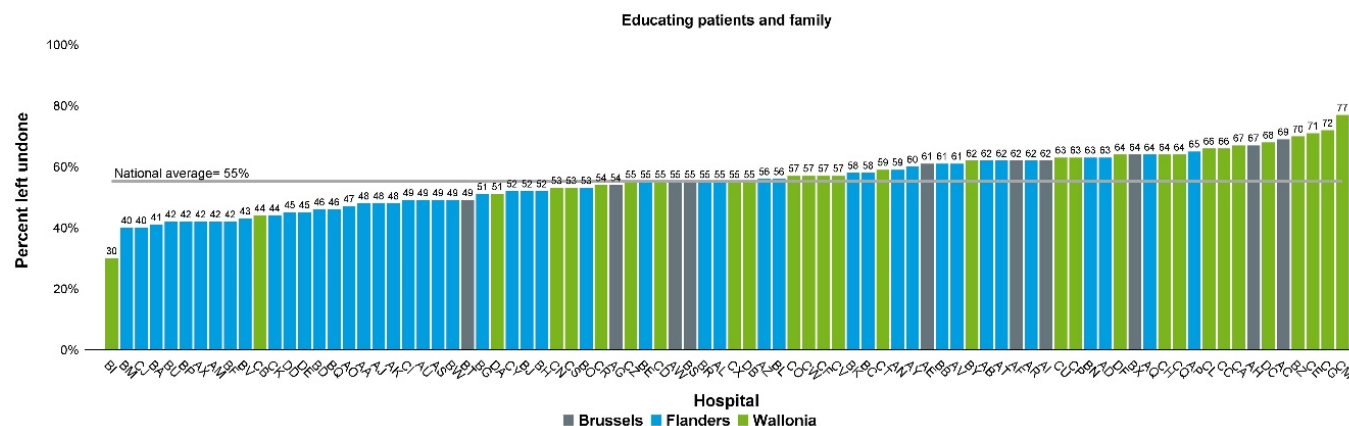
The average percentage of nurses who reported leaving preparing patients and their family for discharge undone during their last shift due to lack of time is 34% (8% to 55%) (Figure 58).

Figure 58 – Percentage of nurses who reported preparing patients and their family for discharge undone during the last shift, at hospital and regional level in 2019
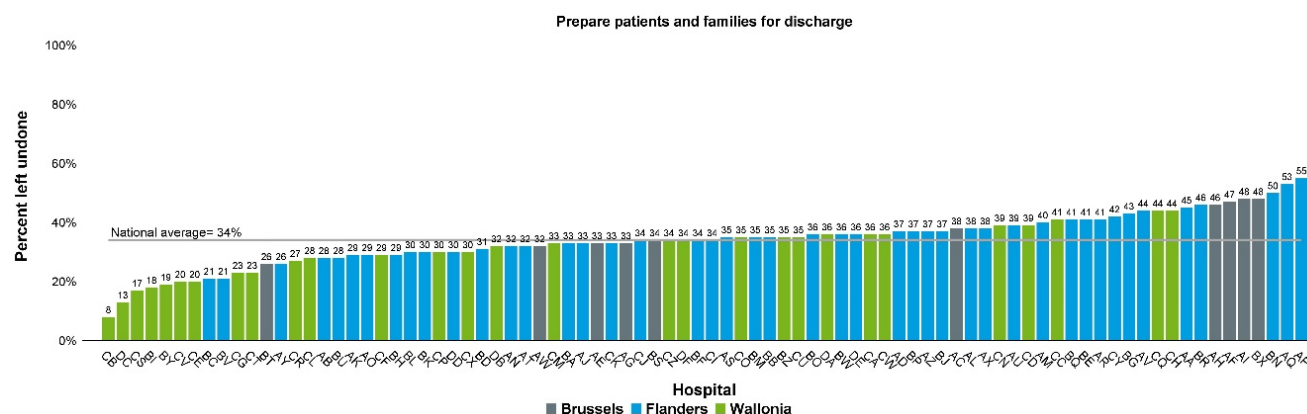
The average percentage of nurses who reported leaving developing or updating nursing care plans or care pathways undone during their last shift due to lack of time is 47% (28% to 67%) (Figure 59).

Figure 59 – Percentage of nurses who reported leaving updating care plans undone during the last shift, at hospital and regional level in 2019
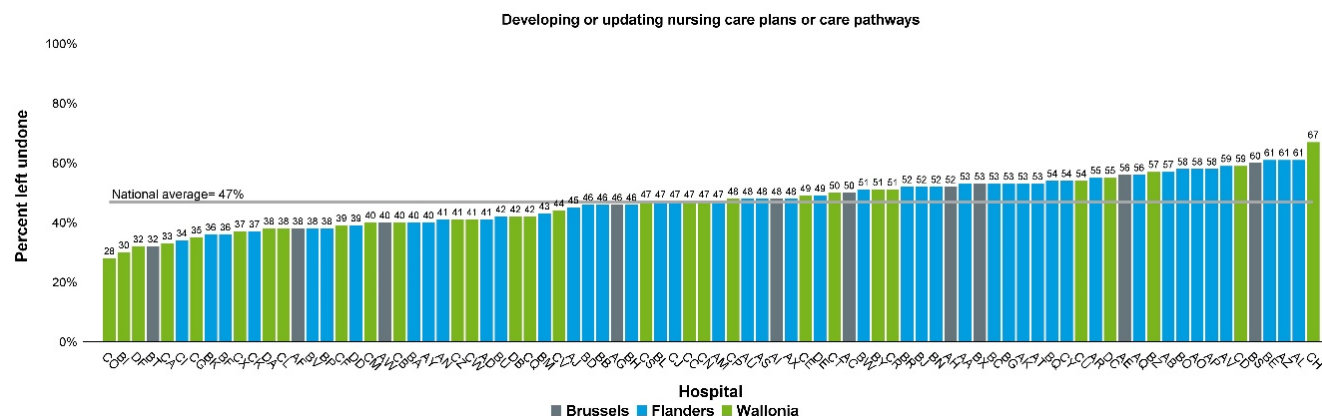
The average percentage of nurses who reported leaving planning care undone during their last shift due to lack of time is 30% (14% to 55%) (Figure 60).

Figure 60 – Percentage of nurses who reported leaving planning care undone during the last shift, at hospital and regional level in 2019
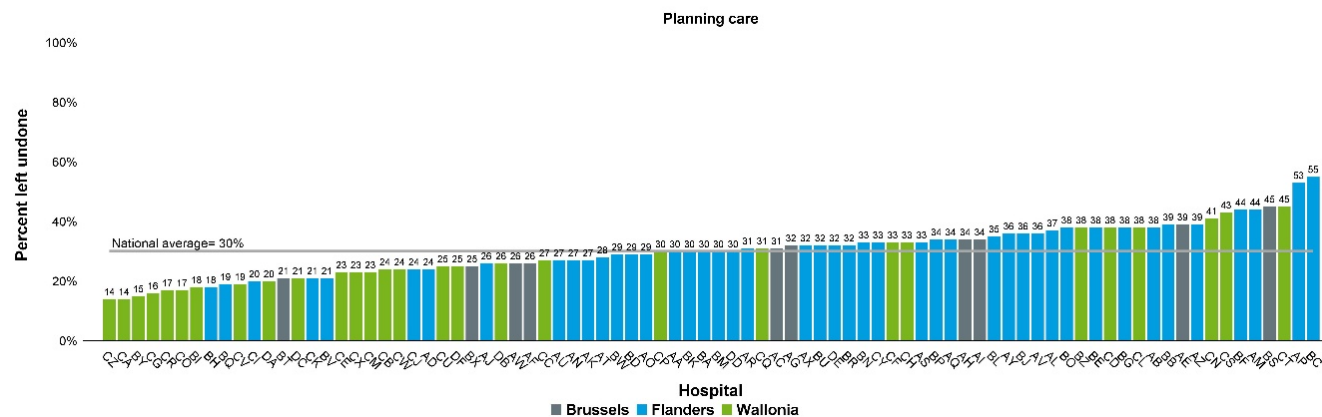
On average, nurses reported leaving 47% (28% to 63%) of five planning and communication tasks left undone during their last shift (Figure 61).

Figure 61 – Percentage of planning and communication activities left undone, at hospital and regional level in 2019
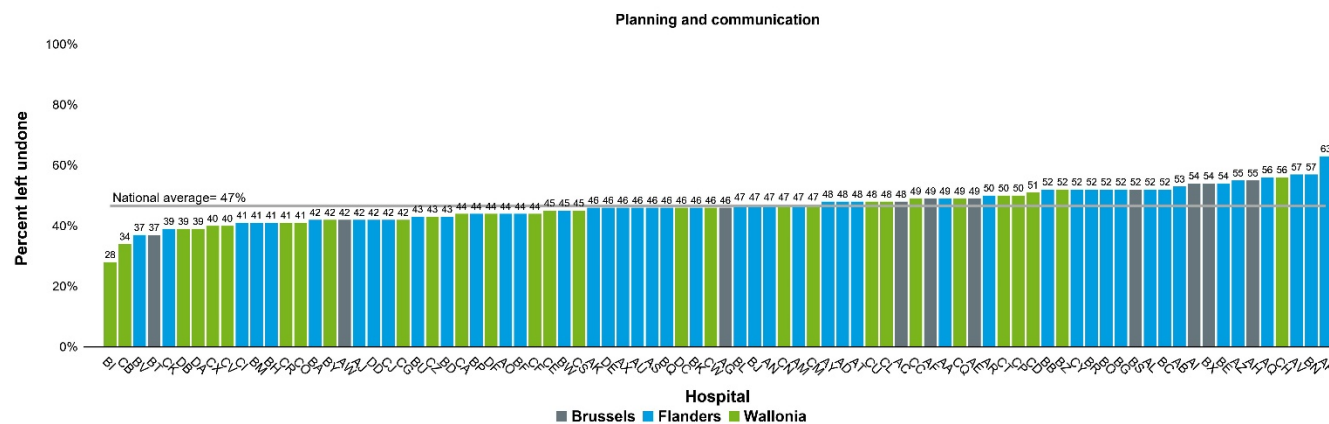
The survey item about documenting care left undone is not part of the dimension of clinical care nor planning and communication. The average percentage of nurses who reported leaving documenting care undone during their last shift due to lack of time is 42% (20% to 63%) (Figure 62).

Figure 62 – Percentage of nurses who reported leaving documenting care undone during the last shift, at hospital and regional level in 2019
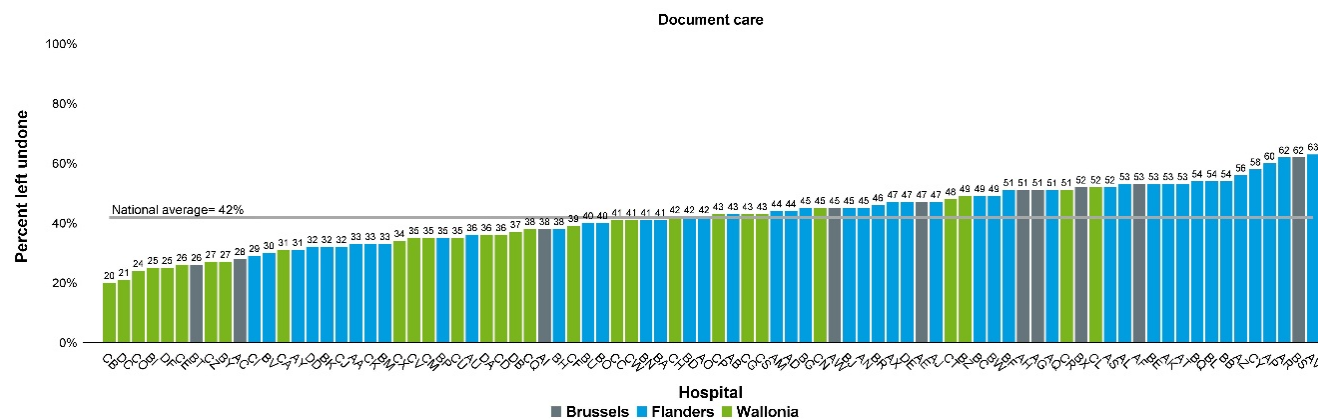
Figure 63 displays the percentage of care activities left undone for weekdays versus weekend, by type of shift. For morning/day and afternoon/evening shifts, clinical activities as well as activities related to planning and communication are slightly less left undone in the weekend versus weekdays. For night shifts, care left undone is slightly higher in the weekend.

Figure 63 – Care left undone during weekday versus weekend, by shift in 2019
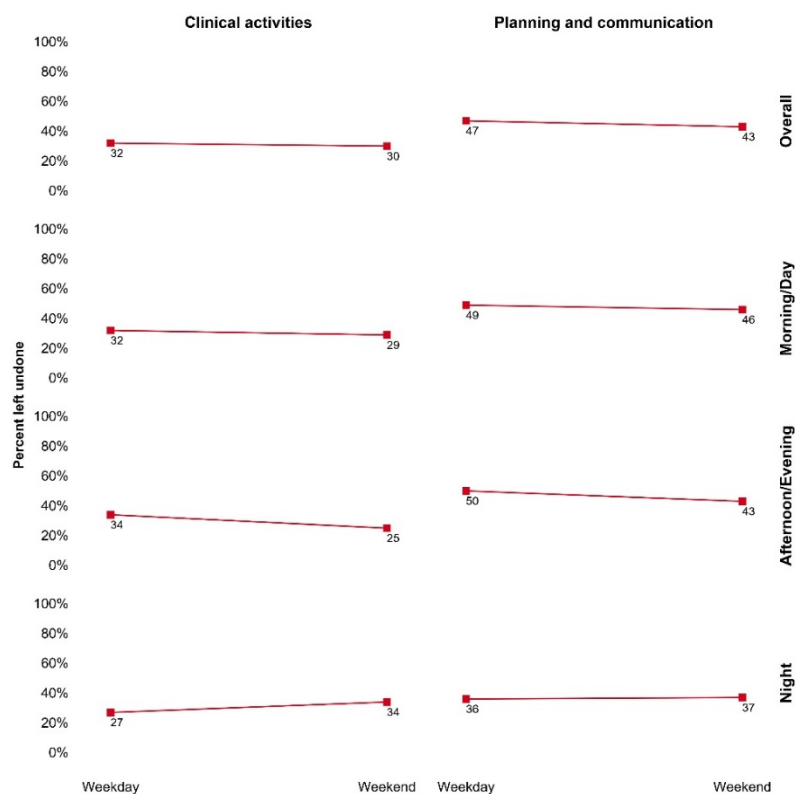
5.5.1.6   Wellbeing

Burnout

Figure 64 displays the percentage of nurses indicating they experience feelings about depersonalization, emotional exhaustion and personal accomplishment at least once a week, several days a week or every day. For depersonalization and emotional exhaustion, the lower the score, the better. For personal accomplishment, the higher the score, the better. Hospitals are on the x-axis and are alphabetically sorted. A heatmap is used to express percentages between a range of colours that moves from green (high percentage) over blue (medium percentage) to red (low percentage).

Using a validated scoring algorithm, dimensional scores are calculated and expressed as high risk of burnout or not (Figure 65 to 67). Here, the items related to personal accomplishment transform into a dimension expressed as reduced personal accomplishment. Thus, for all three dimensions, the lower the score, the better.

Figure 64 – Percentage of nurses indicating they experience feelings about depersonalization, emotional exhaustion and personal accomplishment at least once a week, several days a week or every day, at hospital level in 2019
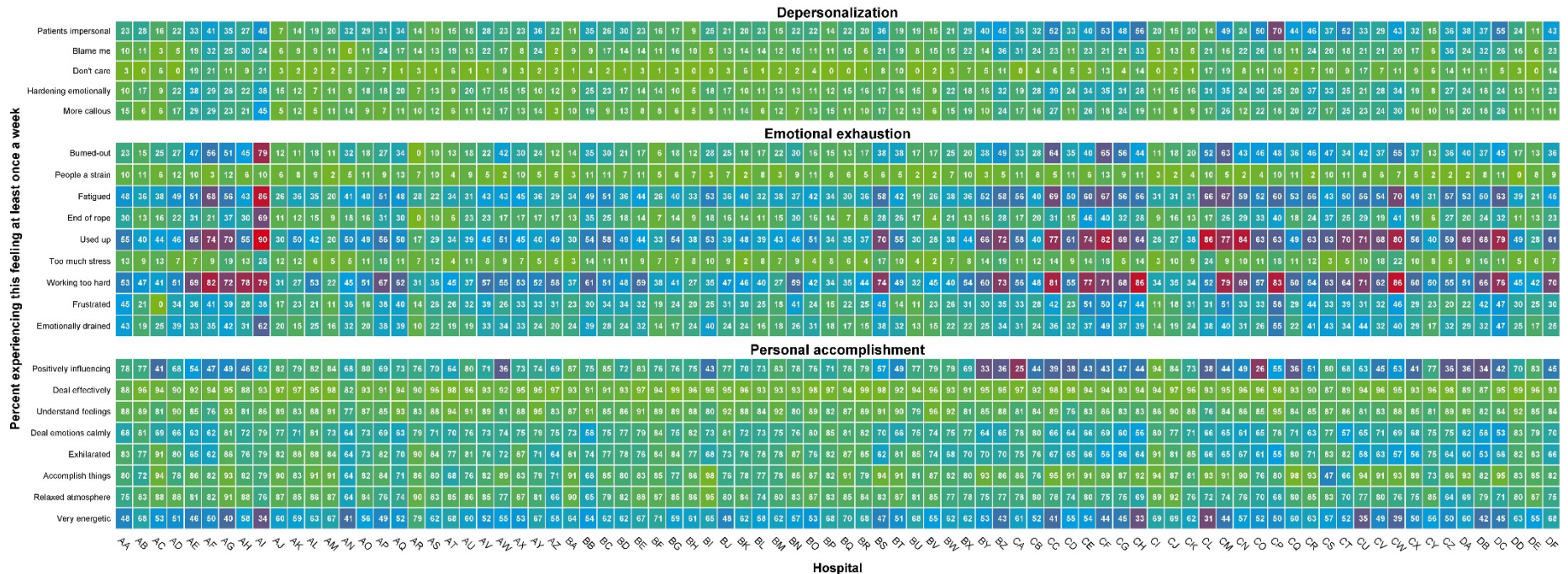
Depersonalization: I feel I treat some patients as if they were impersonal objects; I've become more callous toward people since I took this job; I worry that this job is hardening me emotionally; I don't really care what happens to some patients; I feel patients blame me for some of their problems. *Emotional exhaustion*: I feel emotionally drained from my work; I feel used up at the end of the workday; I feel fatigued when I get up in the morning and have to face another day on the job; Working with people all day is really a strain for me; I feel burned-out from my work; I feel frustrated by my job; I feel I'm working too hard on my job; Working directly with people puts too much stress on me; I feel like I'm at the end of my rope. *Personal accomplishment*: I can easily understand how my patients feel about things; I deal very effectively with the problems of my patients; I feel I'm positively influencing other people's lives; I feel very energetic; I can easily create a relaxed atmosphere with my patients; I accomplish many worthwhile things in this job; I feel exhilarated after working closely with my patients; In my work, I deal with emotional problems very calmly.

The average percentage of nurses at high risk of emotional exhaustion is 36% (7% to 76%) (Figure 65).

Figure 65 – Percentage of nurses at high risk of emotional exhaustion, at hospital and regional level in 2019
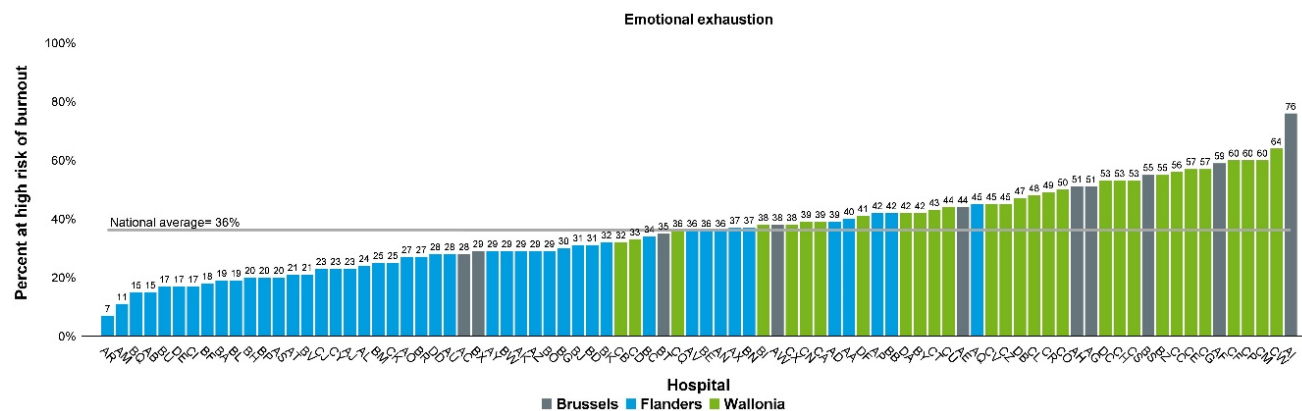
The average percentage of nurses at high risk of depersonalization is 32% (9% to 66%) (Figure 66).

Figure 66 – Percentage of nurses at high risk of depersonalization, at hospital and regional level in 2019
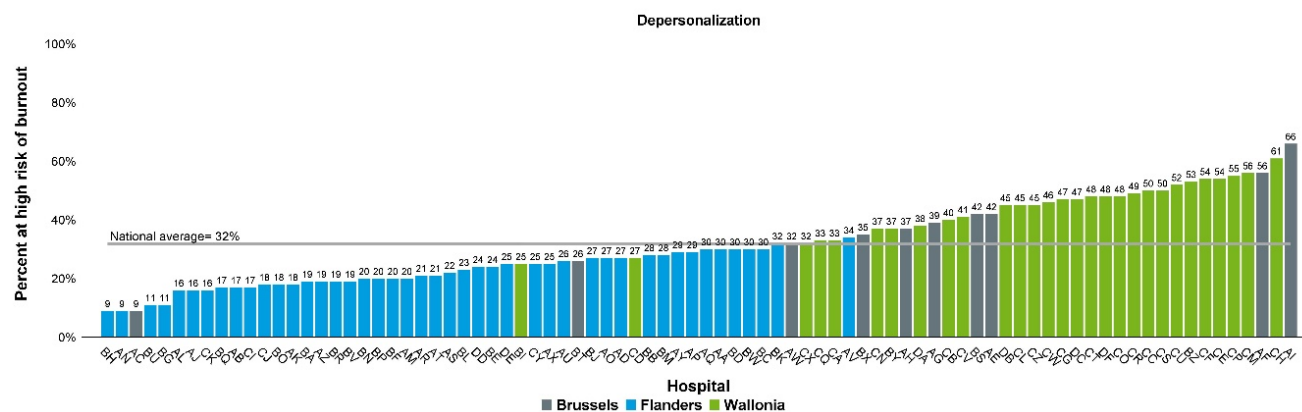
The average percentage of nurses at high risk of reduced personal accomplishment is 31% (12% to 65%) (Figure 67).

Figure 67 – Percentage of nurses at high risk of reduced personal accomplishment, at hospital and regional level in 2019
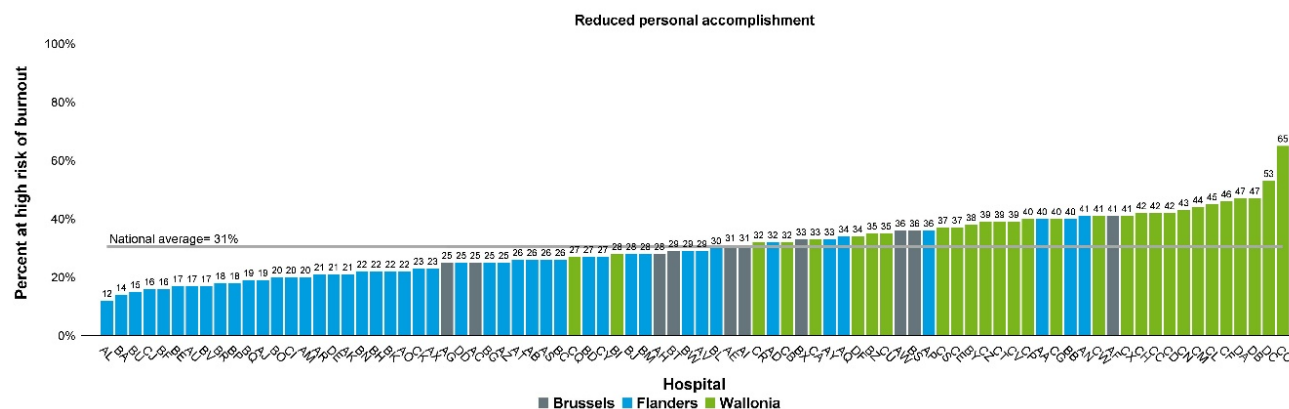
Job dissatisfaction

Overall job dissatisfaction and dissatisfaction with advancement opportunity, schedule flexibility, independence at work, annual leave, educational opportunity, sick leave, professional status, study leave and wages are displayed in Figures 68 to 77. The lower the score, the better.

The average percentage of nurses dissatisfied with their job is 27% (0% to 77%) (Figure 68).

Figure 68 – Percentage of nurses dissatisfied with their job, at hospital and regional level in 2019
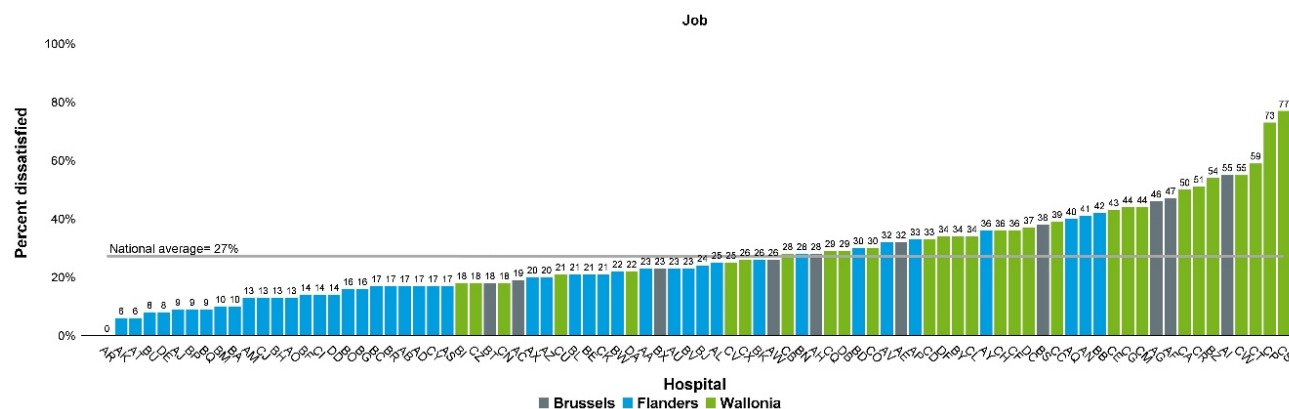
The average percentage of nurses dissatisfied with advancement opportunity is 38% (14% to 70%) (Figure 69).

Figure 69 – Percentage of nurses dissatisfied with advancement opportunity, at hospital and regional level in 2019
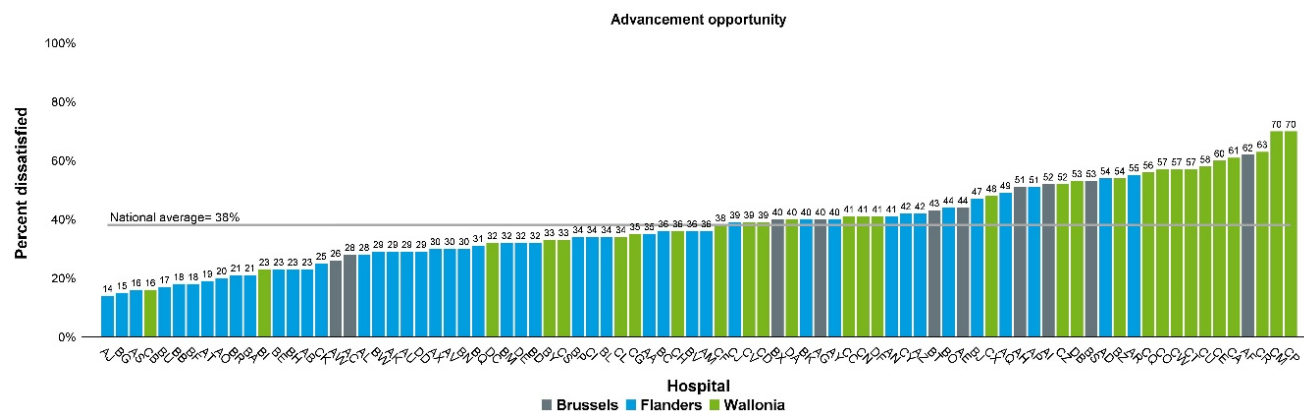
The average percentage of nurses dissatisfied with schedule flexibility is 27% (3% to 82%) (Figure 70).

Figure 70 – Percentage of nurses dissatisfied with schedule flexibility, at hospital and regional level in 2019
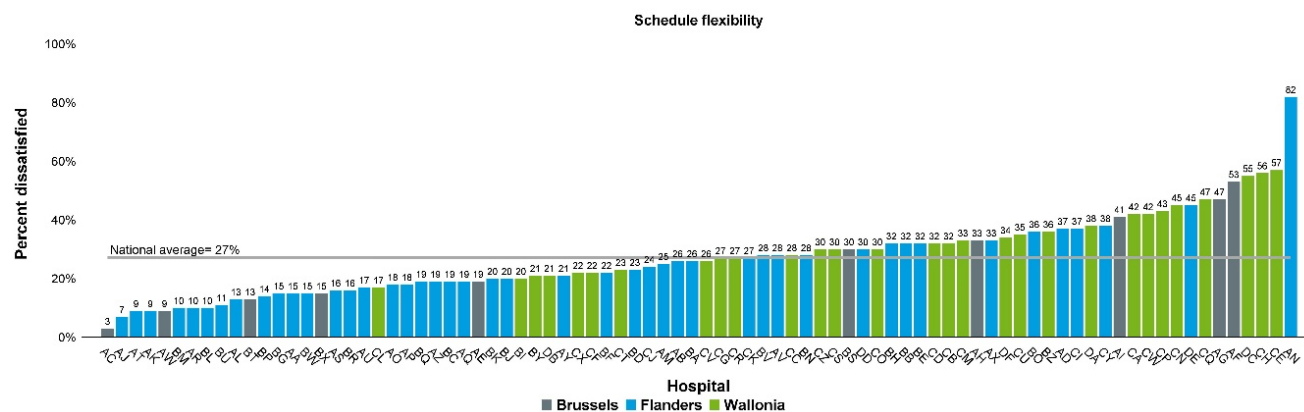
The average percentage of nurses dissatisfied with independence at work is 12% (0% to 41%) (Figure 71).

Figure 71 – Percentage of nurses dissatisfied with independence at work, at hospital and regional level in 2019
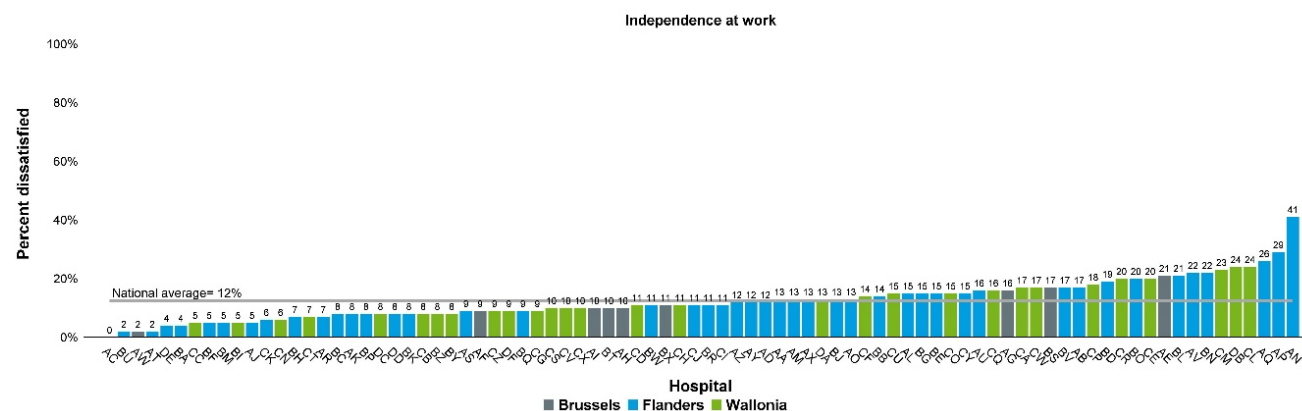
The average percentage of nurses dissatisfied with annual leave is 45% (5% to 73%) (Figure 72).

Figure 72 – Percentage of nurses dissatisfied with annual leave, at hospital and regional level in 2019
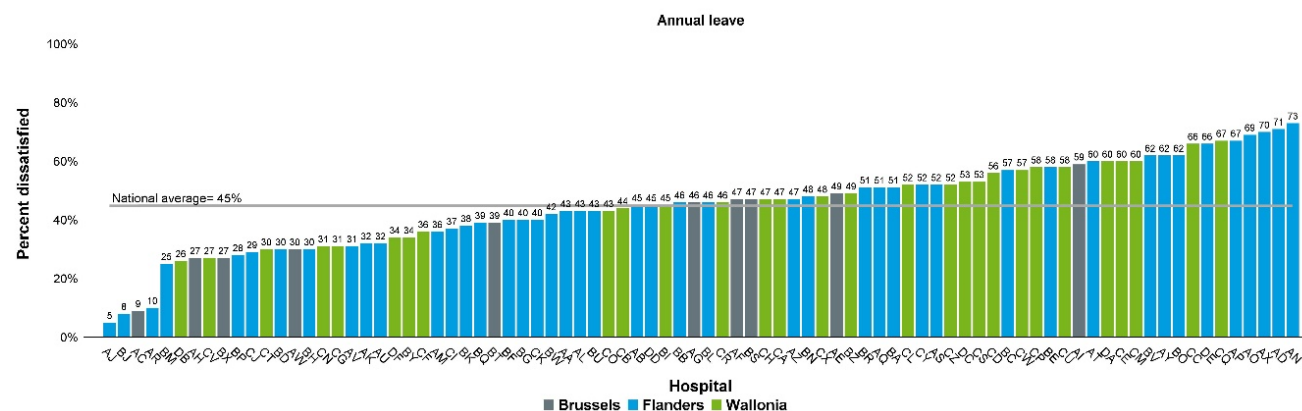
The average percentage of nurses dissatisfied with educational opportunity is 28% (4% to 73%) (Figure 73).

Figure 73 – Percentage of nurses dissatisfied with educational opportunity, at hospital and regional level in 2019
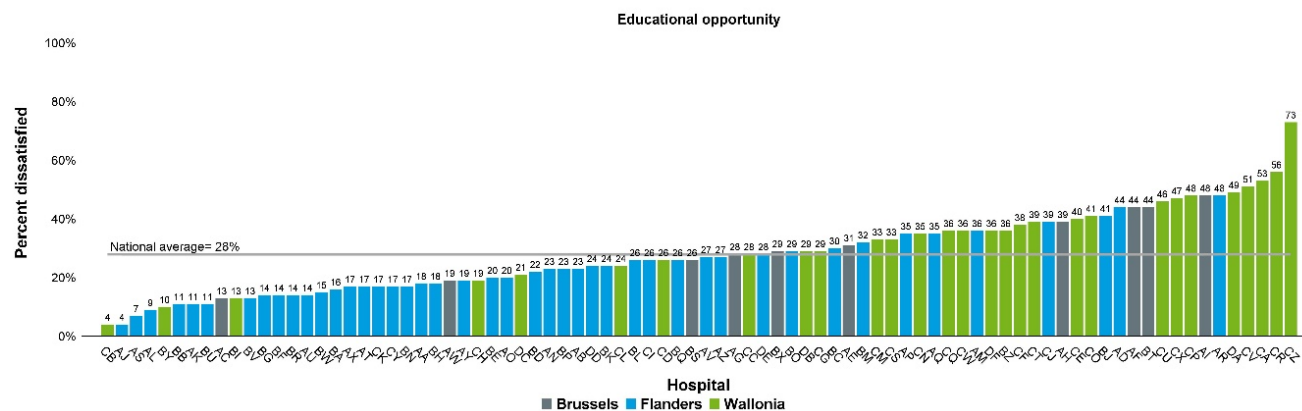
The average percentage of nurses dissatisfied with sick leave is 23% (5% to 50%) (Figure 74).

Figure 74 – Percentage of nurses dissatisfied with sick leave, at hospital and regional level in 2019
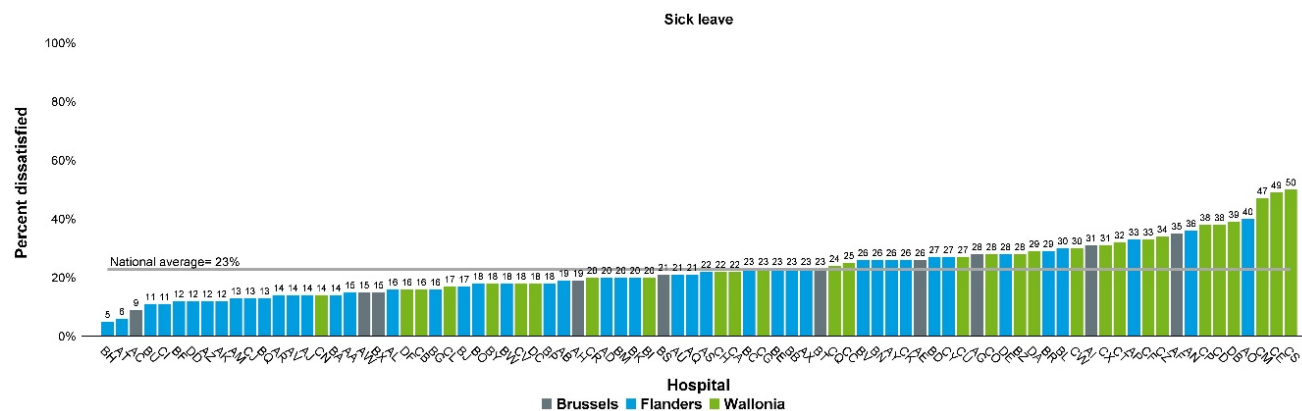
The average percentage of nurses dissatisfied with professional status is 20% (3% to 41%) (Figure 75).

Figure 75 – Percentage of nurses dissatisfied with professional status, at hospital and regional level in 2019
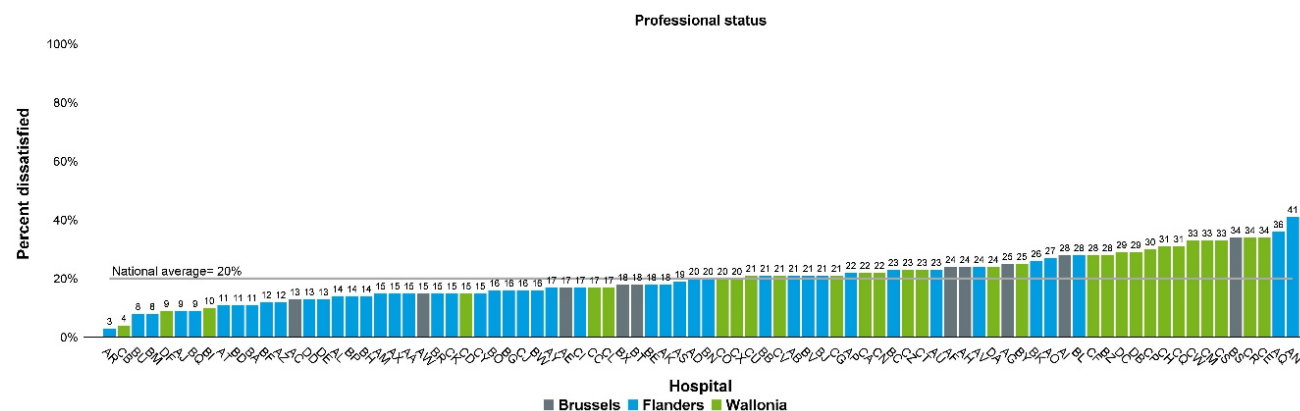
The average percentage of nurses dissatisfied with study leave is 32% (12% to 69%) (Figure 76).

Figure 76 – Percentage of nurses dissatisfied with study leave, at hospital and regional level in 2019
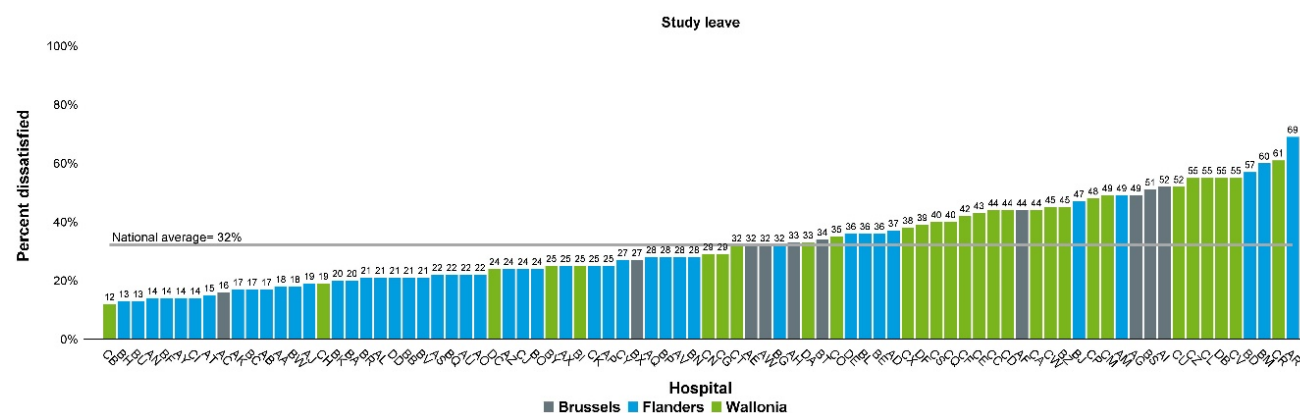
The average percentage of nurses dissatisfied with wages is 57% (25% to 84%) (Figure 77).

Figure 77 – Percentage of nurses dissatisfied with wages, at hospital and regional level in 2019
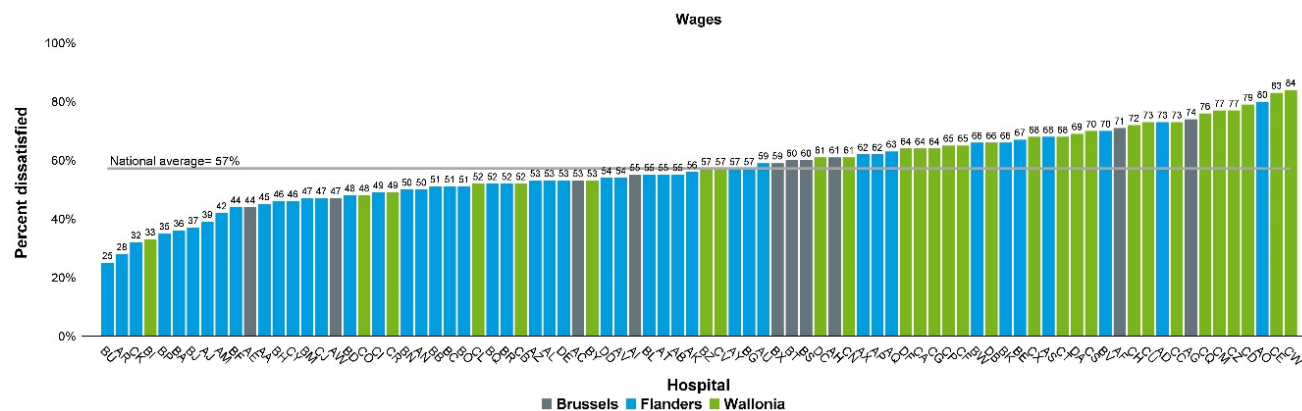
Intention to leave

The average percentage of nurses reporting an intention to leave the hospital in the next year is 32% (9% to 70%) (Figure 78). The lower the score, the better.

Figure 78 – Percentage of nurses indicating they intend to leave the hospital in the next year, at hospital and regional level in 2019
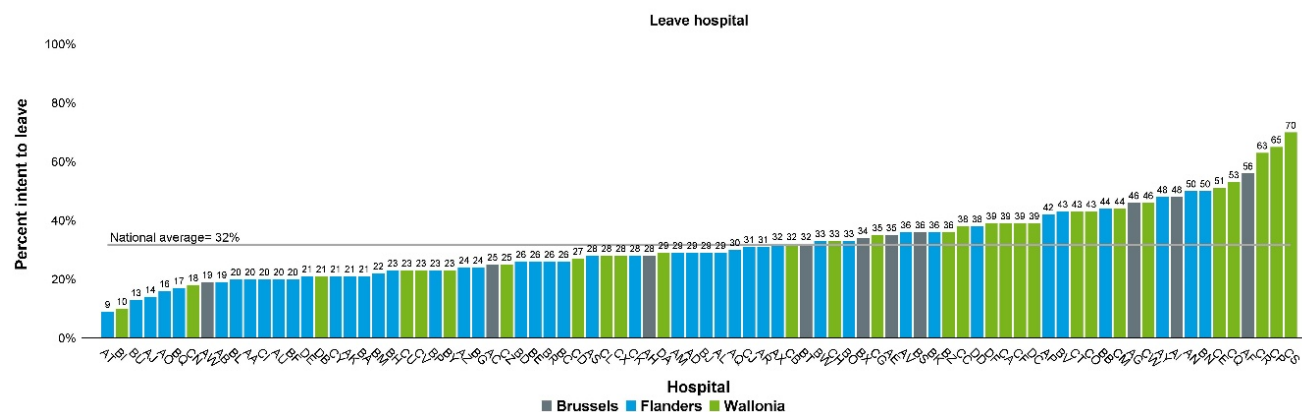
Of these 32% nurses intending to leave the hospital in the next year, the absolute percentage of nurses considering to leave their current hospital for another hospital is 14% (2% to 39%) (Figure 79), the absolute percentage of nurses considering to leave their current hospital for a nursing job outside a hospital is 8% (0% to 40%) (Figure 80), and the absolute percentage of nurses considering to leave their current hospital for a non-nursing job is 10% (1% to 25%) (Figure 81).

Figure 79 – Percentage of nurses indicating they intend to leave the hospital in the next year for another hospital, at hospital and regional level in 2019
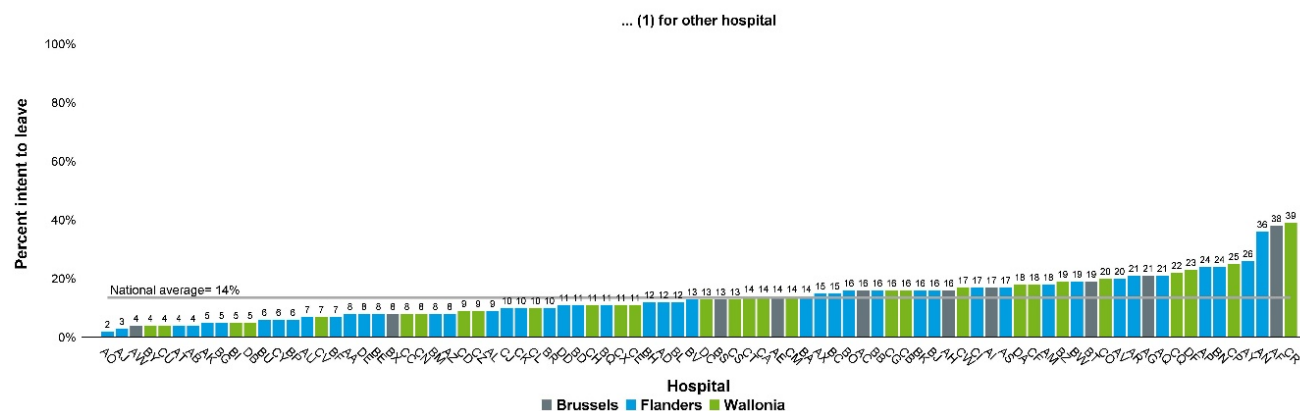
Figure 80 – Percentage of nurses indicating they intend to leave the hospital in the next year for a nursing job outside a hospital, at hospital and regional level in 2019
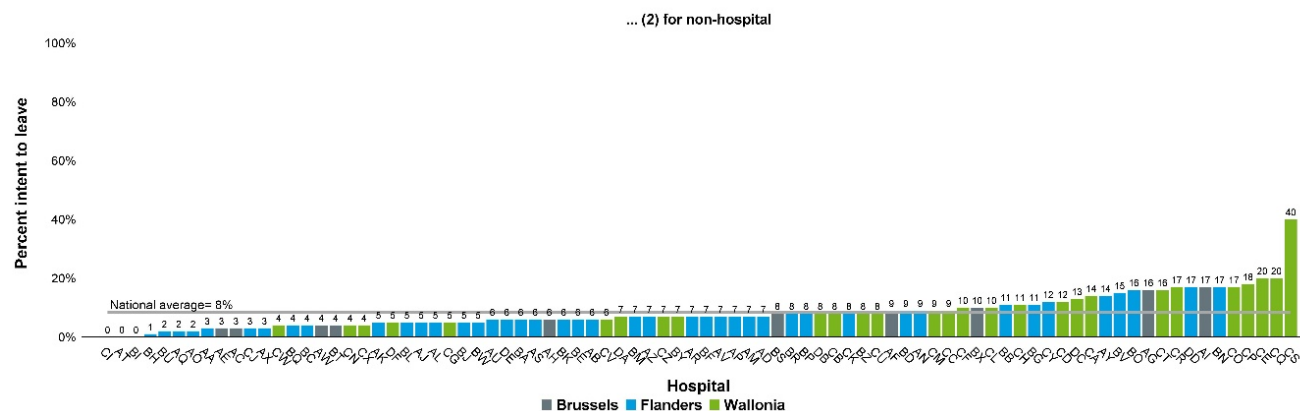
Figure 81 – Percentage of nurses indicating they intend to leave the hospital in the next year for a job outside nursing, at hospital and regional level in 2019

5.5.1.7   Tasks below nurses' skill level

Figures 82 to 89 display the findings for the eight items measuring tasks below nurses' skill level (distributing food trays, performing non-nursing care, arranging discharge, transporting patients, cleaning, perform non-nursing services, obtaining supplies, and performing clerical duties). The lower the score, the better.

The average percentage of nurses reporting to sometimes/often distribute food trays is 82% (58% to 97%) (Figure 82).

Figure 82 – Percentage of nurses reporting to sometimes/often distribute food trays, at hospital and regional level in 2019
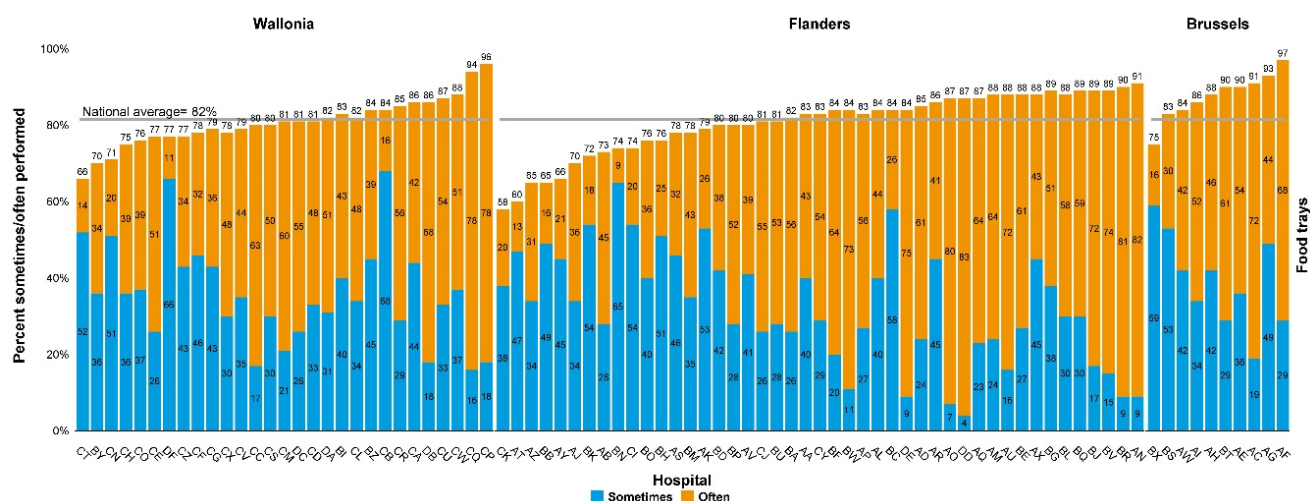
The average percentage of nurses reporting to sometimes/often perform non-nursing care is 96% (89% to 100%) (Figure 83).

Figure 83 – Percentage of nurses reporting to sometimes/often perform non-nursing care, at hospital and regional level in 2019
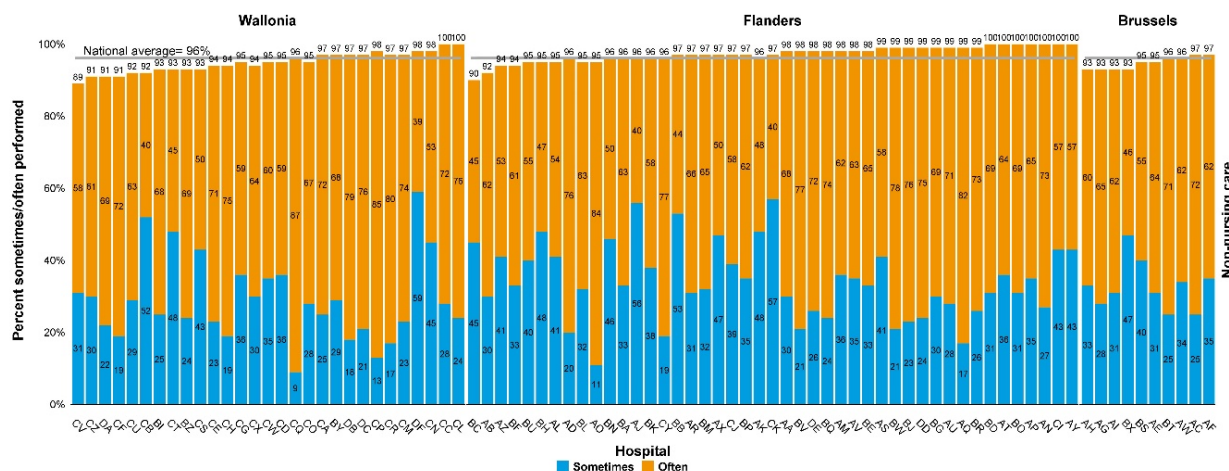
The average percentage of nurses reporting to sometimes/often arrange discharge is 73% (32% to 97%) (Figure 84).

Figure 84 – Percentage of nurses reporting to sometimes/often arrange discharge, at hospital and regional level in 2019
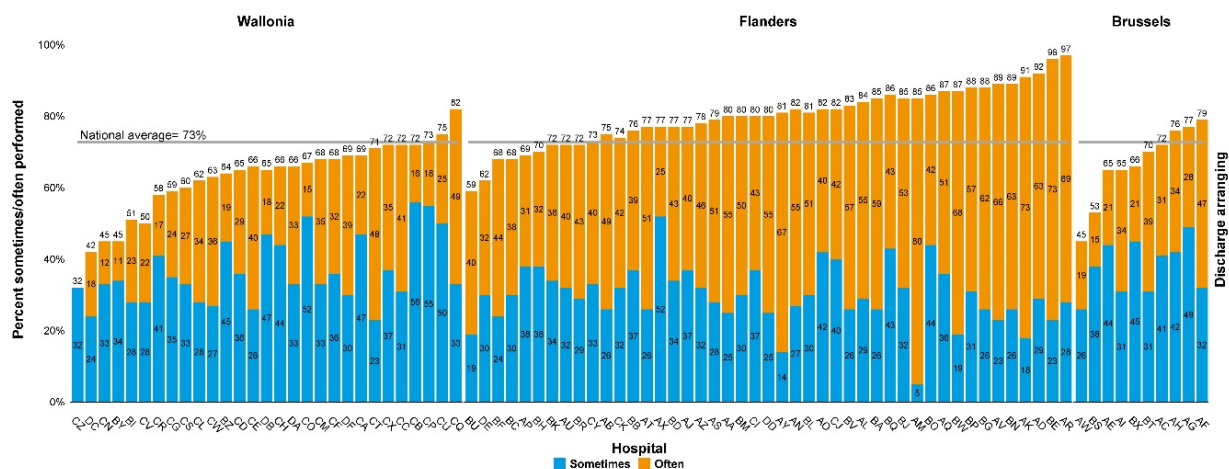
The average percentage of nurses reporting to sometimes/often transport patients is 61% (17% to 97%) (Figure 85).

Figure 85 – Percentage of nurses reporting to sometimes/often transport patients, at hospital and regional level in 2019
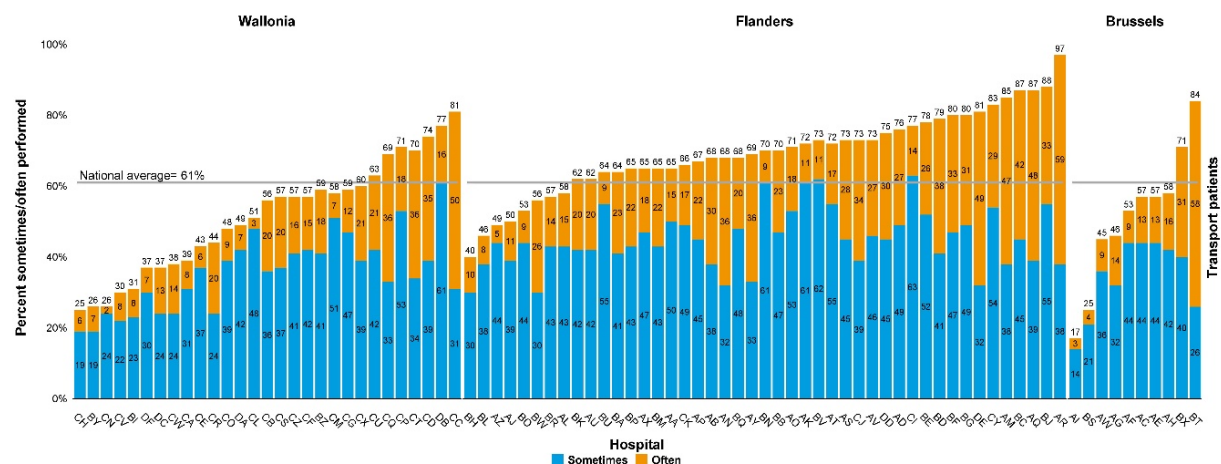
The average percentage of nurses reporting to sometimes/often clean is 77% (30% to 100%) (Figure 86).

Figure 86 – Percentage of nurses reporting to sometimes/often clean, at hospital and regional level in 2019
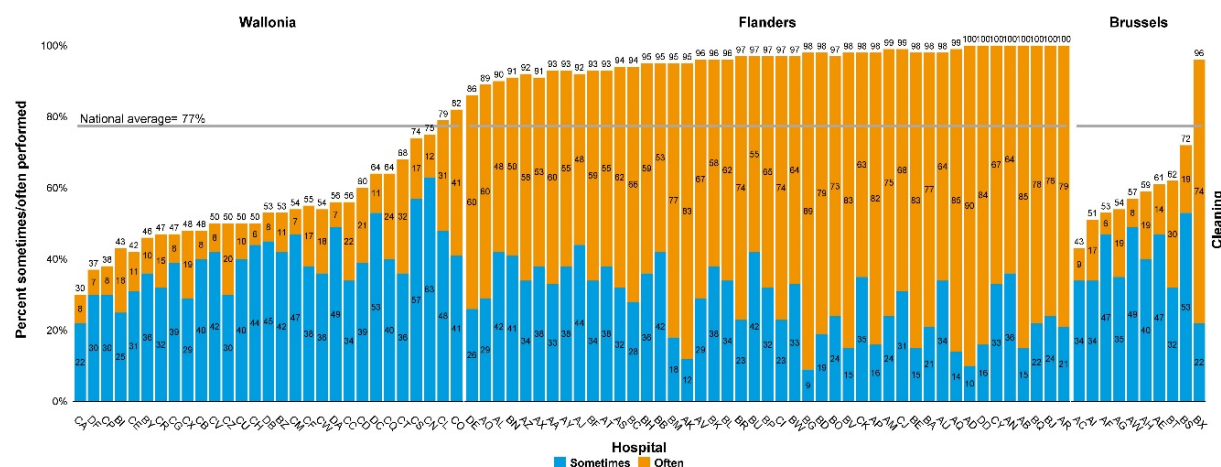
The average percentage of nurses reporting to sometimes/often perform non-nursing services is 44% (23% to 66%) (Figure 87).

Figure 87 – Percentage of nurses reporting to sometimes/often perform non-nursing services, at hospital and regional level in 2019
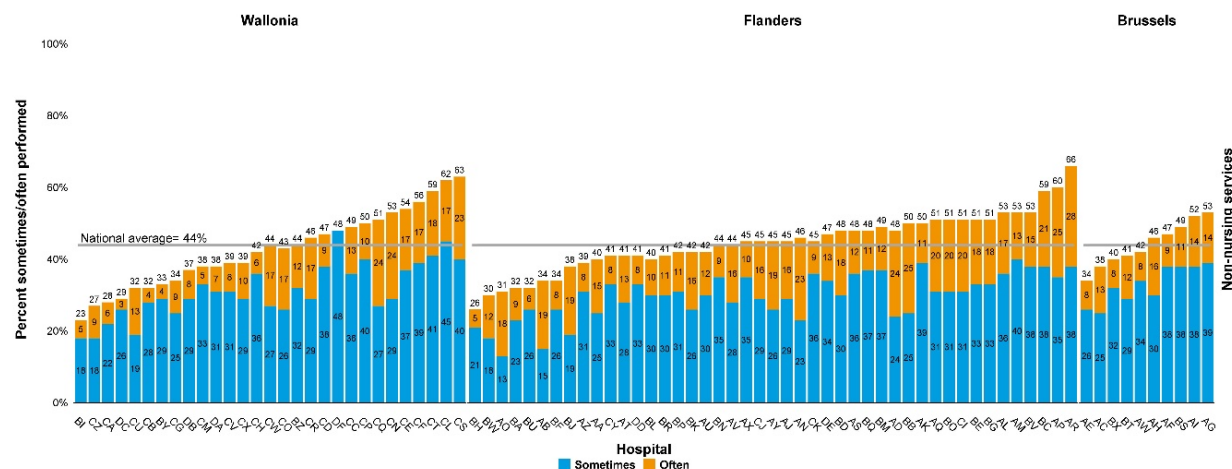
The average percentage of nurses reporting to sometimes/often obtain supplies is 57% (2% to 88%) (Figure 88).

Figure 88 – Percentage of nurses reporting to sometimes/often obtain supplies, at hospital and regional level in 2019
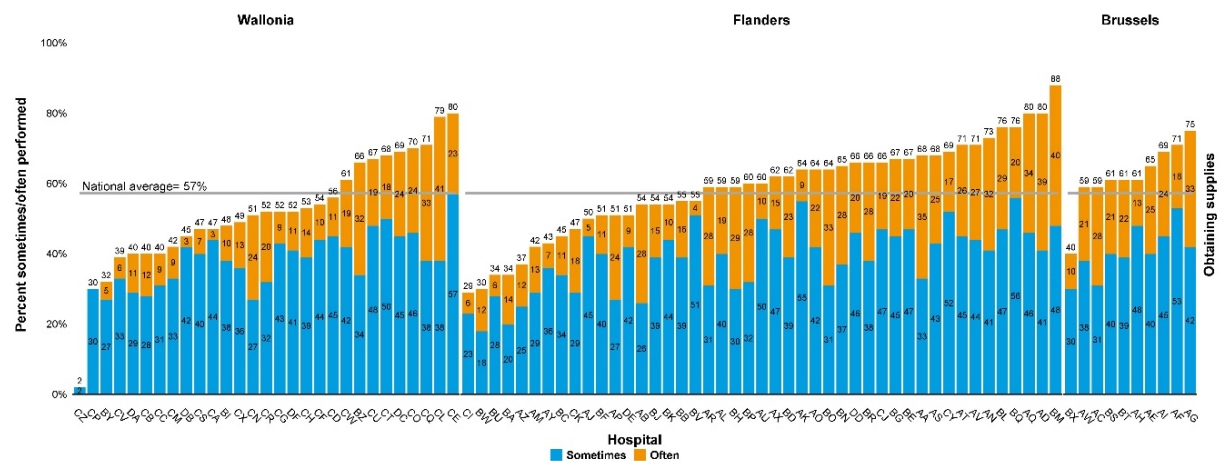
The average percentage of nurses reporting to sometimes/often perform clerical duties is 98% (87% to 100%) (Figure 89).

Figure 89 – Percentage of nurses reporting to sometimes/often perform clerical duties, at hospital and regional level in 2019
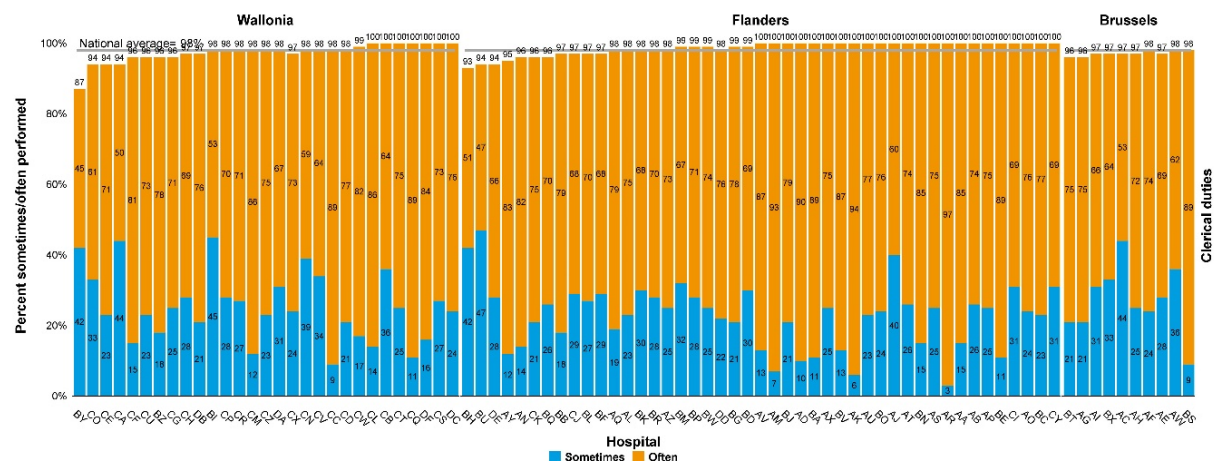
Figure 90 displays the average number of tasks below nurses' skill level for weekdays versus weekend, by type of shift. For morning/day shifts, tasks below nurses' skill level are slightly higher in the weekend versus weekdays. For afternoon/evening and night shifts, tasks below nurses' skill level are slightly lower in the weekend.

Figure 90 – Tasks below skill level during weekday versus weekend, by shift in 2019
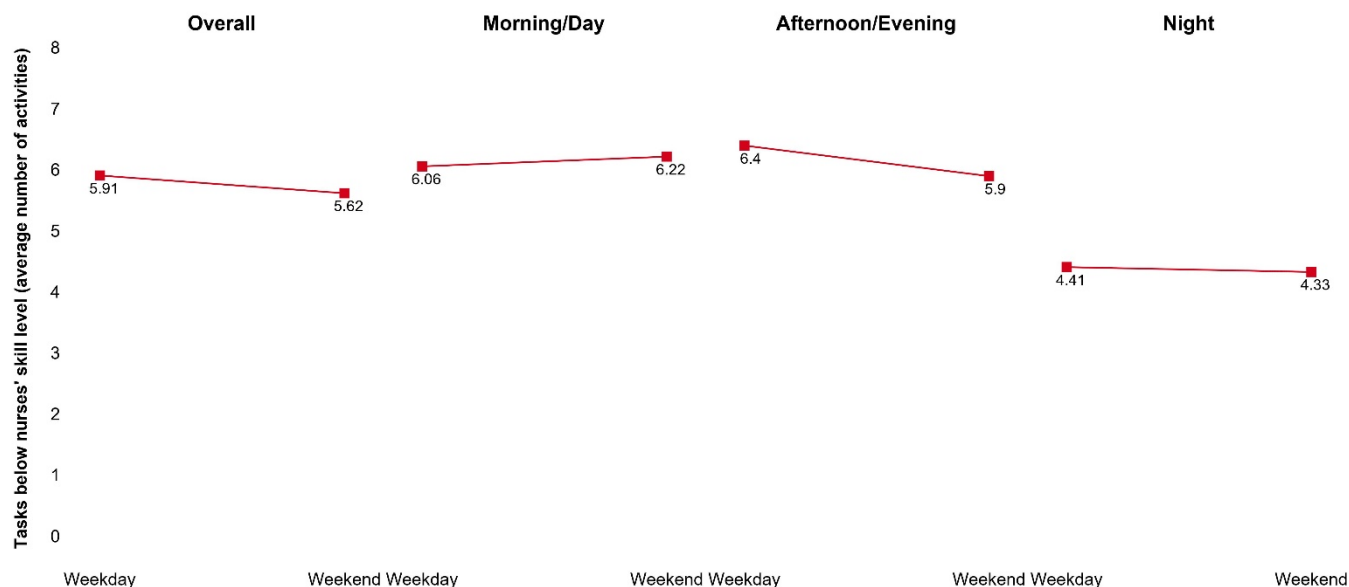
5.5.1.8 Nurses' perceptions of quality of care and reports on adverse events and errors

Nurse-perceived quality of care

Figures 91 to 95 display various aspects of nurses' perception of quality of care: perceived quality of care on the nursing ward, a nursing ward safety grade, the evolution in the quality of patient care in the hospital, nurses' confidence that management acts to resolve problems in patient care, and nurses' confidence that patients are able to manage their own care after discharge.

Details for all response categories are displayed, with negative responses above the x-axis and positive responses below the x-axis. Hospitals are ranked as such. The average percentage of nurses reporting good or excellent quality of care on their ward is 65% (33% to 97%). Accordingly, 35% (3% to 67%) of nurses report that quality of care on their ward is poor or fair (Figure 91).

Figure 91 – Nurses' reports on quality of care on their ward, at hospital and regional level in 2019
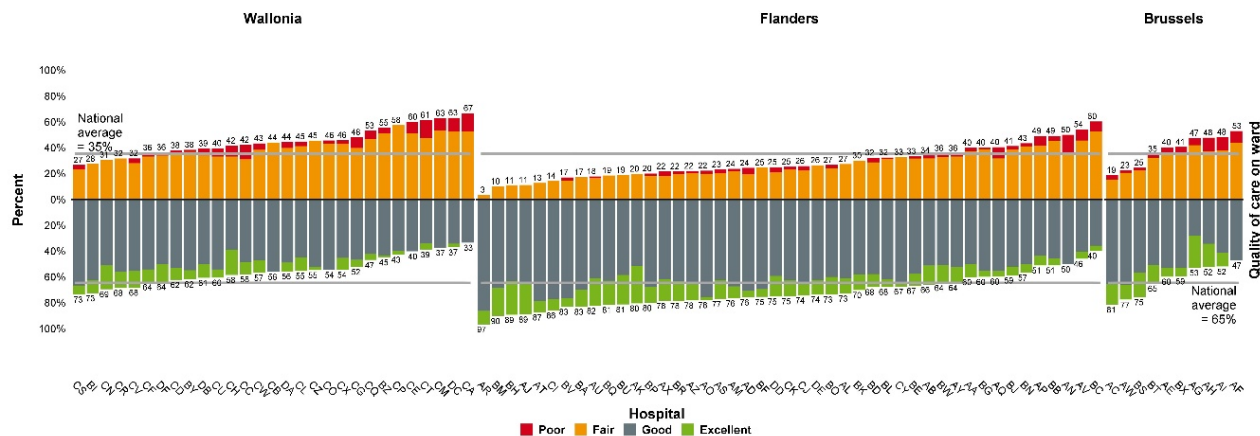
The average percentage of nurses reporting a very good or excellent nursing ward patient safety grade is 46% (17% to 80%). Accordingly, 54% (20% to 83%) of nurses report a failing, poor or acceptable patient safety grade (Figure 92).

Figure 92 – Nurses' reports on their nursing ward safety grade, at hospital and regional level in 2019
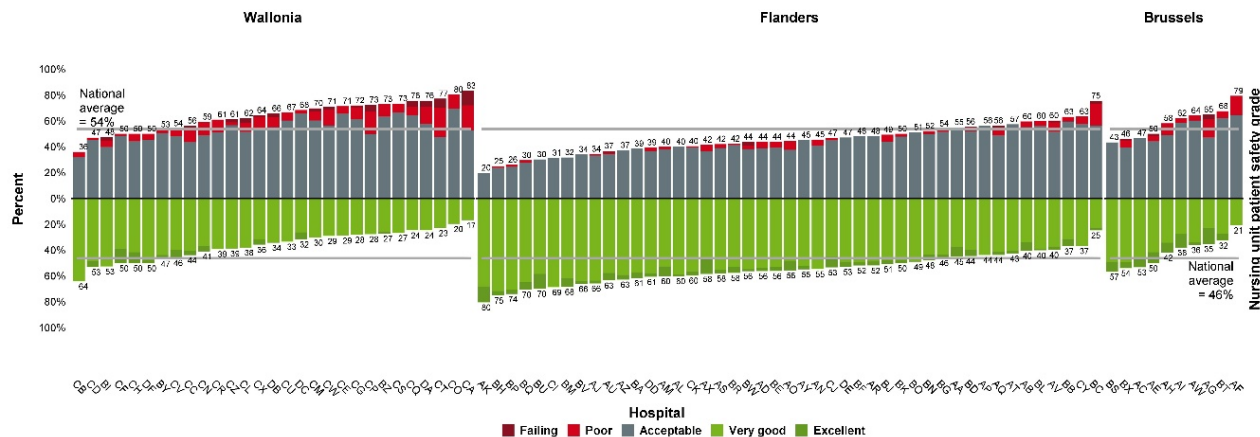
The average percentage of nurses reporting quality of care in their hospital remained the same or improved during the past year is 68% (30% to 97%). Accordingly, 32% (3% to 70%) of nurses report that quality of care in their hospital deteriorated in the past year (Figure 93).

Figure 93 – Nurses' reports on quality of care in their hospital, at hospital and regional level in 2019
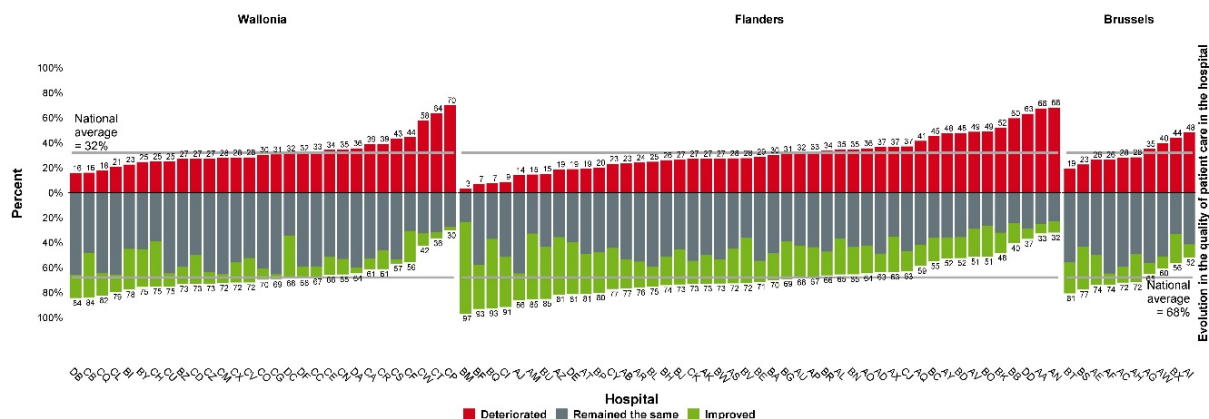
The average percentage of nurses reporting to be not at all confident or somewhat confident that management acts to resolve problems in patient care is 83% (57% to 100%). Accordingly, 17% (0% to 43%) of nurses report that they are confident or very confident that management acts to resolve problems in patient care (Figure 94).

Figure 94 – Nurses' reports on their confidence that management acts to resolve problems in patient care, at hospital and regional level in 2019
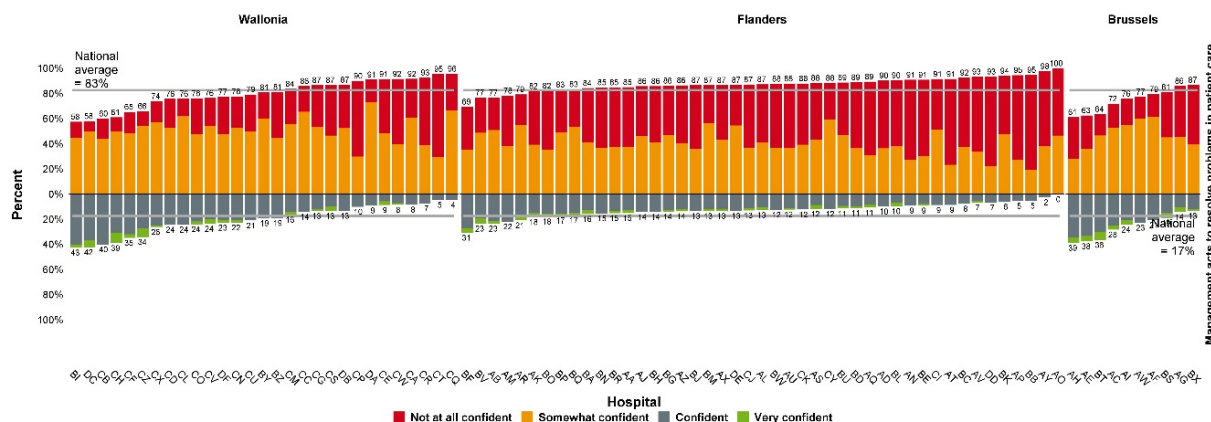
The average percentage of nurses reporting to be not at all confident or somewhat confident that patients are able to manage own care after discharge is 66% (46% - 91%). Accordingly, 34% (9% to 54%) of nurses report that they are confident or very confident that patients are able to manage own care after discharge (Figure 95).

Figure 95 – Nurses' reports on their confidence that patients are able to manage their own care after discharge, at hospital and regional level in 2019
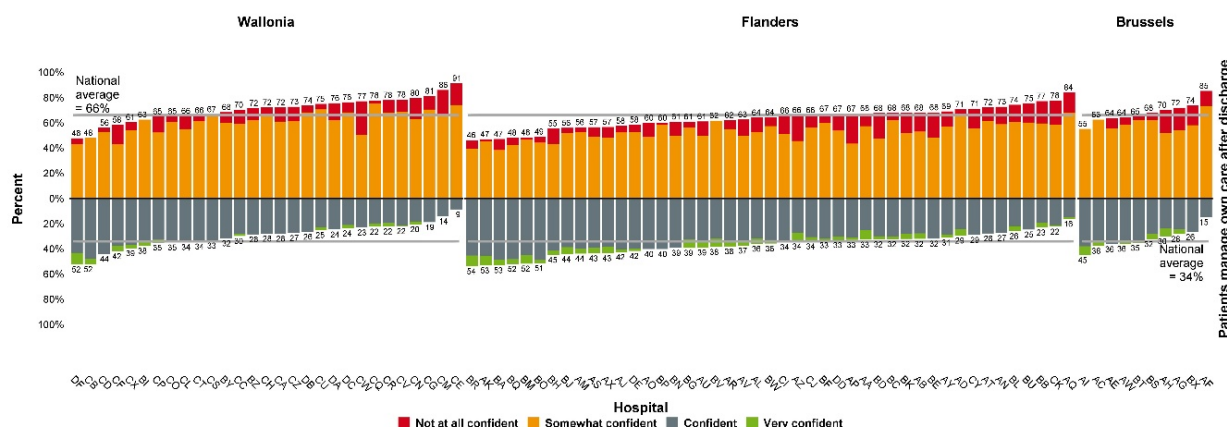
Nurses' reports on adverse events, errors and incidents

Nurses were asked to report on the frequency of twelve adverse events, errors and incidents in which they or their patients were involved during the past year: wrong medication, time or dose, pressure ulcers after admission, patient falls with injury, urinary tract infections, bloodstream infections, pneumonia, work related physical injuries, complaints from patients/family, verbal abuse by patients/family, physical abuse by patients/family, verbal abuse by staff, physical abuse by staff.

The average percentage of nurses who report that wrong medication, time or dose occurred at least once a month during the past year is 18% (0% to 49%) (Figure 96).

Figure 96 – Percentage of nurses reporting that wrong medication, time or dose occurred at least once a month during the past year, at hospital and regional level in 2019
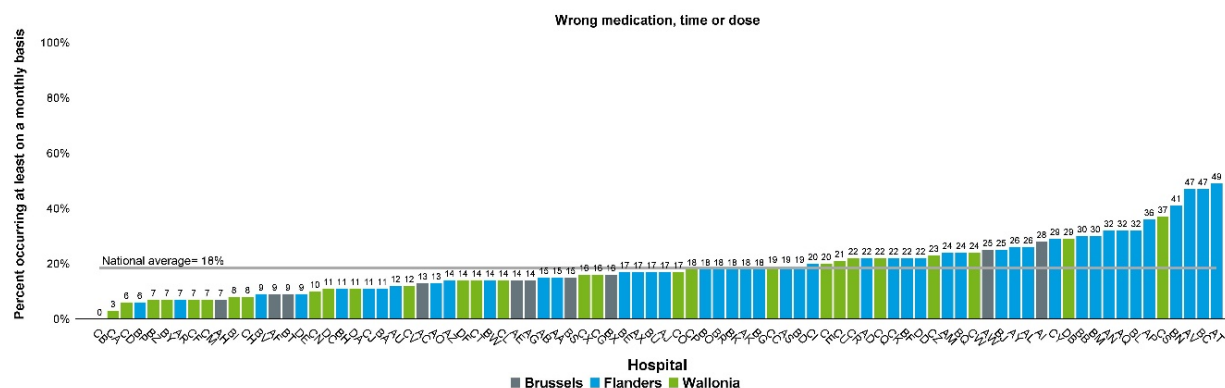
The average percentage of nurses who report that pressure ulcers after admission occurred at least once a month during the past year is 11% (0% to 34%) (Figure 97).

Figure 97 – Percentage of nurses reporting that pressure ulcers occurred at least once a month during the past year, at hospital and regional level in 2019
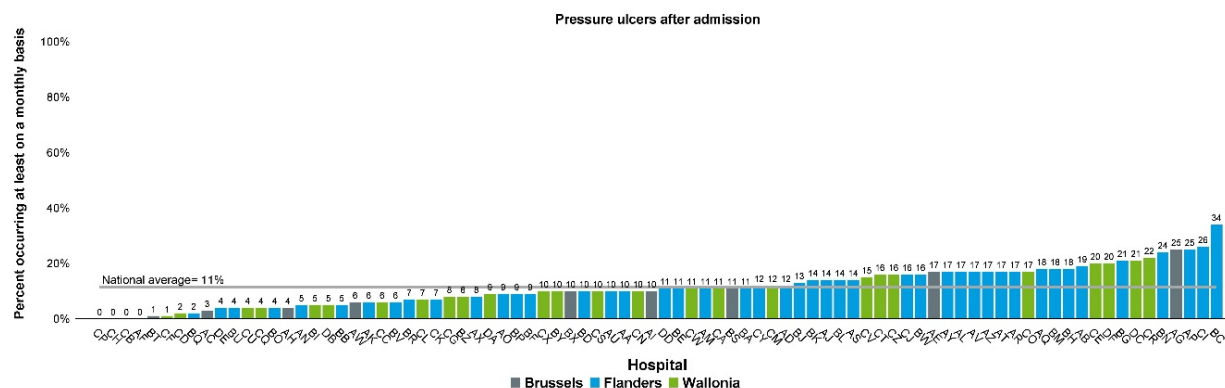
The average percentage of nurses who report that patient falls with injury occurred at least once a month during the past year is 12% (0% to 37%) (Figure 98).

Figure 98 – Percentage of nurses reporting that patient falls with injury occurred at least once a month during the past year, at hospital and regional level in 2019
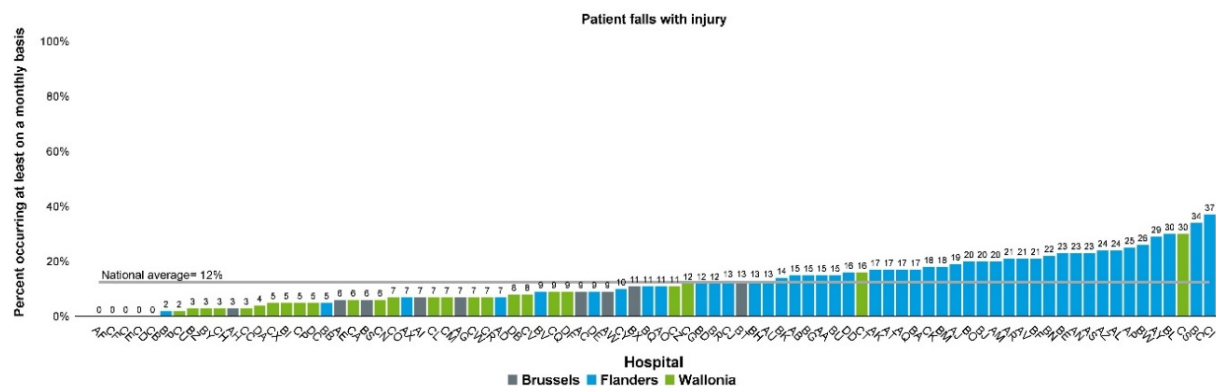
The average percentage of nurses who report that urinary tract infections occurred at least once a month during the past year is 17% (2% to 37%) (Figure 99).

Figure 99 – Percentage of nurses reporting that urinary tract infections occurred at least once a month during the past year, at hospital and regional level in 2019
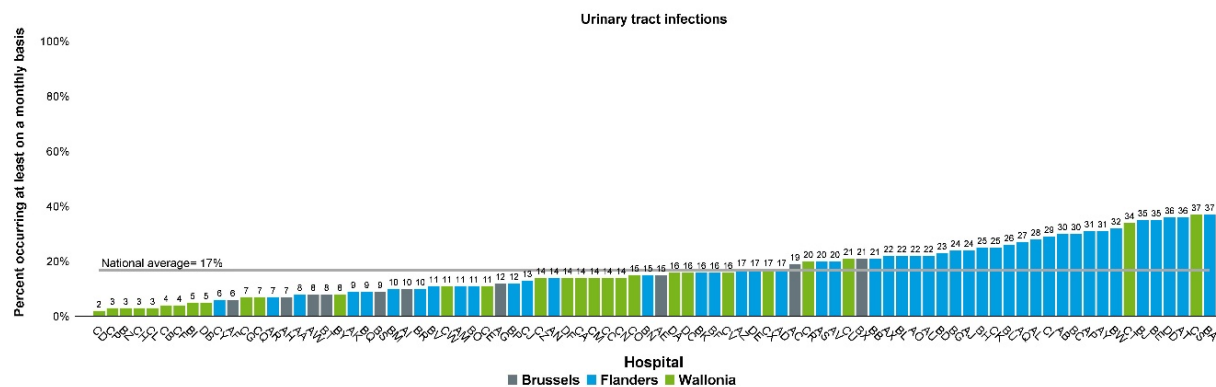
The average percentage of nurses who report that bloodstream infections occurred at least once a month during the past year is 6% (0% to 37%) (Figure 100).

Figure 100 – Percentage of nurses reporting that bloodstream infections occurred at least once a month during the past year, at hospital and regional level in 2019

The average percentage of nurses who report that pneumonia occurred at least once a month during the past year is 9% (0% to 40%) (Figure 101).

Figure 101 – Percentage of nurses reporting that pneumonia occurred at least once a month during the past year, at hospital and regional level in 2019

The average percentage of nurses who report that work-related physical injuries occurred at least once a month during the past year is 6% (0% to 18%) (Figure 102).

Figure 102 – Percentage of nurses reporting that work-related physical injuries occurred at least once a month during the past year, at hospital and regional level in 2019

The average percentage of nurses who report that complaints from patients and/or patient's family occurred at least once a month during the past year is 33% (11% to 64%) (Figure 103).

Figure 103 – Percentage of nurses reporting that complaints from patients/family occurred at least once a month during the past year, at hospital and regional level in 2019

The average percentage of nurses who report that verbal abuse by patients and/or their family occurred at least once a month during the past year is 35% (8% to 70%) (Figure 104).

Figure 104 – Percentage of nurses reporting that verbal abuse by patients/family occurred at least once a month during the past year, at hospital and regional level in 2019
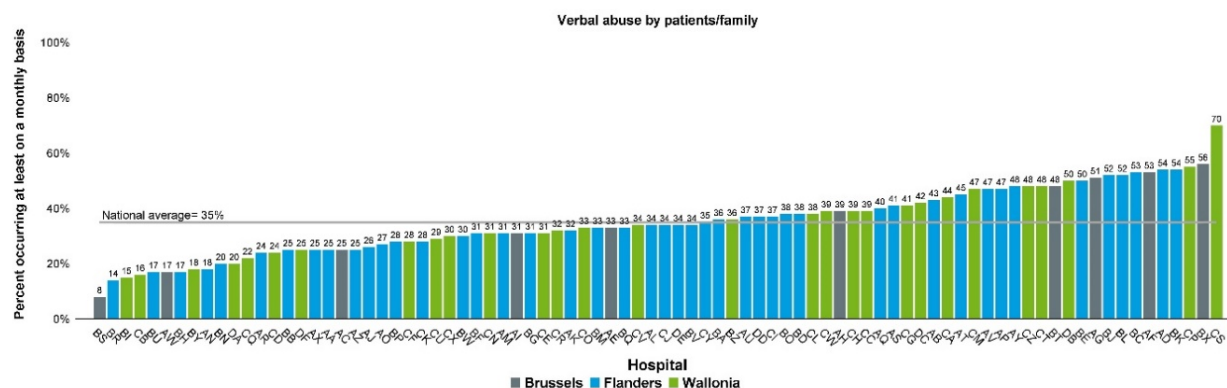
The average percentage of nurses who report that physical abuse by patients and/or their family occurred at least once a month during the past year is 7% (0% to 26%) (Figure 105).

Figure 105 – Percentage of nurses reporting that physical abuse by patients/family occurred at least once a month during the past year, at hospital and regional level in 2019

The average percentage of nurses who report that verbal abuse by staff occurred at least once a month during the past year is 9% (0% to 33%) (Figure 106).
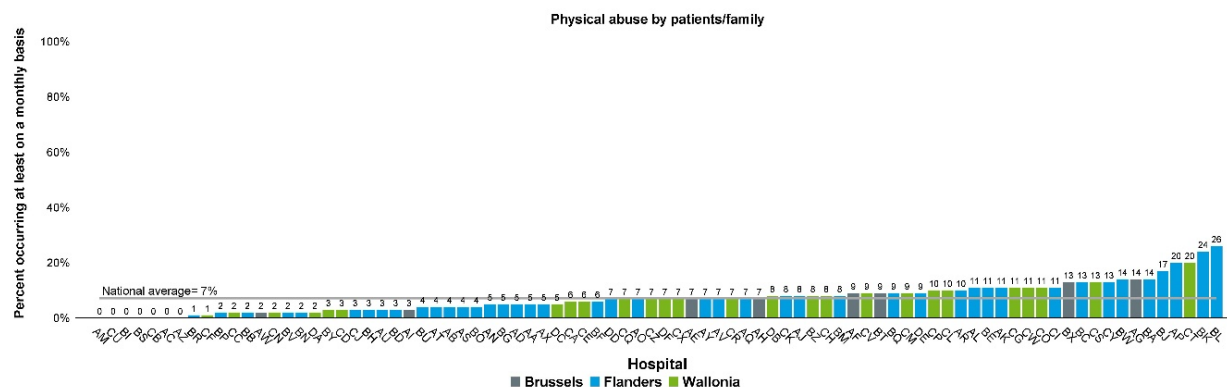
Figure 106 – Percentage of nurses reporting that verbal abuse by staff occurred at least once a month during the past year, at hospital and regional level in 2019

The average percentage of nurses who report that physical abuse by staff occurred at least once a month during the past year is 1% (0% to 7%) (Figure 107).

Figure 107 – Percentage of nurses reporting that physical abuse by staff occurred at least once a month during the past year, at hospital and regional level in 2019

5.5.1.9 Comparison of findings across regions at the hospital level

Table 17 displays statistical significance of hospital scores across regions. The first part presents the national and regional averages based on the findings presented above. The second part presents findings for the ANOVA F test, which examines whether all three means are equal. The third part presents findings for the multiple comparisons test (Tukey's studentized range test) for pairwise differences between regions.

For the latter, statistically significant findings are indicated with a '*'. For example, nurses' perceptions of positive nurse-physician relations vary from 63% in Flanders over 67% in Wallonia to 73% in Brussels. The ANOVA F test suggests that these scores are statistically significantly different (F value = 3.68, P value = 0.030). Multiple comparisons testing suggests that particularly the difference between Brussels and Flanders is of interest as the 95% confidence interval around the difference in the means between Brussels and Flanders (7.489) does not include 0 (0.07 to 14.880).

Table 17 – Comparison of findings across regions at the hospital level

	National average	Regional average			ANOVA F test			Differences between regional means (95% confidence limits)		
		Brussels	Flanders	Wallonia	F value	Eta squared	P value	Brussels vs Flanders	Brussels vs Wallonia	Wallonia vs Flanders
Nurse work environment (percent (totally) agree) – the higher the better										
Manager ability, leadership and support	63%	67%	64%	59%	3.21	7.3%	0.045	2.111 (-6.308 to 10.530)	7.428 (-1.403 to 16.258)	-5.316 (-11.051 to 0.418)
Participation in hospital affairs	40%	44%	39%	41%	1.12	2.7%	0.329	4.100 (-2.800 to 11.000)	2.431 (-4.807 to 9.669)	1.669 (-3.031 to 6.369)
Foundations for quality care	74%	75%	74%	76%	1.04	2.5%	0.358	1.122 (-4.359 to 6.604)	-1.128 (-6.877 to 4.622)	2.250 (-1.484 to 5.983)
Nurse-physician relations	65%	73%	63%	67%	3.68	8.3%	0.030	7.489* (0.097 to 14.880)	3.634 (-4.119 to 11.388)	3.854 (-1.80 to 8.889)
Staffing and resource adequacy	29%	37%	27%	30%	5.12	11.2%	0.008	9.400* (2.338 to 16.462)	6.945 (-0.463 to 14.353)	2.455 (-2.355 to 7.265)
Nurse staffing (patient-to-nurse ratio) – the lower the ratio, the lower the workload										
Overall	9.4	8.6	9.4	9.8	2.67	6.2%	0.075	-0.727 (-0.388 to 1.841)	-1.118 (-2.287 to 0.051)	0.391 (-0.368 to 1.150)
Morning/day	7.1	6.9	6.8	7.7	8.70	17.7%	0.000	0.076 (-0.725 to 0.877)	-0.855* (-1.696 to -0.145)	0.931* (0.386 to 1.477)

	National average	Regional average			ANOVA F test			Differences between regional means (95% confidence limits)		
		Brussels	Flanders	Wallonia	F value	Eta squared	P value	Brussels vs Flanders	Brussels vs Wallonia	Wallonia vs Flanders
Afternoon/evening	8.9	7.6	8.7	9.6	7.70	16.0%	0.001	-1.166 (-0.043 to 2.375)	-2.010* (-3.279 to -0.742)	0.845* (0.021 to 1.668)
Night	18.1	16.2	19.8	16.1	8.96	18.1%	0.000	-3.568* (-6.836 to -0.300)	0.0077 (-3.351 to 3.505)	-3.645* (-5.871 to -1.419)
Nurse education (percent bachelor prepared nurses)										
Bachelor prepared nurses	63%	76%	60%	62%	6.78	14.4%	0.002	15.078* (5.203 to 24.953)	13.743* (3.383 to 24.100)	1.336 (-5.390 to 8.063)
Care left undone – the lower the better										
Clinical care	32%	34%	33%	29%	8.39	17.2%	0.0005	0.767 (-3.535 to 5.068)	5.445* (0.932 to 9.957)	-4.678* (-7.608 to -1.748)
Adequate patient surveillance	37%	39%	38%	36%	0.42	1.0%	0.6607	0.789 (-6.619 to 8.197)	2.431 (-5.339 to 10.201)	-1.642 (-6.688 to 3.404)
Skin care	29%	30%	34%	20%	34.44	45.9%	<0.0001	-4.244 (-10.067 to 1.578)	9.517* (3.410 to 15.625)	-13.762* (-17.728 to -9.796)
Oral hygiene	48%	55%	46%	48%	3.72	8.4%	0.0285	9.189* (1.136 to 17.242)	7.238 (-1.210 to 15.685)	1.951 (-3.534 to 7.436)
Pain management	19%	20%	23%	14%	21.57	34.4%	<0.0001	-2.989 (-7.518 to 1.540)	5.493* (0.743 to 10.244)	-8.482* (-11.567 to -5.397)
Treatments and procedures	19%	20%	24%	12%	30.39	42.9%	<0.0001	-4.367 (-9.578 to 0.845)	7.224* (1.758 to 12.691)	-11.591* (-15.141 to -8.041)
Administer medications on time	33%	35%	35%	28%	5.40	11.8%	0.0063	0.089 (-7.301 to 7.479)	6.752 (-1.000 to 14.504)	-6.663* (-11.696 to -1.629)
Frequent changing of patient position	37%	39%	33%	42%	8.10	16.7%	0.0006	5.878 (-1.749 to 13.505)	-2.700 (-10.700 to 5.300)	8.578* (3.383 to 13.773)

	National average	Regional average			ANOVA F test			Differences between regional means (95% confidence limits)		
		Brussels	Flanders	Wallonia	F value	Eta squared	P value	Brussels vs Flanders	Brussels vs Wallonia	Wallonia vs Flanders
Planning and communication	47%	49%	48%	45%	3.49	7.9%	0.0353	1.000 (-3.634 to 5.634)	4.117 (-0.744 to 8.978)	-3.117 (-6.274 to 0.039)
Comfort/talk with patients	67%	66%	70%	63%	5.48	11.9%	0.0058	-4.033 (-11.167 to 3.101)	2.631 (-4.852 to 10.114)	-6.664* (-11.524 to -1.805)
Educate patients and family	55%	60%	52%	60%	10.27	20.2	0.0001	8.200* (1.408 to 14.992)	0.179 (-6.945 to 7.304)	8.021* (3.394 to 12.647)
Prepare discharge	34%	39%	36%	30%	7.03	14.8%	0.0015	2.633 (-4.134 to 9.401)	8.914* (1.815 to 16.013)	-6.280* (-10.890 to -1.671)
Develop or update nursing care plans/care pathways	47%	48%	49%	44%	2.47	5.8%	0.0908	-1.078 (-8.006 to 5.850)	3.293 (-3.974 to 10.560)	-4.371 (-9.090 to 0.348)
Plan care	30%	31%	32%	26%	4.87	10.7%	0.0101	-0.944 (-4.782 to 5.893)	5.059 (-2.114 to 12.231)	-6.003* (-10.661 to -1.346)
Adequately document nursing care	42%	45%	45%	36%	8.19	0.0006	16.8%	0.456 (-7.415 to 8.326)	9.128* 0.872 to 17.384)	-8.672* (-14.033 to -3.311)
Burnout (percent at high risk) – the lower the better										
Emotional exhaustion	36%	47%	27%	48%	47.14	53.8%	<0.0001	19.867* (11.779 to 27.954)	-0.952 (-9.435 to 7.532)	20.818* (15.310 to 26.327)
Depersonalization	32%	38%	22%	45%	62.33	60.6%	<0.0001	16.267* (8.996 to 23.537)	-6.290 (-13.916 to 1.337)	22.556* (17.604 to 27.509)
Reduced personal accomplishment	31%	32%	24%	40%	45.53	52.9%	<0.0001	7.322* (1.466 to 13.179)	-8.603* (-14.747 to -2.460)	15.923 (11.936 to 19.915)
Job dissatisfaction – the lower the better										
Overall job dissatisfaction	27%	33%	19%	38%	22.11	35.3%	<0.0001	14.222* (3.965 to 24.480)	-4.628 (-15.387 to 6.132)	18.850* (11.863 to 25.837)

	National average	Regional average			ANOVA F test			Differences between regional means (95% confidence limits)		
		Brussels	Flanders	Wallonia	F value	Eta squared	P value	Brussels vs Flanders	Brussels vs Wallonia	Wallonia vs Flanders
Advancement opportunity	38%	44%	32%	46%	14.63	26.5%	<0.0001	12.278* (2.417 to 22.138)	-2.203 (-12.547 to 8.140)	14.481 (7.765 to 21.198)
Schedule flexibility	27%	26%	23%	34%	5.55	12.0%	0.0055	2.944 (-7.737 to 13.626)	-7.183 (-18.387 to 4.021)	10.127* (2.852 to 17.403)
Independence at work	12%	11%	13%	13%	0.44	1.0%	0.6436	-2.156 (-7.832 to 3.521)	-2.159 (-8.113 to)	0.003 (-3.863 to 3.869)
Annual leave	45%	38%	45%	47%	1.47	3.5%	0.2366	-6.711 (-18.994 to 5.572)	-9.241 (-22.126 to 3.643)	2.530 (-5.836 to 10.897)
Educational opportunity	28%	32%	22%	36%	11.47	22.1%	<0.0001	9.856 (-0.130 to 19.841)	-3.383 (-13.857 to 7.092)	13.238* (6.437 to 20.040)
Sick leave	23%	22%	20%	28%	7.99	16.5%	0.0007	2.578 (-4.599 to 9.755)	-5.593 (-13.122 to 1.936)	8.171* (3.282 to 13.060)
Professional status	20%	22%	17%	24%	7.01	14.8%	0.0016	4.289 (-1.799 to 10.376)	-2.090 (-8.475 to 4.296)	6.379* (2.232 to 10.525)
Study leave	32%	37%	26%	40%	11.55	22.2%	<0.0001	10.756* (0.418 to 21.093)	-2.897 (-13.741 to 7.947)	-13.652* (-20.694 to -6.611)
Wages	57%	58%	52%	65%	11.28	21.8%	<0.0001	6.378 (-3.100 to 15.856)	-6.428 (-16.369 to 3.514)	12.805 (6.350 to 19.261)
Intention to leave the hospital – the lower the better	32%	36%	28%	37%	6.12	13.1%	0.0033	8.322 (-1.378 to 18.023)	-0.755 (-10.931 to 9.420)	9.077* (2.470 to 15.685)
Non-nursing tasks sometimes/often performed – the lower the better										
Delivering and retrieving food trays	82%	88%	81%	81%	3.86	8.7%	0.0250	7.061* (0.857 to 13.265)	6.777 * (0.269 to 13.285)	0.284 (-3.942 to 4.510)
Perform non-nursing care	96%	95%	97%	95%	8.22	16.9%	0.0006	-2.4022* (-4.4177 to -0.3868)	-0.3655 (-2.4796 to 1.7486)	-2.0367* (-3.4095 to -0.6639)

	National average	Regional average			ANOVA F test			Differences between regional means (95% confidence limits)		
		Brussels	Flanders	Wallonia	F value	Eta squared	P value	Brussels vs Flanders	Brussels vs Wallonia	Wallonia vs Flanders
Arrange discharge referrals and transportation	73%	67%	80%	63%	30.4	42.9%	<0.0001	-13.103 (-21.193 to -5.014)	4.347 (-4.139 to 12.832)	-17.450 (-22.960 to -11.940)
Transport patients within hospital	61%	51%	70%	51%	16.7	29.2%	<0.0001	-18.342 (-30.373 to -6.311)	-0.164 (-12.784 to 12.456)	-18.178 (-26.373 to -9.983)
Clean patient rooms and equipment	77%	61%	96%	54%	204.4	8.3%	<0.0001	-35.118 (-42.742 to -27.494)	6.835 (-1.162 to 14.833)	-41.953 (-47.146 to -36.760)
Filling in for non-nursing services not available on off-hours	44%	44%	45%	43%	0.4	0.0%	0.64	-0.658 (-8.154 to 6.838)	1.350 (-6.513 to 9.214)	-2.008 (-7.114 to 3.098)
Obtain supplies or equipment	57%	62%	59%	52%	2.9	6.6%	0.0621	3.296 (-8.584 to 15.175)	10.226 (-2.235 to 22.687)	-6.931 (-1.161 to 15.022)
Clerical duties	98%	97%	99%	97%	4.0	9.0%	0.0218	-1.5167 (-3.2440 to 0.2107)	-0.3355 (-2.1474 to 1.4764)	-1.1811* (0.0046 to 2.3577)
Nurse perceived quality of care										
Report good or excellent quality of care on ward	65%	62%	72%	55%	17.4	30.0%	<0.0001	-9.811 (-0.221 to 19.843)	6.928 (-3.596 to 17.451)	-16.739* (-23.572 to -9.905)
Report a very good or excellent patient safety grade	46%	42%	55%	36%	23.6	36.8%	<0.0001	-13.022* (-22.665 to 3.379)	5.421 (-4.695 to 15.536)	-18.443* (-25.011 to -11.86)
Report quality of care in their hospital remained the same or improved	68%	68%	68%	67%	0.1	0.0%	0.9410	0.033 (-11.805 to 11.871)	1.162 (-11.255 to 13.580)	-1.129 (-9.192 to 6.935)
Confident or very confident that management acts to resolve problems in patient care	17%	26%	13%	20%	11.73	22.7%	<0.0001	12.455* (5.287 to 19.622)	5.224 (-2.279 to 12.727)	7.230* (2.337 to 12.124)
Confident or very confident that patients are able to manage own care after discharge	34%	32%	37%	30%	5.23	11.4%	0.0073	-4.567 (-12.258 to 3.124)	2.410 (-5.657 to 10.478)	-6.977* (-12.216 to -1.738)

5.5.1.10 Association between nursing organisation of care and nurse wellbeing and care left undone

Table 18 and Table 19 present findings from the multiple logistic regression analysis to estimate the association between measures reflecting organisation of nursing care on the one hand and nurse wellbeing (Table 18) and care left undone (Table 19) on the other hand. We categorized hospitals into patient-to-nurse ratio quartiles based on the weighted average of the morning/day and afternoon/evening patient-to-nurse ratio. The median patient-to-nurse ratio was 7.95, with percentile 25 and percentile 75 equalling 7.28 and 8.59, respectively.

As an example to interpret the findings, for high risk at emotional exhaustion (Table 18), the first column presents the least-squares means, i.e. the adjusted means based on all covariates in the model. The second column presents the model coefficients. The third column presents the P value, which should be interpreted alongside the coefficient. Higher scores for manager ability, leadership and support are statistically significantly associated with a lower log-odds of high risk of emotional exhaustion (Estimate = -1.1618, P value<0.0001), holding all other covariates in the model constant. Compared to hospitals in quartile 1 of the patient-to-nurse ratio, hospitals in quartiles 2 (Estimate = 0.2149, P value = 0.0427), 3 (Estimate = 0.5143, P value <0.0001) and 4 (Estimate = 0.3294, P value = 0.0047) have statistically significantly higher log-odds of high risk of emotional exhaustion, holding all other covariates in the model constant. Put more simply, better manager ability, leadership and support and better nurse staffing are associated with lower risk of high emotional exhaustion. It can also be observed that 40 to 49 year olds have statistically significantly lower risk of high emotional exhaustion compared to 20 to 29 year olds. For various outcomes, such nurse demographic effects are at play. But most striking are the recurring effects of nurse manager ability, leadership and support, and of patient-to-nurse ratio starting at the second or third quartile.

The patient-to-nurse ratio continues to play a key role in the association between organisation of care and care left undone (Table 19). Also strongly associated with an increase in care left undone is an increase in the number of non-nursing tasks.

Table 18 – Association between nursing organisation of care and nurse wellbeing

	High risk at emotional exhaustion			High risk at depersonalization			High risk at reduced personal accomplishment			Job dissatisfaction			Intention-to-leave the hospital within the next year		
	%	Est	P value	%	Est	P value	%	Est	P value	%	Est	P value	%	Est	P value
Region															
Flanders (n=2 977)	27.0%	Ref	--	22.3%	Ref	--	23.8%	Ref	--	19.6%	Ref	--	27.0%	Ref	--
Brussels (n=565)	43.9%	0.8342	<0.0001	37.0%	0.7727	<0.0001	31.2%	0.3639	0.0102	31.0%	0.7345	<0.0001	34.7%	0.5144	0.0008
Wallonia (n=1 661)	47.3%	0.7876	<0.0001	43.3%	0.8425	<0.0001	40.3%	0.7568	<0.0001	36.1%	0.6547	<0.0001	34.4%	0.1739	0.2141
Hospital-level patient-to-nurse ratio	--		0.0051	--	0.1031	0.0023	--	0.0043	0.8793	--	0.1373	0.0006	--	0.1204	0.0007
Quartile 1 (5.26 to 7.27, n=21 hospitals)	28.9%	Ref	--	24.5%	Ref	--	25.6%	Ref	--	19.5%	Ref	--	25.6%	Ref	--
Quartile 2 (7.28 to 7.94, n=21 hospitals)	34.5%	0.2149	0.0427	28.2%	0.1248	0.1792	29.7%	0.0841	0.2980	23.9%	0.2229	0.1077	29.3%	0.2386	0.0423
Quartile 3 (7.95 to 8.58, n=21 hospitals)	40.5%	0.5143	<0.0001	34.4%	0.4402	<0.0001	32.3%	0.1954	0.1000	29.5%	0.6089	<0.0001	31.6%	0.4368	0.0005
Quartile 4 (8.59 to 11.57, n=21 hospitals)	39.6%	0.3294	0.0047	37.9%	0.4038	0.0002	33.3%	0.1230	0.1876	34.3%	0.5406	0.0002	36.2%	0.4496	0.0004
Hospital-level care intensity per patient day	--	0.0087	0.0511	--	0.0008	0.7901	--	0.0017	0.7020	--	0.0036	0.5415	--	0.0027	0.5481
Hospital-level work environment															
Nurse-physician relations	--	0.1611	0.6692	--	0.1033	0.7808	--	0.1732	0.6636	--	-0.0947	0.8728	--	-0.0418	0.9390
Foundations for quality care	--	0.3088	0.5041	--	-0.6326	0.1342	--	-0.6236	0.1057	--	0.0378	0.9458	--	-0.2920	0.5243
Participation in hospital affairs	--	-0.6836	0.0586	--	-0.1617	0.6727	--	0.0685	0.8464	--	-0.7365	0.1495	--	-0.4611	0.3501
Manager ability, leadership and support	--	-1.1618	<0.0001	--	-0.8473	0.0045	--	-0.1854	0.7020	--	-1.9482	0.0001	--	-1.2916	0.0025
Education															
Diploma degree (n=1 880)	32.2%	Ref	--	26.9%	Ref	--	29.1%	Ref	--	23.4%	Ref	--	27.4%	Ref	--
Bachelor degree (n=3 323)	37.1%	0.1532	0.0508	32.7%	0.1814	0.0037	30.3%	0.0566	0.4164	27.7%	0.2574	0.0011	31.8%	0.1436	0.0630
Gender															
Female (n=4 604)	34.8%	Ref	--	29.0%	Ref	--	30.1%	Ref	--	25.7%	Ref	--	29.7%	Ref	--
Male (n=599)	39.7%	0.1089	0.2733	43.2%	0.5297	<0.0001	23.4%	-0.1558	0.1043	29.1%	0.0875	0.4162	34.1%	0.1039	0.2585
Age															
20-29 (n=1 706)	38.1%	Ref	--	37.3%	Ref	--	28.1%	Ref	--	23.6%	Ref	--	35.1%	Ref	--
30-39 (n=1 331)	37.0%	-0.0914	0.2139	35.3%	-0.1439	0.0701	33.4%	0.2288	0.0034	27.9%	0.1955	0.0124	36.3%	0.0250	0.7500
40-49 (n=1 004)	31.1%	-0.3220	<0.0001	24.3%	-0.6366	<0.0001	31.6%	0.1819	0.0556	25.8%	0.1430	0.1185	27.3%	-0.3808	<0.0001
50-59 (n=995)	33.2%	-0.1797	0.0511	21.2%	-0.7681	<0.0001	26.1%	-0.0636	0.5023	27.5%	0.2903	0.0082	19.0%	-0.8377	<0.0001
60-65 (n=167)	32.3%	-0.3129	0.0831	19.1%	-0.9879	<0.0001	31.1%	0.1225	0.5029	31.1%	0.3929	0.0358	16.8%	-1.0322	<0.0001

Table 19 – Association between nursing organisation of care and care left undone

	Clinical care			Planning and communication		
	%	Est	P value	%	Est	P value
Region						
Flanders (n=2 977)	35.5%	Ref	--	46.6%	Ref	--
Brussels (n=565)	33.1%	2.4867	0.2714	50.3%	3.7332	0.1256
Wallonia (n=1 661)	28.2%	-4.8308	0.0019	45.4%	-1.1558	0.4869
Hospital-level patient-to-nurse ratio						
Quartile 1 (5.26 to 7.27, n=21 hospitals)	28.6%	Ref	--	44.5%	Ref	--
Quartile 2 (7.28 to 7.94, n=21 hospitals)	32.5%	3.9578	0.0003	45.4%	0.8803	0.5486
Quartile 3 (7.95 to 8.58, n=21 hospitals)	32.9%	4.3305	0.0040	48.3%	3.7766	0.0179
Quartile 4 (8.59 to 11.57, n=21 hospitals)	34.1%	5.5479	<0.0001	49.4%	4.8489	0.0045
Hospital-level average number of non-nursing tasks performed	--	3.3315	0.0071	--	4.2493	0.0031
Hospital-level work environment						
Nurse-physician relations	--	3.4752	0.5458	--	-1.2315	0.8285
Foundations for quality care	--	-8.9749	0.0871	--	-0.8505	0.8849
Participation in hospital affairs	--	4.4888	0.3142	--	-4.5941	0.3009
Manager ability, leadership and support	--	-6.2964	0.1409	--	-3;6007	0.4431
Education						
Diploma degree (n=1 880)	33.3%	Ref	--	46.7%	Ref	--
Bachelor degree (n=3 323)	30.9%	-2.3347	0.0054	46.5%	0.2910	0.7632
Gender						
Female (n=4604)	30.9%	Ref	--		Ref	--
Male (n=599)	38.7%	7.8883	<0.0001		4.5038	0.0002
Age						
20-29 (n=1 706)	36.0%	Ref	--	49.4%	Ref	--
30-39 (n=1 331)	32.2%	-3.7776	0.0015	46.9%	-2.4651	0.0554
40-49 (n=1 004)	38.9%	-7.0908	<0.0001	44.9%	-4.5264	0.0004
50-59 (n=995)	27.5%	-8.4640	<0.0001	43.9%	-5.5081	<0.0001
60-65 (n=167)	28.3%	-7.7004	0.0015	43.1%	-6.2515	0.0126

Type of day						
Weekday (n=4467)	32.2%	Ref	--	47.2%	Ref	--
Weekend (n=736)	29.3%	-2.9021	0.0106	43.3%	-3.9006	0.0015
Type of shift						
Morning (n=2 701)	31.8%	Ref	--	48.4%	Ref	--
Day (n=1 655)	32.9%	1.0548	0.1846	49.2%	0.8275	0.3723
Night (n=847)	29.6%	-2.2506	0.0411	36.1%	-12.2661	<0.0001

5.5.1.11 Association between patient-to-nurse ratio as measured in the nurse survey and in the Belgian Nursing Minimum Data Set

Figure 108 visually displays the association between patient-to-nurse ratio as measured in the nurse survey and in the Belgian Nursing Minimum Data Set (cf. Chapter 3). Also shown is the Pearson correlation coefficient (0.47) estimating the degree of linear correlation at the hospital level. This correlation coefficient is positive, i.e. the higher the patient-to-nurse ratio as measured in the nurse survey, the higher the patient-to-nurse ratio as measured in the Belgian Nursing Minimum Data Set. The correlation is said to be moderate.

Figure 108 – Association between patient-to-nurse ratio as measured in the nurse survey and in the Belgian Nursing Minimum Data Set
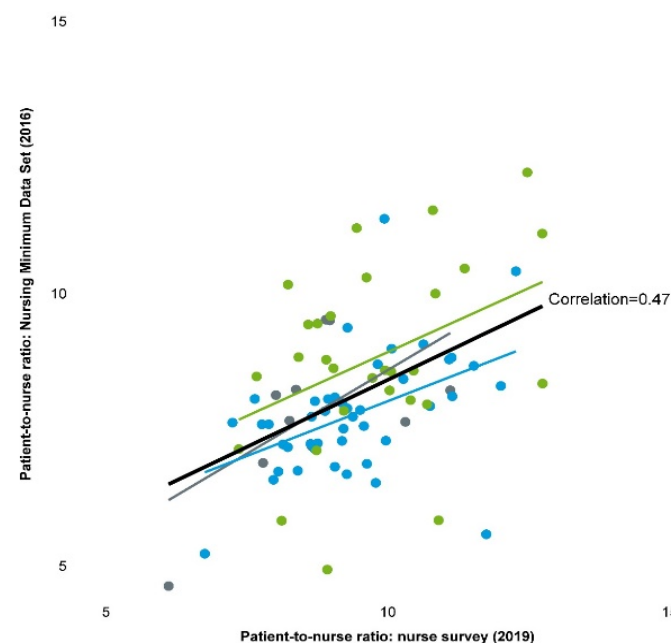
5.5.1.12 Association between percent bachelor prepared nurses as measured in the nurse survey and in the Belgian Nursing Minimum Data Set

Figure 109 graphically depicts the association between percent bachelor prepared nurses as measured in the nurse survey and in the Belgian Nursing Minimum Data Set. Also shown is the Pearson correlation coefficient (0.76) estimating the degree of linear correlation at the hospital level. This correlation coefficient is positive, i.e. the higher the percent bachelor prepared nurses as measured in the nurse survey, the higher the percent bachelor prepared nurses as measured in the Belgian Nursing Minimum Data Set. The correlation is said to be high.

Figure 109 – Association between percent Bachelor prepared nurses as measured in the nurse survey and in the Belgian Nursing Minimum Data Set
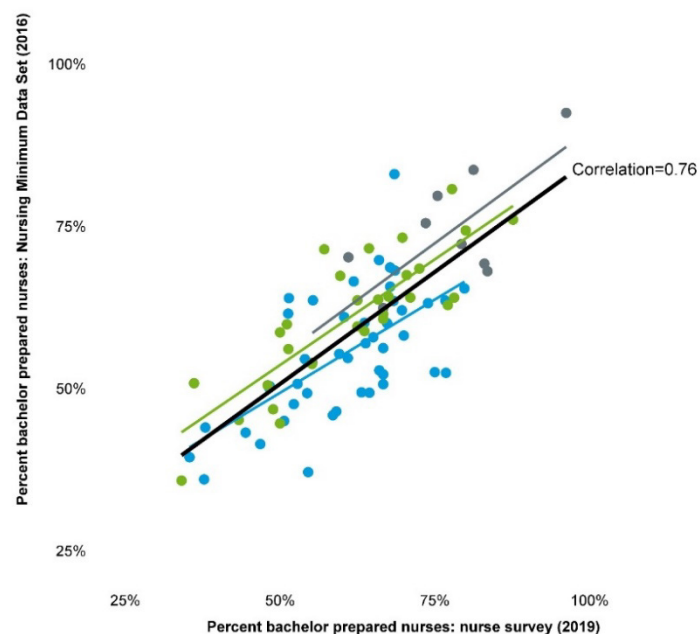
5.5.1.13 Influence of language in comparing work environment and burnout across regions

Table 20 and Table 21 list the findings for the Bayesian MIMIC model assessing differential item functioning of the work environment and burnout measures across Dutch and French speaking nurses. French is the reference category. The estimates present the direct effect of that item on the subscale. A negative and statistically significant estimate, for example for the item 'I don't really care what happens to some patients', means that, for a given value of the subscale 'Depersonalization', Dutch speaking nurses have a lower probability of agreeing to this item than French speaking nurses. A positive and statistically significant estimate, for example for the item 'I feel emotionally drained from my work', means that, for a given value of the subscale 'Emotional exhaustion', Dutch speaking nurses have a higher probability of agreeing to this item than French speaking nurses. Effects go both ways, and do not provide a rationale for the large differences in burnout across regions. Findings for the work environment scale can be interpreted similarly.

Table 20 – Influence of language in comparing burnout

Maslach Burnout Inventory subscales and items	Effect of language (reference category is French)	
	Estimate	P value
Depersonalization		
I've become more callous toward people since I took this job	-0.007	0.351
I worry that this job is hardening me emotionally	0.010	0.240
I don't really care what happens to some patients	-0.151	<0.0001
I feel patients blame me for some of their problems	-0.046	<0.0001
I feel I treat some patients as if they were impersonal objects	-0.104	<0.0001
Emotional exhaustion		
I feel emotionally drained from my work	0.056	<0.0001
I feel frustrated by my job	0.135	<0.0001
I feel I'm working too hard on my job	-0.074	<0.0001
Working directly with people puts too much stress on me	0.072	<0.0001
I feel used up at the end of the workday	-0.071	<0.0001
I feel like I'm at the end of my rope	0.068	<0.0001
I feel fatigued when I get up in the morning and have to face another day on the job	0.031	0.006
Working with people all day is really a strain for me	0.179	<0.0001
I feel burned-out from my work	-0.085	<0.0001
Personal accomplishment		
I feel very energetic	-0.069	<0.0001
I can easily create a relaxed atmosphere with my patients	-0.060	<0.0001
I accomplish many worthwhile things in this job	-0.190	<0.0001
I feel exhilarated after working closely with my patients	0.071	0.0001
In my work, I deal with emotional problems very calmly	0.031	0.047
I can easily understand how my patients feel about things	0.086	<0.0001
I deal very effectively with the problems of my patients	0.059	<0.0001
I feel I'm positively influencing other people's lives	0.335	<0.0001

Table 21 – Influence of language in comparing nursing work environment

Practice Environment Scale subscales and items	Effect of language (reference category is French)	
	Estimate	P value
Collegial nurse-physician relations		
Physicians and nurses have good working relationships	-0.173	<0.0001
Physicians value nurses' observations and judgments	0.168	0.002
Physicians recognize nurses' contributions to patient care	0.099	0.045
A lot of team work between nurses and physicians	0.096	0.033
Physicians respect nurses as professionals	-0.453	<0.0001
Collaboration between nurses and physicians	0.055	0.214
Physicians hold nurses in high esteem	0.300	<0.0001
Nurse manager ability, leadership and support of nurses		
A supervisory staff that is supportive of nurses	-0.431	<0.0001
A nurse manager who is a good manager and leader	0.226	0.009
Praise and recognition for a job well done	0.310	<0.0001
A nurse manager who backs up the nursing staff in decision making, even if the conflict is with a physician	0.137	0.020
Nurse participation in hospital affairs		
Career development/clinical ladder opportunity	0.016	0.419
Opportunity for registered nurses to participate in policy decisions	-0.172	<0.0001
A chief nursing officer who is highly visible and accessible to staff	-0.696	<0.0001
A chief nursing officer is equal in power and authority to other top level hospital executives	0.154	<0.0001
Opportunities for advancement	0.399	<0.0001
Management that listens and responds to employee concerns	-0.453	<0.0001
Registered nurses are involved in the internal governance of the hospital (e.g., practice and policy committees)	0.221	<0.0001
Registered nurses have the opportunity to serve on hospital and nursing committees	0.101	0.009
Nursing foundations for quality of care		
Active staff development or continuing education programs for nurses	-0.362	<0.0001

High standards of nursing care are expected by the management	0.560	<0.0001
A clear philosophy of nursing that pervades the patient care environment	-0.174	0.003
Working with nurses who are clinically competent	0.011	0.428
An active quality assurance program	0.341	<0.0001
A preceptor program for newly hired nurses	0.110	0.004
Nursing care is based on a nursing rather than a medical model	-0.373	<0.0001
Written, up-to-date care plans for all patients	-0.229	<0.0001
Patient care assignments that foster continuity of care (i.e., the same nurse cares for the patient from one day to the next)	-0.263	<0.0001
Staffing and resource Adequacy		
Adequate support services allow me to spend time with my patients	-0.220	<0.0001
Enough time and opportunity to discuss patient care problems with other nurses	0.185	<0.0001
Enough registered nurses on staff to provide quality patient care	-0.197	0.002
Enough staff to get the work done	0.409	<0.0001

5.5.2 Evolution of nurse staffing and quality of care between 2009 and 2019

This section reports on the panel analysis for the 49 hospitals that participated in the 2009 and 2019 surveys and that could be matched over time following the explanation in 5.4.1. Because the previous section reported on the cross-sectional analysis of the 84 hospitals that participated in the 2019 survey, there are some differences between the 2019 findings presented here and the 2019 findings reported in the previous section. Overall, these differences are very minor.

5.5.2.1 Nurse working environment

The percentage of nurses who totally agreed with positive statements about manager ability, leadership, and support, nurse-physician relation and foundations for quality care was significantly lower in 2009 compared to 2019 (58.4% vs. 64.1%, P value <0.0001; 59.8% vs. 66.1%, P value <0.0001; 70.8% vs. 74.4%, P value <0.0001, respectively). The percentage of nurses who totally agreed with positive statements about the participation of nurses in hospital affairs and about staffing and resource adequacy did not differ significantly between 2009 and 2019 (41.5% vs. 40.2%, P value = 0.0724 and 32.6% vs. 30.6%, P value = 0.7130, respectively) (Figure 110).

Figure 110 – Percentage of nurses agreeing or totally agreeing with presence of positive work environment aspects, evolution between 2009 and 2019
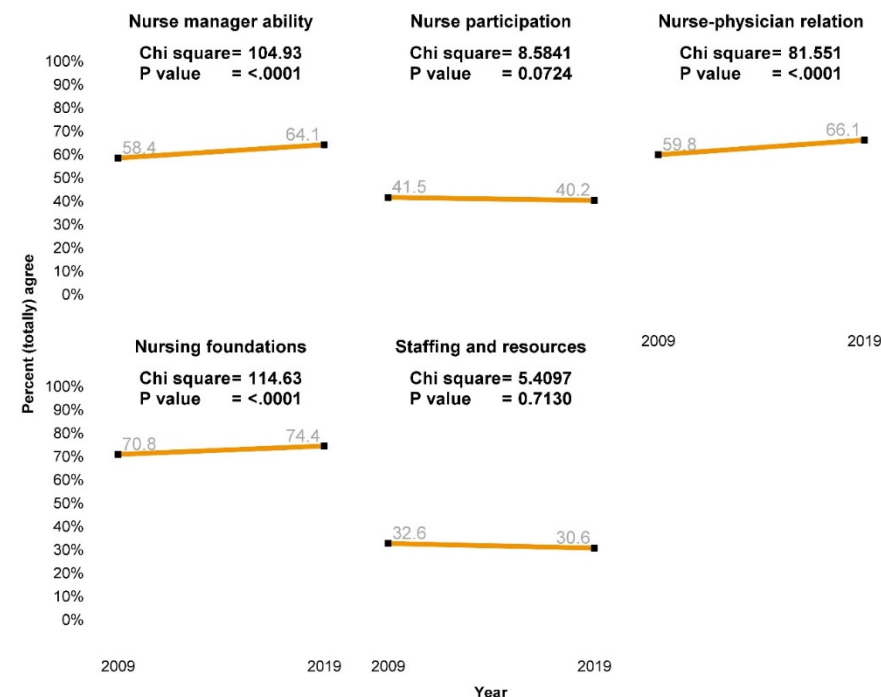
Figure 111 presents a heatmap of the change in the work environment scores between 2009 and 2019 at the hospital level. Hospitals are on the x-axis and are ranked by the average percentage for all 32 items from left (highest percentage, i.e. 74%) to right (lowest percentage, i.e. 39%) for the 2009 survey. Also indicated between brackets is the 2019 score. The higher the score, the better. A heatmap is used to express percentages between a range of colours that moves from green (the score for that specific item surged by at least 5% between 2009 and 2019) over blue (the score remained stable between 2009 and 2019) to red (the score dropped by at least 5% between 2009 and 2019). In addition, for each work environment dimension the percentage of items that surged by at least 5% is indicated, within each hospital and across hospitals. Overall, hospitals that performed well compared to the other hospitals in 2009 experienced a drop in 2019 and hospitals that performed poor in 2009 compared to the other hospitals experienced a surge. A hospital that experienced a surge between 2009 and 2019 does not necessarily perform well in 2019 compared to the other hospitals, and vice versa (cf. Figure 36 to Figure 41).

Figure 111 – Percentage of nurses agreeing or totally agreeing with presence of positive work environment aspects, evolution between 2009 and 2019 at the hospital level

5.5.2.2 Nurse staffing

Overall as well as during the morning/day, afternoon/evening and night shift, the patient-to-nurse ratio significantly decreased in 2019 compared to the situation of 2009 (7.6 vs. 6.9, p<0.0001; 9.5 vs. 8.6, P value <0.0001; 19.7 vs. 16.7, P value <0.0001, respectively) (Figure 112). This decrease was persistent across most hospitals (Figure 113).

Figure 112 – Patient-to-nurse ratio, evolution between 2009 and 2019
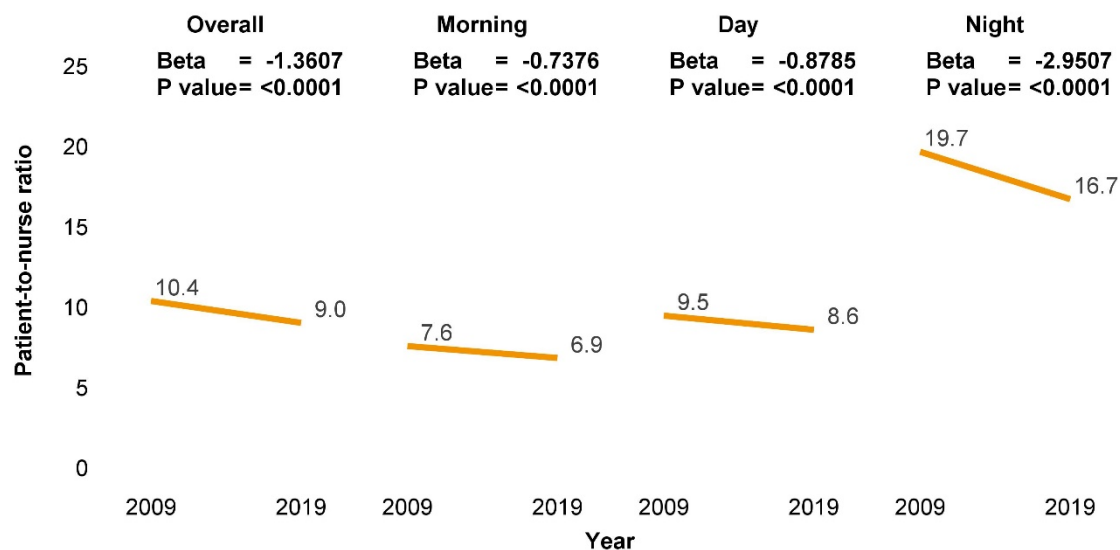
Figure 113 – Patient-to-nurse ratio, evolution between 2009 and 2019 at the hospital level
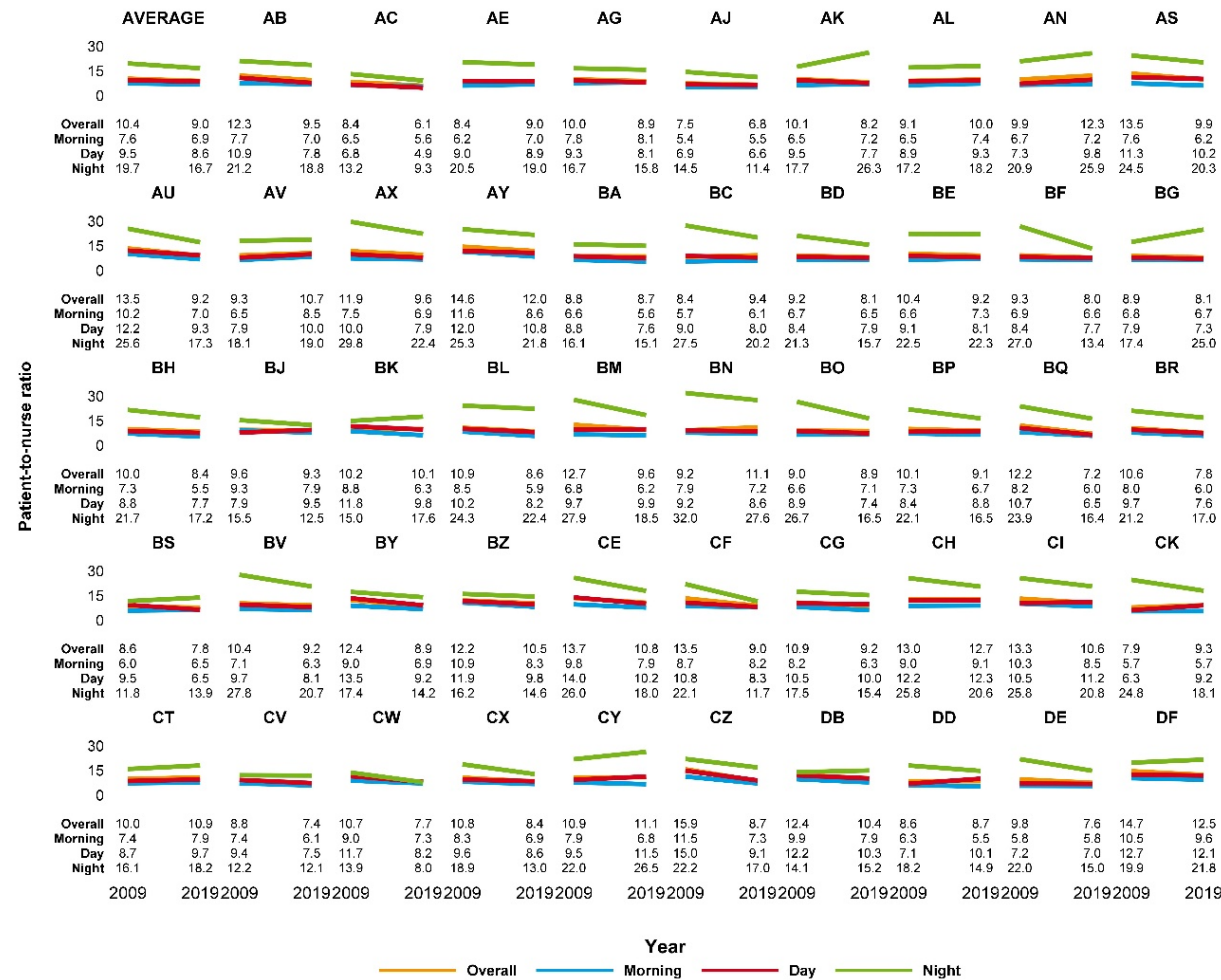
5.5.2.3   Nurse education

The percentage of nurses with a Bachelor degree significantly increased with about ten percentage points between 2009 and 2019 (55.1% vs. 65.2%, P value <0.0001) (Figure 114). This increase was persistent across most hospitals (Figure 115).

Figure 114 – Percentage of Bachelor prepared nurses, evolution between 2009 and 2019
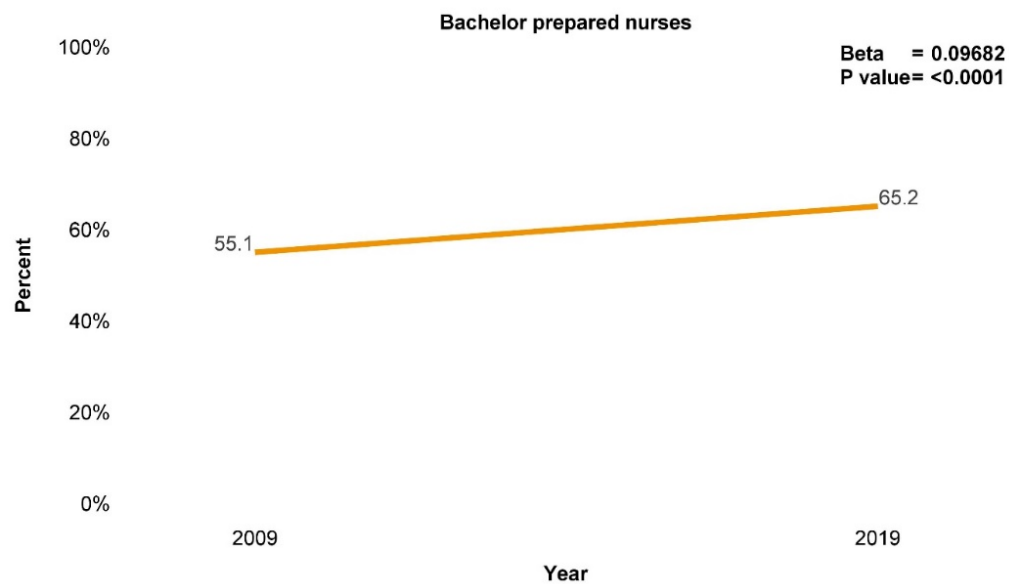
Figure 115 – Percentage of Bachelor prepared nurses, evolution between 2009 and 2019 at the hospital level
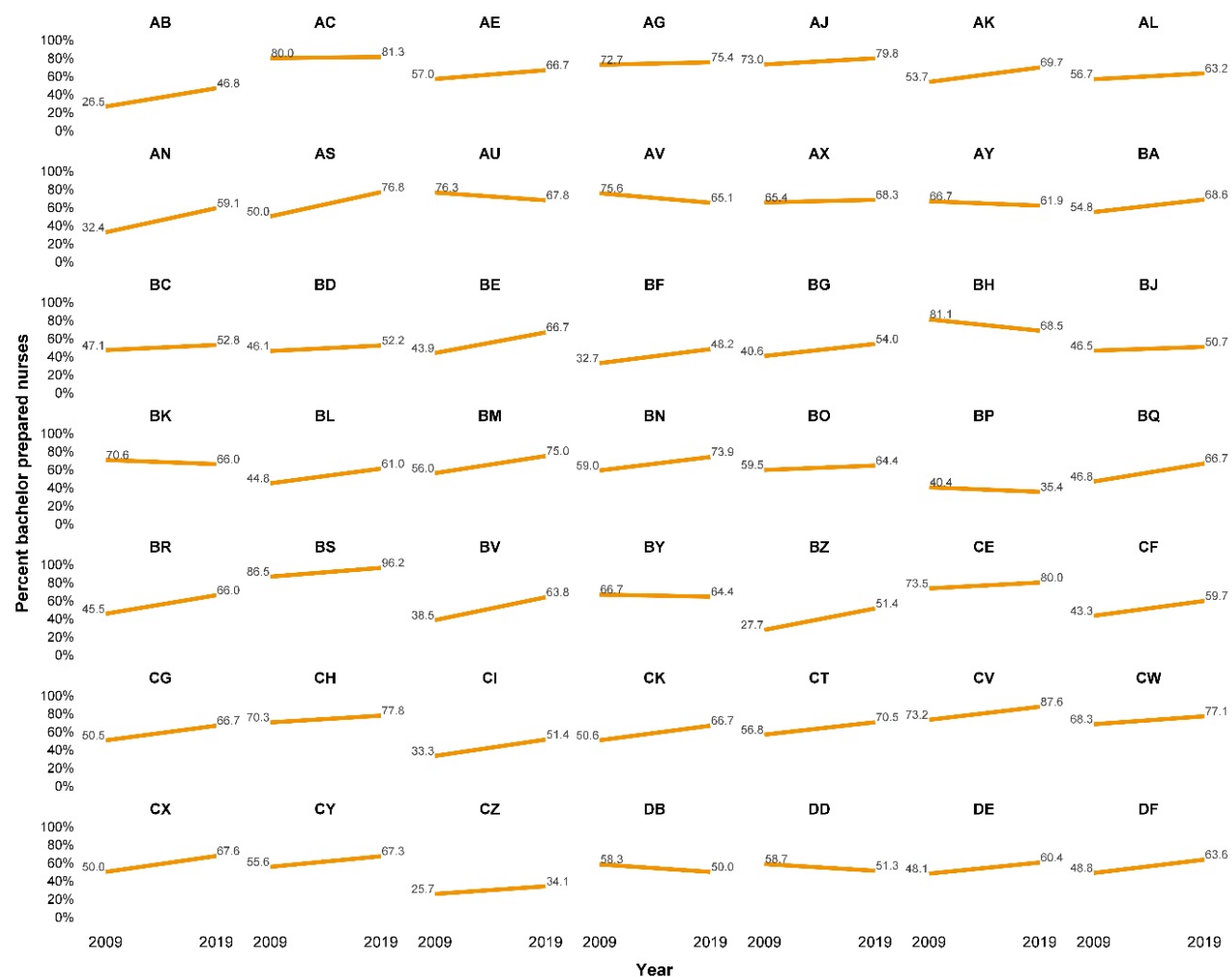
5.5.2.4   Care left undone

Average percentages of clinical activities (surveillance, skin care, oral hygiene, pain management, treatments/procedures, timely medication and change patient position) and planning and communication (comfort patients, educate patients, prepare discharge, updating care plans and planning care) left undone significantly increased between 2009 and 2019 (24.98% vs. 31.45%, P value <0.0001 and 40.43% vs. 45.23%, P value <0.0001, respectively) (Figure 116).

Figure 116 – Percentage of care activities left undone (subscales), evolution between 2009 and 2019
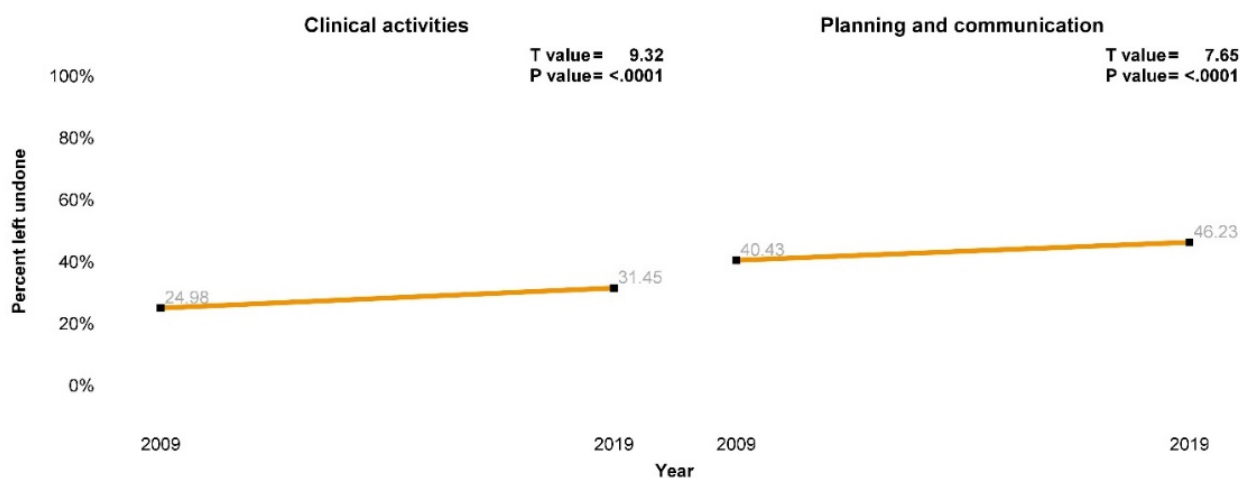
This effect was present for all items used to measure care left undone, except for oral hygiene (42.7% vs. 44.9%, p=0.0757) (Figure 117).

Figure 117 – Percentage of care activities left undone (items), evolution between 2009 and 2019
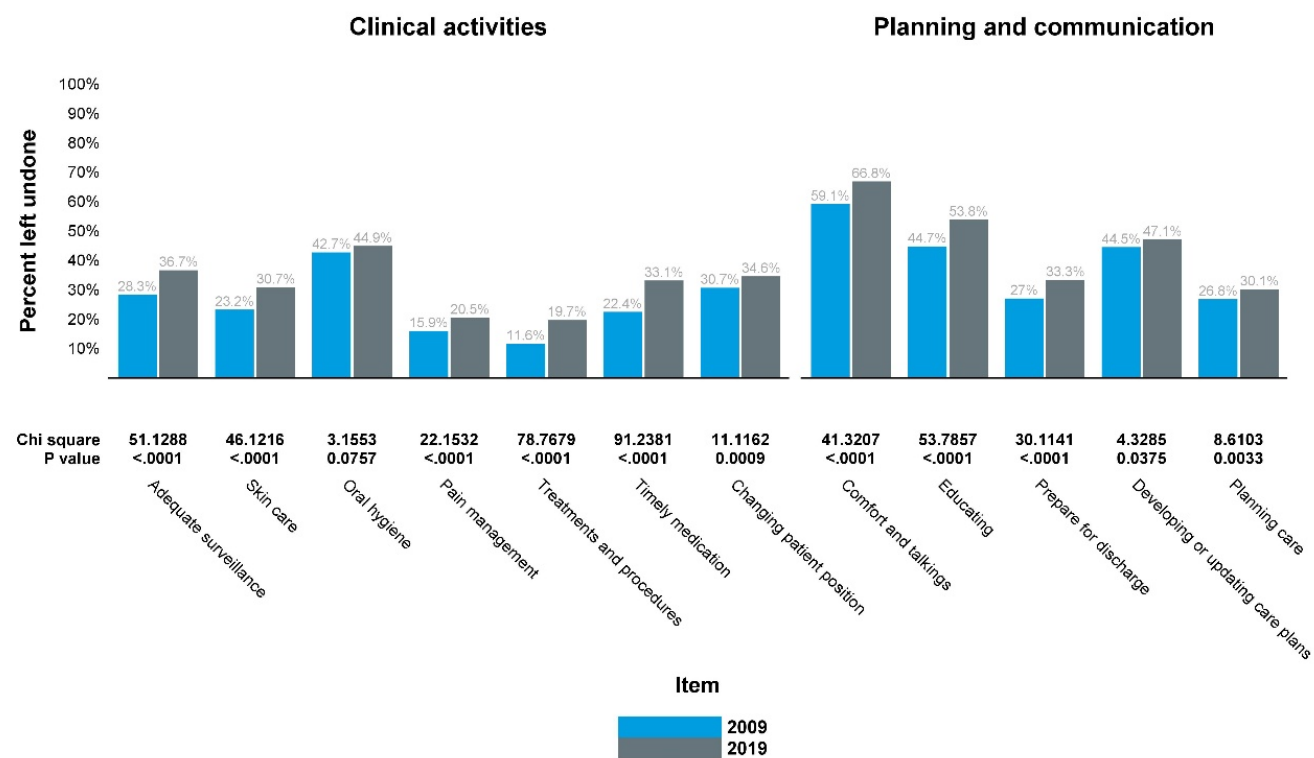
Figure 118 presents a heatmap of the change in care left undone between 2009 and 2019 at the hospital level. Hospitals are on the x-axis and are ranked by the average percentage for the 12 items measuring care left undone (documenting care is not included as it is not part of any of the dimensions) from left (lowest percentage, i.e. 23%) to right (highest percentage, i.e. 51%) for the 2009 survey. Also indicated between brackets is the 2019 score. The lower the score, the better. A heatmap is used to express percentages between a range of colours that moves from green (the score for that specific item dropped by at least 5% between 2009 and 2019)

over blue (the score remained stable between 2009 and 2019) to red (the score surged by at least 5% between 2009 and 2019). In addition, for each care left undone dimension the percentage of items that dropped by at least 5% is indicated, within each hospital and across hospitals. Overall, hospitals that performed well compared to the other hospitals in 2009 experienced a surge in 2019 and hospitals that performed very poor in 2009 compared to the other hospitals experienced a drop. A hospital that experienced a drop between 2009 and 2019 does not necessarily perform well in 2019 compared to the other hospitals, and vice versa (cf. Figure 48 to Figure 62).

Figure 118 – Care left undone, evolution between 2009 and 2019 at the hospital level
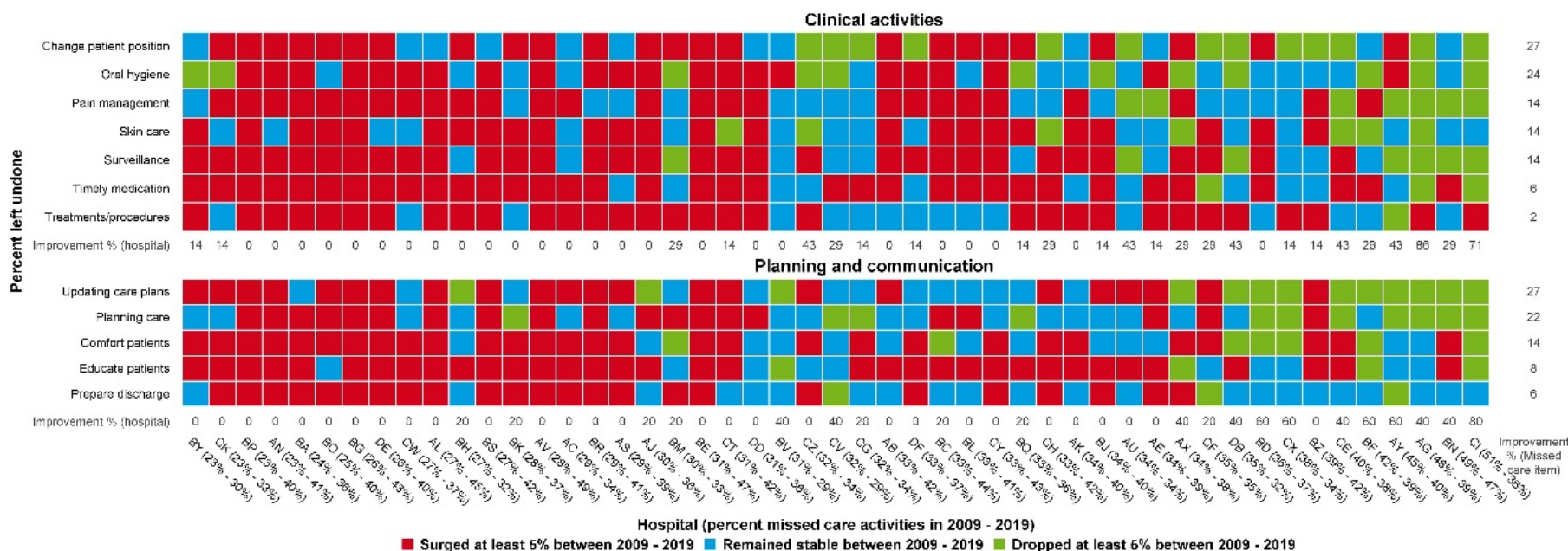
5.5.2.5 Nurse outcomes

Burnout

Compared to 2009, 2019 marked an increase in the percentage of nurses at high risk of depersonalization and emotional exhaustion (20.6% vs. 28.9%, P value <0.0001 and 24.6% vs. 33.7%, P value <0.0001, respectively) and a decrease in reduced personal accomplishment (33.4% vs. 27.9%, P value <0.0001) (Figure 119).

Figure 119 – Percentage of nurses at high risk of burnout, evolution between 2009 and 2019
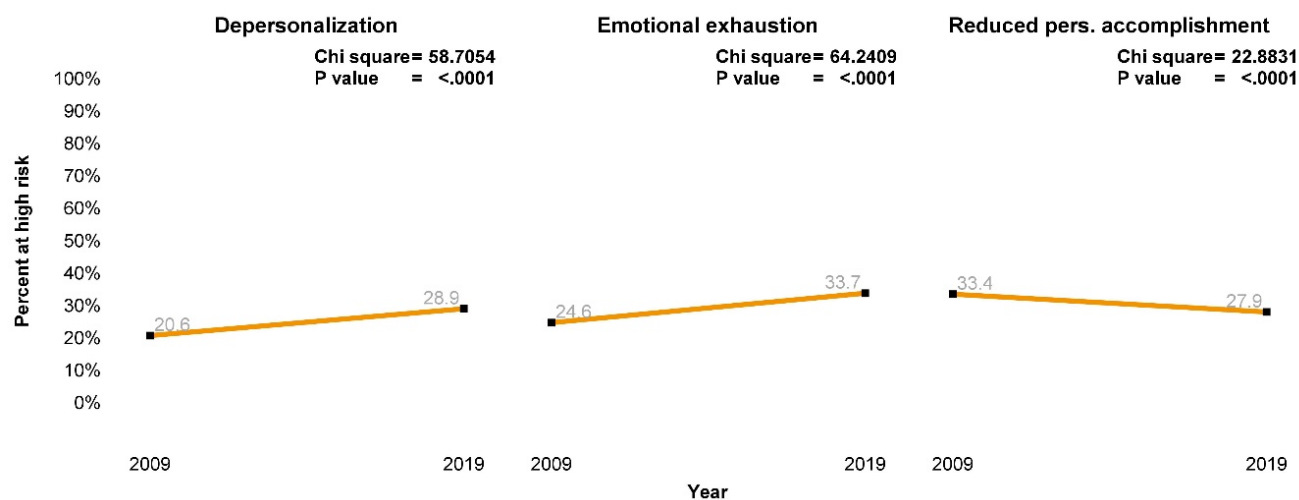
Figure 120 presents a heatmap of the change in burnout between 2009 and 2019 at the hospital level. Hospitals are on the x-axis and are ranked by the average percentage for the 22 items measuring burnout from left (lowest percentage, i.e. 11%) to right (highest percentage, i.e. 39%) for the 2009 survey. Here, the percentage reflects items for which nurses indicate they experience the feeling at least once a week, several days a week or every day (for the items related to emotional exhaustion and depersonalization) or experience the feeling never, a few times a year, a few times a month or less, or a few times a month (for the items related to reduced personal accomplishment). Also indicated between brackets is the 2019 score. The lower the score, the better. A heatmap is used to express percentages between a range of colours that moves from green (the score for that specific item dropped by at least 5% between 2009 and 2019) over blue (the score remained stable between 2009 and 2019) to red (the score surged by at least 5% between 2009 and 2019). In addition, for each burnout dimension the percentage of items that dropped by at least 5% is indicated, within each hospital and across hospitals. Overall, hospitals that performed well compared to the other hospitals in 2009 experienced a surge in 2019 and hospitals that performed very poor in 2009 compared to the other hospitals experienced a drop. A hospital that experienced a drop in burnout between 2009 and 2019 does not necessarily perform well in 2019 compared to the other hospitals, and vice versa (cf. Figure 64 to Figure 67).

Figure 120 – Percentage of nurses at high risk of burnout, evolution between 2009 and 2019 at the hospital level
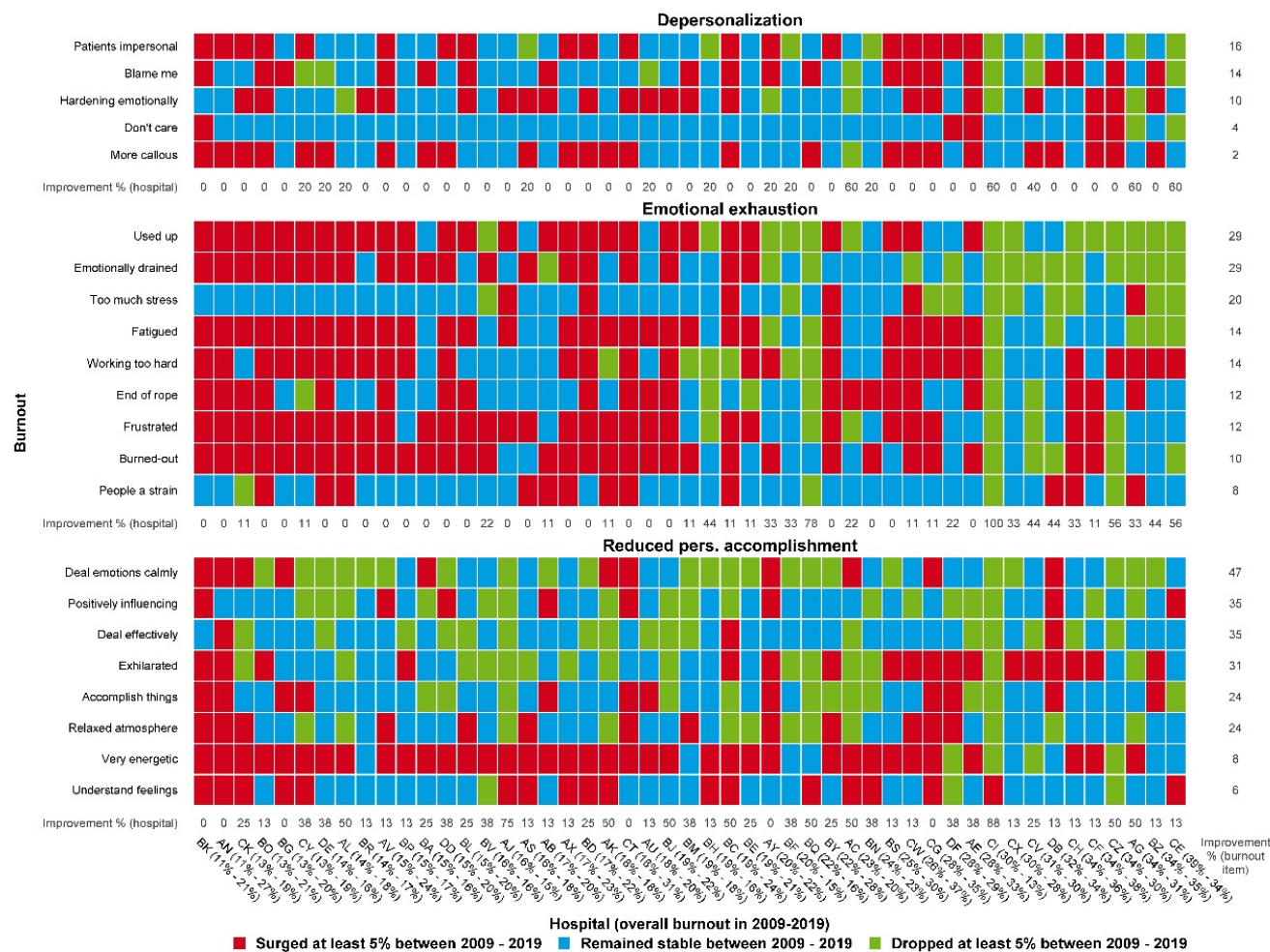
Job satisfaction

Compared to 2009, in 2019 we observe a significant increase in dissatisfaction with job, annual leave and sick leave (22.1% vs. 24.7%, P value = 0.0137; 34% vs. 40.7%, P value <0.0001 and 24.5% vs. 25.6%, P value = 0.0003, respectively) and a significant decrease in dissatisfaction with independence at work, wages and professional status (15.1% vs. 12.3%, P value = 0.0010. 62.2% vs 55.6%, P value <0.0001 and 24.8% vs. 19.3%, respectively) (Figure 121).

Figure 121 – Percentage job dissatisfaction, evolution between 2009 and 2019
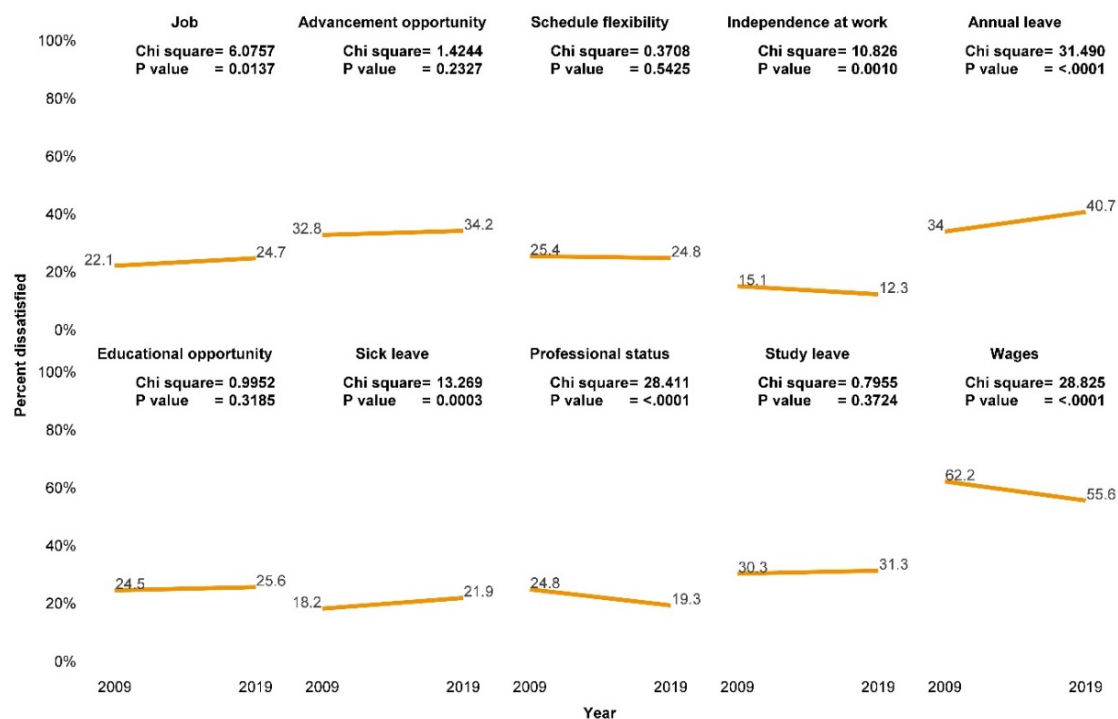
At the hospital level, the evolution in job dissatisfaction is ambiguous. Several hospitals with high as well as low scores on job dissatisfaction in 2009 experienced a decrease in 2019, and vice versa (Figure 122).

Figure 122 – Percentage job dissatisfaction, evolution between 2009 and 2019 at the hospital level
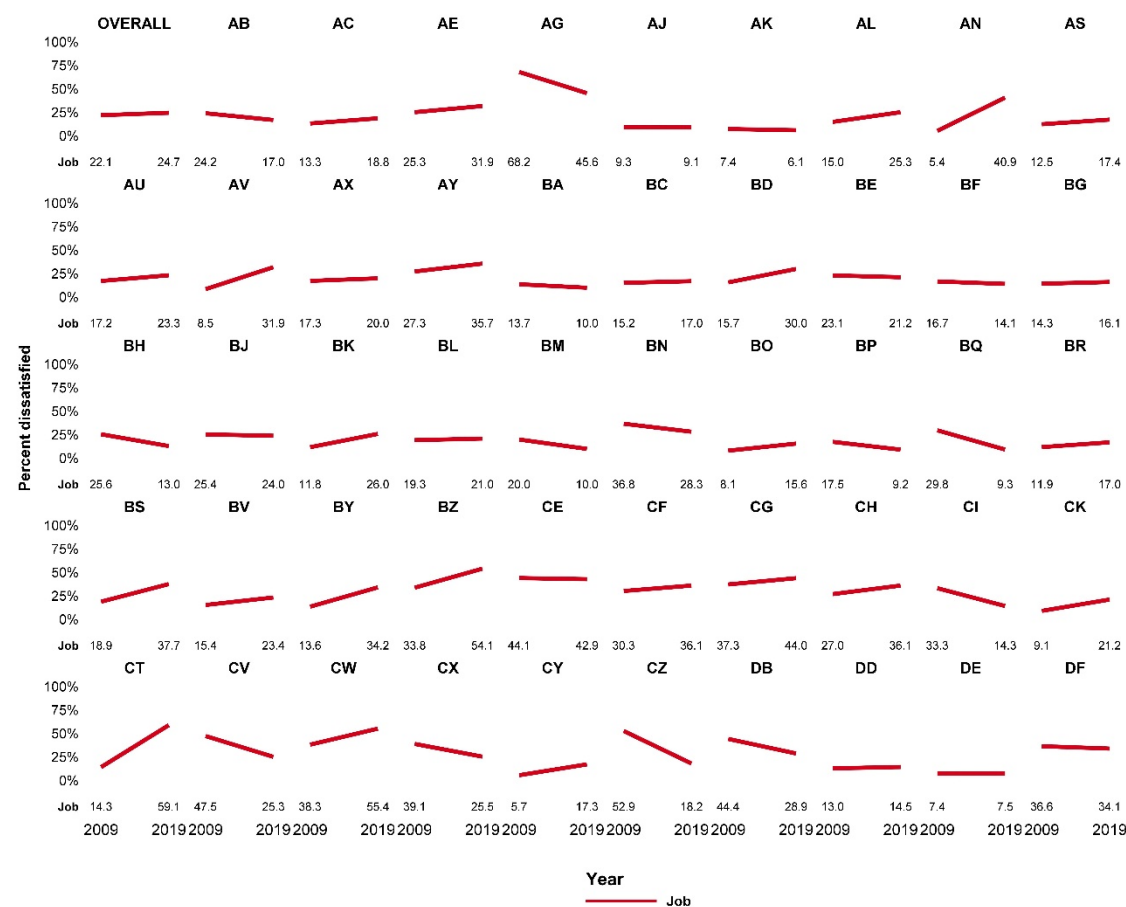
Intention to leave

Intention to leave the hospital, for another hospital, a non-hospital or a non-nursing job within the next year did not significantly change between 2009 and 2019 (Figure 123), but large variation could be observed across hospitals (Figure 124).

Figure 123 – Percentage intention to leave, evolution between 2009 and 2019
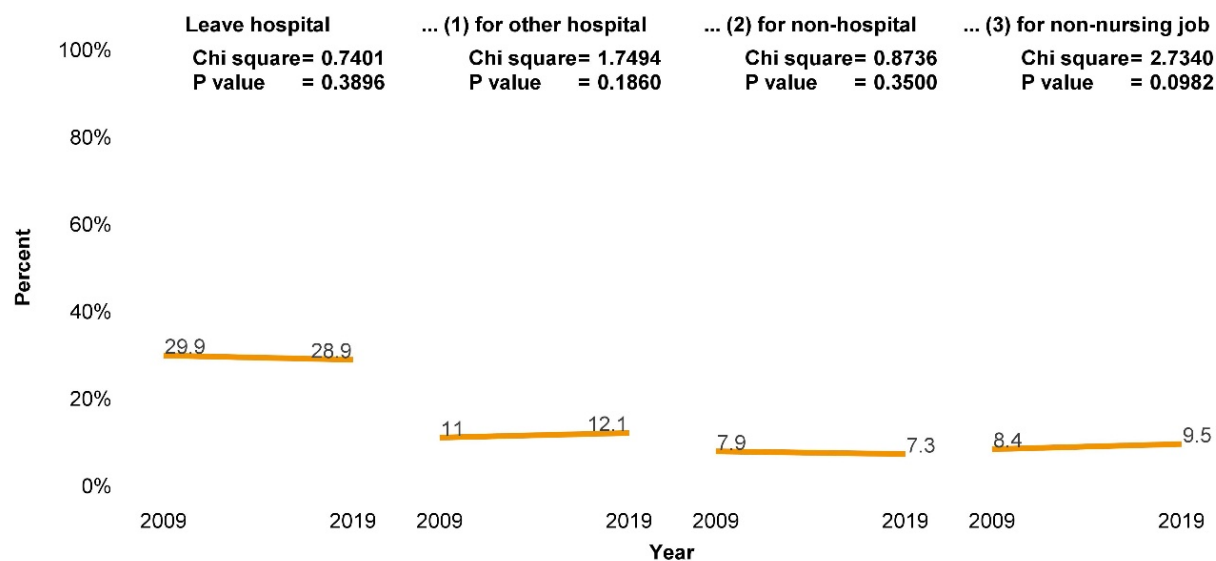
Figure 124 – Percentage intention to leave, evolution between 2009 and 2019 at the hospital level
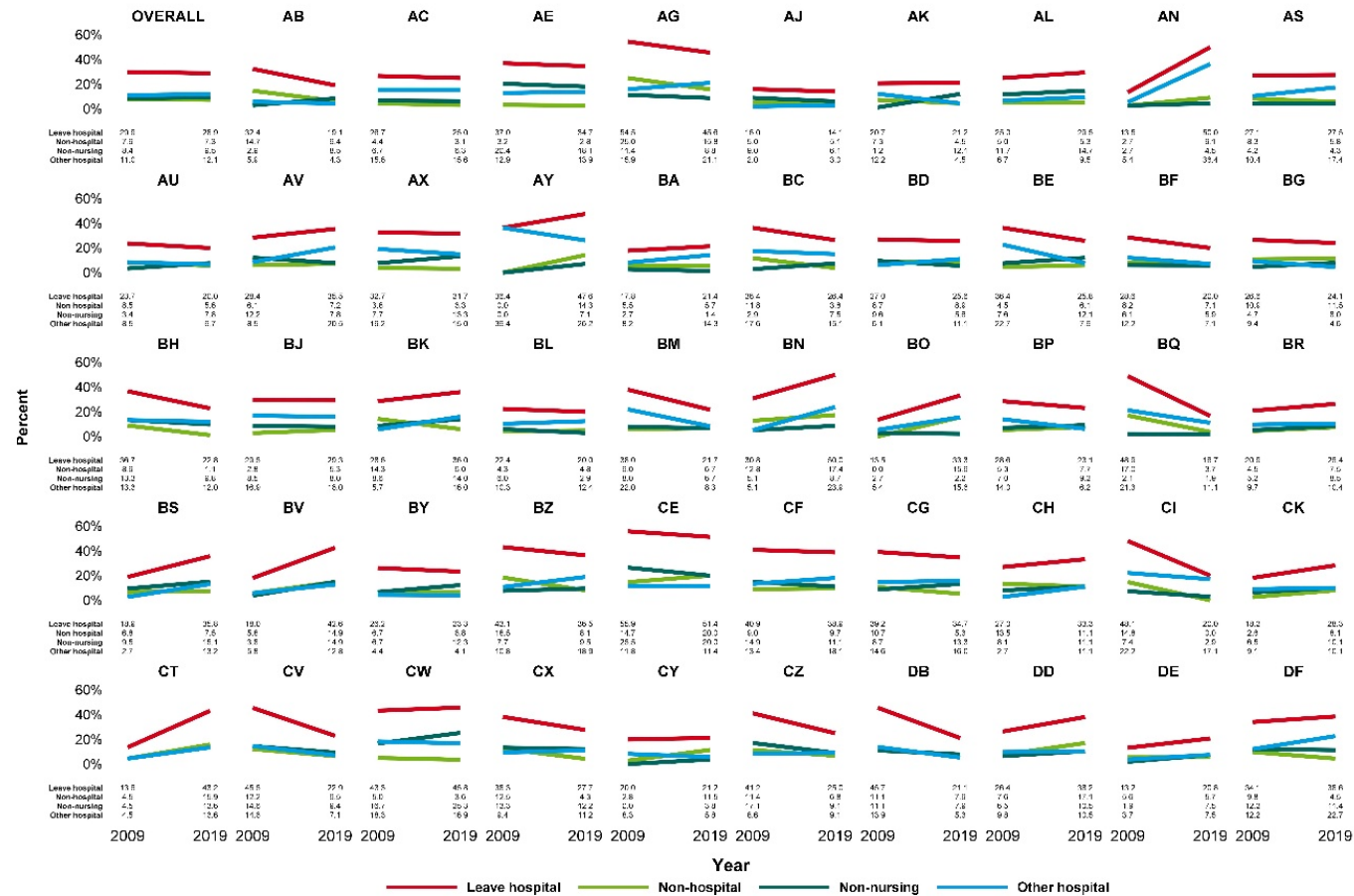
5.5.2.6 Tasks below nurses' skill level

Significantly less nurses reported that they sometimes/often collect and distribute food trays, arrange patient discharge, transport patients, perform non-nursing services and obtain supplies in 2019 compared to 2009 (P value <0.0001; P value = 0.0008; P value <0.0001; P value <0.0001 and P value <0.0001, respectively) (Figure 125).

Cleaning and clerical duties are reported similarly on in 2009 and 2019 (P value = 0.0696 and P value = 0.1803, respectively). Overall, about the same percentage of nurses reported that they sometimes/often perform non-nursing care in 2019 compared to 2009.

Figure 125 – Percentage tasks below nurses' skill level, evolution between 2009 and 2019 at the hospital level
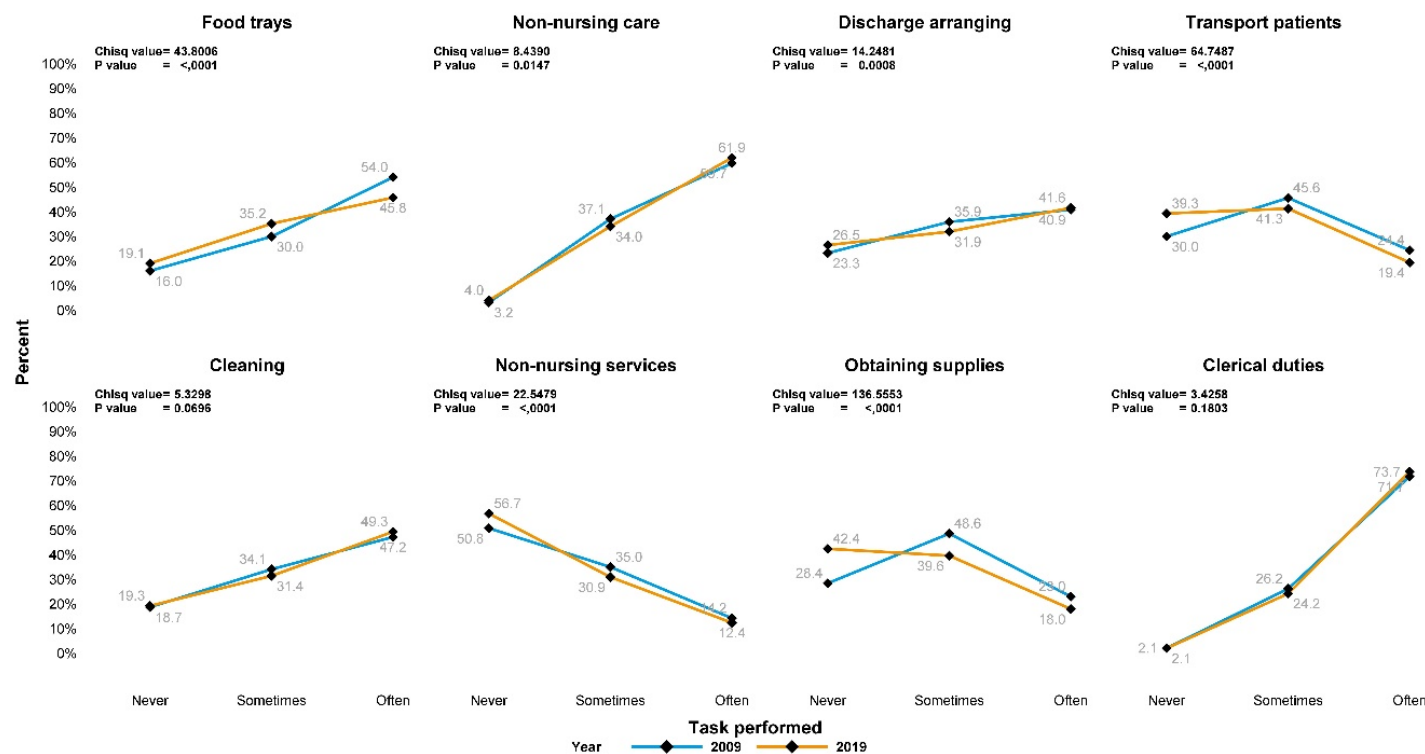
5.5.2.7 Nurses' perceptions of quality of care and reports on adverse events and errors

Nurse-perceived quality of care

The majority of nurses in 2009 and 2019 reported good quality of care on ward (59.1 % and 55.5 %, respectively) (Figure 126). However, significantly more nurses reported poor (30% vs. 25%) or fair (3.2% vs. 2.8%) quality of care on ward in 2019 compared to 2009 at the expense of good and excellent quality (P value = 0.0001).

Figure 126 – Quality of care on ward, evolution between 2009 and 2019 at the hospital level
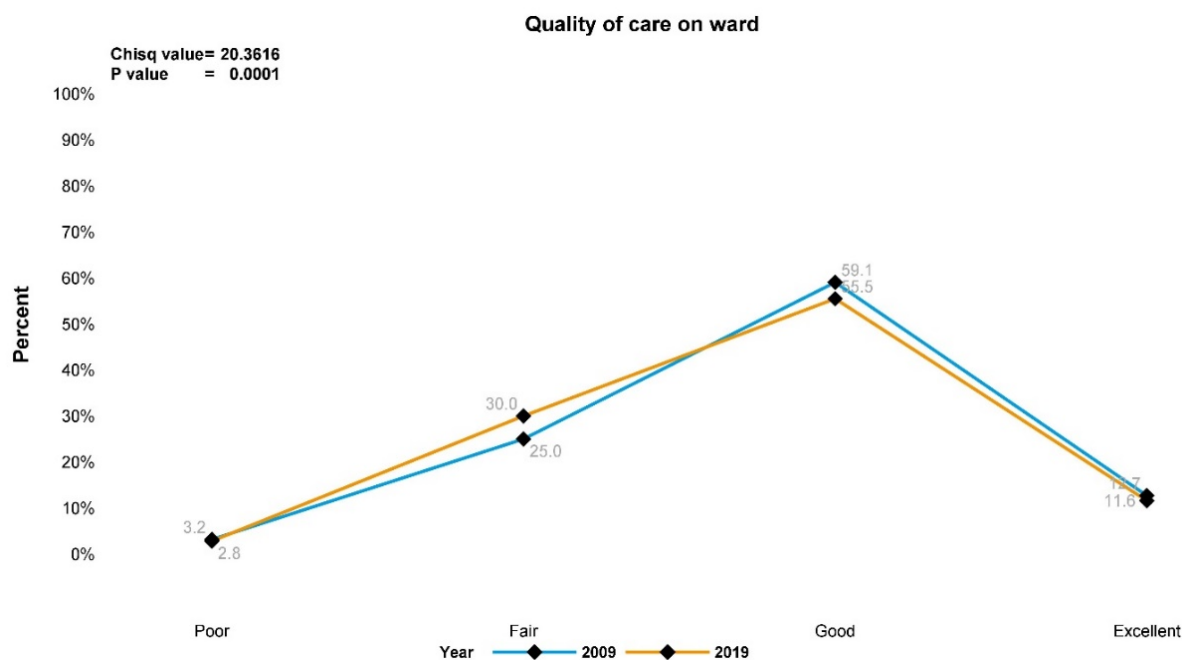
The majority of nurses in 2009 and 2019 report that the quality of patient care during the past year in the hospital remained the same (55.3% and 45.8%, respectively) (Figure 127). However, significantly more nurses reported deteriorated or improved quality of patient care in 2019 compared to 2009 at the expense of care quality having remained the same (31.4% vs. 29.1% and 22.7% vs. 15.6%, respectively; P value <0.0001).

Figure 127 – Evolution in the quality of patient care in the hospital during the past year, evolution between 2009 and 2019 at the hospital level

Evolution in the quality of patient care in the hospital

Chisq value= 73.2850
P value   = <,0001
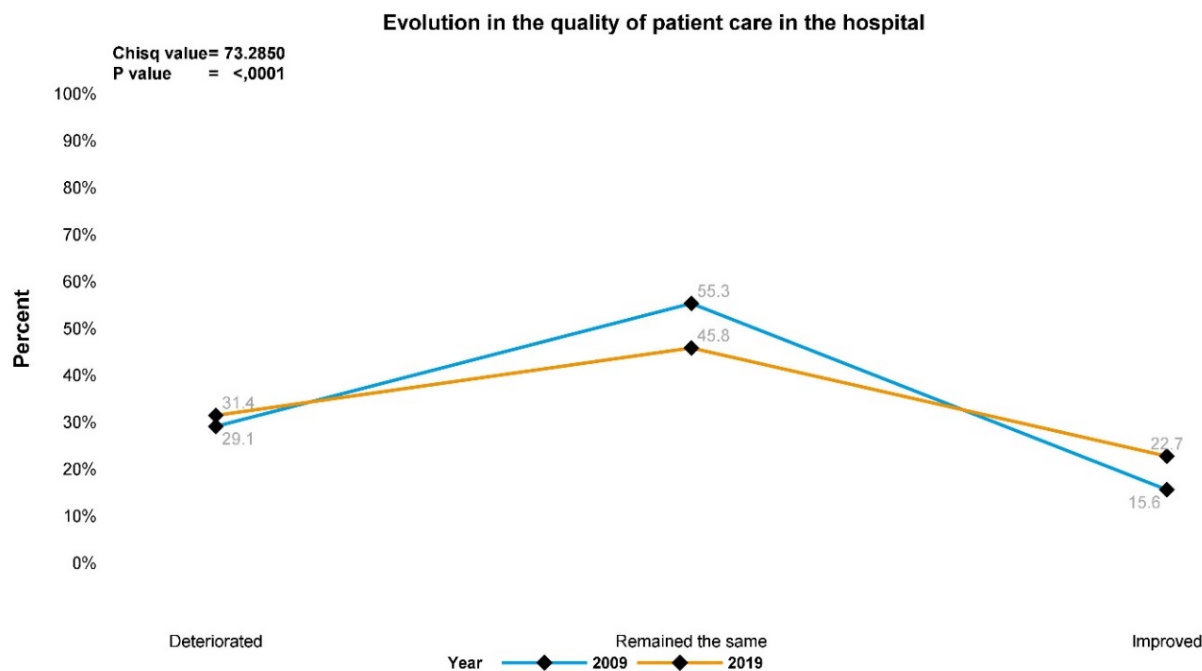
The majority of nurses in 2009 and 2019 report that the nursing ward patient safety grade is acceptable (52.7% and 45.3%, respectively) or very good (38.9% and 46.3%, respectively) (Figure 128). Compared to 2009, in 2019 significantly more nurses reported a very good safety grade (46.3% vs. 38.9%; P value = 0.0001).

Figure 128 – Nursing unit patient safety grade, evolution between 2009 and 2019 at the hospital level

Nursing unit patient safety grade
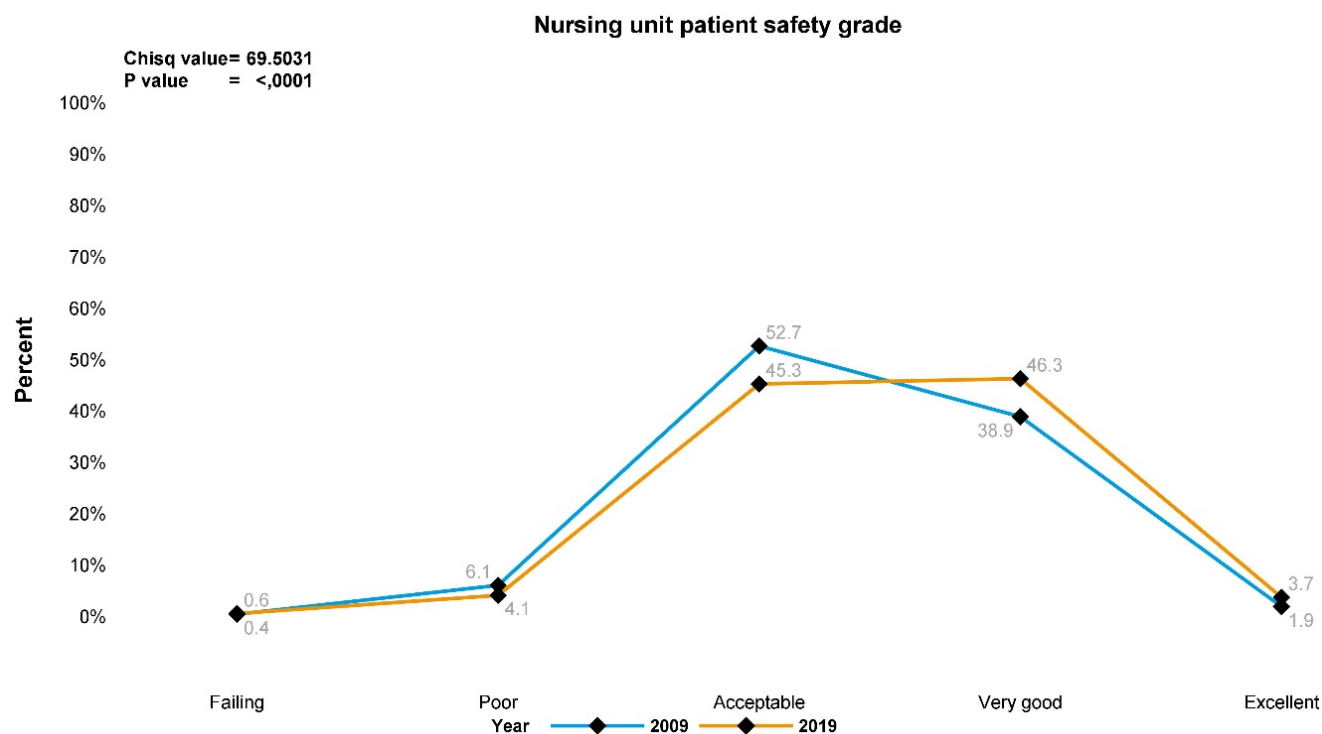
The majority of nurses in 2009 and 2019 reported being not at all confident (35.5% and 39.8%, respectively) or somewhat confident (44.7% and 44.0%, respectively) that management acts to resolve problems in patient care (Figure 129). Significantly more nurses reported being not at all confident in expense of being confident that management acts to resolve problems in patient care in 2019 compared to the situation of 2009 (39.8% vs. 35.5% and 14.5% vs. 18.0%, respectively; P value = 0.0001).

Figure 129 – Management acting to resolve problems in patient care, evolution between 2009 and 2019 at the hospital level

Management acts to resolve problems in patient care
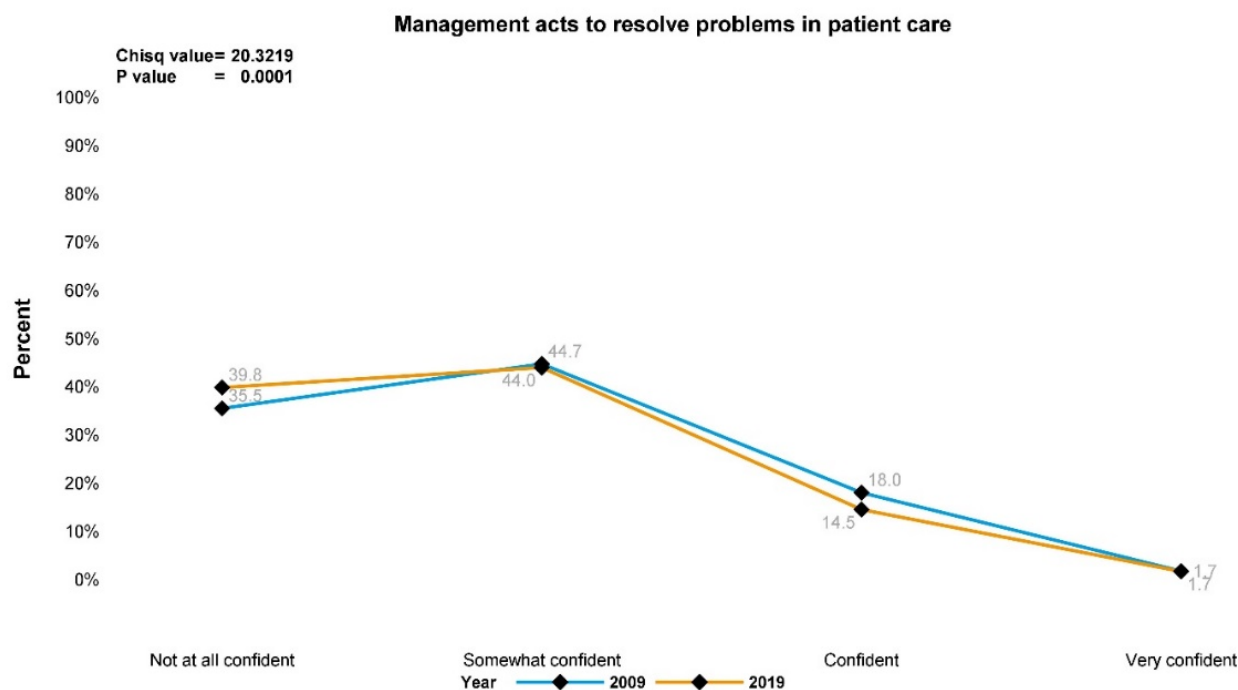
The majority of nurses in 2009 and 2019 report to be somewhat confident that patients manage own care after discharge (51.4% and 54.2%, respectively) (Figure 130), and there was no significant difference between 2009 and 2019.

Figure 130 – Patients managing their own care after discharge, evolution between 2009 and 2019 at the hospital level
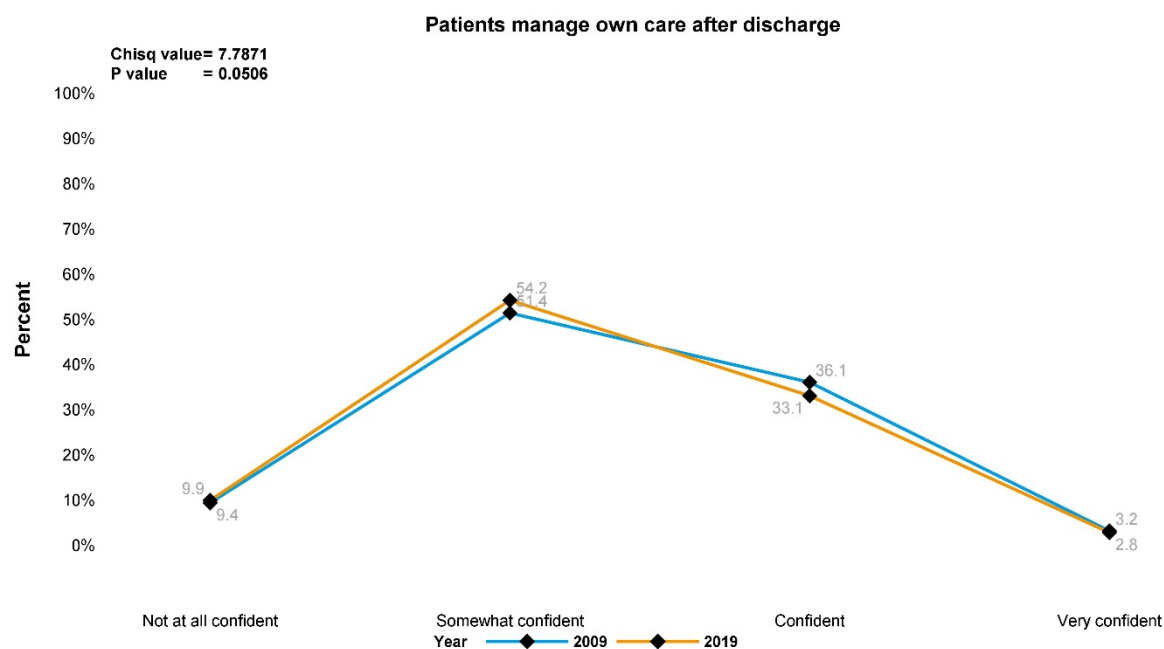
Nurses' reports on adverse events, errors and incidents

The percentage of nurses reporting adverse events, errors and incidents occurring at least once a month during the past year remained stable over time (Figure 131).

Figure 131 – Evolution reporting incidences that occurred at least once a month during the past year between 2009 and 2019
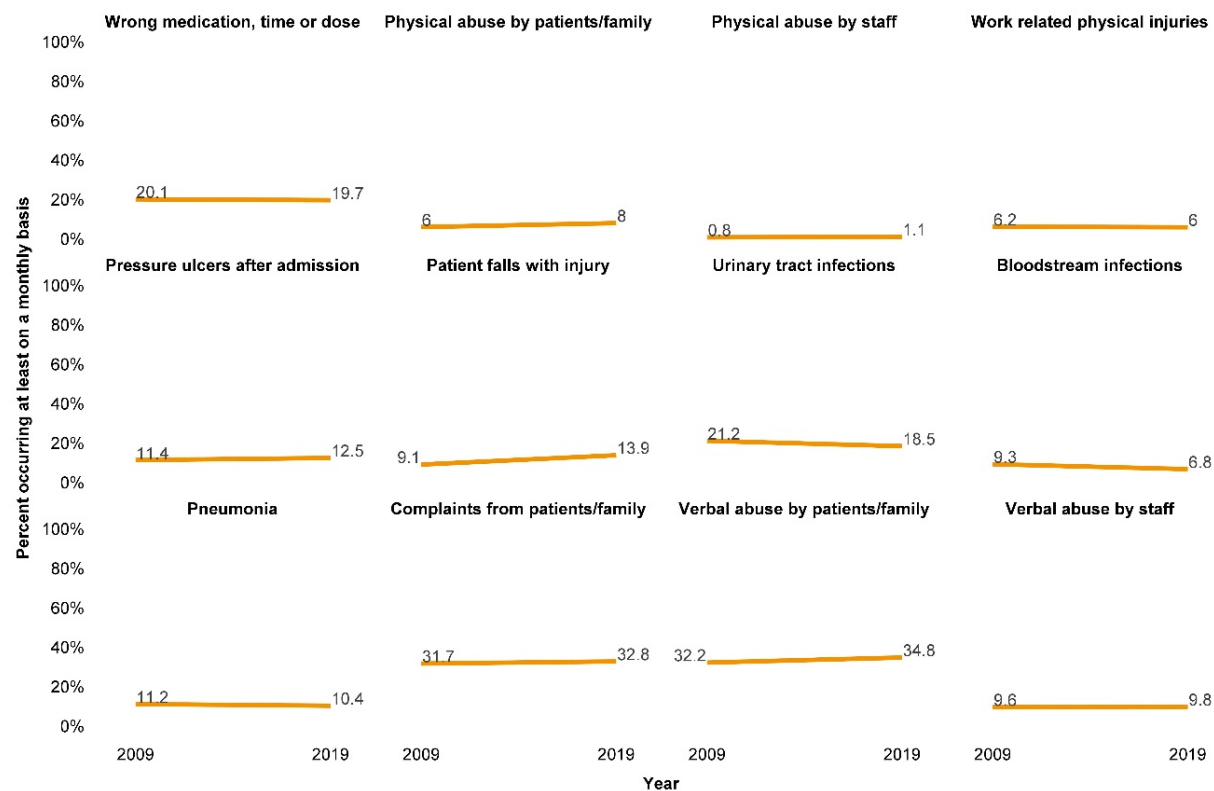
5.5.2.8   Evolution in patient-to-nurse ratio between 2009 and 2019: association between nurse survey measure and Belgian Nursing Minimum Data Set measure

Figure 132 depicts the changes in the patient-to-nurse ratio reported by nurses in the 2009 and 2019 nurse survey, and the changes in the patient-to-nurse ratio calculated from the 2009 and 2016 B-NMDS. The difference-in-difference analysis involves 47 hospitals as for two hospitals no B-NMDS data were available.

On average, across years, the B-NDMS measure is significantly lower compared to the survey measure (Estimate = -1.5679, P value <0.0001). There were statistically significant decreases in both the survey (10.76 to 9.29 from 2009 to 2019) and B-NMDS measures (9.19 to 7.93 from 2009 to 2016). The difference in these decreases was not statistically significant (Estimate = 0.2135, P value = 0.6530), suggesting that the two measures evolved similarly over time.

Figure 132 – Evolution in patient-to-nurse ratio between 2009 and 2019: association between nurse survey measure and Belgian Nursing Minimum Data Set measure
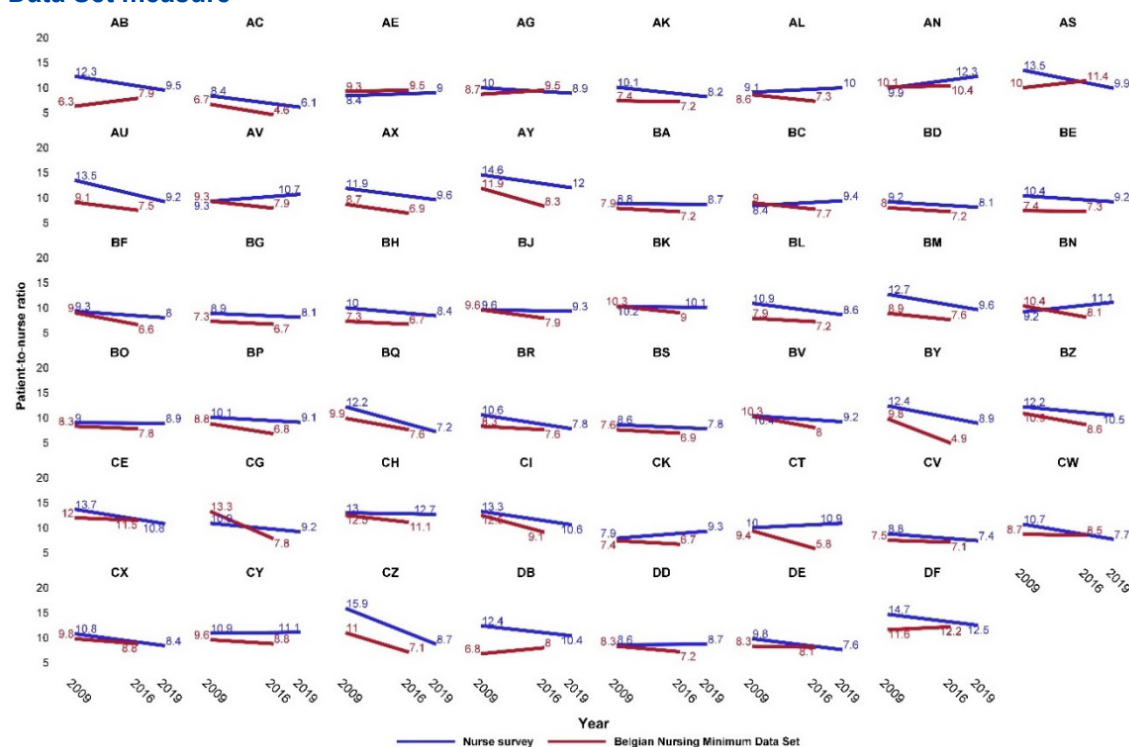
5.5.2.9 Evolution in percent Bachelor prepared nurses between 2009 and 2019: association between nurse survey measure and Belgian Nursing Minimum Data Set measure

Figure 133 depicts the changes in the percent Bachelor prepared nurses reported by nurses in the 2009 and 2019 nurse survey, and the changes in the percent Bachelor prepared nurses calculated from the 2009 and 2016 B-NMDS. The difference-in-difference analysis again involves 47 hospitals

as for two hospitals no B-NMDS data were available. On average, across years, there is no statistically significant difference between the B-NDMS measure and the survey measure (Estimate = -0.6275, P value = 0.8147). There were statistically significant decreases in both the survey (54.7% to 64.5% from 2009 to 2019) and B-NMDS measures (55.3% to 60.4% from 2009 to 2016). The difference in these increases was not statistically significant (Estimate = 4.742, P value = 0.2058), suggesting that the two measures evolved similarly over time.

Figure 133 – Evolution in percent Bachelor prepared nurses between 2009 and 2019: association between nurse survey measure and Belgian Nursing Minimum Data Set measure
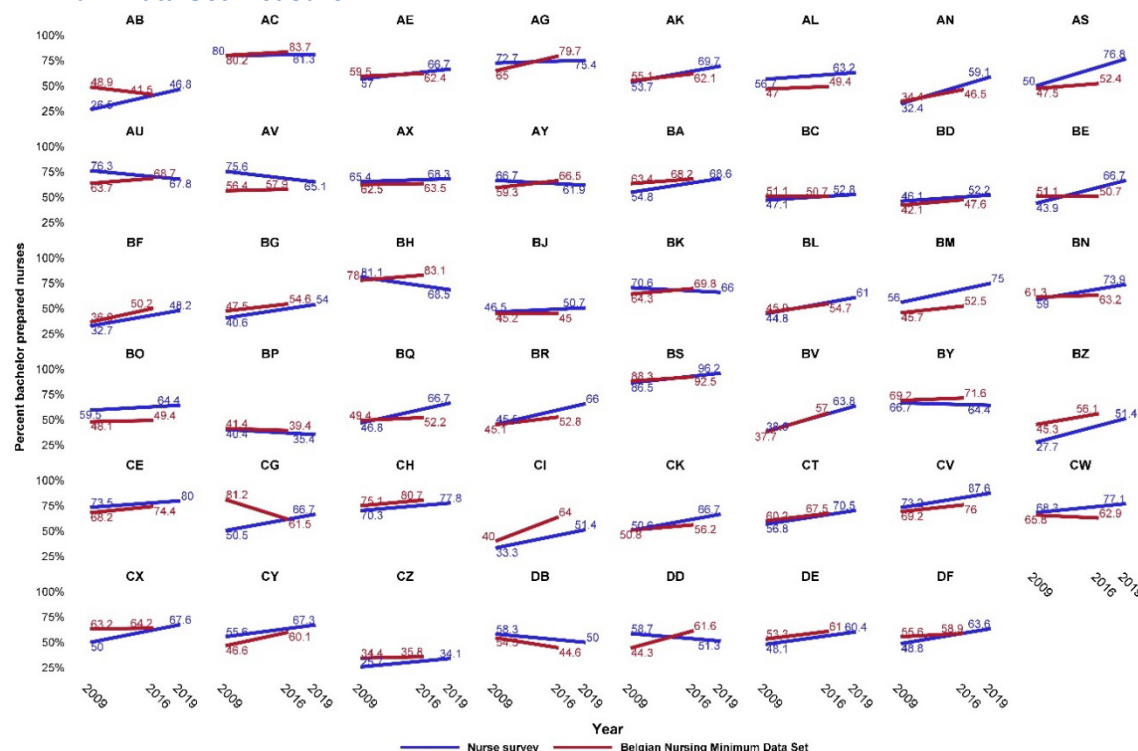
5.6 Key points

- The nurse survey (2019) was conducted in 84 hospitals including responses from 5 203 nurses. For a sample of 49 hospitals (3 035 nurses in 2009 and 3 457 nurses in 2019) a comparison between 2009 and 2019 could be made.

- The nursing work environment had dimensions with favourable results ('foundations for quality of care') and fairly good results ('nurse-physician relationships' and 'managers' ability, leadership and support'). Poor results were found for 'staffing and resource adequacy' and 'participation of nurses in hospital affairs'. Compared to 2009, the nursing work environment changed positively on three factors (i.e. leadership, nurse-physician relationships, and foundations for quality of care) and remained unchanged on 'staffing and resource adequacy' and 'participation of nurses in hospital affairs'.

- The overall patient-to-nurse ratio in Belgian hospitals, in 2019, is 9.4 patients per nurse (ranging from 6.1 to 12.7). This is a significant but small improvement compared to 2009.

- The average percentage of Bachelor prepared nurses is 63% (ranging from 34% to 96%) which is a significant and substantial improvement compared to 2009.

- Clinical activities (on average 2.2 on 7 activities) as well as planning or communication activities (on average 2.3 on 5 activities) are rationed due to a high workload. This is a substantial and significant increase compared to 2009.

- Nurses often performed tasks below their skill level. For some tasks an increase while for others a decrease was observed compared to 2009.

- Nurse outcomes are not good and are worse compared to 2009. In 2019, 36% of nurses are at risk for emotional exhaustion (hospital rates vary between 7% and 76%) and 27% is dissatisfied with the job (hospital rates vary between 0% and 77%). The intention to leave the hospital did not change significantly. It remained at a high level: 32% (hospital rates vary between 9% and 70%). Walloon hospitals performed significantly worse than Flemish hospitals on these nurse outcomes.

- A higher patient-to-nurse ratio is consistently associated with worse nurse outcomes. The association between the different factors of the 'nursing work environment' and 'nurse outcomes' is less clear. For leadership a consistent relationship with nurse outcomes was observed.

- Patient-to-nurse ratio and non-nursing tasks are important predictors for missed nursing care (clinical activities as well as planning and communication activities).

PART III – DESCRIPTION OF SAFE STAFFING POLICIES ABROAD

6 INTRODUCTION AND APPROACH TO THE INTERNATIONAL 'SAFE STAFFING POLICIES'

6.1 Aim of international comparison

The cumulative evidence about the association between nurse staffing levels (number and educational level) and patient and nurse outcomes is large. Yet, as described in the introduction of this report, many practical questions remain unanswered (e.g. what is the optimal patient-to-nurse ratio). Therefore we will study a number of 'safe staffing policies' applied abroad. The main aim of the evaluation of 'safe staffing policies' in other countries/regions is to draw lessons for the Belgian context. All these elements will be, after consultation with relevant Belgian stakeholders, used to formulate recommendations about nurse staffing ratios in Belgian acute hospitals.

6.2 Study approach

6.2.1 Selection countries / regions

This part of the study has not the ambition to be exhaustive. We want to identify best-practices, alternative policy approaches, barriers, facilitators, etc. We selected, after an internet search, the following four countries/regions:

- United Kingdom with a focus on England (other UK-countries are also discussed but not in detail)
  - o Main reasons for selection: NICE-guideline on 'safe staffing'; 'light-touch' approach compared to ratios; possibility to contrast with other UK-countries (same context, evidence base but other policy approach).

- Australia with a focus on Victoria and Queensland:
  - o Main reasons for selection: Both states implemented mandated patient-to-nurse ratios. However, the approach allows more flexibility compared to Californian ratios.

- Ireland
  - o Main reasons for selection: Safe staffing policy that includes the adjustment of actual staffing levels based on required staffing levels as measured by patient acuity system. Although a national framework exists the implementation is (at the moment) limited to pilot sites.

- United States with a focus on the state of California (approaches in other states are summarized);
  - o Main reasons for selection: California pioneered patient-to-nurse ratios; region with most evaluation studies. Massachusetts is the only USA-state besides California that adopted ratios (only in ICU). Also this state is discussed briefly.

This selection was presented to a panel of international experts (see colophon, Meeting in Leuven on 21 February 2019). During this meeting it was confirmed that this selection would yield important insights. The experts were asked to suggest other regions that could bring additional insights. Only Germany was suggested (see Box 9). Yet, as the 'safe staffing policy' in Germany is still to the largest part in a conceptual phase and early phase of implementation since 2019, it was decided to only briefly discuss this and not include it as a full case. The experts assessed that other regions with 'safe staffing policies' would not yield additional insights to those of the selected countries/regions.

Box 9 – Safe staffing policy in Germany

- The German hospital landscape is in a European context known to be very dense (i.e. a high number of hospitals and hospital beds per population) and dispersed (i.e. large number of small hospitals and no tradition to concentrate specialised services).[87] In addition, the RN4CAST study showed that the number of patients assigned per nurse (patient-to-nurse ratio) is high in a European context.[16]

- In June 2018 a safe staffing policy was introduced in Germany via legal order § 137i SGB V and came into effect on 1 January 2019.

- In a first step, patient-to-nurse ratios were introduced in four 'nurse-sensitive areas': intensive care (without paediatrics), geriatric care, trauma surgery and cardiology. The areas are identified as 'nurse sensitive' based on either being dedicated wards (e.g. intensive care wards) or on the activity (indicator-DRGs are used to identify 'nurse sensitive areas'). The implementation of staffing ratios on 'nurse sensitive areas' is remarkable. After all, and despite the fact that it is stated that hospital managers should not recruit from other wards, there is a risk that it will have a negative impact (e.g. attractiveness of the workplace, patient safety) on other care areas. Moreover, the terminology 'nurse sensitive' has been criticized, because all wards in hospitals can be considered nurse-sensitive. In general the term is used to refer to quality indicators that are 'sensitive to nursing care' (e.g. pressure ulcers, falls, nosocomial infections) but not to a type of services or wards. To counteract potential unintended consequences, a political agreement exists to introduce hospital-wide staffing ratios from May 2020 onwards. This will be based on patient acuity measurement. Yet, this system still needs to be developed.

- In the second semester of 2018, the concerned hospitals and wards were identified (based on DRG-activity) and informed. From April 2019 financial penalties (remuneration deduction or reduction of number of cases) are taken when hospitals do not comply with these staffing ratios.[154]

- The staffing ratios differ between day (6 AM to 10 PM) and night (10 PM to 6 AM) but are not different on weekdays, weekends or public holidays. On geriatric wards, for instance, the ratios include a maximum of 10 patients per nurse on day-shifts and 20:1 on night shifts 7 days a week. On intensive care, the maximum number of patients per nurse is 2.5 (2 from 2021 onwards) during the day and 3.5 (3 from 2021 onwards) during the night. Given the absence of evidence about an optimal staffing level, these ratios are consensus-based which makes them susceptible for critique.[155] Exceptions to the ratios can be made in case of sudden and unexpected decrease in staff (e.g. flu outbreak) or increase in patients (e.g. epidemic).

- Only staff involved in direct patient care can be included in the ratios. Both registered nurses (RN) and 'nursing assistants' can be used to meet the ratios. For 'nursing assistants' a limit was determined (e.g. max. proportion of 'nursing assistant' is 8% on a day and night shift in intensive care wards and 20% on day shifts in geriatrics). The required staffing levels that are considered as the minimal 'safe staffing level' are low compared to other systems (e.g. regions such as California, Victoria, Queensland) as high numbers of patients per nurse are allowed under the German staffing ratios.

- Until 2018 the RN costs were entirely integrated in the DRG calculation and payment system. In 2019, the RN costs are still included in the DRG system, but an additional payment is provided to hospitals for newly employed RNs and additional nursing hours. From 2020 it is foreseen that the nursing costs are excluded from the DRG-payment system. A separate budget for nursing, called 'Pflegebudget' will be provided.[156]

- Given the limited stock of nurses (and the unlike event that the budget for nurse staffing will increase) it is expected that these staffing ratios, together with other drivers (e.g. shift of care towards hospital alternatives, decreasing length of stay), will result in a decrease in selected wards, or even the number of German hospitals.[156, 157] It is clear that the legislation (when fully implemented) holds the potential to significantly impact the German hospitals landscape.

- To attract more nurses, a larger policy action plan exists, called the 'Konzertierte Aktion Pflege' ('Concerted action for nursing'). It was launched by three ministries, Ministry of Health (BMG), Ministry for Family Affairs, Senior Citizens, Women and Youth (BMFSFJ, Ministry of Labour and Social Affairs (BMAS), in July 2018. This plan includes several action points such as an information campaign, a reform of nursing training, financial incentives (e.g. remuneration during training) which aim to attract more people to the nursing profession.[158]

Sources: Wolfgang, 2018[157]; Busse, 2019[159]; Friedrich et al. 2019[160]

6.2.2 Approach international comparison

For each of the selected regions we:

- Conducted a desk-research and compiled a first draft of chapter (about 15 pages for each of the 4 countries) based on grey and peer-reviewed literature.

- Consulted the country-experts on 21 February 2019 to discuss our first findings.

- Finalised the draft of the chapters based on input from the expert meeting. Per country/region an expert was asked to give feedback on the part that concerns the region of interest (and indicate sources of information that were missing).

7 ENGLAND

7.1 Contextual information England

Nursing education in England has a strong tradition: the nursing profession gradually evolved from a hospital trained to an all degree profession

The history of nursing education in England dates back to the Florence Nightingale era. She gave an impulse to nurse training. Education was undertaken in hospitals with a nursing school attached to it. The most well-known and influential training school is the 'Florence Nightingale School' next to the St Thomas Hospital London founded in 1860.[161] Students were mainly based on the hospital wards and were in fact actively counted as being part of the workforce.[161]

Since the 1940s two levels of training were introduced to enter the Register[s] of Nurses, which also distinguished two levels for practice: Registered Nurses or RNs (three years training) and Enrolled Nurses or ENs (two years training)[t]. Although the number of ENs steadily grew (up to one third of the nursing profession in the 1970s), the problems identified already at the start (e.g. overlap between the two types of nurses, low status and lack of career prospects for ENs) did not disappear.[162] In the light of these long-lasting problems the 'Royal College of Nursing' strongly advocated for a single standard qualification for nurses in the early 1980s.[161]

In 1986 the Project 2000 was implemented. This reform fundamentally changed the nursing profession since a 'diploma level' became the minimum for all RNs. As a consequence, the second level entry was abolished and nursing education was moved into universities ('Higher Education Institutes').[162] For more than two decades it was possible to obtain the single entry level (i.e. RN) via two ways i.e. the diploma (the majority) or the degree level.

Since 2013 it is required that nurses are trained at the degree level. This choice was motivated by the fact that a degree level underpins the level of practice (intellectual, professional, academic and practical competencies) needed for the future, and enables new nurses to work more closely and effectively with other professionals.[163] The current nursing education complies with the EU directive (2005/36/EC) and consequently includes at least 4 600 hours of education (of which half in practice). The universities work closely together with the NHS to train nurses. Until 2017, nurses received bursaries from the NHS to study nursing. This system changed and now nursing students have to take out loans to pay their tuition fees. The stated intention was to increase the supply of nurses by removing the cap placed on the number of training places by limited NHS funding. It is widely predicted that this measure will, together with a dip in the population of 18-years old, have a downward effect on the applicants for the nursing education programmes.[164] This was, indeed, already observed during the first year through a drop in the number of applications.[165] A recent report[166] confirmed this suspicion as it showed that for a second year in a row the number of applications for pre-registration nursing degrees decreased despite the creation of additional training places. A recent report[167] recommended that further action is needed (i.e. covering tuition fees and cost of living grants of around £5 200) to ensure more nurses will graduate in the future.[167]

---

[s]   In the UK nurses have to be registered for practice with the 'Nursing and Midwifery Council' or NMC, formerly the 'United Kingdom Central Council' or UKCC.

[t]   First called 'State Enrolled Nurses' and since the 1960s 'Enrolled nurses'

Nursing careers

The career structure for nurses in the English NHS is quite hierarchical and traditional. There are different levels (with accompanying pay-grades) of staff nurses. A staff nurse can become a ward sister or charge nurse. A next step in the career generally demands a move into management. Nevertheless, there are also possibilities to develop a career in clinical practice. Master prepared nurses can take up advanced practice nursing roles (e.g. clinical nurse specialist; nurse practitioner). Yet, there is no formal regulation or registration of these titles and roles: while the RCN framework[168] is widely recognized it has no statutory status.

Sustainability of the nursing workforce is under pressure

The NHS is the single largest employer in England. In December 2018, there were 1.2 million persons (1 million FTE) employed by the NHS (hospital and community care)[u] of which 652 040 professional qualified clinical staff (583 881 FTE). The nursing profession is (with 322 724 persons and 288 136 FTE) the largest group. Although the nursing profession in the NHS is still growing (e.g. an increase of 1% in FTE compared to December 2017) several reports indicate that it is under pressure. In this section we describe some of the main highlights without the intention to be exhaustive.

The NHS staff shortages are huge and are a recurrent theme in the mainstream media. In England and Wales, for instance, there are reports of an increase between 2013 and 2015 in nursing staff shortages of 50%. Another source reported a shortfall of 22 000 adult care nurses in 2015.[169] Given the aging nursing workforce (in 2016 one in three nurses was older than 50 years) and the increasing demand, it is expected that this shortage will continue to grow.[164] Indeed, based on projections it is expected that by 2020 there will be a shortfall of between 14 000 (optimistic scenario about the supply) to 38 000 adult care nurses (pessimistic scenario).[169] These high

vacancy rates are confirmed by other reports.[166, 170, 171] In 2018, a total of 41 000 RN posts were reported as being vacant.[166]

As part of a response to the shortage, the NHS works with international recruits and agency staff. Yet, both of these approaches are now identified as pressure points of the NHS system. Indeed, there is a high and increasing spending on agency staff. This is a major concern as it is very costly and it also reflects the increasing difficulty of the NHS to recruit and retain permanent staff.[164] As a consequence of the rising costs for agency staff NHS Monitor installed a mandatory cap on agency pay, yet many trusts are exceeding this cap.[172, 173]

Despite the long tradition of NHS hospitals to work with international nurses, the international recruitment is identified as not sustainable. The inflow of international nurses in the UK peaked in 2002 when nurses from EU and non-EU countries accounted for more than half of the new entries at the UK register. The inflow dropped after this peak but started to increase again since 2009 (mainly due to an increasing inflow from Spain, Romania and Italy). In 2016, one in three newly RNs were non-UK trained nurses.[164] Following the vote to leave the EU in 2014 it is expected that this will have an effect on the recruitment and retention of international EU nurses (about 7% of nurses in NHS England have other EU nationalities than the British one).[169, 174] Nevertheless, a recent report showed that to meet the rising demand also in the future international recruitment will remain required.[167]

The nursing workforce also suffered from the economic recession in 2008. As part of austerity measures, NHS hospitals were imposed efficiency targets. Capping NHS pay increases to 1% until 2019, was the largest single element of this national contribution to efficiency.[169] Historically the salaries of healthcare workers increased around 2% per year over and above inflation in the NHS (in line with growth in the rest of the economy). This changed since the recession.[164] While in the whole UK economy salaries are back on the rise since 2017 (due to economic growth), the cap on the

---

[u]   The number of registered qualified nurses and midwives (FTE) working in NHS hospital services (acute, elderly, general, maternity and paediatrics) has risen from 154 371 in 2004 to 177 255 in 2014 (an increase of 8.6%).[164]

growth of NHS staff was maintained for a long time. As such, the government's pay policy contributed to the fact that healthcare workers' pay fell relative to other professional groups.[164] Studies estimate that NHS staff will see their salaries in real terms decline between 2010 and 2020 with at least 12%.[169] It is clear that this can have an impact on the long-term attractiveness of a career in the NHS. In 2018, the pay cap was lifted but it was agreed that pay would not rise much above inflation and so it will do little to restore the position of NHS staff in the market.[175]

There were no direct cuts in clinical staffing jobs.[v] An initial drop in FTE nurses, followed by a period of stagnation proved to be unsustainable and numbers have increased since 2013.[164, 176] Nevertheless, the increase in nursing staff did not follow the same pace as the increase in activity and patient acuity (substantial increase of patient episodes coincided with drastic decrease in mean length of stay).[164, 169] Furthermore, as part of the cost-containment strategy (and also as a response to the nursing shortages) the number of healthcare assistants grew faster than the number of nurses, resulting in a slightly lower skill mix.[165] What's more, the medical positions increased at a faster rate than the nursing positions.[176]

Healthcare assistants and nursing associates

There have always been roles in care to support nurses (e.g. nursing aides at the time of the Crimean War). With the implementation of Project 2000 the nursing education changed from being viewed as part of the workforce in an apprenticeship model to being regarded as 'supernumerary' primarily there to learn, not deliver service. As such, nurses could to a far lesser extent use student nurses to support them in care delivery. This was one of the main reasons for the growth of the healthcare assistant (HCA) role (which already existed, to some extent, in the form of 'nursing auxiliaries'). Although the UK registration body suggested to have a three month induction and preparation period before delivering patient care, this was not adopted. There are no formal requirements for entry. Yet, HCAs can obtain vocational qualifications. A recent variant of the HCA-role are the 'assistant

practitioners'. These assistant practitioners can deliver care and undertake tasks that were previously within the remit of registered professionals. However, also for general HCAs it seems that over the years the boundaries between the RN and HCA role started to blur. HCAs are taking up tasks previously reserved for nurses,[177] a practice which also received attention from mainstream media.[178] Despite this evolution in practice it is stated that their training is insufficient to guarantee safety of all patients. A recent study showed that substitution of RNs by HCAs has detrimental effects on patient care (increased risk of mortality, increase in missed vital observations among patients in critical conditions, etc.).[42] HCAs are highly valued within the system but it is clear that they should not be used to substitute RNs.

In addition to the HCA role, a new role called 'the nursing associates' was announced in December 2015.[164] The first 2 000 students were recruited and started a 2-year training programme in 2017.[165] After this first cohort about 5 500 training places will be funded each year from 2019 onwards.[165] The nursing associates' role was developed to allow to recruit from broader labour markets in order to scale up the nursing workforce. It also offers a career development for healthcare assistants and potentially a graduated pathway towards RN training. The nursing associate's role aims to support nurses to spend more time on their core duties and shows many resemblances with the EN role which was abolished since the 1980s. It is important to note that this role is regulated by the nursing regulator, the NMC (Nursing and Midwifery Council). Besides resemblances in the role, also the same critics that were voiced (role confusion and overlap, status, etc.) then are repeated now.[164] Yet, it is too early to evaluate if these problems are indeed observed in practice.

---

v   There was a substantial decrease of staff in the category 'NHS infrastructure and support'.

7.2 Safe staffing policies: local initiative supported by national guidance

7.2.1 Nurse staffing and patient safety: extensive public debate but no top-down imposed policy measures

Patient safety incidents triggered the public debate about safe staffing

A series of inquiries into unexpectedly high death rates at some acute hospitals did put 'safe staffing' on the political agenda. The 'Francis Report'[179] clearly linked local staffing problems (and a chronic shortage of nursing staff in particular) with substandard care, patient safety issues and preventable mortality. Since then a series of reports highlighted that patient safety issues and staffing concerns were a general problem within the NHS.[177, 180-183] The government announced already in 2013 that hospitals would have to make their staffing levels public (planned versus scheduled). An analysis in 2014 showed that in more than half of the hospitals the actual numbers did not meet their planned numbers of staff.[184] This obligation of public reporting is now replaced by mandatory reporting of 'Care Hours per Patient Day'. The objective was not primarily safe staffing but rather providing benchmarks in a context of concerns about productivity.

In the follow-up of these reports, the Department of Health charged the National Institute for Health and Care Excellence (NICE) to develop a guidance on safe nurse staffing on acute hospital wards.

Increased risk for harm when one nurse has to care for more than 8 patients but no national guidance about patient-to-nurse ratios

While some[185] expected that NICE would set 'minimum staffing levels' in their guideline, the commissioning briefs explicitly stated that 'minimum nurse staffing levels' were excluded from the outset.[186] [187]

Although the association between nurse staffing levels and patient outcomes was confirmed by the commissioned evidence reviews,[188] the decision at the outset not to determine 'safe staffing levels' determined the content of the guideline. Moreover, at that time, there was limited evidence for the UK context and most of the studies used observational designs and omitted important variables (e.g. physician staffing) in their models. There was (and still is) no evidence about a 'dose-response relationship' on which the staffing ratios can be based. The motivation for this decision was, however, publicly contested.[185] The proponents of the ratios stated that financial reasons rather than a lack of evidence are the reason why it was decided not to install patient-to-nurse ratios.[185]

There was a lot of discussion about a paragraph in the NICE guideline that stated that *"there is evidence of increased risk of harm associated with a registered nurse caring for more than 8 patients during the day shifts. Therefore, if the available registered nurses for a particular ward (excluding the nurse in charge) are caring for more than 8 patients during the day shifts, the senior management and nursing managers or matrons[w] should: closely monitor nursing red flag events; perform early analysis of safe nursing indicator results, take action to ensure staffing is adequate to meet the patients' nursing needs if indicated by the analysis of nursing red flag events and safe nursing indicators. In many cases, patients' nursing needs, as determined by implementing the recommendations in this guideline, will require registered nurses to care for fewer than 8 patients."*[138]

This paragraph seems to be in contradiction with the explicit intention at the outset not to fix patient-to-nurse ratios (or other types of mandated nurse staffing levels). While this paragraph could be interpreted as representing a safe minimum staffing ratio, it should be read as an indicator of risk, not 'safety'. Nevertheless, there was central pressure on the 1:8 ratio, questioning it was always needed (i.e. not treating this as a minimum). In fact, the NHS firmly stated that this '1:8' is only a general guidance and not a requirement. In a letter (from NHS, NICE and NHS Improvement) to all hospital administrators they stressed that hospitals have to *"take a rounded view of staffing"* that shows that they are *"making the best use of resources"*

---

w   Nursing middle management

as well as providing safe care.[187, 189] The main message of their communication was that the patient-to-nurse ratio should not be interpreted too strictly. On the contrary, there was a strong plea for flexible staffing including the use of technology and other professionals. Many nurse leaders interpreted this move from the NHS as a cost containment effort.[185]

NICE developed guidelines for general surgery, internal medicine and midwifery but abandoned plans for other areas

NICE published a first guideline on safe staffing in adult inpatient wards in 2014, followed by one on midwifery in 2015. While the initial idea was to develop guidelines for seven other domains (e.g. emergency care) these plans were abandoned. The Department of Health decided to shift the 'safe staffing' responsibility to the 'National Quality Board' which is, by the nursing and general press, perceived as less independent than NICE.[188, 190] This move was publicly contested and some feared that, due to budgetary constraints, the guidelines on safe numbers would be dropped or toned down. In 2016 with the creation of NHS Improvement (a merger of various NHS agencies) this organisation became the lead actor of the safe staffing programme. The safe staffing policies were expanded towards mental health, learning disabilities, community, maternity, children's services, etc.

7.2.2　National guidance focuses on a 'triangulated approach' and a Board-to-ward policy

The national guidance contains instructions about how to set up a safe staffing policy at the local level: from strategic towards shift-to-shift decisions

The NHS published several reports to support safe staffing at the local level.[191-193] For safe staffing on adult wards these reports build on the NICE guideline. The national guidance on safe, sustainable and productive staffing in the publications from NHS Improvement are based on a framework that focuses on three expectations:

- *The right staff*: evidence-based workforce planning, professional judgement and comparison with peers;

- *The right skills*: mandatory training; multiprofessional teams; recruitment and retention;

- *The right place and time*: eliminating waste and productive way of working; efficient deployment and flexibility (e.g. increase capacity by overtime, temporary staff or dedicated floating pools➔ using in-house nurse staffing banks instead of agency; minimising agency staff).[193]

In addition, the guidance stipulates: to measure and improve (patient outcomes, productivity, financial sustainability); to report, investigate and act on incidents (e.g. red flags: to indicate that nurse staffing levels were below what is required); to implement Caring Hours per Patient Day (CHPPD) and to develop local dashboards.[193]

In the next section, we will first describe the general principles to get the 'right staff'. Then, we will describe which guidance is given on the different levels (strategic, operational, shift-to-shift level).[191-195]

Making an informed choice based on evidence-based tools, outcomes and professional judgement

The main message of the guidance is that NHS trusts should develop a systematic approach on staffing including the use of evidence-informed decision support tools that are triangulated with professional judgement and benchmarked with peers.[191-193]

Figure 134 – Triangulated approach for safe staffing

Although it was the initial intention to develop *decision support tools*, only a limited number of these tools are endorsed by NICE.[138] In addition, the National Quality Board (2018) gives some general advice to select them.[193] According to this guidance decision support tools for safe staffing follow a systematic approach to capture patient acuity and dependency, use the best available evidence (e.g. do not extrapolate data about required staff based on 'nursing time measurements' from suboptimal staffed wards; include essential aspects of the nursing resource (e.g. direct patient care, admissions, care handovers, indirect patient care, scheduled breaks, mentoring, etc.) and consider additional resource aspects (e.g. ward layout, escort duties).[193] The most commonly used tool is the 'Safer Nursing Care Tool'[176] which classifies patients according to their level of patient acuity and provides a calculation method for 'required staff' based on the patient acuity measurement.[196]

Professional judgement will have to take elements into account that are not covered by planning tools such as ward lay-out (e.g. long distance between patient rooms); multiprofessional working (e.g. absence of staff that provide administrative support); or shift pattern (long versus short days).[193]

Outcomes responsive to nurse staffing have to be followed. Examples such as falls, pressure ulcers and medication errors are included in the guide.[193] The 'Safer Nursing Care Tool' also includes 'nurse sensitive patient outcome' measures.[196]

The guidance is separated in 'strategic staffing plans' on an annual base, a monthly follow-up of the staffing plans and a shift-by-shift basis. We describe these three parts in the next sections below.

Annual agreed staffing plans: commitment of senior management

The national guidance states that trusts must develop yearly staffing plans at the strategic level based on evidence-based tools and data, professional judgement and outcome measurement. The main objective of a workforce plan is to ensure that staffing capacity and capability are sustainable and sufficient to provide safe and effective care. In addition, a staffing plan takes account of the financial constraints, the multiprofessional context, and aims to minimise the use of expensive agency staff, etc.

The staffing plans detail the nursing establishments per nursing ward and ensure that <u>an uplift</u> is included for: annual leave (e.g. average across the hospital), study leave (including mandatory training), parenting leave (e.g. driven by local workforce demographics), sickness (e.g. targets) or other absences. The realistic character of this uplift is yearly evaluated, and adapted if needed.[193]

Reassess staffing plans at least two times per year: It is assessed twice per year if changes to the nursing establishment of a ward are required on elements such as patient acuity and dependency based on evidence-based tools, patients' activity levels, seasonal variations in demand, service developments and changes, staff supply and experience issues, analysis of reports about red flags (see below), extensive use of temporary staff, and patient and staff outcome measures. Nevertheless, it should be possible to review and adjust a staffing plan when it is required.[193]

Staffing process is part of the governance statement: The NHS Improvement added a section to the compulsory annual governance statement (Department of Health accounting manual) of trusts about staffing. Each Trust will have to include a statement that their staffing governance process

is safe and sustainable and complies with the national guidance.[192] A statement of the medical and nurse director is required in which they confirm that staffing levels are safe. In addition, the annually updated staffing plan is signed off by the chief executive officer. Although the responsibility for the staffing plans is with the senior management, it is important to collaborate with the RNs responsible for setting the staffing levels at the ward level.[138]

Monthly updates including the use of dashboards

The national guidance also included the advice to work with dashboards to give boards each month an update about staffing and skill mix levels together with efficiency and outcome parameters.[192] It is the idea to compare the actual staffing levels with the expected staffing alongside quality of care, patient safety, patient & staff experience data.

Part of quality label: Since the recent use of monthly dashboards (e.g. local quality and outcome measures) for staffing, the comparison of performance against the staffing plans and benchmarks are included within the assessment of a quality label, i.e. 'the Single Oversight Framework (SOF)'. This framework is used to help trusts to meet or attain a quality label of 'good' or 'outstanding' based on five themes i.e. quality of care, finance and use of resources, operational performance, strategic change, and leadership and improvement capability. When trusts do not meet the standards of the SOF, action can be undertaken by NHS Improvement varying from offering targeted support to the providers about one or more themes towards mandatory support or even 'special measures'.

Dynamic solutions to ensure that nurse staffing levels are adequate for each shift

The alignment of staffing with fluctuations in patient acuity and demand requires dynamic solutions. At least every 24h the operational day-to-day managers need to assess if staffing is adequate to meet the demands. If this is not the case a procedure should be in place to react. An assessment of staffing problems may require a decision to:

- Increase staffing numbers to meet patient demand;

- Partially or fully close a ward or service for a determined period until the issues are resolved;

- Temporary reduce service delivery or take another demand management approach to redeploy the available workforce to areas of critical needs to sustain safe and adequate patient care; or

- Close the service, facility or model in the long-term.

The nurse in charge will have to make an assessment (informed professional judgement) to see if the available nursing staff is sufficient to deliver safe patient care. This can be facilitated with NICE-endorsed decision support tools (see above), 'safety tipping points' and 'red flag events'.

'Safety tipping points' may help to make the assessments. A safety tipping point is a minimum level of staffing that needs to be present on each ward. If these levels are breached a face-to-face discussion with the nurse in charge has to take place to ensure safe staffing is provided (e.g. not less than 1 RN for eight patients; at least 2 RNs on every shift; a maximum of 20% agency staff; at least 50% RNs). The assessment could result in safe staffing; moderate risk (wards are visited regularly); high risk (middle management assess and mitigate the risk); unmitigated risk (CNO needs to intervene).[192]

Red flag events (e.g. unplanned omission in providing patient medication; delay of >30 minutes in providing pain relief; patient vital signs not assessed or recorded as outlined in the care plan; delay or omission of regular checks on patients; a shortfall of more than 8 hours or 25% of registered nurse time compared with the actual shift requirement; fewer than two registered nurses present on a shift) will have to be monitored for each 24h period. When a red flag event occurs a prompt action by the nurse in charge is required and might include the allocation of additional nursing staff. These day-to-day assessment will have to be documented and can be used to inform future planning of nursing ward level nurse staffing establishments.[193]

The NHS published also a guidance to make staffing data public. In fact they recommend that staff numbers will need to be displayed on boards outside all inpatient ward areas.[197]

7.2.3 Caring Hours per Patient Day (CHPPD) as a central measure to compare staffing within and between hospitals

Uniform measurement of staffing levels

To enable the comparison of staffing levels between hospitals (and trusts) and hospital wards with 'Caring Hours per Patient Day (CHPPD)' a uniform measure was introduced.[192] This was a direct consequence of the 'Lord Carter recommendations' (review on efficiency and performance of NHS hospitals).[183]

CHPPD measures the workforce deployment at the ward or service level and can also be aggregated at the trust level. The preferred level of use is the ward level since it can be used to compare with similar wards within and outside the trust and to analyse changes over time. They are, thus, more flexible compared to fixed patient-to-nurse ratios. A CHPPD of 9 on average, for instance, can vary in reality between 6 to 16.[172]

It is stressed in the guidance documents that this measure should not be used in isolation but alongside measures about clinical quality and safety.

Calculation method: nursing staff hours for patient care divided by inpatient days

It is calculated monthly based on 'hours worked by nursing and nursing support staff/patient days', as follows:[192]

Caring Hours per Patient Day
• **Calculation method**	• Day shift hours + night shift hours worked by both nursing support staff and RNs and midwives • Approximation of every 24h of inpatient admissions by taking a daily count of patients in beds at 23.59
• **Example**	• Total day hours worked by nursing support staff for the month: 400 • Total day hours worked by registered nurses for the month: 1 000 • Total night hours worked by nursing support staff for the month: 300 • Total night hours worked by registered nurses for the month: 1 000 • Total worked hours: 2 700 • Total patients at 23.59 for the month (logged daily): 300 • CHPPD= 2 700/300: 9.0

Publicly available since 2018

The data are since 2018 publicly reported on the Trust and ward level (https://improvement.nhs.uk/resources/care-hours-patient-day-chppd-data/). There is, in the published measures, a distinction between overall CHPPD, CHPPD for RNs and CHPPD for nursing support staff.

Trusts can use this measure in a more refined way:

- Comparing staffing levels within and across hospitals

- Setting nursing staff levels at ward level (during the budget rounds)

- CHPPD and rostering:

  - Planned CHPPD

  - Actual CHPPD

  - CHPPD and patient acuity

7.2.4 Approaches used by other UK countries

The other UK countries start from the same evidence-base and have a lot of similarities in their system (e.g. nursing profiles, funding mechanisms, patient population). Nevertheless, other options are taken regarding 'safe staffing' policies. In all UK regions a triangulation approach (combination of data-driven, professional judgement and benchmarking) is proposed but the extent to which the recommendations are compulsory is different. The English NHS follows the weakest approach and only provides a 'light touch' national guidance.[188] In Wales and Scotland legislation is implemented to support a safe staffing policy. In Northern-Ireland national nurse-patient ranges are proposed but no legislation is adopted to make them compulsory. We shortly describe below the main options taken in the different UK regions.

Northern Ireland: use of national determined nurse-patient ranges at the local level

In Northern Ireland there is no law on nurse staffing levels, but since 2014 the Department of Health has outlined nurse staffing in the Delivering Care

framework.[198, 199] The Department of Health proposes a framework for safe staffing that resembles the English guidance. One large difference is the determination of a staffing range at the national level for medical and surgical acute care wards (those for midwifery, emergency department, district nursing, etc. are planned). These 'normative staffing ranges' are determined in order to help to establish nurse staffing levels at the local level. It is considered as a reasonable starting point for discussions about appropriate staffing in a particular ward. The framework clearly indicates that triangulation is required and that the staffing levels are a result of a discussion with staff, managers and commissioners.[188]

The framework does, as such, not prescribe ratios that should be met at every ward at every point in time.[198] When staffing levels are outside the normative staffing range, the Chief Nurse Officer (CNO) must provide assurances about quality of nursing care and efficient use of resources via information dashboards (including quality of care data).[198] The framework also guides skill mix (ratio of registered to unregistered staff). The ward sister's (or charge nurse) time is not included in the direct nursing care staff as the ward sister has to be able to fulfil her leadership and supervisory responsibilities for 100%. A skill mix of 70% RNs and 30% unregistered staff is proposed.

The range is expressed as the number of nurses (FTE) per bed. In the range a distinction is made between general medical and surgical wards (or bed types within wards: e.g. specialist respiratory beds within a medical ward have a higher FTE per bed) versus specialist medical and surgical wards:

- The majority of general wards (general internal medicine: e.g. general respiratory, cardiology, acute elderly medicine; general stroke care) has a staffing level within the 1.3 FTE per bed and 1.4 FTE per bed range. It is recognised that a small number of wards may fall below 1.3 FTE per bed and 1.2 FTE per bed; and a small number at the higher end of 1.4 nurses per bed;

- The majority of specialised medical wards (a higher degree of acuity compared to general wards: e.g. specialist respiratory care, acute stroke) fall within the 1.4 and 1.8 range;

- The general surgical care wards (elective and emergency surgery: e.g. urology, orthopaedic surgery) falls within the range of 1.25 FTE and 1.4 FTE nurses per bed;

- The specialised surgery wards (e.g. a higher degree of surgical acuity and/or progressive recovery: neurosurgery, cardiac, head and neck surgery): a range of 1.4 and 1.8 beds.

- What this range means in practice can be illustrated via an example. A general medical ward of 24 beds has been assigned the number of 1.3 (based on a calculation method[x] starting from a required number of registered and unregistered nursing staff per shift equivalent of about 5 or 6 patients per nurse on general medicine: see pages 17 and 18 of the guidance provided by the Department of Health[200]). This equates to: 24X1.3=31.2 FTE. To ensure that the ward sister can perform her leadership and supervisory role 1 FTE is added (i.e. 32.2 FTE). With a skill-mix of 70:30, this allows to staff this ward with:

  - 21.84 FTE RNs (0.7X31.2)[y];
  - 9.36 FTE unregistered staff (0.3X31.2);
  - 1.0 FTE ward sister.

  Suppose that this ward was staffed, including the ward sister, with 30 FTE (19 RNs and 11 unregistered staff), the ward sister can start a discussion with middle management and the CNO to review the nursing establishment (increase total FTE, re-allocate part of unregistered staff to other wards and increase RN FTE).

Scotland and Wales opt for mandatory use of national approved tools at the local level

Scotland and Wales follow a similar approach but in Scotland a wider range of areas is already covered. The system highly resembles that of NHS England. Yet, both countries opt for a system of mandatory use of nationally approved nursing planning tools. These tools have to be used to calculate the FTE for the current workload and will have to be used together with professional judgement and local indicators of quality. The legislation in both countries does not impose minimum ratios but it does impose a methodology that forces senior management to use planning tools supported by triangulation with professional judgement and data about quality indicators and activity. As such staffing levels might still remain unsafe. Nevertheless, this policy gives an additional push to the local management to invest in nursing when the staffing tools suggest to do so.[188]

In Wales the 'Nurse Staffing Levels (Wales) Act 2016'[201] obliges hospitals since 2017 to have nursing workforce plans in place to ensure they have enough nurses in all NHS adult acute medical and surgical inpatient wards. Since April 2018, hospitals are required that a senior nurse calculates at least twice a year nurse staffing levels (i.e. a senior nurse) using a triangulated approach. An operational handbook provides guidance and standardised templates to enable each hospital to follow the same process, providing a clear and consistent approach throughout Wales. Once the nurse staffing level is established, it has to be increased with 26.9%. This uplift has to ensure safe staffing levels in case of sickness, maternity and annual leave, etc. In addition hospital trusts have to report to the government about the implementation process of the mandatory staffing tools.[202]

---

[x]   This method also provides an uplift of 24% to compensate for annual leave (15%); sickness absence (5%); study leave (4%).

[y]   This number can be transformed to a patient-to-nurse ratio for reasons of comparability based on several assumptions (i.e. 1 FTE works 210 days; the

bed occupancy rate in Northern-Ireland is 95%; 70% of the FTE are nurses). Based on these assumptions for a ward with 30 beds, a 1.3 FTE per bed corresponds with 5.4 patient-to-nurse ratio).

In Scotland the 'Health and Care (Staffing) Scotland Bill', which will place a legal requirement on NHS boards and care services to ensure that appropriate numbers of suitably trained staff are in place at all times.[203] Hospitals have to use mandatory planning tools. In Scotland the 'Nursing and Midwifery Workload and Workforce Planning Toolkit' is used.[172, 204]

7.3 Impact of the policy

Although safe staffing is part of government policy in England (and the UK)[205] and a fundamental standard of quality and safety (monitored by the 'Care Quality Commission')[206] much flexibility on how to implement safe staffing is left to the local initiative. The Care Quality Commission can, however, not prosecute in case of any breaches.[206] In this section we discuss some of the consequences and critiques on this system.

A rise in demand and supply of nurses after publication of the Francis report

A recent NHS Improvement report states that there was a rapid rise in demand for hospital nurses since the publication of the Francis report.[170] Also the NICE guideline is suspected to have had a role in the increasing demand for nurses. While the guideline does not propose a fixed minimal patient-to-nurse ratio, it is suspected, according to the report, that many hospitals adopted such a ratio.[170] The report states that the demand for adult nurses in hospitals was 189 000 in 2014 which is 7 000 more than what was forecasted a year earlier (or 24 000 more than two years earlier).[170]

Since 2013, an increase in the supply of nurses (number of FTE nurses +10%) and healthcare assistants (+30%) was indeed observed. Yet, this increase followed a period when there was no growth during several consecutive years.[170, 176] Therefore, it is questionable if this growth in number of nursing positions matches up with the growth in patient acuity and hospital activity or whether the growth observed in the post Francis period was anything other than a return to an upward trend that had halted after the recession of 2008. After all, a sharp increase in the hospital activity and shortening of length of stay was observed since 2014. Furthermore, this growth has to be evaluated in the light of a downward shift in skill mix (i.e. healthcare assistant positions grew at a faster pace than RN positions).

Finally, the growth in nursing positions (number of FTEs) is not to the same extent observed at the shift-level. Indeed, one in four Trusts report that in more than 65% of the shifts in the past 12 months the number of patients per RN exceeded 8.[176]

Various staffing approaches are adopted at the local level but harmonisation is growing

Despite this guidance from the NHS Improvement, a report of the Health Foundation[169] described that there is still much variation in how local trusts approach staffing issues. Some of these approaches are data driven (e.g. patient acuity and patient flows) while other mainly rely on professional judgement: fixed patient-to-nurse (or nurse-bed) ratios; calculating the number of staff per occupied bed or patient day; calculating the number of Nursing Hours per Patient Day (NHPPD), sometimes integrating patient acuity; determining a skill mix (e.g. %RNs); or professional judgement or expert opinion.[169]

The above approaches are not mutually exclusive and all have strengths and weaknesses. The use of patient acuity and other data may be, for instance, useful when care is unpredictable but overshooting when the care process is highly standardized. Furthermore, the possibility of use (e.g. link with flexible e-rostering) should be balanced with the extra efforts (e.g. registration burden) required to use these tools. These tools appear to have a positive impact when data on needs and resources are integrated and when there is technical and leadership support (at all levels).[172]

A recent report concludes, however, that the use of nursing workforce planning and deployment technologies is on the rise and the use of staffing methods are more and more being harmonized. As part of this study a national survey among CNOs was conducted. The majority reported that nurse staffing establishments were reviewed twice a year and almost all reported to use the 'Safer Nursing Care tool'. The CNOs reported that the adequacy of shift staffing was assessed based on professional judgement (75%) and patient acuity measurement (69%). The vast majority (i.e. 97%) reported to use 'red flag events'. A series of case studies also learned that uniformisation in staffing approaches across trusts starts to take place: six-

monthly reviews of nurse staffing establishments, monthly reports to the board, the use and reporting of planned versus actual CHPPD, etc.[176]

It is clear that the national 'safe staffing guidance' at least increased the transparency about staffing plans and staffing levels (e.g. some trusts publish real-time planned[207] and actual staffing levels per ward online). The recent evaluation report about the impact of the national 'safe staffing policy' concludes that the national policy succeeded in triggering a shift in thinking.[176] The awareness about the importance of safe staffing increased among hospital administrators and management as well as among the general public. The term 'safe staffing' had become embedded in organisational thinking in the NHS, from board level downwards. Seventy-four percent of the CNOs indicate, for instance, that Board support for nursing workforce has improved.[176] This awareness also coincided with increased investments in nursing, staffing methodologies and data-information systems to support safe staffing. Nevertheless, due to the wider workforce and resource restrictions, the 'safe staffing policy' approach in England did not succeed to achieve 'safe staffing levels' everywhere and at all times. Many trusts still have problems to implement actual staffing levels that correspond with required staffing levels.[176] This is confirmed by nurses reporting that insufficient action is undertaken to remediate unsafe staffing practices.[208] It is clear that the introduction of 'safe staffing policies' changed the attitude and culture about staffing but that wider and reinforced policy actions are required to overcome the nursing workforce and resource limitations.

Critique on the system

Although the 'safe staffing policy' in England managed to increase transparency about staffing and resulted in an increased awareness it is also criticized as a 'too weak approach' to make fundamental changes. The Health Foundation called it a 'light touch' approach. Calling an approach soft is not per se a critique since it has the advantage of being flexible. It is certainly a very different policy than mandatory patient-to-nurse ratios for

which there was a strong plea (that still pops up now and again[209, 210]) from the nursing profession.[211, 212] The other side of the coin of this 'flexibility' is to accept that local staffing levels will continue to vary.

Nevertheless, besides calling it soft, they state that such bottom-up approach with a general national guidance is insufficient.[188] This local autonomy of decision making will have to be supported by 'checks' and 'balances' to ensure that events like 'Mid Staffordshire[z]' will no longer happen. This means that besides the local initiatives a collaboration exists where best-practices are shared, data are compared and red flags are captured. They also recommend to strengthen the use of the national guidance by: investing in technology (data dashboards) and training of staff to use staffing tools, to link safe staffing methods with staff rostering and planning, etc.[188] Furthermore, England can learn from the other UK countries (e.g. do the staffing tools that they implement work?).

Another frequently voiced critique is that switching the safe staffing programme from NICE towards NHS Improvement is considered as a way to control costs (and avoid mandatory staffing ratios). After all, NHS Improvement is considered as "less independent" compared to NICE. Ratios are still debated[213] and the Minister of Health even created some openness.[213] Yet, it is questionable if this will result in legislation.

Furthermore, it is criticised that there is a disconnect in the policy measures between staffing and funding. According to Buchan et al. (2016), it is unrealistic to expect improvements in staffing (e.g. stimulating bottom-up approaches) when no additional capacity is provided.[164] This critique was recently repeated in a report that assessed safe staffing policies introduced after the Francis' Inquiry.[176] A 'recurring theme' of the study had been a lack of resources to deliver safe staffing. In addition, during recent years the national message towards trusts started to change from 'safe staffing' towards financial sustainability. The requirement that trusts both deliver safe staffing in every situation and remain within budget was described in the study as a 'source of tension'.[176] The report further concludes that limitations

---

[z]   In this NHS Trust high risk-adjusted mortality rates led to an investigation. Many patient safety problems were identified (including staffing problems).

in workforce supply (e.g. 10% of nursing posts are vacant) and funding 'continue to threaten the achievement of safe staffing in general acute hospital wards'.[176]

7.4 Key learning points

- The history of nursing profession has its roots in England. Within this country nursing evolved from a hospital-based training towards an all degree university educated profession. For a long period there were two levels of nurses: registered nurses (RNs) and enrolled nurses (ENs). The latter was abolished because of issues such as role overlap, lack of career perspective, etc. The healthcare assistants were introduced to support nurses in direct patient care. Recently a new role that resembles that of the previous ENs (now called 'nursing associates') was created.

- The nursing workforce is facing many challenges such as: long-lasting shortages; an aging profession; a fall in the inflow of international nurses in a country that has a tradition of working with international recruits; a substantial increase in agency staff; a national cap on salary increases of NHS staff making healthcare jobs less competitive against the rest of the market.

- A series of scandals and public inquiries found place, which linked safety problems to understaffing. Consequently, a national safe staffing policy was established (including the development of a NICE guideline). This is characterised by bottom-up responsibility supported with national guidance. The national guidance includes: a Board-to-ward approach; the use of evidence-informed tools together with professional judgement and quality of care indicators; transparency and benchmarks of staffing levels, etc. Although NICE states that there is an increased risk for harm when one nurse is responsible for more than 8 patients, no minimal patient-to-nurse ratios were recommended.

- Although evolutions are observed (e.g. increased transparency; slight increase in nurse staffing number; shift in thinking about

staffing among hospital administrators; more systematic and transparent approach in staffing allocation) the general perception is that the 'safe staffing policy' is not sufficient to prevent critical incidents linked to unsafe staffing in the future.

- A big deficit is that the safe staffing policy seems to be disconnected from funding. If the capacity is not provided at the national level, it is hard for hospitals to adopt a safe staffing level at the local level. Furthermore, due to the long-lasting nursing workforce shortage in England, a wider policy approach is required than the 'safe staffing policy' to increase the number of nurses (and skill mix) into the system.

- The other UK regions use the same evidence in a similar context in another way. All regions recommend to work with a triangulated approach. In Scotland and Wales there is legislation that makes the use of a specific method mandatory. In Northern Ireland, there is no such legislation. Instead there is national guidance including normative nurse to bed ranges for specific ward types. In short, compared to the English approach, the approach in the three other UK regions can be considered as stricter. This gives England the opportunity to learn from the neighbouring regions and in the future adapt its policy accordingly.

8 AUSTRALIA WITH A FOCUS ON MANDATED RATIOS IN VICTORIA AND QUEENSLAND

8.1 Contextual information Australia

Federal and state level authorities

The Australian healthcare system is administered both at the Federal and the State (or territory) level. While public hospital funding is derived from federal tax revenue, the management of hospital-based care is the responsibility of the state and territory governments.[214] The nursing workforce is regulated at the state level by a series of Acts of Parliament.

In this chapter we first give a general introduction about Australian nursing and then focus on the two states that already adopted nurse to patient ratios: Victoria (± 6.3 million inhabitants of which 4 million live in Melbourne) and Queensland (± 5 million inhabitants of which about 2 million live in Brisbane).[214, 215] Most other states use a Nursing Hours per Patient Day (NHPPD) model combining professional judgement with data measurement (cf. example in Box 10). However, they are also discussing the introduction of ratios or already partly moved into that direction.[216]

In New South Wales, for instance, the NHPPD method is used to determine staffing levels based on location categories or 'peer groups'. The NHPPD are then converted to patient-to-nurse ratios in general nursing wards of public hospitals (i.e. the ratios are calculated based on NHPPD of hospital peer groups).[215]

In Western Australia the required NHPPD are calculated based on a patient acuity system, bed occupancy and patient turnover rates to adjust actual NHPPD. This method has led to positive results in nursing sensitive patient outcomes and resulted in 3.65% more productive nursing hours and a decline of 1.8% in agency staff. The Irish model (cf. Chapter 0) is based on the Western Australian system. We refer the reader to the section on Ireland for more information.

Box 10 – Nursing Hours per Patient Day (NHPPD) method

In several Australian states an NHPPD model is used such as the Tasmanian system, here explained in short. The NHPPD method determines staffing levels based on a negotiation process that relies on clinical judgement and data to assess adequate staffing levels. The model in Tasmania consists of 7 categories with different NHPPD based on patient activity (acuity), diversity, complexity and required nursing tasks. The 'nursing hour values' over a 24h period ranging over these 7 categories range from 3 NHPPD (an ambulatory care setting such as day-surgery or renal dialysis unit) to 7.5 NHPPD (high complexity units such as high dependency units). These 'NHPPD guiding principles' detail the hours of direct care that are required for patients in a range of clinical settings. Indirect care hours (e.g. nursing ward manager) and leave allowances (152 hours of sick leave and 190 hours for annual leave) are not included. They are in a next step added to the direct care hours. Based on this method the required number of FTE per nursing ward per year is calculated.

The NHPPD has to be applied at least once a year and needs to be discussed between nursing ward managers and senior management. It is a flexible approach whereby staffing requirements can be determined through negotiation. Yet, it also uses activity and patient acuity data to determine the required number of hours. It has the disadvantage of being very time consuming and it is not clear and transparent for everyone (e.g. bedside nurses).

Nursing education in Australia evolved from a hospital-based training programme towards university college degree

Historically, nursing education in Australia was organised by hospitals as an apprenticeship style system. With the introduction of regulatory bodies for nursing in the different states also minimum standards for both the theory and clinical components of nurse training were imposed and an accreditation system of nursing schools emerged. During the 1980s the regulatory bodies gradually increased the demands on the nursing education (e.g. increase in theory components). As a result of these increasing demands it became

difficult to organise the nursing education programmes outside of the larger metropolitan centres.[217]

Since 1984 legislation exists that enables states to transfer nursing education into the tertiary education sector. The pace of adopting this legislation was different for the different states. New South Wales was the pioneer and completed the transfer towards tertiary education by 1987. It lasted until 1991 when the last state (i.e. Queensland) started the transfer from nursing education towards the university sector. The nursing associations (with the 'Australian Nursing and Midwifery Federation – ANMF' as the most prominent one) strongly supported this move.[218, 219]

Two levels: Registered and enrolled nurses

Nursing is the largest health profession in Australia. Nurses do not carry a license per se but have to register with the regulatory body when they want to practice. This registration is regulated differently per state but there are national agreements about the required competencies.[217] In Australia there are two categories of nurses regulated to practice:

- Registered nurses (RNs) and midwives require a 3-year bachelor or postgraduate degree in nursing (or the equivalent).[220]

- Enrolled nurses (ENs) hold a minimum diploma from the Vocational Education Training sector. This education lasts between 1 and 2 years and provides a theoretical base as well as supervised clinical experience. At present, 1 year courses for enrolled nurses are being phased out. ENs usually work with RNs to provide patients with basic nursing care, doing less complex procedures than RNs.[221, 222]

Since the 1990s a clear shift was observed in the skill mix towards more highly trained nurses and a decrease in the proportion of ENs.

In 2015, there were in Australia 360 008 nurses and midwives (8.9% increase since 2011): 300 524 RNs (11% increase since 2011); 32 651 registered midwives[aa] (21.2% decrease since 2011) and 59 160 ENs (0.8 decrease since 2011). In total 307 104 persons were, in 2015, employed in nursing and midwifery. As such there are about 53 000 nurses not employed: ±9 000 looking for a job; ± 15 000 on extended leave; ± 29 000 not in the nursing workforce.

About 80% of Australian nurses and midwives received their education in Australia, followed by England (5%) and India (3%).[223]

Advanced practice nursing

With the role of 'Nurse Practitioner' (NPs) a clinical career perspective exists for Australian RNs. NPs require a master's degree level and training in nursing at an advanced level. They work in an advanced and extended clinical role, and may perform some functions traditionally done by a medical practitioner (e.g. prescribing some medications, ordering diagnostic tests and making referrals when operating within approved guidelines). This remains a relatively small group within the nursing profession.[218]

Assistants in Nursing

Assistants in Nursing have had a role in Australian healthcare for many years and are a valued part of the healthcare workforce. While they played, historically, a greater role in aged care facilities with the introduction of a national qualification (HLT32507 Certificate III in Health Services Assistance) to train Assistants in Nursing in the acute care setting they are in recent years more and more employed in hospitals. This role is frequently undertaken by undergraduate nursing students.

While health assistants (in nursing) work within clearly defined parameters and under delegation and supervision of RNs, the role itself is often flexible, involving a mixture of direct patient care and other activities that support the nursing team.[224]

---

aa   Including 28 954 persons that are also RN.

The Australian nursing organisations value the role of Assistant in Nursing but stress that their introduction into nursing care teams must never be as a substitution for RNs and ENs. The decision to delegate care to an Assistant in Nursing must consider not only the context of the task, patient (e.g. few co-morbidities and stable condition) and care setting, but also their education, experience and competence.[225, 226]

Nursing workforce challenges require a wide number of policy actions

There are, already for more than two decades, reports of Australian wide shortages in many areas of nursing.[222, 227] It is expected that this problem will intensify in the near future. In 2012, Health Workforce Australia published a report with forecasts for the health workforce until 2025. For nurses, they concluded that there will be a substantial shortage based on population health trends, an ageing nursing workforce (in 2015 about 2 in 5 nurses are >50 year[223]) and poor retention rates.[228] An update of these projections in 2014, confirmed that by 2025 the demand for nurses will significantly exceed the supply. Yet the projected shortfall was lower compared to the 2012 report (85 000 nurses in short compared to 109 000). This was explained by better nurse retention rates and a lower demand in acute care. Nevertheless, it is clear that no single policy change is capable of closing the gap between the workforce demand and supply. A combination of approaches is required (e.g. retention of nursing students, improvement in employment rates of domestic trained nurses, increased early career retention, etc.).[229]

8.2 Victoria one of the first states in the world to introduce mandated patient-to-nurse ratios

8.2.1 Nursing profession in malaise after a series of budget cuts

Budget cuts resulted in a state wide crisis of the nursing workforce

In the early 1990s, there were substantial cost reductions in the Victorian healthcare system.[230] The government assessed that there was an oversupply of nurses resulting in a downsizing of the number of nursing positions with 2 000 (via buy-outs). In addition, Assistants in Nursing were introduced to replace these nursing positions and the use of agency staff increased. On top of these direct cuts, hospitals got a serious incentive for efficiency gains (e.g. by means of reductions in length of stay and/or staff) via the introduction of a DRG-based hospital payment system.[230] These cost reductions together with reports of deterioration in quality of care, and a national and state-level nursing shortage has resulted in a state-wide crisis in the nursing labour force: low staff morale, nurses resigning from the public nursing workforce.[214, 230] About 20 000 nurses were not in the labour force.[230]

Targeted actions from nursing unions brought staffing ratios to Court

The nursing associations were advocating for the ratios mainly to increase retention rates of (permanent) staff and stated that these would be cost-saving (reduction of agency staff). Yet, it did not result in mandated ratios being adopted overnight. The nursing labour crisis caused several disputes between the Victorian branch of the Australian Nursing Federation, the Victorian Hospitals Industrial Association and the Victorian state government about the staffing numbers and the safety of patient care. The nursing federation advocated for staffing ratios. Yet, they did not use full-blown industrywide strikes to support their demand. Instead they used an isolated strike tactic with isolated bed closures (e.g. closing 1 in 5 beds resulting in cancellation of elective surgery). In addition, nurses cut back on indirect care activities such as administrative work.[230] This prolonged dispute was finally brought before the Australian Industrial Relations Commission (AIRC).[214]

The arbitration is, however, not the only factor that contributed to the mandated patient-to-nurse ratios. It is the conversion of several factors that created a favourable environment for the ratios. In an environment dominated by cost control, the union actions were backed up by several stakeholders and also the media played a key role, as did the general public. In fact there was a degree of public despair over the failing health system which reached a peak by the late 1990s.[230]

8.2.2 Introduction of mandated patient-to-nurse ratios: first obligatory part of the industrial bargaining agreements now imposed via the 'Safe Patient Care Act'

Court arbitration was the basis of mandated nurse to patient ratios

The AIRC is a national tribunal that has the authority to make rulings with legal authority on issues pertaining to working conditions. Under the form of private arbitration (a commissioner meets the parties and comes to a final decision) the ratios were regulated. The union convincingly asserted that a system-wide problem of work intensification called for a system-wide solution.[230] Once the AIRC ruled in favour of the ratios, they operated (since 2000) as part of Australia's system of labour law: the 'Public Sector Enterprise Agreement'.

Safe Patient Care Bill 2015 provides a legal framework for the patient-to-nurse ratios

Despite the integration in the labour law, mandated ratios were vulnerable during 'Enterprise Agreement negotiations' especially when a new government came into force. Therefore, in 2015 the 'Safe Patient Care Bill'[231] was introduced to preserve the ratios in law and protect them during future bargaining agreements and government changes.[232] This bill highly resembled the ratios as foreseen by the 'Enterprise Agreement negotiations'.[233]

Under this Act, hospitals will have to be able to document their efforts to comply with the ratios. When the legislation is not followed a 'local dispute resolution process' can be introduced. If a local solution cannot be found, the dispute can be brought to the Industrial Division of the Magistrates Court. Hospitals are obliged to report any breaches or follow-up actions proposed by the Magistrates' Court into their Annual report. Some hospitals that have difficulties to meet the ratios can apply for a 12-month period delay in order to comply with the ratios or to propose a variation to the ratio (a legally provided possibility).[234]

In December 2018 amendments to the Bill were submitted to the Parliament to ensure that these remain fit for purpose.[235] The government committed to take supportive measures to implement these amendments once they are approved by the Parliament (see Box 12).

Public money to ensure the implementation: an earmarked budget

The government agreed to fund the nursing positions required to comply with the outcome of the arbitration proceedings. It was calculated that about 1 700 additional nursing positions (on top of the number of positions before the ratios of which many were vacant) were required to comply with the mandated ratios. Once wages and benefits were settled, the government budgeted money to pay for enough staff to fill in the ratios. Although there might not have been money set aside to staff above the ratios at least there was money to pay for the ratios. This money was earmarked for nursing solely. In 2000, $198 million was allocated to fund the ratio positions. Because this was insufficient, the government provided another $300 million in 2001. Part of the funding was for setting up re-entry programmes within the hospitals.

In addition to the ratios, a directive on agency staff was published (i.e. only to replace unexpected absence such as sickness leave) and a significant advertising campaign was undertaken by the government.[230]

8.2.3 Mandated staffing ratios for various areas: nursing ward level ratios allow flexibility

Scope

The mandated minimum staffing levels in Victoria cover a wide range of services (e.g. emergency departments, aged care facilities, neonatal care, birth suites, operating theatres). With the exception of dedicated mental health nursing wards and outpatient units such as day surgery, chemotherapy administration, renal dialysis and community nursing all types of services are covered. In the remaining of this section we focus on adult general surgery and internal medicine.

Table 22 – Mandated staffing ratios for general medical and surgical nursing wards

Shift	Level 1 hospital	Level 2 Hospital	Level 3 hospital
Morning	1:4 (+nurse in-charge)	1:4 (+nurse in-charge)	1:5 (+nurse in-charge)
Afternoon/Evening	1:4 (+nurse in-charge)	1:4 (+nurse in-charge)	1:6 (+nurse in-charge)
Night	1:8	1:8	1:10

Ratios incorporate type of shift and hospital type

The Victorian ratios incorporate the type of shift (morning, evening, night) and the level of the hospital, such as major or minor metropolitan and rural hospitals.[236] The different level of hospitals (see Box 11) result from the arbitration process of the AIRC.

Box 11 – Classification of Victorian hospitals

- Level 1 teaching and research hospitals that act as major referral points of care across the state. These hospitals are physically and geographically large.

- Level 2 hospitals: large metropolitan and country based hospitals. These are large hospitals but do not typically offer the breadth of specialized services as a level 1 hospital.

- Level 3 hospitals include small to medium metropolitan and country based hospitals.

Small country hospitals are the smallest hospitals (<30 beds) with limited operating theatre facilities.

Source: Arbitrary Commission of the AIRC).[233]

Staffing ratios: not at the patient but at the nursing ward level

Victoria introduced patient-to-nurse ratios as a minimum number at the nursing ward level and not at the patient level. On general surgery and internal medicine wards, for instance, not a maximum of 4 patients per nurse (at all times) was imposed but a 5-20 ratio[bb] was implemented. This permits that the nurse in charge has more flexibility to adjust the staffing allocation in function of the patient acuity and unit workload. It places the decision-making authority about the patient load allocation with the nursing ward manager who allocates in function of patient needs, staffing needs and skill mix.[214] For example, in a general surgical nursing ward with 8 patients, 2 nurses need to be available. It is, however, possible that 3 patients require a higher level of care and 5 patients require a lower level of care. Then one nurse may be assigned to care for the patients requiring the higher level of care and the other nurse to the 5 other patients.[214] It should also be noted that the ratios impose that no more than 20% of ENs may be used. The introduction of the ratios are a drastic change compared to the pre-

---

bb   5 nurses for 20 patients

mandatory staffing ratios situation (e.g. on night shifts on a general surgery ward a ratio of one nurse for twelve or more patients was not uncommon).[230]

Ratios apply to actual patient number at the nursing ward and not bed numbers

A ratio must be applied on the basis of the actual number of patients in each nursing ward. For example, in a nursing ward with 30 beds where only 26 beds are usually occupied the operator of the hospital must not use the other 4 beds unless additional staff are available to meet the ratio requirements (at the nursing ward level).

Rounding down/up methodology

If the number of patients in a nursing ward is not divisible into a whole number when a ratio is applied, the number of nurses must be rounded:

- If the actual number of patients in a nursing ward requires ≤50% of one additional nurse, the operator of the hospital is not required to roster an additional nurse in order to comply with the ratio. The operator may also assign a nurse to take care for patients across multiple nursing wards at night;

- If the actual or expected number of patients in a nursing ward requires >50% of one additional nurse, the operator of the hospital must roster an additional nurse.[237]

The rounding methodology remains contested (and was adjusted in the 2018 proposals). In fact some report that unit sizes are deliberately chosen to be not divisible by four to enable managers to round down.[230]

The Victorian ratios are minimum ('floor level') ratios and may be uplifted when required. As such, they may run in tandem with the use of patient classification systems. The most prominently used system in Victoria is the 'Trend Care Patient Acuity and Care Management System'[214]. Nevertheless, ratios in reality are often a 'de facto ceiling'[230] and ratios were felt inadequate after some time due to the increased intensity of nursing care. This need for recalibration of the ratios resulted in the recent introduction of amendments to the Safe Patient Care Act (see Box 12).

Box 12 – Amendments to the Safe Patient Care Bill

An advice regarding the amendments was prepared by a small Expert Taskforce (n=3) appointed by the government based on a public consultation process (with input from public sector hospitals; nurses and midwives currently employed in public hospitals; representative unions; professional colleges).

The main changes to the 2015 ACT that were included in the amendment concerned: changes to the rounding methodology (rounding up instead of down); increased ratios in areas such as palliative care, birthing suites and during peak times in emergency department resuscitation cubicles; the introduction of ratios for new domains such as acute stroke units, haematology and acute inpatient oncology units.[238]

The implementation of the amended law started from 1 March 2019 onwards. They provide an additional 600 FTE and the Department of Health and Human Services was committed to continue the promotion of the nursing profession to enhance attraction and retention rates. An implementation period of five years is envisaged to enable hospitals to slowly adapt to the new ratios. The implementation of the different parts of the act is phased in 5 different parts (e.g. in 2019 changes to 50% rule; in 2020 new ratios for palliative care, etc.).[238] The government created a 'Nursing and Midwifery Workforce Development Fund' of $50 million to support the training of more nurses: expand the existing RN programme; establish a graduate programme for ENs; postgraduate training; refreshment courses to stimulate re-entry into the profession.[239]

8.2.4 Impact of Victorian ratios: understudied

Impact on the Victorian nursing workforce

In 1999, Victoria's hospitals had approximately 1 300 nursing positions vacant. By October 2001, there were an additional 2 650 FTE nurses employed in Victoria's hospitals – with half the number filling the vacancies and the other half as additional staff to meet the ratio requirements.

By 2006 an additional 7 000 nurses had been recruited into the public system, as, according to ANMF, nurses who had been unwilling to work in understaffed nursing wards returned to practice.[237]

Since the inception of the mandated patient-to-nurse ratios staffing disputes dropped considerably.[237] The impact on patient outcomes is unclear and understudied.

8.3 Queensland: mandated patient-to-nurse ratios resembling the Victorian model

Ratio background

In Queensland there was a NHPPD-like system. However, the elimination of the legal obligation to work with a 'workload management system' caused, according to the nursing unions, an increase in unwarranted service variation. This resulted in health services not achieving the level of performance they could have if minimum staffing ratios and skill mix levels were standardized.[237] With the elections in 2015 the nursing unions called upon introducing minimum staffing ratios for a wide range of services with a specific recommendation for each of these service areas. This demand was picked up by a major political party and was included as an 'election promise' in the pre-elections campaign. Once elected, the government fulfilled its pre-election promise. Queensland Health worked together with the nursing unions to prepare safe staffing legislation. This collaboration is quite unique and is probably an important factor in the successful implementation of the patient-to-nurse ratios.[240]

Since 2016 mandated patient-to-nurse ratios for general surgical and internal medicine

From 1 July 2016, only for acute medical and surgical wards in public hospitals, mandated minimum patient-to-nurse ratios were introduced. It was decided to pilot the ratios in 27 public hospitals only. There were a number of reasons why some hospitals (and nursing wards) were not selected at this first stage of implementation such as: their lower risk and acuity levels, their use of alternative models of care, the multi-purpose

nature of nursing wards within certain facilities, etc.[240] The ratios set a minimum (the 'floor') of nurses required on the nursing wards.

The ratios will operate in conjunction with the 'Business Planning Framework' (see

Box 13). This framework is used to determine the optimum nurse staffing levels needed to safely meet the needs of the patients. The framework is underpinned by adherence to professional nursing standards and clinical judgement in determining appropriate staffing levels to meet demand.[241] The framework is the main staffing model for the other service areas as the by the nursing unions proposed mandated ratios were not adopted. There are no direct consequences of non-compliance to the prescribed ratios. However, compliance will be monitored and repeated instances of non-compliance will prompt a review at the local level through the Nursing and Midwifery Consultative Forum (NMCF).[242] Exemption to the ratios can be temporarily approved by the Minister but it will require that hospitals present an action plan to remediate the situation.[243]

The Queensland model of mandated staffing ratios resembles that of Victoria, to a certain extent

Also in Queensland the staffing ratios are applied at the level of the nursing ward. Yet, there is no classification (as in Victoria) of hospital types. In fact there are hospitals where the ratios are piloted and hospitals that were not selected.

The legislated ratios are: one nurse to four patients (1:4) for morning and afternoon shifts and one nurse to seven patients (1:7) for night shifts.[242] They are (as in Victoria) applied at the nursing ward level. This means that, for example, on a nursing ward with 28 patients, the ratio of 1:4 would require a minimum of 7 nurses on a morning and afternoon shift, and a minimum of 4 nurses on a night shift.[242] The ratios outline the minimum staffing and skills required to adequately manage patient demand. The model also foresees that higher levels of staffing or changes in skill mix may be necessary depending on changes in the internal and external clinical environment.

The application characteristics of the ratio model has many similarities with that of Victoria (but also some differences):

- the actual patients admitted in a nursing ward determine the ratios (not the beds);

- unused bed stock is only made available when additional nurses with the appropriate skills can be sourced;

- where the application of the ratio results in a number of nurses plus an additional requirement of 50% or more rounding up is required; where the application of the ratio results in a number of nurses plus an additional requirement of less than 50% rounding down is required; frontline staff that needs to be replaced for short-term absences is replaced by nurses with a similar education, competency and qualification (e.g. clinical nurse with specialized skills in cardiac surgery is replaced with a clinical nurse with specialized skills in cardiac surgery);

- only registered nurses and enrolled nurses who are directly providing patient care to one or more patients may be counted as part of the ratio. Nurse ward managers, clinical nurse educators, nurse practitioners, etc. are not included in the direct care ratios. Yet, there is no minimal percentage of RNs.

Public reporting

- The compliance with the ratios is publicly reported. The compliance with the ratios is high with 98% compliance in September 2016 and 100% compliance in September 2018 (all shifts and all nursing wards).[245]

Box 13 – The Business Planning Framework

The Business Planning Framework incorporates elements very similar to the NHPPD, to determine required nursing hours which are then used to establish a notional patient-to-nurse ratio which is displayed on the corresponding nursing ward.[237] This is the agreed staffing methodology in areas where ratios do not apply. It resembles the NHPPD approach in other states and has 7 steps:

- Calculate productive nursing hours (direct and indirect care);

- Calculate total annual productive nursing hours required to deliver service;

- Determine skill mix of the nursing hours (may be based on DRGs);

- Convert productive hours into full-time equivalents (hours divided by beds);

- Calculate non-productive hours;

- Convert FTEs into dollars;

- Allocate nursing hours to service requirements;

The framework clearly states that DRGs are not nursing sensitive and that in addition other information (qualitative) on patient acuity should be used. It also accommodates nursing activities like education, attending meetings and other in-direct nursing duties in its calculations.[244]

Evaluation: work in progress

Queensland Health has engaged independent researchers from the University of Pennsylvania and Queensland University of Technology to undertake an evaluation study on the impact the ratios implementation is having on patient and nurse outcomes. The results of this study will be used to inform the future roll out of ratios in Queensland (in particular for mental health services where a trial of ratios implementation has been conducted in two units). A first release of the results (ICN conference – Singapore 30/06/2019) shows a positive impact. The average medical/surgical nurse saw a workload reduction of 1 to 2 patients during day shifts and 1 to 3 patients during night shifts. In addition, it was shown that reductions of 1 patient per nurse were associated with better results (lower odds of in-hospital mortality, readmissions within 7 days after discharge, reduced length of stay and lower risk on burnout).[246, 247]

An important element of the Queensland ratios is, thus, that this evaluation research was built in and budgeted for prospectively. While in other jurisdictions (e.g. California) research is commissioned to determine the impact of the ratios or safe staffing policies (e.g. England) via retrospective research, in Queensland a prospective evaluation (collection of baseline data – policy implementation – comparison of data collected after implementation with baseline data) was scheduled. Such an evaluation does not exist for Victoria.

Nursing Unions claim to expand the ratios

A new campaign is set up by the nursing unions to achieve an expansion of the claims. They want to expand the mandated ratios to services (e.g. inpatient mental health; paediatric intensive care; outpatient care; rehabilitation wards; maternity services) as well as to private and aged care facilities (at least one registered nurse to be present at all times, on all shifts, in all Queensland residential aged care facilities). In addition they want to refine and expand the application of the existing ratios such as:

- obligation to round up instead of down;

- always exclude team leaders from the ratios;

- clear parameters that define if nursing wards have to comply with the mandated ratios;

- a legally defined framework for publicly reporting ratios compliance and quality outcomes;

- correct application of the Business Planning Framework such that ratios are uplifted when patient care requires it. Nowadays, ratios are inappropriately set as the maximum staffing level instead of the minimum.[248]

8.4   Key learning points

- There are two regulated levels, RNs and ENs, with a difference in autonomy and scope of practice. Assistants in Nursing, historically only used in aged care facilities, also support nurses in direct care in acute care facilities.

- Nursing education (RNs) in Australia moved from hospital-based training programmes towards university college degrees. Enrolled nurses are educated at the vocational level (1-2 years of training).

- As in other Western countries the changing demographics of the population together with an aging nursing workforce and cost containment efforts in healthcare resulted in challenges for the nursing workforce: reports of shortages, poor work environments, low staff morale, excessive use of agency staff, increased intensity of nursing care and problems with quality of care.

- In two states mandated patient-to-nurse ratios were implemented as (part of) the policy response to these problems. Victoria was a pioneer (also worldwide) with mandated patient-to-nurse ratios already implemented (for a wide range of services) since 2000. Queensland implemented patient-to-nurse ratios since 2016 on adult general surgical and internal medicine nursing wards only (in a selection of 27 public hospitals that serve as pilot sites).

- In Victoria, the ratios are different depending on hospital type (e.g. teaching hospital versus local hospital) and type of shift (morning, evening, night). In this way the ratios already take into account differences in patient acuity.

- Although there are differences, the patient-to-nurse ratio models in both states have very similar characteristics:

  o The ratios are defined at the nursing ward level instead of at the patient level. This allows flexibility and gives the nurse managers the autonomy to assign staff in function of patient needs and staff experience.

  o The ratios are defined in relation to the number of patients actually present on the nursing ward and not to the number of beds. If otherwise not occupied beds are used, additional staff is required in order to comply with the ratios.

  o When the number of patients is not divisible by the mandated ratio a rounding methodology is used. If the actual number of patients in a nursing ward requires ≤50% of one additional nurse, it is possible to round down. This rule is contested in both states.

  o Only direct care nurses (not the nurse in charge) are included in the ratios.

  o In theory the mandated staffing ratios are specifying the minimum staffing levels that need to be upscaled based on patient acuity measurement ('floor level'). In practice, the ratios are applied as a maximum staffing levels ('ceiling level').

  o An additional and earmarked budget was made available to hospitals to comply with the ratios. In addition a substantial advertising campaign was set up by the public authorities together with other policy measures that aimed to improve attrition and retention of nurses (e.g. re-entry programmes).

- A strong lobby and prolonged campaign (e.g. selective bed closures in Victoria) from the nursing unions backed up with evidence about a relationship between nurse staffing levels and patient/nurse

outcomes did put mandated patient-to-nurse ratios on the political agenda. In both states the campaigns of the unions are continued with the aim to expand (in Queensland: to other service areas) and refine (e.g. rounding up instead of down) the application rules.

- In Victoria the mandated staffing ratios were first integrated in labour law after a dispute (between nursing unions and hospital associations) that was arbitrated by the Industrial Relations Commission Court. The elections and appointment of a new government were pivotal in Queensland to start with mandated ratios and in Victoria to further embed them legally (i.e. via the Safe Patient Care Act).

- In Queensland the compliance with the ratios is transparent and public via a public reporting system.

- The impact of the introduction of the ratios on patient and nurse outcomes is largely understudied in Victoria. It remains limited to narratives and local research evaluations. Nevertheless, the numbers about a positive impact on re-entry in the profession and about increased attraction and retention rates are not rebuttable.

- In Queensland the introduction of the ratios is accompanied with a research programme to evaluate effects on nurse and patient outcomes. The results of this research are not yet available.

9   IRELAND

9.1   Contextual information Ireland

Nursing education in Ireland: from a hospital-based certificate level to a Bachelor's level education in two decades

The nursing education system in Ireland underwent major changes during the past two decades. Until 1994, nurses were educated at the apprenticeship level[cc] and obtained a certificate after a total of 3 years including 40 weeks of theory and 98 weeks of clinical practice.[250] Between 1994 and 1998, nursing education was reformed towards the diploma level with an increase in the amount of theory to 58-64 weeks.[250] This programme was organised in all 36 nursing schools which had an affiliation with 14 third-level institutions (i.e. universities and institutes of technology). In 2002, the nursing education (general, psychiatric, intellectual disability) was again reformed towards a four-year undergraduate degree programme (Bachelor-degree level) with full integration into the third-level sector. In 2006, midwifery and the integrated children and general nursing programme underwent a similar reform.[251] The nursing education is now organised by 13 higher education institutions (i.e. universities and institutes of technology) in partnership with hospitals and other healthcare agencies. Ireland has thus reformed the nursing education programme from traditional 'hospital-based' schools of nursing towards a system of universal preparation of nurses within higher education structures.[252, 253] In addition to these pre-registration education programmes, nurses can also obtain a master's and doctoral degree after their basic education.[253]

Nursing careers

Graduating nurses can start to work as a staff nurse in hospitals. There exist career opportunities in management (clinical nurse managers: level I ('junior' nursing ward manager), level II (nursing ward manager, ward sister) and level III (manager of clinical area such as surgery; Assistant to the Nurse Director; nursing director or CNO) and in clinical practice (Clinical Nurse Specialist and Advanced Nurse Practitioner posts). These advanced careers in clinical practice require specialised and advanced diploma and master degrees.[254] The implementation of specialised roles in nursing is accompanied by legislation (e.g. prescription authority for nurses since 2006) and is growing fast in numbers.[255] Approximately 0.2% of the nursing workforce are currently at ANP level but a target of 2% of the nursing workforce to be ANPs has been set.[256]

Austerity measures between 2008 and 2013 had a major impact on the nursing workforce

The nursing profession is the single largest profession employed by Irish public health service.[257] Staff nurses represent the largest proportion of the nursing grades at 67%, followed by 20% for nurse managers and just over 4% for specialised nurses.[257] The economic crisis in 2008 resulted in severe overall austerity measures in Ireland, including substantial reductions in nursing staff obtained by an early retirement scheme, an embargo on the recruitment of new staff and a reduction in educational places. In addition, austerity measures included also salary cuts (on average 7% decrease in nurses salaries), increased working hours and a drastic restructuring of hospital services.[258] As a consequence, the nursing workforce employed by the public health services reduced between 2008 and 2013 from nearly 38 000 to just under 34 000 FTE (a reduction of 13%).[258] Due to the early retirement scheme there was also a significant loss of experience and expertise as senior nurses were incentivised to retire early.[258] In addition, newly graduated nurses found it difficult to source jobs and many of them

---

[cc]   Apprenticeship is a programme of structured education and training which formally combines and alternates learning in the work place with learning in an education or training centre.[249]

(about 30-40%) left the country.[258] This happened despite an increase in the population. The remaining workforce was thus forced to do more with less people, a situation that inevitably resulted in an increased workload and decreased working conditions.[258] The austerity measures had also a large impact on the employment of overseas nurses. While between 2000 and 2010 there were almost as many nurses recruited internationally (10 000 non-EU nurses especially from India and the Philippines; 3 500 EU nurses) as trained locally, this drastically changed due to the economic recession.[258, 259]

Since 2014 these reductions in staff recruitment came to an end and started to slowly expand again. In 2017, about 36 000 nurses were employed in public health services. This trend seems to continue with about 37 000 nurses employed by public health services in June 2018 and about 38 000 employed in 2019.[255, 260, 261]

Healthcare assistants and supporting staff

In Ireland healthcare assistants were introduced to assist nursing/midwifery staff in the delivery of patient care under the direction and supervision of the clinical nurse manager and staff nurses. Healthcare assistants are due to follow an 8-month training course with a mix of theory and practice. This mix of theory and practice is not standardized.

Initially, the implementation of these healthcare assistants lacked standardization.[262] Yet, over the last decades efforts were undertaken to have general clear learning objectives for the training course and a job description (introduced in 2006) for practice.[263, 264] However, their role and function remain debated and a national review of the healthcare assistants' role has been undertaken.[265] Based on a literature review,[266] stakeholder consultation and an analysis of their current practice several recommendations were made to further clarify their role and job description.[267]

9.2 Development of an Irish framework for safe staffing

Safety problems and the importance of nurses in delivering safe patient care triggered the policy

With the objective of setting up a safe staffing policy in Ireland a 'Taskforce on staffing and skill mix for nursing' was established by the Minister of Health in July 2014. This taskforce was established in an era when national and international patient safety issues in hospitals started to be part of the public debate,[268, 269] when the results of the Irish branch, a large study[270] on nurse staffing and patient outcomes was published and when the body of evidence about the association between staffing and patient outcomes increased exponentially (including evidence from Ireland via the RN4CAST study)[268, 269]. Furthermore, as described above (see section 9.1) the economic crisis has had a major impact on the nursing workforce. At a moment that the economy started to improve, the initiative for this safe staffing policy was taken.

Scope: medical and surgical nursing wards in acute hospitals

The taskforce was chaired by the Chief Nursing Officer of the Department of Health and had as main task to develop a framework to determine the staffing and skill mix requirements for the nursing workforce. The scope of this framework was initially limited to medical and surgical care settings in adult general hospitals and has recently been expanded to emergency settings.[271] The framework is described in detail below.[272]

Purpose: implementation of a national systemic approach to determine nurse staffing and skill mix

A lack of experience in systematic nurse staffing allocation approaches (e.g. lack of nationally agreed or endorsed decision support tools) was observed. Nurse staffing levels in Irish hospitals are largely historically determined and/or based on professional judgement rather than being based on the patients' (e.g. patient acuity, dependency) or nursing staff profiles (e.g. expertise, qualification). The main purpose why the framework was developed, is to support the positive impact of safe nurse staffing on patient outcomes by the implementation of a national systemic approach.[272]

Evidence-informed process with a strong stakeholder engagement concluded that there is no 'one size fits all' approach

During the development of the framework an evidence-informed policy approach was used together with a broad engagement of national stakeholders (e.g. web surveys to obtain views of nurse managers, front line nurses, academics, etc.) and consultation of international experts. It was concluded that there exists no 'one size fits all' approach to determine safe staffing levels. Determining staffing levels requires a dynamic equation whereby the estimation will vary across and within organisations depending on the changing dynamics of patients, nursing roles and profiles and the environment. Although objective data about all of these factors are important, they will always have to be complemented by professional judgement.[272] The key-components of the framework (see for more detail section 9.3) are to adjust staffing levels in order that:

- The Clinical Nurse Manager has no patient caseload (and can spend time on supervisory tasks).

- 80% of the nursing staff is provided by RNs.

- The required Nursing Hours per Patient Day (NHPPD) are estimated based on patient acuity, bed occupancy and patient turnover rates. Based on these estimates the actual NHPPD are adjusted.[53]

- The approach is largely inspired by the staffing approach that was employed in Western Australia.[273] The implementation of this approach in Western Australia resulted in a 3.65% increase in productive hours (nursing hours excluding annual leave, sick leave, etc.) of permanent nurses and a decrease of 1.8% in the use of agency nurses. What's more, it was observed in a pre-post evaluation that nursing sensitive patient outcomes improved.[273]

The first draft of the Irish framework was tested in the field by means of three pilot projects (see section 9.4). The findings of this evaluation, together with a second round of stakeholder consultations, resulted in a final report with a framework for safe staffing and recommendations.[272] A strong leadership involvement from the Department of Health and a stakeholder approach involving the Health Service Executive, nursing representative bodies,

researchers and academics and international experts contributed to the successful finalization of the framework.

9.3   Key components of the Irish safe staffing framework

9.3.1   *Acuity based NHPPD: an important measure to guide staffing decisions*

Nursing Hours per Patient Day (NHPPD) based on acuity

A key component of the safe staffing policy framework is the use of Nursing Hours per Patient Day (NHPPD) based on acuity and dependency levels of patients. This is based on the assumption that patients are unique and have different care needs. To capture this variability, it is recommended to systematically and consistently monitor patient acuity levels in order to support staffing decisions. Therefore, the framework foresees that validated patient classification systems are used to measure patient dependency and patient acuity at the ward level.

The systematic use of patient acuity systems

Various patient classification systems exist to measure acuity. They generally categorize patients in a manageable number of groups (e.g. four groups: low-medium-high-very high patient acuity) and calibrate these groups in function of the nursing time required.

The framework does not impose a particular patient classification system. Nevertheless, it seems indicated that harmonization between hospitals is preferred. After all, it is not only recommended to analyse these data to study predictable changing patterns in the demand of nursing care over the spectrum of a week, month or year but, these data can be also used to study trends (e.g. increasing patient acuity) and to benchmark patient acuity within and across hospitals. In addition, these patient classification systems can preferably be linked to DRGs to enable the development of nursing intensity weights to be used in the cost allocation system of DRGs. It is proposed to do a daily measurement including all patients for one month, at least two

times a year. This frequency can be increased, especially in case of changes (e.g. service redesign).

Currently, the Australian 'Trendcare' patient classification system (http://trendcare.com.au) is adopted during the implementation of the framework.[53]

Occupancy rates and professional judgement

These tools, together with patient turnover and occupancy rates, will have to be used in combination with professional judgement. In addition, it is suggested to identify the nursing wards' core specialities with the idea to monitor non-core speciality admissions. If these non-core admissions are too high, this can impact on the patient's safety as the required competencies may not be available within the nursing team.

Staffing levels: based on required NHPPD and Clinical Nurse Managers are supernumerary

Although there is clear evidence about a relationship between nurse staffing levels (numbers) and patient outcomes, the evidence does not allow to set a 'one size fits all' threshold. What's more, as bed occupancy rates in Ireland are extremely high (95-100%),[274] patients are (in case of capacity problems) admitted on wards of another medical specialty than for which they were admitted. As such and given the high variability in patient acuity it is difficult to specify ratios for particular ward types. Therefore, no mandated patient-to-nurse ratios were implemented in Ireland.[275]

Nevertheless, evidence suggests that an 'unsafe staffing zone' exits when one nurse is taking care of more than eight patients. It is of critical importance to understand that an 'unsafe staffing zone' is not the same as a 'safe nurse staffing level'. It is called 'tipping point' within the report: 'a staffing point at which there is known increased likelihood of care becoming unsafe'. To determine safe staffing levels, local data (e.g. skill mix, organisational environment, ward climate, missed nursing care) have to be used. Key within this data approach is to calculate the required NHPPD based on patient acuity and adjust the actual NHPPD accordingly (also using patient turnover, occupancy rates and professional judgement). Within

the calculation of NHPPD, the CNM II role is not included because CNM II's need to be able to spend time on their supervisory and leadership role. As such no patient caseload can be assigned to them. Some general guidance about this data approach (to be used together with the local data and professional judgement) can be found in

Table 23.

Skill mix threshold: at least 80% of nursing staff are RNs

Based on the evidence review carried out during the development of the framework it is assumed that next to the number of nurses also the skill mix of the care team (average grade mix of nurses to healthcare assistants) influences patient safety.[272] Based on an analysis of the Irish situation, the available evidence and the international benchmarks, it was decided to recommend a grade mix of at least 80% registered nurses (and thus a maximum of 20% healthcare assistants). This decision was taken because the healthcare assistants' educational path and role in practice are less developed and standardised than in other countries.

Table 23 – General guidance about NHPPD-levels for different types of nursing wards

NHPPD	Category	Clinical setting description
≥6	A	Very High Complexity Very high dependency and acuity level. Very high intervention level (e.g. acute post-operative neurosurgical unit in a surgical ward) – Model 4 hospital setting
5.5-5.9	B	High Complexity High intervention level Special Unit/Ward (e.g. high observation unit) – Model 4 hospital setting
5-5.4	C	Moderate-High complexity care Moderate – High intervention level acute ward. Increasing complex medical/surgical care (e.g. post complex urological surgery) – Typically Model 4 hospital setting
4.5-4.9	D	Moderate Complexity Care Moderate intervention level acute ward (e.g. general respiratory, gynaecological surgery, elective and emergency admission) – Typically Model 3 hospital setting
4-4.4	E	Low – Moderate Complexity of care Sub-acute Ward/unit; general medical/ surgical/rehabilitation ward – Typically Model 2 hospital setting

Example of how the Irish safe staffing framework might be applied in practice

An example (see Table 24) illustrates how this framework can be used in practice. Nursing Hours per Patient Day (NHPPD) is the estimation of how many hours of direct nursing care staff is required. This estimation is based on patient acuity measurement (in this case 'TrendCare') which, in the example given, classifies patient days in 4 categories: 44% low-care and

56% in medium- care while 0% of the patients were classified as having a high or very high acuity level. This nursing ward is part of a Model 3 hospital, has 31 beds (98% occupancy rate) and can be described as a 'Moderate complexity general nursing ward'. Together with the guidance (Table 23), the professional judgement of the nurse managers, and the acuity levels, the required NHPPD to deliver safe nursing care was estimated to be 4.9[dd]. In addition, it was estimated that the indirect hours for nursing staff for this nursing ward was 5.6 hours per day.

Table 24 – Example of the calculation of safe nurse staffing establishment at ward level

Variables	Examples
Measurement actual situation	
Ward descriptor	Moderate complexity, general medical ward in a Model 3 hospital
NHPPD	The required NHPPD was calculated to be 4.9
Acuity & dependency	Categories: low (44%); medium (56%); high (0%); very high (0%)
Number of Beds	31
Bed occupancy	98%
Nurse staffing	Current nurse staffing establishment is: CNM2=1; CNM1=1; RN=16; HCA=14 Total FTE=32
Indirect Hours	5.6
Required staffing	
Calculate average hours per day	4.9 NHPPD*30.3 (98% occupancy) + 5.6 indirect hours= 154.07 hours per day
Calculate hours per year	154.07*365=56 235.5 hours per year
Calculate FTE	56 235.5/2028 (52 weeks * 39 hours)= 27.7 FTE
Calculate absence FTE	27.7/100*22 (22% absence rate)=6.1 FTE
Calculate total FTE	27.7+6.1=33.8 FTE 33.8 FTE + 1 (Clinical Nurse Manager level 2: 100% supervision role) Total recommended FTE: 34.8
Interpretation of the recommended FTE	
	In the above example the recommended FTE under the safe staffing policy framework is 34.8. This includes 1 FTE to safeguard the supervision role of the CNM2 and an increase of 1.8 FTE. If the 80%/20% grade-mix rule is applied there will be a maximum of 7 HCA. This implies that 7 HCAs are replaced by RNs.

[dd]   The 4.9 NHPPD largely depends on the patient classification system that is used. In this case, the Australian TrendCare system is used. In practice this model is widely accepted and there is little opposition on how this is calibrated.[275]

As such, the daily required number of nursing staff hours for direct nursing care for this nursing ward was calculated to be 154.07 hours ((4.9 NHPPD *30 patient days) + 5.6 indirect hours). This is the equivalent of 56 235.5 nursing staff hours (or 27.7 FTE) available for direct care per year. Based on the measurement of absence rates (i.e. 22% for this nursing ward), the available nursing staff has to be increased with 6.1 FTE. To increase the supervisory role of clinical nurse managers, they were no longer counted as being available for direct nursing care. As a consequence, the total required nursing staff for this nursing ward was 34.8 FTE. Since the actual available nursing staff was only 32 FTE, the nurse staffing level had to be increased with 2.8 FTE. In addition, healthcare assistants had to be substituted by nurses (27.8/34.8 FTE instead of 18/32 FTE) to meet the 80%/20% qualification threshold.

To ensure prompt staff replacement an effective management of recruitment including active monitoring of staff turnover, recruitment times, management of planned and unplanned absences, a close collaboration between the CNO (Chief Nursing officer) and the HR department, etc. is essential.

9.3.2   Safe staffing depends on the broader context

Organisational factors have an impact on how nurse staffing affects patient outcomes

The assumption that the nursing work environment (ward leadership, model of care, organisational culture) has an influence on how staffing affects patient care outcomes led to several suggestions and recommendations. To allow strong ward leadership, it is recommended that organisations invest by safeguarding the full clinical nurse managers (level 2) role for supervision and leadership. In addition, it is suggested to adopt processes and models of care which have a demonstrated impact on safe care (e.g. productive ward series: a ward based quality improvement project that streamlines work processes). These elements (ward size and layout; leadership and other organisational factors) should also be monitored and taken into account when making staffing decisions.

Monitoring patient and staff outcomes is important to get insights in safety and quality of nursing care

Nurse staffing and skill mix have a direct impact on nurse and patient outcomes, and should therefore be monitored. The framework suggests to monitor staff and patient experiences, fall incidences and pressure ulcers at the ward, the hospital and the hospital group level. It is also recommended that 'safety CLUEs (Care Left Undone Events)' are monitored on a shift by shift basis by the Clinical Nurse Manager. Examples of safety CLUEs are: inability to carry out vital observations set out by the National Early Warning Score; inability to provide adequate patient surveillance in cases such as post-operative disoriented patients; missed meal breaks by staff; delay or unplanned omission of activities such as medication administration, repositioning of the patient and completing patient records.[272]

9.3.3   Macro-level factors

Macro-level factors are outside the immediate control of those responsible for staffing but do have an effect. They are summarized via the acronym PESTLE:

- Political: government policy, health service reform and design;
- Economic: funding, economic situation and health budget;
- Sociocultural: demographics, education & lifestyle, public expectations;
- Technological: emerging technologies;
- Legal: professional and health regulation, employment law;
- Environmental.[272]

9.3.4 Nursing workforce governance

The workforce governance requires a systematic approach, regularly reviewed and based on ward to Board accountability as well as on collaborative decision making (Clinical & Managerial) and a combination of a triangulation of information and professional judgement.[272] The group and hospital directors of nursing, as part of the management team, needs to be able to determine, control and influence the size and utilisation of the nursing budget.

At least twice a year, the Clinical Nurse Manager together with senior management determines, recommends and monitors the total staff requirements of the nursing ward (see NHPPD). In addition, the Clinical Nurse Manager monitors on a daily basis the safety CLUEs. CNOs will use organisational, patient and workforce data along with input from their clinical nurse managers to discuss staffing with the senior hospital management. The CNO will make recommendations (including the budgetary impact) about changes that are needed to deliver safe patient care. Hospital board should have a standing item on their agenda about workforce management and should ensure the regular discussion at the senior level. Each hospital should have a mechanism (e.g. during quality and safety walk arounds) to communicate the outcome of the workforce discussion to ensure the board to ward accountability loop.

9.3.5 Accountability measures

As the safe staffing framework is not yet implemented on a national level, the accountability measures such as 'penalization', 'licensing' or 'public reporting' are not yet put into place. Accountability in the Irish safe staffing policy has to be situated at the level of the hospital (or hospital groups) where staffing decisions are moving from historically and pragmatic based numbers towards evidence-informed staffing decisions. Making this process

explicit and transparent in combination with a strong mandate for nurse managers adds to the board's staffing accountability.

9.3.6 Accompanying measures

As described above, the economic crisis resulted in policy measures (e.g. reduction in education places in nursing schools; the employment embargo, non-replacement of nurses on maternity leave and the non-facilitation of nurses seeking more flexible working arrangements) which negatively impacted the nursing work environment. While during recent years efforts have been taken to revert the negative impact of these measures it is unclear whether policy measures (e.g. a pact that there will be no further salary cuts over the next 4 years; additional leave days) are making much impact. Safe staffing remains a complex issue in Ireland. In 2019, the Irish Nurses and Midwives Organisation undertook industrial action following a dispute over staffing and pay-levels within the health sector. This was only the second strike of nurses. It highlights the sensitivity of the subject. Nurses ask for improvements in staffing, recruitment and pay[ee].[276] A new agreement is on the table including better starting salaries for nurses, investment in the safe staffing policy and an increase of ANP roles.[277] There are no plans to incorporate safe staffing guidelines into legislation.[271]

9.4 Impact of the policy

After the publication of the first draft of the framework, a pilot was set up to evaluate its impact on nurse-sensitive patient outcomes, staffing outcomes and organisational factors. The framework was implemented in three hospitals of varying size and included six pilot wards.

Nurse staffing variables changed

The measurement of required (based on patient acuity) versus actual NHPPD, together with other related factors, resulted in shifts in staffing levels. A total investment of 21.2 FTE (€ 160 000 per ward per year) was

---

[ee]   Pay-levels for starting nurses, for instance, are lower compared to other health professionals of a similar educational level.

made in the six pilot wards (of which two wards did not receive additional FTE). In those wards, where (at time 1) the available FTEs were lower than the required FTEs, an increase in the number of FTEs was observed (at time 2). In most wards ward managers could undertake 100% of their role as supervisory. In addition, an uplift in the skill mix was observed which corresponded with the 80%/20% objective defined in the framework. The absence rates dropped during the implementation of the pilots. The introduction of new staff (because of the uplift of FTE) was associated initially with an increase in the time nurses 'supervised' (new) staff and was not immediately seen on direct patient care.

The most consistent and substantial change that was observed in the pilot wards was the reduction (30-100%) in the use of agency staff. Even in wards where there was no uplift of the number of FTEs, the use of agency staff dropped; it is of note that these wards did implement the recommendations in the framework. The introduction of the framework clearly resulted in a stabilization of the nursing teams. The costs of uplifting the number of FTE was initially only partly compensated by the reduction of the use of agency staff.[278] Yet, as the pilot continued and the reduction in the use of agency staff sustained, the cost of investment was entirely compensated by the savings made due to the stabilization of the nursing teams. There was a return of € 2 900 per month or € 34 000 per year.[272]

Although the data set is small, the observed changes in patient outcomes are promising

Improvements were observed in nurse-sensitive patient outcomes. Yet, due to the small sample size and the short timeframe used during the pilots, these changes should be interpreted with caution.[279]

Also the patients that were surveyed in the pilots rated overall care positive and would recommend the hospital to family and friends. The levels of communication, nurse responsiveness and pain management were rated high. This was observed at the start and at the end of the pilot.[278]

The nursing work environment and nursing care conditions improved

An improvement in the nursing work environment could be observed in the pilot wards. Especially in wards with the greatest uplift, there was a substantial improvement in all areas of nursing work, including an improvement in respondents' perceptions that wards were adequately staffed. Staff also rated the perceived quality of care better than before the introduction of the framework.

The proportion of care left undone, which is an important mediating factor in the staffing – outcomes relationship, reduced from 76% to 32%. Yet, a similar decline in delayed care could not be observed. Also the levels of job satisfaction and the proportion of nurses that reported an intention to leave remained relatively similar.[272] [279]

Investment cost for nationwide implementation

In the final report it was concluded that the investment in a nationwide implementation of the framework could for the most part be resourced by efficiencies that would be realized (e.g. reduction in agency staff use, improvement in patient outcomes). Yet, this conclusion is based on the small-scale pilot evaluation.[272] As such this statement has to be treated with caution and should be closely monitored when implementing the framework. The evaluation of a further 13 pilot wards will give additional insights. These 13 new nursing wards require 57 additional FTE of which the Department of Health directly funds 21.5 FTE and 35.5 FTE were identified through agency conversion. In other words an average direct investment of 1.65 FTE is expected to yield 2.7 FTE due to agency conversion.[272] The report states that it is required to move away from a traditional funding model towards an 'invest to save' model. This requires an initial upfront investment through the operation of a seed fund. When efficiencies are generated they should be used to reinvest in the nursing resources as required within a hospital group. This will extend the life of the investment fund.

Implementation expanded

The implementation is currently being further expanded with pilot projects being evaluated (2018-2020) in three hospitals where the framework is implemented on 16 wards while between 16 to 19 wards in these three hospitals will continue with the current staffing allocation model. The results of the evaluation will determine the further roll out of the framework on a national level.[53]

9.5 Key learning points

- The nursing profession in Ireland changed substantially during the last decades. It moved from a hospital-based certificate programme to a Bachelor-level programme. The number of nurses employed in hospitals was on the rise in times of economic prosperity. The economic crisis (2008) had a major impact on nursing (e.g. salary cuts, early retirement and loss of expertise, a decrease in nursing education places) with an impact on the nursing work environment.

- Since 2014, these austerity measures came to an end but the impact is still there.

- With a comprehensive 'safe staffing policy framework' the authorities aim to introduce evidence-informed staffing in Irish hospitals to ensure safe patient care.

- Key in the framework is the estimation of the required Nursing Hours per Patient Day (NHPPD) for a nursing ward to enable the delivery of safe patient care. This estimation has to be based on the measurements (at least one month of data, twice a year) of patient acuity levels. These data will have to be complemented with bed occupancy rate data and professional judgement.

- Also the measurement and monitoring of other factors in the nursing work environment (e.g. leadership) as well as care left undone and nurse-sensitive patient outcomes are important indicators to inform safe staffing policies.

- The framework is not yet implemented nationally but the first pilot tests demonstrated its potential since a positive impact on several factors was found (e.g. decreased missed care, staff perception). Although it requires, in general, initial investments in additional staffing, there are indications that, after a while, there is a return on investments (especially via a major reduction in the use of agency staff). These findings are of course very specific to the Irish context where there is a high historical use of agency staff.

10 UNITED STATES WITH A FOCUS ON CALIFORNIA

10.1 Contextual information USA

10.1.1 Number of nurses in the USA

In the USA, it is estimated that nearly 13.1 million people are employed in health care. The registered nurses (RNs) represent the largest healthcare occupation and are the core of the nursing profession. In 2001, there were 2 217 990 RNs employed in the USA and this number increased steadily towards 2 906 840 in 2017.[280, 281] Licensed practical nurses (LPNs) and licensed vocational nurses (LVNs), were estimated to be with 724 500 in 2016 (LPNs and LVNs indicate the same professional level; the latter term is used in California who provide basic nursing care and work under the direction of RNs and doctors).[282] Nurses are supported by nursing aides or nursing assistants, who help to provide basic care for patients in hospitals and residents of long-term care facilities. Their number was estimated at 1 564 300 in 2016 (twice as much as the LPNs/LVNs).[283] Not only the scope of practice and responsibility differs between RNs, LPNs/LVNs and nursing aides, also their salaries vary: i.e. around. $70 000/year, $45 030/year and $27 510/year respectively (depending on state of employment, organisation of employment, etc.).[281-283]

The Bureau of Labour Statistics projected that the employment of RNs, LPNs/LVNs and nursing aides will grow with respectively 15%, 12% and 11%, for the period 2016-2026.[281-283]

Depending on the source, the number of RNs in California ranges from 282 290 RNs to 330 000 RNs (data for 2017).[281] In addition, an additional 65 250 LVNs are employed in California (data for 2015).[284] In the state of Massachusetts, their number is estimated at 130 048 RNs and 21 028 LPNs.[285]

10.1.2 Professional levels and education in nursing in the USA

How to become a RN? Three main educational pathways and a state licensure examination

To become a RN, one first needs to earn a professional nursing degree which can be obtained through three main educational pathways, i.e. through a hospital-based diploma programme, through an Associate Degree in Nursing (ADN), or through a Bachelor degree of Science in Nursing (BSN). We briefly describe these educational paths below. Thereafter, one should apply, register and pass the 'National Council Licensure Examination for RN' (NCLEX-RN) exam in the state of employment, also known as 'the boards', which provides the licensure.

- Diploma

A diploma in nursing was common prior to the 1970s and is now rare. Today, there are less than 100 programmes (especially located in New Jersey and Pennsylvania). If people want to start a career in nursing (and earn money in the meantime), this entry level, consisting of a 2 to 3 year hospital-based training programme, still allows 'learning through experience'. Although the graduates do not receive a college degree, the majority of diploma in nursing programmes are college or university affiliated. This implies that college credits are granted for certain courses (and it is also possible to apply for achieving advanced degrees). The diploma programme curriculum is similar to the ADN with the more clinical hours for the diploma level as main difference.

- Associate Degree in Nursing (ADN)

Another and the most common entrance path in nursing is a higher level of education with the ADN, offered by community colleges and trade schools. There is often a waiting list to get in. If you are already a LPN/LVN, you can become an ADN in one year time, otherwise it will take up to two years of education at an accredited college. The ADN degree offers the possibility to become a RN after passing the NCLEX-RN. With an ADN, the set of responsibilities differs from an LPN/LVN, with duties such as observe and

report on the wellbeing of patients, operate medical equipment, come up with treatment plans for patients' care, etc.

- Bachelor degree of Science in Nursing (BSN)

Since many RNs with ADNs return for a BSN to a university, special RN-to-BSN programmes have been designed by most schools of nursing. This makes it possible to obtain the BSN in 2-years' time. Accelerated programmes also exist to allow a college graduate in another field to complete their BSN in 12 to 18 months. Another bridging programme allows the candidate to earn the BSN and Master of Science in Nursing (MSN) degree simultaneously. Yet another, although very expensive and therefore less likely to be taken, pathway to become a RN is through obtaining the 4-year BSN degree (without previous education) before passing the NCLEX-RN. A BSN is required for administrative positions and provides more clinical experience in nonhospital settings (more training in areas such as communication, leadership and critical thinking).

In 2011 the Institution of Medicine (IOM) recommended in a position paper on 'The Future of Nursing' that by 2020 at least 80% of future nurses obtain a BSN.[286] This recommendation is also supported by the American Nurse Association (ANA).[287]

Specific qualifications, post-graduate certifications and advanced degrees for RNs

In addition to the basic educational levels RNs may specialize themselves as an Advanced Practice RN (APRN) i.e. a nurse practitioner (NP), a nurse anaesthetist, a nurse midwife or a clinical nurse specialist. They can obtain a MSN at university and/or achieve a doctoral degree (PhD or Doctorate in Nurse Practice (DNP)). Moreover, to demonstrate expertise in a specific area, RNs may choose, or their job may require them, to be credentialed in ambulatory care, gerontology, informatics, paediatrics, etc. through the American Nursing Credentialing Center, the National League for Nursing or other agencies. Also, RNs can enter a Physician Assistant (PA) programme that takes at least 2 years and combines classroom instruction with clinical experience, offered at community colleges, academic medical centres, medical schools and colleges. Upon completion of an accredited PA

programme the graduate is eligible to obtain the 'Physician Assistant National Certifying Examination'.

Nursing aides and LPNs/LVNs: supporting roles for RNs

Roles, considered as 'supporting roles of RNs' are the 'licensed practical nurses' (LPNs) or 'licensed vocational nurses' (LVNs) (different names are given to the same profession across the states) and the role of 'nursing aides'. We briefly describe these nursing roles and their educational level in the section below.

- LPN/LVN program

The LPN/LVN programme is a fast track program of one year. When finishing the programme, the participant is eligible for license after passing the state administered nursing exam i.e. the 'National Council Licensure Examination for Practical Nurses' (NCLEX-PN). LVNs/LPNs provide basic bedside care under the direction of physicians and RNs. They give support in clinical care by performing the more technical aspects such as taking patients' vital signs, giving injections, drawing blood, monitoring intravenous lines, inserting and monitoring urinary catheters, dressing wounds, administering medication, etc. They may assist patients with their activities of daily living. LPNs can become an RN when obtaining the acquired educational degree, mostly an ADN since that can be obtained in one year and after passing the NCLEX-RN.

- Nurse aide / certified nursing assistant

Becoming a 'nurse aide' or 'certified nursing assistant' does not require a college degree, but they typically complete a 6 to 12 week state-approved nurse's aide training programme, provided by vocational-technical schools, nursing care institutions or community colleges, followed by a certification exam (requirements are opposed and differ by state). Training courses for aspiring nurse' aides may be completed in conjunction with high school classes or following completion of a high school diploma. They perform routine tasks (help patients with activities of daily living, escort patients, answer call lights, deliver messages, serve meals, make beds, etc.) under the supervision of nurses and physicians. In nursing homes, nursing aides

are the principal caregivers. Nursing aides can become a RN, when they follow a higher education degree and pass the NCLEX-RN.

10.2 Description of safe staffing policy

10.2.1 Background safe staffing policies in the USA

How did the safe staffing legislation receive attention across the states?

Establishing safe staffing legislation such as safe staffing ratios, is part of a nationwide trend to better protect patients and nurses. Since the 1980s, researchers reported associations between nurse staffing levels and the outcomes of hospital care. Moreover, the nurses themselves reported a shift towards sicker patients and a shorter hospital stay, resulting in increased workload. Combined with a decreasing nursing staff, nurses experienced not to be able to provide safe and high-quality care.[230, 288, 289] In response and commissioned by the Congress, the IOM published in 1996 a report concerning the adequacy of nurse staffing in hospitals and nursing homes. The report, however, concluded that there was insufficient evidence to support specific nurse staffing ratios (in relation to improved outcomes) in hospitals.[290]

Patient safety remained high on the agenda. After all, in the IOM report '*To Err is Human: Building a safer health system*', it was estimated that between 44 000 and 98 000 hospitalized Americans died each year, not as result of their illness or disease, but as a result of errors in care.[291] Since then, also the evidence supporting an association between nurse staffing and better patient outcomes has grown. Aiken et al. (2002)[292] and Needleman et al. (2002)[293] pointed out that less direct-care nurse staffing is associated with and increased risk of poor patient outcomes and mortality. In addition, Aiken et al. (2003)[294] showed that the educational level of nurses is linked to patient outcomes (i.e. a 10% increase in the proportion of nurses holding a bachelor's degree was associated with a 5% decrease in mortality). This evidence was integrated in a new report of the IOM in 2004 '*Keeping Patients Safe: Transforming the work environment of nurses*'. This report investigated processes to improve patient outcomes and work conditions

and stated that nursing (and nurse staffing) is inseparably linked to patient safety.[295]

What is aimed to be achieved by implementing a safe staffing legislation? The differences between states and two main approaches

The core objectives of USA safe staffing legislation are to provide safer high-quality patient care, and to improve the work environment for nurses including nurse retention. Nursing unions have played an important role in the adoption of safe staffing legislation. Yet, currently, there exists no nationwide safe staffing policy. Since the passing of the Californian Assembly Bill 394 in 1999, more than 14 USA states adopted some kind of regulatory requirements for nurse staffing in hospitals. These policies can be divided in two main groups:[296]

- The most far-reaching safe staffing policy, is the implementation of minimal patient-to-nurse staffing ratios as enacted in California for acute-care hospitals. Also in the state of Massachusetts mandated patient-to-nurse ratios were defined for intensive care wards (ICUs) only in 2015 (HB 1958, SB 1206).

- Safe staffing committees who have to construct, evaluate and report on safe staffing plans. This is often a second-best option in states where the mandated staffing ratios were (heavily) debated but not approved. These staffing committees and plans can be seen as a kind of (temporary) compromise between the proponents and opponents of the ratios. In some states the obligation to work with staffing committees and plans coincides with public reporting obligations.

We will discuss more in detail the situation in the states where patient-to-nurse ratios are implemented i.e. California and Massachusetts, and we will provide a small overview of the ongoing legislative developments at the national and state level. We will also describe in short the situation of the states where only a staffing committee is mandated.

10.2.2 Minimum patient-to-nurse staffing ratios

By imposing minimum patient-to-nurse ratios, the objective is to mandate the maximum number of patients that may be assigned to licensed nurses in hospitals for different types of hospital wards.

10.2.2.1 California

Assembly Bill 394 – California, the first jurisdiction with mandated safe staffing ratios

In October 1999, California became the first jurisdiction with laws and regulations for minimum nurse staffing levels across healthcare facilities. With the enactment of the Assembly Bill 394 (AB 394), the Californian Department of Health Services (CDHS) expanded the already mandated (Title 22, enacted in 1975) minimum 1:2 patient-to-nurse ratios in critical care wards, towards minimum patient-to-nurse ratios in several acute hospital wards.[297] In general this legislation is unfunded (i.e. no additional budget for hospitals to increase staffing levels). Yet, in 2002 $60 000 000 was provided to the hospitals to hire more RNs.

Clinical, political and economic antecedents to AB 394

- The ratio legislation did not came out of the blue, as previous attempts were made to obtain mandated ratios in California: the first attempt in 1993 died in committee and the second attempt in 1997 was passed by the legislature.[297] The enactment was driven by organised actions organised by the California Nurses Association (CNA). To illustrate the importance of adequate staffing levels, the CNA made extensive use of the growing evidence (linking higher nurse staffing levels to better patient outcomes or fewer adverse events).[291-293, 298]

- The mandated patient-to-nurse ratios and staffing levels

After the enactment of AB 394 in 1999, California had the difficult task to develop patient-to-nurse ratios. Few research had been conducted from which California could develop the ratio requirements. A few case studies existed at that time, mainly focusing on ICUs. Although the evidence supported that a higher patient-to-nurse ratio was associated with better outcomes, it did not provide information on the optimal ratio.[297]

While the original implementation date of AB 394 was foreseen on 1 January 2002, the law only became effective on 1 January 2004 with specific ratios for different types of hospital wards (Table 25). The bill prohibited unlicensed personnel from performing certain tasks.[299] Due to the lack of sound research to underpin the specific ratios (by ward type), stakeholders such as the Californian Healthcare Association (CHA) (hospital group), the Service Employees International Union (SEIU), and the California Nurses Association (CNA) were asked to submit suggestions to the California Department of Health Services (CDHS). This resulted in a broad range of suggested ratios for the specific wards. The recommended maximum number of patients to one nurse on medical-surgical wards varied, for instance as follows: 10 patients per nurse (CHA); 3 patients per registered nurse (CAN); 4 patients per nurse (SEIU); 4 patients per registered nurse (UNAC). Most hospitals followed the CHA, however, Kaiser Foundation Hospitals embraced the SEIU propositions. The final ratios (e.g. 6 patients per nurse on medical-surgical wards) can thus be seen as a compromise between the various stakeholders' proposals.

California implemented its ratios in two steps. In certain wards, such as the mixed wards and medical/surgical wards the patient-to-nurse ratios implemented in 2004 were changed in 2005 (e.g. for medical-surgical wards ratios changed from 6 patients to one nurse towards 5 patients per nurse). The political discussions continued after 2005 and in 2008, the ratios were reduced again for step down, specialty and telemetry wards.

Table 25 – Proposed and implemented patient-to-nurse ratios in California

Hospital Unit	CDHS (AB 394)	CHA proposal (RN only)	SEIU proposal (RN & LVN)	UNAC (RN only)	CNA (RN only)
Intensive care					
Critical Care / ICU	1:2 (or fewer)	1:2	1:2	1:2	1:2
Neonatal ICU	1:2 (RN only)	1:2	1:2	1:2	1:2
Burn Unit	1:2	1:2	1:2	1:2	1:2
Labour & Delivery					
Active labour and delivery	1:2	1:3	1:2	1:2	1:1
Antepartum	1:4 (non-active labour)		1:3		
Postpartum	1:6 (mothers only)	1:8	1:6		1:5
Couplet care	1:4	1:4	1:3	1:3	
Well-baby nursery	1:8	1:8	1:6	1:6	1:5
Emergency (ER)					
Trauma	1:1		1:1		
Critical care	1:2		1:2	1:2	
Visits	1:4 (+ 1RN triage nurse)	1:6	1:3	1:3	1:3
Hospital Services					
Medical / Surgical	1:6 -> 1:5 (March 2005)	1:10	1:4	1:4	1:3
Operating room	1:1 (RN only)	1:1	1:1 (+1LVN & 1 tech)	1:1	1:1
Paediatrics	1:4	1:6	1:3	1:3	1:3
Post-anesthesia	1:2	1:3	1:2	1:2	1:2
Behavioural health & Psychiatry	1:6	1:12	1:2 / 1:3 / 1:5 (by acuity)	1:5	1:4
Specialty (e.g. oncology, dialysis)	1:5 -> 1:4 or fewer (1 January 2008)	1:10		1:3 / 1:4 (by specialty)	1:3
Step-down	1:4 -> 1:3 (1 January 2008)	1:6	1:3	1:3	1:3
Telemetry	1:5 -> 1:4 (1 January 2008)	1:10	1:3	1:3	1:3
Mixed wards	1:6 -> 1:5 (1 January 2005)				
Continuing care / Subacute / Transitional care	1:4	1:12	1:5	1:5	1:4

CDHS: Californian Department of Health Services; CHA: Californian Healthcare Association; SEIU: Service Employees International Union; UNAC: United Nurses Association of California; CNA: California Nurses Association. Table derived and adjusted from three sources.[230, 300, 301]

How were the ratios in California implemented in practice?

The patient-to-nurse ratios in California are the minimum requirements mandated by the legislation. The minimum ratio legislation should be complied with at all times, under any circumstances (even during lunch breaks or in case of sickness), except in a state of declared emergency. To state clear, the ratios are not a target and only establish a minimum. Hospitals are expected to increase staffing above the minimum levels as patient acuity requires (see below). The proposed ratios are counted per nurse and cannot be averaged per nursing ward as is done in Australia. When hospitals at any given moment do not follow ratios, accountability measures can be taken (see below).

An important note is that LVNs may make up 50% of the licensed nurses in the ratio. However, the adequacy of this threshold is questioned given the available evidence about the link between the educational level of nurses and patient outcomes.

How did the ratios affect the Californian hospitals? What was the impact of the safe staffing policy on outcomes?

- Methodological approach to find studies that evaluate the impact of the safe staffing policy

Based on a scanning of the research domain (internet search and targeted search in PubMed) we selected four systematic reviews that include publications evaluating the patient-to-nurse ratio mandate in California after the implementation of the legislation in 2004. The reviews include 25 original studies that are listed in Appendix 2. Four supplemental articles were selected through hand search (including one dissertation[301]), resulting in a total of 29 studies evaluating the impact of the safe staffing legislation in California. In the review of Donaldson et al., 2010[302] 3 (unpublished) dissertations[303-305] and a poster presentation[306] were included. These 4 publications are reported as in Donaldson et al., 2010.[302] In the review, the authors stated that a preliminary report of pre-post ratios impacts by Donaldson et al., 2005[307] was replicated and extended by Bolton et al., 2007[308].

- General description of the evaluated outcomes

The original articles investigated the effect of the safe staffing legislation on several outcomes, i.e. financial outcomes, staffing levels, nursing workforce, work environment and nurse outcomes, patient related outcomes and unintended results of the mandated ratios. Table 26 lists the specific outcomes that were evaluated in each article, including the result of the evaluation. The arrows used in the table can reflect either a significant result or a trend; otherwise it is specifically mentioned that the result was not significant (*ns*). Mixed findings refer to the fact that the studies reporting on a certain outcome found (non-)significant results, opposing trends or no differences. In general, most studies perform a comparison of the post-regulation period (ranging from a few months to a few years) with the pre-regulation period. During the pre-regulation period (i.e. before 2004), a number of other laws that potentially influence staffing, financing, etc. were taken into legislation. Therefore, it is difficult to assess the sole effect of the mandated safe staffing ratio legislation. Moreover, in anticipation of the implementation of the mandate in 2004, hospitals tried to staff already at or above mandatory ratios during the period 1999 to 2004. In Donaldson et al., 2010[302] studies were selected if they assessed the pre- versus post-legislation period. Therefore, influencing studies such as Aiken et al., 2010[309] were not included in the review by Donaldson et al. (2010) since they had a cross-sectional design and evaluated a single point in time.

Table 26 – Summary of the impact of the ratio legislation in California

Changes attributed to the ratios	Increase (↑) / Decrease (↓) / No difference (=)	Study
Financial Outcomes		
Inpatient prices (except Medicare & Medical)	↑	Antwi et al., 2009[310]
Capital expenditures	↑	Antwi et al., 2009[310], Cook, 2009[304]
Operating expenditures (per discharge)	↑	Antwi et al., 2009[310], Cook, 2009[304], Reiter et al., 2012[311]
Labour expenditures per discharge	↑	Antwi et al., 2009[310]
Hospital operating margin	↓	Spetz et al., 2009[312], Reiter et al., 2012[311]
Hospital costs	↑	Cook, 2009[304]
Cost of providing care	↑	Chapman et al., 2009 (ED)[313], Hickey et al., 2011 (pediatric surgery)[314]
Uncompensated care	↓	Reiter et al., 2011[315]
Staffing Levels & Nursing Workforce		
(R)NHPPD	↑	Bolton et al., 2007[308], Donaldson et al., 2005[307], Cook, 2009[304], Spetz et al., 2009[312], Serratt, 2009[303], McHugh et al., 2011[316], Mark et al., 2013[317], Munnich, 2014[318], Reiter et al., 2011[315], Serratt et al., 2011[319], Reiter et al., 2012[311], Tellez, 2012[320], Spetz et al., 2013[321] (non-RN increase but generally lower)
RN-to-patient ratio	↓	Bolton et al., 2007[308], Mitchell, 2008[306], Weichenthal and Hendey, 2011[322], Donaldson et al., 2005[307], Cook, 2009[304], Hickey et al., 2011[314], McHugh et al., 2012[323]
%RN	↑	Bolton et al., 2007[308], Serratt, 2009[303], Spetz et al., 2009[312], Donaldson et al., 2005[307], Cook et al., 2012[324], Hickey et al., 2011[314]
%LVN	↓	Bolton et al., 2007[308], Donaldson et al., 2005[307] Aiken et al., 2010[309]
Hiring LVNs and ancillary staff	↓ ; =	Chapman et al., 2009[313], Aiken et al., 2010[309], Serratt, 2009[303], Cook et al., 2012[324]
Nursing FTE in ED	=	Weichenthal and Hendey, 2011[322]
Use of supplemental / agency nurses	↑	Aiken et al., 2010[309]
Skill mix	↑	McHugh et al., 2011[316], Cook et al., 2012[324], McHugh et al., 2012[323]
Work environment & Nurse outcomes		
Intensity of care (by acuity, monitoring, number of procedures, etc.)	↓	Antwi et al., 2009[310], Aiken et al., 2010[309]
RN workload	↓	Aiken et al., 2010[309], Cox et al., 2005[325]
Case mix index	↑ ; =	Antwi et al., 2009[310], Serratt, 2009[303] Cook et al., 2012[324]
RN wages	↑	Mark et al., 2009[326], Serratt, 2009[303], Munnich, 2014[318], Serratt et al., 2011[319]
Intension to stay	↑	Mitchell, 2008[306]

RN work environment satisfaction or Index Work Satisfaction	↑ ; =	Spetz, 2008[327], Spetz & Herrera, 2010[328], Aiken et al., 2010[309], Cox et al., 2005[325], Tellez, 2012[320], Armstrong, 2004[305]
Length of stay of patients	Mixed findings	Spetz et al., 2009[312], Serratt, 2009[303], Cook, 2009[304]
Occupancy of beds	↑	Serratt, 2009[303]
RN turnover & anticipated turnover scale	↑	Armstrong, 2004[305]
Burnout	↓	Aiken et al., 2010[309]
Quality and safety of care	↑	Aiken et al., 2010[309]
Verbal abuse or complaints by patients, their family or staff	↓	Aiken et al., 2010[309]
Occupational injury and illness rates for RNs and LVNs	↓	Leigh et al., 2015[329]
Patient related outcomes		
Falls incidence (with injury)	= ; ↓	Bolton et al., 2007[308], Donaldson et al., 2005[307], Mitchell, 2008
Restraint prevalence	↓ (ns) ; =	Bolton et al., 2007[308], Donaldson et al., 2005[307]
HAPU	Mixed findings	Bolton et al., 2007[308], Donaldson et al., 2005[307], Cook, 2009[304], Cook et al., 2012[324], Spetz et al., 2013[321]
Quality of care	=	Chapman et al., 2009[313]
Deep vein thrombosis or pulmonary embolism	↓ (ns)	Spetz et al., 2009[312], Spetz et al., 2013[321]
Post-operative pneumonia or respiratory failure	Mixed findings	Spetz et al., 2009[312], Mark et al., 2013[317], Spetz et al., 2013[321]
Post-operative sepsis	Mixed findings	Spetz et al., 2009 [312], Mark et al., 2013[317], Spetz et al., 2013[321]
Hospital acquired infection	↓; mixed findings	Mark et al., 2013[317], Cook, 2009[304], Spetz et al., 2013[321]
Failure to rescue	= ; ↓	Spetz et al., 2009[312], Cook, 2009[304], Aiken et al., 2010[309], Cook et al., 2012[324], Mark et al., 2013[317]
Mortality after post-operative complication	↓	Mark et al., 2013[317], Spetz et al., 2013[321]
Mortality	↓ ; ↓ (ns)	Aiken et al., 2010[309], Hickey et al., 2011[314]
Complication ratio	↑ (ns)	Hickey et al., 2011[314]
Unintended results		
ED waiting and care time	↑ ; ↓	Weichenthal and Hendey, 2011[322], Chapman et al., 2009[313], Chan et al., 2010[330]
Waiting time to administer antibiotics in ED	↓	Weichenthal and Hendey, 2011[322]
Emergency resuscitations	↑	Mitchell, 2008[306]
Hospital and ED closure	↑	Terasawa, 2016[301]
Mental health services	↓ (ns)	Terasawa, 2016[301]

↑: increased; ↓: decreased; ↑ (ns): non-significant trend towards increase; ↓ (ns): non-significant trend towards decrease; =: no impact; RN: Registered Nurse; HPPD: Hours per Patient Day; HAPU: Hospital Acquired Pressure Ulcer; LVN: Licensed vocational nurse; FTE: Full-time equivalent; ED: emergency department

Impact of the ratios on financial outcomes

Six studies evaluated the financial outcomes of the ratio legislation in California. In general, the studies suggest an increase in costs (of hospital, of care, etc.) and expenditures (capital, operating, labour, etc.), leading to a decline in hospital operating margins. However, it is very difficult to assess the sole influence of the ratio legislation on the financial impact of hospitals. During the pre- and post-legislation period of the ratios, various other policies such as changes in Medicare and Medicaid funding had substantial effects on the finances of Californian hospitals. Medicare changed its billing procedures and payment streams. The financial margins of Californian hospitals severely declined since 1997 (Balanced Budget Act). Again, in 2005, the state began enacting new changes in Medicaid funding that aimed to decrease government transfers to safety-net hospitals (i.e. hospitals that provide health care to individuals independently of their insurance status). So by 1999, the hospitals had experienced significant declines in operating margins, then started to recover, and in 2004 started to decline again. Due to these pre-ratio trends, most hospital types experienced statistically significant variations in operating margin after the implementation of the ratios. Thus, authors tend to state that the ratios had a rather 'marginal impact' on hospital finances compared to the other conducted laws.[312, 331]

Impact of the ratios on staffing levels and nursing workforce

The majority of the studies described the impact of the ratio legislation on nurse staffing levels and looked more in detail into the nursing workforce and skill mix. Due to the ratio legislation, hospitals needed to hire more licensed nurses to meet the ratio requirements.

During the 5-year period before the ratios came into effect, it was observed that many Californian hospitals started to prepare for the mandated ratios.

The Nursing Hours per Patient Day (NHPPD) of RNs increased significantly (on average with 1h in medical-surgical wards and 0.7h in step-down wards), with more rapid growth after 2002. A significant increase of about 0.5 additional hours was observed from 2004 to 2006 in medical-surgical wards and about 0.4 additional hours in stepdown wards, resulting in an overall significant increase in RN care hours from 2002 to 2006 by an average of

1.5h in medical-surgical wards and about 1h in step-down wards. The growth in NHPPD varied between 14.3% and 18.9%.[309] Accordingly, the number of patients per RN decreased significantly. Reductions in patient-to-nurse ratios were seen as early as 2002 in all hospitals (hiring peaked at that time), independently of the staffing level at that moment.[308] The mandate resulted in nearly a full patient per nurse fewer for all Californian hospitals (no difference was seen between non-safety net and safety net hospitals).[309, 323]

It was feared that hospitals would predominantly hire 'cheaper' LVNs instead of RNs to comply with the ratio legislation and that as a result the skill mix would decrease. However, results point out that the %RN significantly increased while the %LVNs and ancillary staff did not differ, which resulted in an augmented skill mix. In fact, only hospitals with the greatest staffing deficit (often fiscally weak hospitals) used LVNs over RNs to increase nurse staffing hours.

To meet the increased number of required staff, especially in the early period, more agency nurses were hired. This was done in the period just after implementation of the legislation, because hospitals encountered initially difficulties to find specialty nurses or nurses holding higher educational degrees to meet the ratios.[313]

Impact of the ratios on the work environment and nurse outcomes

A main goal of the safe staffing legislation was to enhance the work environment for nurses and to increase their well-being. Thirteen different related outcomes were investigated. Overall an improved work environment and better nurse outcomes were reported.

Comparing California with two states without mandated ratios (Pennsylvania and New Jersey), a significantly lower proportion of Californian nurses experienced high levels of burnout (29% vs 34% & 36% respectively), and they were less likely to be dissatisfied with their jobs (20% vs 26% & 29%). Improved nurse satisfaction was also found in other studies such as in Tellez et al. (2012),[320] who reported that satisfaction improved from 3.93 in 1997 to 4.09 in 2008 on a 5-point Likert scale.

When nurses' workloads were in line with California-mandated ratios in all three states, nurses reported consistently better quality and safety of care because they were able to spend more time with their patients.[309, 321] Moreover, there were less verbal abuse or complaints by patients, their family or the colleagues. Also the intensity of care, evaluated by acuity, the number of procedures, etc. decreased. An increased occupancy of beds was reported, but mixed findings were seen for the length of stay and the case mix index.

Direct care nurses as well as managers stated that the mandate reduced nurse workloads and resulted in improved recruitment, reduced turnover and increased intent-to-stay of nurses. So it appears that the ratios had ultimately a positive influence on work environment and nurse outcomes. This result was initially, in the early post-regulation period, unexpected.[325] After all, it was feared that the ratios' inflexibility (i.e. comply with ratios at all times) would be too rigid and would result in a reduction of nurses' perceptions of control in decision making, professional judgement and autonomy.[230, 325] Yet, this was not confirmed by the evaluation studies. Perceptions of workload were reported to be better in California compared to the other states.[309] Moreover, it was seen that the mandated ratios were effective in reducing occupational injury and illness rates by 31.6% and 33.6% in RNs and LVPs respectively.[329] The mandated ratios may also have contributed to an increase in wages (RNs mean wages, adjusted for inflation, increased by almost 9%[303]) and consequently labour costs and operating expenses as seen in the financial outcomes.[332]

Impact of the ratios on mortality, failure to rescue and other patient-related outcomes

Another important objective of the ratio legislation was to improve quality of care and patient safety. After implementation of the legislation, the Californian hospital nurses cared for one less patient on average (as stated above) than nurses in the other states and two fewer patients on medical and surgical wards.[309, 323] It was found that the lower ratios are associated with significantly lower in-patient mortality within 30 days of hospital admission in California.[309] The studies also reported a lower likelihood of mortality after post-operative complication (10-13.9% decrease in failure to rescue).

Although the mandated ratios have increased patient access to licensed nurses, it remains unclear whether this increase is associated with improved patient outcomes (other than mortality).[309] The nine evaluated patient outcomes and quality measures (such as pressure ulcers, deep vein thrombosis/pulmonary embolism, pneumonia mortality, incidence of falls, postoperative sepsis, etc.) do not appear to have been directly affected by the increase in licensed nurse staffing. Important to note is that these studies do not separate LPNs from RNs in their measure of staffing, while evidence suggests that the main benefit in terms of patient outcomes and mortality is associated with increased RN staffing and outcomes can be worse when skill mix is poor even accounting for licensed nurse staffing. Moreover, these studies often using less robust designs or measurement methods to capture patient outcomes.

Unintended results of the safe staffing ratio legislation: did the ratios have an impact on access to care, waiting time, hospital closures, etc.?

When the ratio legislation was introduced it was feared that the new law could also potentially evoke unintended unfavourable results such as increased waiting times, hospital closure, etc. Three studies found mixed results on emergency department waiting time and care time (or time to administer antibiotics). Emergency resuscitations tended to increase.

In the year of implementation, about 60 waivers (demands for exceptions) were requested, of which 23 were approved, nearly all given to rural hospitals. This could indicate that hospitals found it difficult initially to comply with the ratios. Serratt (2011) found that 21 hospitals closed during the period 2000-2006, but no explanation could be given. In 2004, one emergency department and one hospital were closed, blaming it to the ratios legislation, while former employees said the hospital was meeting the ratios without difficulty.[299] Therefore, it is not clear if the ratios had a negative impact on hospital closure and waiting time.

The lack of flexibility, due to the 'at all times' requirement, was singled out as the reason why some hospitals had trouble to comply with the ratios.[313] The hospitals became creative to overcome these challenges by integrating certain strategies such as the creation of 'float pools' (cross-trained staff from other wards, employing agency nurses, charge nurses, etc.) to comply

with the ratios to cover breaks, etc. Another strategy was that nursing shifts were truncated with the sole purpose of providing care during breaks.

10.2.2.2 Massachusetts

Since 2015, the state of Massachusetts mandates nurse staffing ratios in intensive care wards (ICUs) as stipulated in the Massachusetts General Law (c.111, §231).

How did the ratio debate in Massachusetts arise, evolve and result into the mandated ICU ratios?

Since 1995, the Massachusetts Nurse Association (MNA), a state-wide union, began its campaign for a safe staffing legislation with submitting a bill (not attaching ratios). Although this enactment was defeated, the debate has been ragging since. Influenced by the ratio mandate in California and the publication of landmark studies[292, 293], the MNA made mandated staffing patient-to-nurse ratios a top priority. However, the Massachusetts Organisation of Nurse Executives (MONE) argued that multiple factors are needed to be considered in the assignment of nursing staff.[294] Therefore, the Organization of Nurse Leaders of Massachusetts, Rhode Island and New Hampshire (ONL) in conjunction with the Massachusetts Hospital Association (MHA), have advocated a more flexible approach for nurses to make staffing decisions. PatientCareLink, a kind of pilot was developed with the aim to obtain staffing and outcome data on each shift, in each unit, for all kinds of patient-care settings. Initially, 12 very diverse patient care settings participated in the pilot. This voluntary process has evolved and improved over more than ten years with now all hospitals participating fully in this initiative.[333] In 2014, the MNA introduced two ballot initiatives of which one focussed on imposing patient-to-nurse ratios. To counter that campaign, other stakeholders formed the Committee for Quality Hospital Care to develop strategies to inform the voting public about the potential (negative) consequences of a ratio legislation. Policymakers were invited into the patient care settings and a coalition was built between ONL (nursing expertise) and MHA (political expertise). This evolved in the MNA submitting an alternative proposal, implementing ratios in ICUs only. Both the ONL and MHA agreed that the new MNA proposal was aligned with current ICU

staffing for critical ill patients in most hospitals in the state and recognised the available evidence stating that medical and nursing staff is associated with the survival of critical ill patients.[334] Many state-wide sessions were organised to give the public and stakeholders the opportunity to comment on the proposed law, which was approved in June 2015. Since then, MNA has continued to lobby for expansion of the mandate staffing ratios to other wards.

The current patient-to-nurse safe staffing legislation and actions in Massachusetts

RNs deliver one-on-one care in ICUs and are only allowed to take a second patient if and when it is deemed safe to do so based on the acuity of both patients. Thus, the law states minimal patient-to-nurse assignments in ICUs of 1:1 or 1:2 depending on the stability of the patient as assessed by staff nurses (or by the nurse manager or designee in case of a disagreement) and an acuity tool (selected by each hospital in consultation with the appropriate staff). Moreover, three to five related patient safety quality measures should be publicly reported and accountability should be verified by the Health Policy Commission. During 2018, it was proposed to implement state-wide RN-to-patient ratios in all hospitals and health care facilities in Massachusetts through the Ballot initiative brief. This was a rough battle with heavy discussion between stakeholders. Proponents gave statements in favour of implementing the ratios (*'…Independent scientific studies have consistently found that quality of care decreases dramatically when nurses are forced to care for too many patients at once, putting patients at increased risk for complications like pneumonia, medication errors, and more. This initiative establishes a safe maximum limit for the number of patients assigned to nurses in all hospital areas to ensure our patients receive the care and attention they need. It provides maximum flexibility, requiring hospitals to adjust RN staffing levels based on the needs of patients and does so without reducing other members of the health care workforce…'*) while opponents of the bill stated it would (*'…override the professional judgment of nurses and doctors…' ; '… create a massive unfunded government mandate costing more than one billion dollars in higher healthcare costs annually, causing community hospitals to close and forcing others to reduce emergency, addiction and behavioral health*

*services…' ; and 'There is no scientific evidence that these rigid ratios improve patient care.').[335] These statements drove experts to the conclusion that the public was misinformed since studies indicated that the ratio legislation in California reduced patient mortality and improved nurse satisfaction.[309] Moreover, there was no evidence that the ratio legislation would be so expensive or would result in the closure of hospitals. Ultimately this act was defeated on 6 November 2018.[335]

Preliminary results of the mandated staffing ratios in ICUs

A retrospective cohort study compared outcomes in Massachusetts with outcomes of other states through administrative claims data from medical centres across the USA (Vizient) during the post-mandate period April 2016 to March 2017 (baseline period April 2014 to March 2015). The regulations were not associated with improvement of nurse staffing and patient outcomes.[336] An explanation for this can be that the law in fact only induced no or small changes in nurse staffing in ICU since the ICUs were already staffed accordingly. It does not appear that nurse staffing or budgets changed in the rapid interval between passage and implementation of the new law. Moreover, a letter-to-the-editor was written claiming several considerations for which the research by Law and colleagues should be interpreted with care.[337]

10.2.2.3 National level and other states

Ongoing debates at federal level and in other states considering implementation of mandated safe patient-to-nurse staffing ratios

Besides California and Massachusetts, there are no other USA states with enacted minimal patient-to-nurse ratios. Californian regulations, however, did affect the political debate in many other states in the USA. Currently, in states such as Michigan, Minnesota, New Jersey, New York, and Vermont discussions to implement certain safe staffing measures as acts are still pending. Moreover, in the House of Representatives at the 115th Congress (first session) on 4 May 2017, bill H.R. 2392 was introduced. This bill is an amendment of the Public Health Service Act to establish direct care registered patient-to-nurse staffing ratio requirements *in hospitals*, implementing a nurse staffing plan by a nurse staffing committee. This bill was also announced in the Senate (S. 1063). In the 2nd session of the Congress on 15 February 2018, bill H.R. 5052 was introduced to amend the Social Security Act. This amendment has the intention to provide patient protection by establishing safe nurse staffing levels at certain *Medicare providers*, and for other purposes similar to the H.R. 2392 objectives. The bill was also announced in the Senate (S. 2446). The bill prescribed that health care facilities have to adhere to the mandated nurse staffing ratios without reducing services or staffing levels. These bills are still ongoing. The proposed staffing ratios can be found in Table 27. However, experts doubt if these ratio legislations submitted to the federated government will ever be enacted.

Table 27 – Example of the patient-to-nurse minimal staffing ratios as proposed in Act H.R. 2392 in the House of Representatives USA

Unit	Proposed patient-to-nurse ratios*
Trauma emergency	1:1
Operating room	1:1 (+ 1 additional scrub assistant)
Critical care (neonatal intensive care, emergency critical care and intensive care, labour and delivery, coronary care, acute respiratory care, post-anaesthesia, burn)	1:2
Emergency room, paediatrics, stepdown, telemetry, antepartum and combined labour, deliver, and postpartum	1:3
Medical-surgical, intermediate care nursery, acute care psychiatric, and other specialty care units	1:4
Rehabilitation and skilled nursing	1:5
Postpartum (3 couplets) and well-baby nursery	1:6

More specific nuances to the legislation were listed: units with different names, application of ratios to hospital nursing practice standards, restrictions, adjustment of ratios, ancillary and additional staffing, relationship to state-imposed ratios, and exemption in emergencies.

10.2.3 Staffing committees and nurse staffing plans

During the years, patient-to-nurse ratio legislation was introduced but not passed in several states including Washington, Arizona, Missouri, Illinois, West Virginia Pennsylvania, Florida, Texas, Kentucky, D.C., and Maine. In some of these States it was decided to implement mandatory safe staffing committees into the hospital sector instead of adopting a mandatory patient-to-nurse ratio. These committees have to construct, evaluate and report on safe staffing plans. A staffing plan is considered to provide adequate, appropriate, and quality delivery of health care services and to protect patient safety. A nurse staffing plan is considered to ensure that an adequate number and skill mix of nurses are available to meet the level of patient care needed. The development of nurse staffing plans varies per state where such a plan is enacted. The composition and role of staffing committees as well as the content of the developed staffing plans differ by state. We provide here some examples as implemented by certain states, without being exhaustive.

Composition and functioning of staffing committees: important role for nurses involved in direct patient care

The input of nurses involved in direct nursing care is important to make the staffing plans acceptable for them and to adapt them to the bedside needs. Therefore, the establishment of a staffing committee is compulsory in several states. The committee member selection could be based on bargaining agreement or if this is not available by their peers providing direct care as done in Texas and Washington. However, in different states, legal obligations exist about their composition. In Connecticut and Nevada, for instance, RNs who provide direct patient care should account for ≥50% of the members of the staffing committee. In Ohio, a staffing committee should at least include a chief nursing officer (CNO) while in Texas, the obligation of a CNO also exists together with the requirement that ≥60% of the committee's members have to be direct staff nurses. Participation on the committee is part of the employee's work time, is compensated as such and implies that the committee member is relieved of other work duties during the meetings. Nurses who participate in these committees are also protected to prevent retaliation from management.

Developing and monitoring the execution of staffing plans

The main task of a staffing committee is to draft, monitor (using specific measures such as nurse-sensitivity outcome, quality-indicators, patient needs, patient-care outcomes, evidence-based nurse staffing standards, or nurse satisfaction measures), evaluate (in most states at least annually) and review a nurse staffing plan (nursing ward and shift-based). A staffing committee should also report on (modifications of) the safe staffing plan to the hospital's governing body or directly to the government. The committee could have additional duties such as reporting on establishment, activities, progress and efficacy of their committee; development of policies and

procedures for overtime requirements of RNs providing direct patient care and for appropriate time and manner of relief of such RNs during routine absence; or process requests and complaints submitted to the committee such as any variations where the nurse personnel assignment in a patient care unit is not in accordance with the adopted staffing plan, relieve, objection or refusal to a work assignment (e.g. if not in congruence with the staffing plan or if the nurse is not prepared by education, training, or experience to fulfil the assignment without compromising the safety of any patient or jeopardizing the license of the nurse).

Which accountability measures are taken to comply with the safe staffing legislation?

Public reporting and transparency on (RN) staffing are imposed by eight states (5 mandated by legislation, 3 elective) to ensure the safe staffing policy (accountability measure) or 'as' safe staffing policy (a policy aiming to improve the quality of care) such as in New Jersey.[338] However, some doubt the effectiveness of 'public reporting' as a safe staffing strategy. Yet, a recent study examined the public reporting legislation of New Jersey.[338] They found that the number of patients per RN decreased for ten specialties, similar to the data of the American Hospital Association. These results suggest that public reporting could be important in improving patient safety. More far-reaching consequences of violating (multiple times) one or more requirement(s) of the enactments are the penalization measures and/or licensing procedures.

- Public reporting

Public reporting can be done in various ways of which the two most prominent ones are:

  o First, transparency on the staffing and patient levels on a shift-by-shift base (during each shift at each unit) can be imposed. It may include that the hospital posts daily for each shift, in a clearly visible place, a document that specifies in a uniform manner the current number of (un)licensed direct-care nursing staff in each ward of the hospital, identifying specifically the number of RNs. The method used to determine these staffing levels as well as the applied acuity tool, could be reported by the hospital. It may include a statement that anyone may file a complaint against a hospital concerning their staffing disclosures during a certain period of time or the hospital may provide a toll-free telephone number were the public may request information on staffing regulations. Moreover, it can be requested to post information on the internet, so that it is available for a longer period of time (New Jersey).

  o Second, public reporting on the staffing plan in general can be demanded upon request by the government or the policymakers can request electronic submissions at specific times. It can be required to disclose on the safe staffing regulations at multiple levels such as to the government, board, nurses, care givers and/or patients and their families. Moreover, in case that the hospital has violated the law, the penalization could be posted publicly through internet websites.

- Penalization and licensing procedures

In case a hospital violates the legislation, the government could impose an administrative fine or civil money penalties (ranging between $ 10 000 – $ 50 000 across the states) and/or limit, suspend, or revoke the hospital's license or certification after giving the hospital notice of its intent to do so. However, before these measures are taken, the hospital could be required to establish a corrective action plan to prevent the recurrence of such violation.

10.3 Key learning points

- About 4.2 million professionally nurses are active in the USA, of which approximately 3.4 million are registered nurses (RNs).

- RNs are the largest group of healthcare professions. To become a RN, there are three educational pathways: a diploma, an advanced degree in nursing (ADN) or a bachelor degree of science in nursing (BSN). After obtaining a degree, the national council licensure examination for registered nurses (NCLEX-RN) has to be passed. This is also known as 'the boards'.

- RNs may proceed advanced education by obtaining an advanced practice RN (APRN), master degree of science in nursing (MSN) or a doctorate (doctorate in nursing practice (DNP) or PhD). Other specific qualifications can be obtained by credentials or as physician assistant (PA).

- RNs can be assisted by licensed vocational nurses (LVNs) and nursing aids.

- The core objective of safe staffing legislation is to protect patients and to improve work environment for nurses.

- A nationwide movement to protect patients and nurses started in the '80s. However, it was only around the turn of the century that groundbreaking reports and landmark publications revealed that decreased nurse staffing is associated with worsened patient outcomes.

- No nationwide safe staffing legislation is available (up until today). However, more than 14 states in the USA enacted some kind of safe staffing legislation with California being the first jurisdiction to mandate safe staffing ratios in 1999 with the Assembly Bill 394. Massachusetts followed in 2015 with mandated ratios in intensive care units (ICUs).

- In general, two safe staffing strategies were adopted in states: staffing by mandated patient-to-nurse ratios or the creation of a staffing plan by a staffing committee.

- It took California 5 years (1999-2004) to effectively implement the mandated patient-to-nurse ratios. It was a difficult task to construct the ratios for all wards because evidence about optimal levels was and still is absent. Moreover, the legislation was subject of a heavy political debate. The ultimately adopted ratios are a compromise situated between the ratios proposed by the nursing (lower number of patients per nurse) and hospital associations (higher number of patients per nurse).

- The ratios became effective in 2004. One year later, the ratios were reduced with one patient for specific wards such as medical/surgical and mixed wards. In 2008, the ratios were reduced with one patient for specialty, step-down, and telemetry wards.

- An important regulation is that the ratios are fixed, cannot be averaged and should be complied with at all times at the level of the individual nurses.

- Licensed nurses other than RNs may make up 50% of the ratios.

- The impact of the ratios on financial outcomes was difficult to verify as multiple enactments were introduced in the same period that could have influenced hospital finances more than the ratio legislation itself.

- Together with these enactments, reductions in patient-to-nurse ratios were already observed in 2002, before the effective implementation of the mandated safe staffing ratios in 2004. By then, most hospitals were already staffed at or above the mandated levels.

- The implementation of mandated minimum patient-to-nurse ratios achieved the policy aim of two (related) key structural measures: a reduction in the number of patients assigned per licensed nurse and an increase in the number of working Nursing Hours per Patient Day (NHPPD) in acute care hospitals. Moreover, the skill mix increased as the direct patient care was more provided by RNs than by non-RN staff.

- Compared to other states' legislation, lower ratios are associated with significantly lower mortality. Yet, other patient outcomes and most of the quality measures do not appear to have been directly affected by the increase in RN staffing. Therefore it is questioned whether the ratios obtained their intended effect to improve patient outcomes and better quality of care.

- The outcomes are better for nurses in hospitals that meet a benchmark based on California nurse staffing mandates irrespective of whether the hospitals are located in California. When nurses' workloads were in line with California-mandated ratios, nurses' burnout and job dissatisfaction were lower, and nurses reported consistently better quality of care.

- The mandate resulted in nearly a full patient per nurse fewer for all Californian hospitals.

- It is unclear whether the ratios had a negative impact on the access to care, waiting time and hospital closures.

- The Massachusetts Nurse Association (MNA) has been pleading for a safe staffing legislation since 1995. Endorsed by research and the California mandated ratios, the MNA continued its battle. In 2015, ratios for ICUs were enacted in Massachusetts.

- The impact of the ratios in Massachusetts was not significantly different prior to the mandate or compared to other states. Although caution should be taken when interpreting these results because of the limited availability of evaluation research.

- Both California and Massachusetts are states with politically active organised nurse labour unions.

- California ratio legislation has influenced other states and even the federal government. However, it is doubted whether and to what extent these submitted proposals will be enacted in the future. Instead of mandated ratios, a safe staffing committee to develop a safe staffing plan was introduced in several states as an alternative to comply with a safe staffing legislation.

- The committees have to construct, evaluate and report on safe staffing plans. A staffing plan is considered to provide adequate, appropriate, and quality delivery of health care services and protects patient safety. The composition of the staffing committees and the contents of the plans differ by state.

- It is questioned to what extent this legislation contributes to safe staffing since there are no evaluation studies.

- Accountability measures were taken in states were a kind of safe staffing legislation was enacted. On the one hand, states could demand 'public reporting' at nursing ward level on a shift-by-shift base and/or at governmental level through electronic submission of the staffing plans. On the other hand, money penalties could be imposed and/or the hospital licensure could be limited, suspended or revoked.

11 DISCUSSION INTERNATIONAL COMPARISON

11.1 Lessons learned

The cumulative evidence about a relationship between nurse staffing levels (number and skill mix) and patient and nurse outcomes is sound and consistent. Starting from this body of evidence, safe staffing policies attempt to realize gains in patient and nurse outcomes. Although safe staffing policy measures start from the same premise, their implementation varies across countries and regions. This is not surprising since the available evidence lacks precision on important practical issues such as 'the optimal number of nursing staff', the 'best way to measure patient acuity', 'the ideal way to tailor staffing levels to type of hospitals and nursing wards'.

To draw lessons for the Belgian context we studied safe staffing policies in the following countries and/or regions: the UK (with a focus on England), Ireland, Australia (with a focus on the states of Victoria and Queensland) and the USA (with a focus on California and Massachusetts). Each of these regions deal in another way with the same policy question: 'how to ensure safe nurse staffing levels at the bedside and at the same time create or maintain a working environment for nurses that is attractive and satisfactory.' From this international overview, it is clear that there is not one 'best-way' to deal with these issues. As a consequence the policies taken often rely on expert consensus (e.g. determination of the patient-to-nurse ratio) which demands a collaboration of all relevant actors (e.g. nursing associations, policy makers, hospital associations) and strong central leadership. Despite the absence of a gold standard method, certain policy features are common or highly similar across the different countries. This allows us to make a number of policy observations. In the sections below, we discuss the main similarities and differences.

Nursing education programmes for RNs are upgraded

The original nursing education programmes in all studied regions were hospital-based 'apprenticeship programmes', where nursing students were often counted as being part of the 'workforce'. During the last couple of decades all regions reformed their nursing programmes to increase the educational level of 'new nursing graduates'. There is a clear policy intention to bring the pre-registration educational pathway for 'Registered Nurses' (RN's) to the level of a 'Bachelor's degree'. Yet, the regions are at different stages of implementing these reforms. In England, Ireland and Australia RNs are educated at the 'Bachelor-degree' level, which are organised at the 'university level (university colleges or nursing schools associated with universities). In the United States, there are still lower-level entry-programmes (i.e. diploma- and associate-degree level). Yet, there are guidelines from the 'Institute of Medicine' as well as from the professional nursing association to upgrade these to a 'Bachelor-degree' programme. While the 'diploma level' is by now more or less abolished, a large number of nursing students are still enrolled in the 'associate-degree' programme. The latter is often an intermediary step towards the Bachelor's degree.

In all countries nurses can follow advanced education programmes (Master and/or PhD level) and career opportunities at the 'advanced nursing practice' level start to emerge.

If different levels in nursing exist, they are different in terms of education, title, salary, scope of practice

Some regions opt for one 'basic or general' educational level in nursing while others have two (distinct) levels. In Ireland and England, for instance, only one nursing level exists(ed): Registered Nurses educated at the Bachelor-degree level. In other countries/regions a second level of nursing education/practice exists. In the USA this is called 'Licensed Vocational/Practical Nurse' while in Australia the terminology 'Enrolled Nurse (EN)' is used. While the EN-level was, because of several problems (e.g. overlap between roles, low professional status), abolished more than three decades ago a new second level of nursing ('nursing associates') was recently introduced (new graduates from 2019 onwards).

RNs make up by far the largest proportion of the nursing workforce in all countries. It is important to note that countries with two nursing levels make a clear distinction in educational level (Bachelor degree versus vocational level training), title (RN versus EN/LPN), salary, responsibility (e.g. EN/LPN have a limited scope of practice and work under supervision of an RN), etc. In these countries, bridging programmes are organised to obtain a RN degree.

Independently of the number of nursing levels, healthcare assistants or equivalent roles (HCA) exist in all countries. While initially they were mainly employed in nursing homes, they are nowadays more and more deployed in the hospital sector too. In most regions policy discussions or reforms are ongoing regarding the required educational pathway, their role and scope of practice, etc. In general, their role seems to be flexible involving a mixture of direct patient care and other activities to support nurses. Yet, they act within clear boundaries and always under supervision of RNs.

Pro-active policy making versus 'never waste a good crisis'

In many of the studied regions a crisis seemed to trigger the development of a 'safe staffing policy'. In England, a series of public inquires (e.g. Mid Staffordshire report) linked severe patient safety problems to inadequate nurse staffing levels. In Victoria and Ireland the safe staffing policy came, under pressure of the nursing unions, to remediate the negative consequences (e.g. low staff morale, lowered status and attractiveness of the nursing profession, reports of decreases in quality of nursing care) of a period of serious dis-investment in nursing. In Ireland, for instance, the number of nurses employed by public health services decreased with 4 000 FTE[258] (or a reduction of 13%) between 2008 and 2013, because of austerity measures. As a consequence, together with other policy actions (salary cuts of 7%, loss of experienced staff due to early requirement schemes), the nursing profession was plunged in a severe crisis. Also in England austerity measures (e.g. salary caps) were taken after the economic recession in 2008. While no reduction in the nursing workforce was observed, the number of nurses employed remained stable while the demand for nursing care grew substantially. Also in England, it was assessed that the nursing workforce was in crisis (e.g. low job morale, unfilled vacancies, high staff turnover).

In other regions (e.g. California, Queensland) the legislators did not wait for a 'systemic crisis' to develop a 'safe staffing policy'. Based on problems voiced by the nursing profession (e.g. industrial action in California) and starting from a solid evidence basis about the nurse staffing and patient outcomes relationship (e.g. Queensland) policy makers developed a 'safe staffing policy'.

In all of the selected regions the objective seems to be twofold: improve patient outcomes and increase the attractiveness of the nursing profession.

Policy options vary from flexible to rigid and from limited in scope to very comprehensive

Large differences between regions exist in the degree of flexibility of the staffing allocation process. Also the number and type of services that are captured within the scope of the safe staffing policy vary.

The Californian patient-to-nurse ratio system is the most rigid of the countries discussed. The ratios are applied at the patient level, at all times (e.g. also during lunch breaks) with the same ratios for all shift types. On general surgical nursing wards, for instance, the maximum number of patients assigned to one nurse may not be higher than five. Although many feared that the rigid character of the patient-to-nurse ratios would have a negative impact on nurse satisfaction, the overall job satisfaction of nurses in California increased after the ratios were implemented.

The patient-to-nurse ratio system in Victoria and Queensland are more flexible as the ratios are applied at the level of the nursing ward and differ per shift type (e.g. in Queensland on general nursing wards there is a maximum of 4 patients per nurse on morning and afternoon shifts and a maximum of 7 patients per nurse during night shifts). Because the ratios are applied at the nursing ward level it is possible to take into account patient characteristics (e.g. acuity) as well as nursing characteristics (e.g. expertise) in the nurse staffing allocation process.

In Ireland no fixed ratios are imposed but a safe staffing framework is created including a system to determine staffing levels (i.e. Nursing Hours per Patient Day - NHPPD) by means of the use of a standardized patient acuity system. If staffing requirements (determined on patient acuity) are

higher than the actual staffing levels an upscaling is required. Yet, the Irish system does not impose a strategy on how the upscaling needs to be executed since the required staffing levels can be overruled based on professional, clinical judgement. Nevertheless, the pilot tests showed that the option to overrule the outcome of the patient acuity measurement is rarely applied.

The most flexible system is the English system. The core element of the English safe staffing policy was the development of a nationwide guidance on 'safe staffing'. This nationwide guidance includes: a Board-to-ward approach; the use of evidence-informed tools together with professional judgement and quality of care indicators; transparency and benchmarks of staffing levels, etc. There are no patient-to-nurse ratios included in the guidance although it is stated that there is an increased risk for harm when one nurse is responsible for more than 8 patients. The guidance and its elements are not an imposed measure as the implementation is left to the initiative of the individual hospitals. Nevertheless, some policy measures (e.g. public reporting of nurse staffing levels, transparency of yearly staffing plans) ensure that it is not entirely permissive.

Also the scope of the safe staffing policies varies between the regions. In Queensland and Ireland the scope is limited to general medical/surgical nursing wards while in other regions the scope is larger including a wide range of services within and outside hospitals. The latter approach, and thus the larger scope seems more appropriate since otherwise the risk exists that areas with nurse-staffing ratios might be realized at the expense of areas without ratios.

Common elements and objectives observed in safe staffing policies

Despite the large observed differences we identified also important commonalities:

- The safe staffing policies aim to increase the number of nursing staff at the bedside to ensure safe patient care.

- In all systems the importance of patient acuity measurement is acknowledged. This is most pronounced in the Irish system where patient acuity measurement is used to determine the required nurse staffing levels. An Australian patient classification system is used within Ireland. Although the patient classification system was developed and calibrated in Australia, it seems applicable in Ireland. During the pilot test the 'required NHPPD' that resulted from patient acuity measurement were rarely contested. Also the English nationwide guidance advises the use of patient acuity measurement in the staffing allocation process. There is no single patient classification system that is recommended (partly because an evidence review showed that there could not be identified a superior patient classification system). Instead they recommend to use measurement methods that are endorsed by NICE (e.g. 'Safer Nursing Care Tool'). In the regions with mandated patient-to-nurse ratios (e.g. California, Victoria, Queensland), it is specified that the minimum staffing levels need to be up-scaled based on patient acuity measurement ('floor level'). In reality, however, this is rarely the case and the ratios are used as maximum staffing levels ('ceiling level'). The patient-to-nurse ratios in Victoria also partly capture differences in patient acuity by specifying different ratios according to the hospital type.

- The safe staffing policies take into account the evidence about the association between the educational level of nurses and patient outcomes. This is most explicitly done in Victoria and Ireland. In Victoria, hospitals can comply with the ratios by using both RNs and ENs but at least 75% of the nursing staff needs to be a RN. In Ireland, where there is only one level of nurses (i.e. RNs with a Bachelor's degree), the safe staffing framework includes a 80%/20% skill mix recommendation. As such the nursing and caring staff establishment of

a nursing ward in Ireland includes maximal 20% HCAs. In other regions no recommended skill-mix proportion is used. In fact, in California it was feared that hospitals would employ more LPNs to comply with the mandated ratios and that as a consequence the skill mix would drop. Yet, this fear seemed idle as no drop in the skill mix was observed after implementation of the mandated ratios.

- Also the importance of the evidence about nursing leadership is incorporated in the safe staffing policies. The mandated ratios (California, Victoria, Queensland) exclude nursing ward managers from the ratios. Also the Irish and English systems advise to count the nursing ward managers supernumerary.

- The safe staffing policies aim to introduce an awareness about the importance from hospital board to bedside. This requires that staffing decisions and discussions take place at the hospital level (e.g. yearly budget for staff per nursing ward) and the nursing ward level (e.g. allocation of nurses per shift, use of float pools). In the systems with mandated minimal nurse to patient ratios the nursing ward managers need to ensure that staffing levels comply every shift with the ratios. These decisions will also require discussions at the hospital level to provide sufficient budget and provide staffing mechanisms (and mechanisms such as float pools, agency staff, admission policy) to comply with the ratios. The Irish and English staffing policies give explicit advice (e.g. frequency of staffing discussions at the hospital board level, use of a dashboard system) to ensure safe staffing is discussed from board to bedside. Guidance is given to standardize staffing decisions, apply them systematically and make them more evidence informed (e.g. red flag monitoring system indicating the number of shifts per ward with potentially unsafe staffing).

- The importance of systematically collecting data about staffing and related factors in a standardized way in order to be able to benchmark and create transparency. In Queensland the compliance with the ratios is, for instance, publicly reported. In England the 'caring hours per patient day' are publicly reported. The complex nature of nurse staffing decisions is also reflected in the data that are advised to collect in a regular fashion. Besides data about the staffing levels it is also advised

to collect data about missed nursing care, nursing work environment, patient outcomes, nurse outcomes, etc.

Safe staffing policies: clear impact on nurse outcomes and nurse staffing levels, (modest) indications for improved patient outcomes

Before discussing the impact of the safe staffing policies it should be noted that evaluation research within this policy area is limited and often of poor quality. It mostly concerns retrospective comparisons on the pre- and post-implementation period. There are two exceptions. In Ireland an evaluation programme is linked to the implementation of the safe staffing programme. The first evaluation results on the first six pilot wards that implemented safe staffing policies are available but the evaluation of the extended project (16-19 nursing wards) is still ongoing. Also in Queensland a pre-post evaluation was budgeted and commissioned prior to implementing the patient-to-nurse ratios in 27 pilot hospitals. Results are not yet available.

Despite these limitations it can be concluded that:

- 'Safe staffing policies' result in more RNs at the bedside. Even in England (the system with the least obligations) there are some indications that the nationwide guidance resulted in increased staffing levels but only up to the level of the pre-recession situation. In addition, these increases in the number of nurse staffing levels at the bedside coincide with increased nurse outcomes (e.g. less burnout, higher job satisfaction, less intention to leave) and an increased attractiveness of the nursing profession (e.g. more applications for nursing schools, nurses increasing their job time).

- There are indications that mandated patient-to-nurse ratios (as implemented in California) have a beneficial impact on patient outcomes (mortality in particular) but this evidence is not yet sound enough to make firm statements. After all, while a large study illustrated an impact on mortality and failure-to-rescue this finding could not be confirmed by other studies (often using less robust designs or other patient outcome measures).

- The budgetary impact of the different staffing policies is unclear. In California, for instance, several other reforms in the hospital payment

system which were introduced around the same time, hamper an evaluation of the budget impact of safe staffing ratios. Nevertheless, it seems that hospitals succeeded to implement the ratios without receiving additional funding. In Victoria additional funding was provided to implement the ratios. In Ireland the upscaling of NHPPD is only partly funded. Yet, large cost-savings are reported because the use of agency staff drastically reduced after implementation of the safe staffing framework.

- The awareness about the importance of safe staffing (general public, policy makers, hospital boards and administrators, nursing managers) increased in all of the evaluated regions.

11.1 Budget impact of a safe staffing policy in Belgium

Patient-to-nurse ratios in Belgian hospitals are higher than international standards. To stop manifest unsafe patient-to-nurse ratios a substantial increase in bedside nurse staffing levels is required. In this section we estimate the additional nursing hours needed to achieve a target patient-to-nurse ratio in each ward and the budgetary impact thereof.

From the international comparison we know that countries applied a variety of policies to increase staffing levels. Also, the patient-to-nurse ratios that were introduced range from very strict to very flexible and the number of patients per nurse differs between countries. Therefore, we estimated the impact on additional staff and budgetary cost of improved patient-to-nurse ratios for different scenarios. Two calculation methods are used, giving a range of results.

The results are an underestimation of the staff and budget necessary to improve hospital-wide patient-to-nurse ratios. There are multiple reasons. First, the analysis is limited to the wards studied in this report, i.e. general internal medicine and surgical nursing wards (taken together), geriatric, paediatric and rehabilitation wards in acute hospital sites (see section 3.3.1 for more information on the selected wards). Hence only a subset of hospital activity is accounted for and the results should be interpreted in that perspective. Second, labour cost for staff may be higher than the target value used, as additional staff will be needed to work night shifts and the IF-

IC reform may entail higher labour costs. Third, the description of the current hospital payment system in Belgium (Chapter 4) clearly showed that the current B2-budget for nursing staff is not sufficient to cover labour costs. Our budgetary calculations do not account for the additional budget necessary to correct for this discrepancy.

Calculation method

To calculate the required FTE to meet a target patient-to-nurse ratio, two methods were used. In a first method, we assume that the target patient-to-nurse ratio needs to be achieved over a certain period and not on a daily basis given that there is a degree of variability and randomness in available staffing and number of patients in a ward. In the second method, we assume that target patient-to-nurse ratios need to be achieved every day, without exception, to ensure patient safety. Evidently, the second method will have a more profound impact on staffing hours and budgetary requirement.

In **method 1**, the following steps were taken. First, for each ward, we calculated the average patient-to-nurse ratio over the registration days in a semester. This implies that on a ward-level, registration days with patient-to-nurse ratios above and below the target value can compensate each other. If the average patient-to-nurse ratio is above the pursued target value, we calculate the additional number of nursing hours needed to achieve the target, i.e. the difference between the current nursing hours and the nursing hours needed to fulfil the target patient-to-nurse ratio. Of course, for wards with staffing levels that are better than the pursued target, no additional staff is required. The estimated additional nursing hours are extrapolated to annual values and aggregated for each hospital by ward type.

In a second step these nursing hours were converted to FTE. Taking account of holidays, sick days, education and training time, etc. we estimated actual work time to be 200 days, which corresponds to 1 520 work hours for a day of 7h36.[339]

In a third step, the required budget for these additional FTE was estimated, based on the national average labour cost as applied in the calculation of the B2-part of the hospital budget (RD of 25/4/2002, art.46). The average

labour cost is based on labour costs of nursing staff, healthcare assistants, paramedical staff, but nurses are the largest group (all educational levels). Each of these staff categories is subdivided according to seniority. In 2019, average labour costs amounted to € 73 206.07. The budget impact of the target patient-to-nurse ratios in Table 28 is based on an average labour cost of € 73 000.

In **method 2**, the first step is different, while the second and third step are identical to method 1. In the first step, we calculated the patient-to-nurse ratio for each ward and each registration day. If the patient-to-nurse ratio on a registration day is above the pursued target value, we calculate the additional number of nursing hours needed to achieve the target, i.e. the difference between the current nursing hours and the nursing hours needed to fulfil the target patient-to-nurse ratio. If the patient-to-nurse ratio is below the target, no additional staffing hours are required. For each ward, the estimated additional nursing hours are aggregated over all registration days and extrapolated to annual levels. Finally, they are aggregated for each hospital by ward type.

Target patient-to-nurse ratios

In a first scenario, we impose a 24/7 patient-to-nurse ratio of 10.6:1 which is based on 8 patients per nurse during daytime (15 hours) and 15 patients per nurse during the night (9 hours), which is the P25 patient-to-nurse value during the night shift as reported in the survey. In a second scenario a maximum of 8 patients per nurse was imposed. These ratios are not optimal nor safe patient-to-nurse ratios, but thresholds above which it is well established that patient safety is at risk.

8.5% extra FTE are needed to avoid unsafe staffing levels

Following method 1, an additional 220 FTE can avoid unsafe staffing levels during daytime and an additional 1 629 FTE are needed to avoid unsafe staffing levels 24/7 in the selected ward types. In 2016, 19 077 FTE (based on a conversion of nursing hours) were active in the respective wards. Hence, to avoid unsafe staffing levels 24/7, about 8.5% extra FTE are needed, with a budget of about € 119 million. The greatest efforts will be needed for rehabilitation and for geriatric wards. As mentioned in the

introduction, the analysis is limited to a subset of wards and should be considered as an underestimation of the efforts in terms of FTE and budget that is needed to implement target patient-to-nurse ratios throughout the entire hospital.

The additional staff and budget that are necessary to achieve target patient-to-nurse ratios every day are substantially higher. For example, to avoid unsafe staffing levels 24/7 in the selected ward types, an additional 2 186 FTE are needed, corresponding to a budget of about € 160 million.

Table 28 – Budget impact of minimum staffing ratios (Calculation method 1 – method 2)

Ward type	Ratio of 10.6:1		Ratio of 8:1	
	FTE (200 days)	Budget (in 000 €)	FTE (200 days)	Budget (in 000 €)
Surgical +internal medicine	104 (+0.8%) – 266 (+1.2%)	7 592 – 19 418	882 (+6.8%) – 1 238.6 (+9.6%)	64 401 – 90 418
Geriatric	82 (+2.6%) – 1 766 (+5.6%)	5 986 – 12 892	565 (+18%) – 668.6 (+21.3%)	41 245 – 48 808
Paediatric	1.4 (+0.1%) – 8.2 (+0.5%)	102 – 599	7.6 (+0.5%) – 30.6 (+1.9%)	555 – 2 234
Rehabilitation	33 (+2.4%) – 82.4 (+6.1%)	2 409 – 6 015	175 (+12.9%) – 248.2 (+18.3%)	12 746 – 18 119
Total	220 (+1.2%) – 533.2 (+2.8%)	16 089 – 38 924	1 629 (+8.5%) – 2 186 (+11.5%)	118 946 – 159 578

Safe staffing is more than avoiding unsafe staffing levels

The FTE and budgets in Table 28 are needed to avoid unsafe staffing levels. To introduce a patient-to-nurse ratio that represents safe staffing levels, more efforts will be needed. We estimated the budgetary impact of applying the upper limits of international examples: 5:1 for day and evening shifts (California), and 8:1 for night shifts (Victoria). This results in an average of 6.1 patients per nurse for general wards. These ratios do not take the lower international patient-to-nurse ratios for paediatric and specialised medical and surgical wards into account. Table 29 shows the impact on FTE and budget when we apply the same methods as described above. Compared to the current situation, an additional 29.0% to 31.4% FTE (N=5 526.8 to 5 987.6) are required in the subset of studied wards. This entails a yearly budgetary cost of 403 to 437 million euros.

Impact of the IF-IC model

The first phase of the IF-IC payment model was introduced in May 2018 (see section 2.8.2.1). The first phase is counted for 18.25% of full implementation. For all functions taken together, the additional labour cost of the full implementation of the IF-IC model is estimated to be 6%. Hence, for the first phase, the additional labour cost is about 1%. Therefore, to take account of the new payment model, the budgets in Table 28 and Table 29 should be incremented by 1%.

Table 29 – Budget impact of minimum staffing ratios

Ward type	Ratio of 6.1:1	
	FTE (200 days)	**Budget (in 000 €)**
Surgical + internal medicine	3 424.6 (+26.5%) – 3 727.6 (+28.8%)	249 996 – 272 115
Geriatric	1 558.4 (+49.7%) – 1 601.2 (+51%)	113 763 – 116 888
Paediatric	48 (+2.9%) – 106 (+6.5%)	3 504 – 7 738
Rehabilitation	495.8 (+36.5%) – 552.8 (+40.7%)	36 193 – 40 354
Total	5 526.8 (29.0%) – 5 987.6 (+31.4%)	403 456 – 437 095

■ REFERENCES

1. Van den Heede K, Dubois C, Devriese S, Baier N, Camaly O, Depuijdt E, et al. Organisation and payment of emergency care services in Belgium: current situation and options for reform. Health Services Research (HSR). Brussels: Belgian Health Care Knowledge Centre (KCE); 2016 29/03/2016. KCE Reports 263 Available from: http://kce.fgov.be/sites/default/files/page_documents/KCE_263_Org anisation_and_payment_of_emergency_care_services.pdf

2. Van de Voorde C, Van den Heede K, Beguin C, Bouckaert N, Camberlin C, de Bekker P, et al. Required hospital capacity in 2025 and criteria for rationalisation of complex cancer surgery, radiotherapy and maternity services. Health Services Research (HSR). Brussels: Belgian Health Care Knowledge Centre (KCE); 2017 06/2017. KCE Reports 289 (D/2017/10.273/45) Available from: https://kce.fgov.be/sites/default/files/atoms/files/Download%20the% 20report%20in%20English%20%28550%20p.%29.pdf

3. Van de Voorde C, Van den Heede K, Mertens R, Annemans L, Busse R, Callens S, et al. Conceptual framework for the reform of the Belgian hospital payment system. Health Services Research (HSR). Brussels: Belgian Health Care Knowledge Centre (KCE); 2014 26/09/2014. KCE Reports 229 Available from: https://kce.fgov.be/sites/default/files/page_documents/KCE_229_Ho spital%20Financing_Report.pdf

4. Van den Heede K, Dubois C, Mistiaen P, Stordeur S, Cordon A, Farfan-Portet MI. Evaluating the need to reform the organisation of care for major trauma patients in Belgium: an analysis of administrative databases. Eur J Trauma Emerg Surg. 2019;45(5).

5. Huntley AL, Chalder M, Shaw ARG, Hollingworth W, Metcalfe C, Benger JR, et al. A systematic review to identify and assess the effectiveness of alternatives for people over the age of 65 who are at risk of potentially avoidable hospital admission. BMJ Open. 2017;7(7):e016236.

6. Bueno H, Ross JS, Wang Y, Chen J, Vidan MT, Normand SL, et al. Trends in length of stay and short-term outcomes among Medicare patients hospitalized for heart failure, 1993-2006. JAMA. 2010;303(21):2141-7.

7. Sermeus W, Delesie L, Van den Heede K, Diya L, Lesaffre E. Measuring the intensity of nursing care: making use of the Belgian Nursing Minimum Data Set. Int J Nurs Stud. 2008;45(7):1011-21.

8. O'Brien-Pallas L, Irvine D, Peereboom E, Murray M. Measuring nursing workload: understanding the variability. Nurs Econ. 1997;15(4):171-82.

9. Unruh LY, Fottler MD. Patient turnover and nursing staff adequacy. Health Serv Res. 2006;41(2):599-612.

10. Van den Heede K, Diya L, Lesaffre E, Vleugels A, Sermeus W. Benchmarking nurse staffing levels: the development of a nationwide feedback tool. J Adv Nurs. 2008;63(6):607-18.

11. Wet van 28 februari 2019 tot wijziging van de gecoördineerde wet van 10 juli 2008 op de ziekenhuizen en andere verzorgingsinrichtingen, wat de klinische netwerking tussen ziekenhuizen betreft, B.S. 28 maart 2019.

12. Agentschap Zorg & Gezondheid. Brief - Netwerkvorming en regionale zorgstrategische planning [Web page].2018 [cited 25/03/2019]. Available from: https://www.zorg-en-gezondheid.be/brief-netwerkvorming-en-regionale-zorgstrategische-planning

13. GIBBIS. Meer waarde in de zorg - Memorandum met het oog op de verkiezingen van 26 mei 2019. 2019. Available from: https://www.gibbis.be/images/documents/2019/memorandum/GIBBIS-Memorandum-2018_NL-WEB.pdf

14. Cloet M. Je kan niet blijven besparen zonder ongelukken. 15 mei 2018.

15. Aiken LH, Sloane DM, Bruyneel L, Van den Heede K, Griffiths P, Busse R, et al. Nurse staffing and education and hospital mortality in nine European countries: a retrospective observational study. Lancet. 2014;383(9931):1824-30.

16. Aiken LH, Sermeus W, Van den Heede K, Sloane DM, Busse R, McKee M, et al. Patient safety, satisfaction, and quality of hospital care: cross sectional surveys of nurses and patients in 12 countries in Europe and the United States. BMJ. 2012;344:e1717.

17. Audet LA, Bourgault P, Rochefort CM. Associations between nurse education and experience and the risk of mortality and adverse events in acute care hospitals: A systematic review of observational studies. Int J Nurs Stud. 2018;80:128-46.

18. Driscoll A, Grant MJ, Carroll D, Dalton S, Deaton C, Jones I, et al. The effect of nurse-to-patient ratios on nurse-sensitive patient outcomes in acute specialist units: a systematic review and meta-analysis. European journal of cardiovascular nursing: Journal of the Working Group on Cardiovascular Nursing of the European Society of Cardiology. 2018;17(1):6-22.

19. Hill B. Do nurse staffing levels affect patient mortality in acute secondary care? British journal of nursing (Mark Allen Publishing). 2017;26(12):698-704.

20. Liao LM, Sun XY, Yu H, Li JW. The association of nurse educational preparation and patient outcomes: Systematic review and meta-analysis. Nurse Education Today. 2016;42:9-16.

21. McGahan M, Kucharski G, Coyer F, Winner ABNRPsbE. Nurse staffing levels and the incidence of mortality and morbidity in the adult intensive care unit: a literature review. Australian Critical Care. 2012;25(2):64-77.

22. Mitchell BG, Gardner A, Stone PW, Hall L, Pogorzelska-Maziarz M. Hospital Staffing and Health Care-Associated Infections: A Systematic Review of the Literature. Jt Comm J Qual Patient Saf. 2018;44(10):613-22.

23. Shekelle PG. Nurse-patient ratios as a patient safety strategy: a systematic review. Annals of internal medicine. 2013;158(5 Pt 2):404-9.

24. Shin S, Park JH, Bae SH. Nurse staffing and nurse outcomes: A systematic review and meta-analysis. Nurs Outlook. 2018;66(3):273-82.

25. Wilson S, Bremner A, Hauck Y, Finn J. The effect of nurse staffing on clinical outcomes of children in hospital: a systematic review. International Journal of Evidence-Based Healthcare. 2011;9(2):97-121.

26. Wynendaele H, Willems R, Trybou J. Systematic review: Association between the patient-nurse ratio and nurse outcomes in acute care hospitals. J Nurs Manag. 2019;27(5).

27. Van den Heede K, Lesaffre E, Diya L, Vleugels A, Clarke SP, Aiken LH, et al. The relationship between inpatient cardiac surgery mortality and nurse numbers and educational level: analysis of administrative data. Int J Nurs Stud. 2009;46(6):796-803.

28. Haegdorens F, Van Bogaert P, De Meester K, Monsieurs KG. The impact of nurse staffing levels and nurse's education on patient mortality in medical and surgical wards: an observational multicentre study. BMC Health Serv Res. 2019;19(1):864.

29. Griffiths P, Ball J, Drennan J, Dall'Ora C, Jones J, Maruotti A, et al. Nurse staffing and patient outcomes: Strengths and limitations of the evidence to inform policy and practice. A review and discussion paper based on evidence reviewed for the National Institute for Health and Care Excellence Safe Staffing guideline development. Int J Nurs Stud. 2016;63:213-25.

30. Griffiths P, Ball J, Bloor K, Bohning D, Briggs J, Dall'Ora C, et al. In: Nurse staffing levels, missed vital signs and mortality in hospitals: retrospective longitudinal observational study. Southampton (UK); 2018. Available from: https://www.ncbi.nlm.nih.gov/pubmed/30516947

31. Needleman J, Buerhaus P, Pankratz VS, Leibson CL, Stevens SR, Harris M. Nurse staffing and inpatient hospital mortality. New England Journal of Medicine. 2011;364(11):1037-45.

32. Yakusheva O, Lindrooth R, Weiss M. Economic evaluation of the 80% baccalaureate nurse workforce recommendation: a patient-level analysis. Med Care. 2014;52(10):864-9.

33. Fagerstrom L, Kinnunen M, Saarela J. Nursing workload, patient safety incidents and mortality: an observational study from Finland. BMJ Open. 2018;8(4):e016367.

34. Recio-Saucedo A, Pope C, Dall'Ora C, Griffiths P, Jones J, Crouch R, et al. Safe staffing for nursing in emergency departments: evidence review. Emergency medicine journal : EMJ. 2015;32(11):888-94.

35. Tubbs-Cooley HL, Cimiotti JP, Silber JH, Sloane DM, Aiken LH. An observational study of nurse staffing ratios and hospital readmission among children admitted for common conditions. BMJ Qual Saf. 2013;22(9):735-42.

36. Ball JE, Bruyneel L, Aiken LH, Sermeus W, Sloane DM, Rafferty AM, et al. Post-operative mortality, missed care and nurse staffing in nine countries: A cross-sectional study. Int J Nurs Stud. 2018;78:10-5.

37. Bruyneel L, Li B, Ausserhofer D, Lesaffre E, Dumitrescu I, Smith HL, et al. Organization of Hospital Nursing, Provision of Nursing Care, and Patient Experiences With Care in Europe. Med Care Res Rev. 2015;72(6):643-64.

38. Griffiths P, Recio-Saucedo A, Dall'Ora C, Briggs J, Maruotti A, Meredith P, et al. The association between nurse staffing and omissions in nursing care: A systematic review. J Adv Nurs. 2018.

39. Recio-Saucedo A, Dall'Ora C, Maruotti A, Ball J, Briggs J, Meredith P, et al. What impact does nursing care left undone have on patient outcomes? Review of the literature. J Clin Nurs. 2018;27(11-12):2248-59.

40. Schubert M, Glass TR, Clarke SP, Aiken LH, Schaffert-Witvliet B, Sloane DM, et al. Rationing of nursing care and its relationship to patient outcomes: the Swiss extension of the International Hospital Outcomes Study. Int J Qual Health Care. 2008;20(4):227-37.

41. Aiken LH, Sloane D, Griffiths P, Rafferty AM, Bruyneel L, McHugh M, et al. Nursing skill mix in European hospitals: cross-sectional study of the association with mortality, patient ratings, and quality of care. BMJ Qual Saf. 2017;26(7):559-68.

42. Griffiths P, Maruotti A, Recio Saucedo A, Redfern OC, Ball JE, Briggs J, et al. Nurse staffing, nursing assistants and hospital mortality: retrospective longitudinal cohort study. BMJ Qual Saf. 2019;28(8).

43. Maxwell E, Hanss K, Lamont T. Staffing on Wards - Making decisions about healthcare staffing, improving effectiveness and supporting staff to care well. NIHR; 2019. Themed Review doi 10.3310/themedreview-03553 Available from: https://www.dc.nihr.ac.uk/themed-reviews/FINAL%20Ward%20Staffing%20for%20WEB.pdf

44. Bae SH. Assessing the relationships between nurse working conditions and patient outcomes: systematic literature review. Journal of Nursing Management. 2011;19(6):700-13.

45. Bae SH, Fabry D. Assessing the relationships between nurse work hours/overtime and nurse and patient outcomes: systematic literature review. Nursing Outlook. 2014;62(2):138-56.

46. Clendon J, Gibbons V. 12 h shifts and rates of error among nurses: A systematic review. International journal of nursing studies. 2015;52(7):1231-42.

47. Copanitsanou P, Fotos N, Brokalaki H. Effects of work environment on patient and nurse outcomes. British journal of nursing (Mark Allen Publishing). 2017;26(3):172-6.

48. Petit Dit Dariel O, Regnaux J-P. Do Magnet-accredited hospitals show improvements in nurse and patient outcomes compared to non-Magnet hospitals: a systematic review. JBI database of systematic reviews and implementation reports. 2015;13(6):168-219.

49. Stalpers D, de Brouwer BJ, Kaljouw MJ, Schuurmans MJ. Associations between characteristics of the nurse work environment and five nurse-sensitive patient outcomes in hospitals: a systematic review of literature. International Journal of Nursing Studies. 2015;52(4):817-35.

50. Butler M, Collins R, Drennan J, Halligan P, O'Mathuna DP, Schultz TJ, et al. Hospital nurse staffing models and patient and staff-related outcomes. Cochrane Database of Systematic Reviews. 2011(7):CD007019.

51. Leary A, Punshon G. Determining acute nurse staffing: a hermeneutic review of an evolving science. BMJ Open. 2019;9(3):e025654.

52. National Institute for Health Care Excellence. Safe staffing for nursing in adult inpatient wards in acute hospitals. NICE London; 2014.

53. Drennan J, Duffield C, Scott AP, Ball J, Brady NM, Murphy A, et al. A protocol to measure the impact of intentional changes to nurse staffing and skill-mix in medical and surgical wards. J Adv Nurs. 2018;74(12):2912-21.

54. International Labour Office. International Standard. Classification of Occupations. Structure, group definitions and correspondence tables. ISCO-08 Volume 1. Geneva: 2012.

55. Maier CB, Aiken LH. Task shifting from physicians to nurses in primary care in 39 countries: a cross-country comparative study. Eur J Public Health. 2016;26(6):927-34.

56. Maier CB, Aiken LH, Busse R. Nurses in advanced roles in primary care: policy levers for implementation. Paris: OECD; 2017. Health working papers (98) Available from:

http://www.oecd.org/officialdocuments/publicdisplaydocumentpdf/?cote=DELSA/HEA/WD/HWP(2017)8&docLanguage=En

57. International Council of Nurses. Definition and Characteristics of the Role [Web page]. [cited 27/03/2019]. Available from: https://international.aanp.org/Practice/APNRoles

58. Min A, Scott LD. Evaluating nursing hours per patient day as a nurse staffing measure. J Nurs Manag. 2016;24(4):439-48.

59. Kalisch BJ, Friese CR, Choi SH, Rochman M. Hospital nurse staffing: choice of measure matters. Med Care. 2011;49(8):775-9.

60. Morris R, MacNeela P, Scott A, Treacy P, Hyde A. Reconsidering the conceptualization of nursing workload: literature review. J Adv Nurs. 2007;57(5):463-71.

61. Brennan CW, Daly BJ. Patient acuity: a concept analysis. J Adv Nurs. 2009;65(5):1114-26.

62. Alghamdi MG. Nursing workload: a concept analysis. J Nurs Manag. 2016;24(4):449-57.

63. Paulsen RA. Taking nurse staffing research to the unit level. Nurs Manage. 2018;49(7):42-8.

64. Van den Heede K. Nurse-staffing levels and patient safety in acute hospitals: analyzing administrative data at the nursing-unit level [Doctoral thesis]. Leuven: Katholieke Universiteit Leuven; 2008.

65. Park SH, Dunton N, Blegen MA. Comparison of Unit-Level Patient Turnover Measures in Acute Care Hospital Settings. Res Nurs Health. 2016;39(3):197-203.

66. Jones TL, Hamilton P, Murry N. Unfinished nursing care, missed care, and implicitly rationed care: State of the science review. Int J Nurs Stud. 2015;52(6):1121-37.

67. Sermeus W, Eeckloo K, Van der Auwera C, Van Hecke A. Future of Nursing: improving health, driving change. Lessen uit de internationale literatuur en studiedagen 2017. FOD

Volksgezondheid, Veiligheid van de voedselketen en Leefmilieu; 2018.

68. Foulon M, Van Gorp L, Kosten L, Put E. 100 Jaar Opleiding verpleegkunde: 1908 - 2008. NVKVV; 2008. Nieuwseditie september 2008

69. Council Directive 77/452/EEC of 27 June 1977 concerning the mutual recognition of diplomas, certificates and other evidence of the formal qualifications of nurses responsible for general care, including measures to facilitate the effective exercise of this right of establishment and freedom to provide services, Available from: https://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:31977L0452:EN:HTML

70. Richtlijn 89/595/EEG van de Raad van 10 oktober 1989 tot wijziging van Richtlijn 77/452/EEG inzake de onderlinge erkenning van de diploma's, certificaten en andere titels van verantwoordelijk algemeen ziekenverpleger, tevens houdende maatregelen tot vergemakkelijking van de daadwerkelijke uitoefening van het recht van vestiging en vrij verrichten van diensten, alsmede van Richtlijn 77/453/EEG inzake de coördinatie van de wettelijke en bestuursrechtelijke bepalingen betreffende de werkzaamheden van verantwoordelijk algemeen ziekenverpleger, Available from: https://publications.europa.eu/en/publication-detail/-/publication/a0dba6e0-297b-4279-a3c2-c203a3bc0437/language-nl

71. Directive 2005/36/EC of the European Parliament and of the Council of 7 September 2005 on the recognition of professional qualifications, Available from: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex%3A32005L0036

72. Richtlijn 2013/55/EU van het Europees Parlement en de Raad van 20 november 2013 tot wijziging van Richtlijn 2005/36/EG betreffende de erkenning van beroepskwalificaties en Verordening (EU) nr. 1024/2012 betreffende de administratieve samenwerking via het Informatiesysteem interne markt (de IMI-verordening),

Available from: https://eur-lex.europa.eu/legal-content/NL/TXT/?uri=CELEX%3A32013L0055

73. Gecoördineerde wet van 10 mei 2015 betreffende de uitoefening van de gezondheidszorgberoepen B.S. 18 juni 2015.

74. Bruyneel L, Van den Heede K, Sermeus W. Belgium. In: Rafferty AM, Busse R, Zander-Jentsch B, Sermeus W, Bruyneel L, editors. Strengthening health systems through nursing: Evidence from 14 European countries. Copenhagen (Denmark); 2019. Available from: https://www.ncbi.nlm.nih.gov/pubmed/31465172

75. NVKVV. Juridische context verpleegkundige opleidingen en beroepstitel [Web page].2019 [cited 17/07/2019]. Available from: https://www.nvkvv.be/page?orl=1&ssn=13fc5380d1e35912106b98bfc3aa3d12aa7d3074&lng=1&pge=2&nws=1968

76. Wet van 22 april 2019 tot wijziging van de gecoördineerde wet van 10 mei 2015 betreffende de uitoefening van de gezondheidszorgberoepen, B.S. 14 mei 2019.

77. Koninklijk besluit van 27 juni 2016 tot wijziging van de wet betreffende de uitoefening van de gezondheidszorgberoepen, gecoördineerd op 10 mei 2015, teneinde de richtlijn 2013/55/EG van het Europees Parlement en de Raad van 20 november 2013 tot wijziging van Richtlijn 2005/36/EG betreffende de erkenning van beroepskwalificaties en Verordening (EU) nr. 1024/2012 betreffende de administratieve samenwerking via het Informatiesysteem interne markt ("de IMI-verordening") om te zetten, B.S. 18 juli 2016

78. Koninklijk besluit van 27 september 2006 houdende de lijst van bijzondere beroepstitels en bijzondere beroepsbekwaamheden voor de beoefenaars van de verpleegkunde, B.S. 24 oktober 2006.

79. Koninklijk besluit van 18 juni 1990 houdende vaststelling van de lijst van de technische verpleegkundige verstrekkingen en de lijst van de handelingen die door een arts aan beoefenaars van de verpleegkunde kunnen worden toevertrouwd, alsmede de wijze van uitvoering van die verstrekkingen en handelingen en de kwalificatievereisten waaraan de beoefenaars van de verpleegkunde moeten voldoen B.S. 26 juli 1990.

80. Koninklijk besluit van 21 april 2007 tot wijziging van het koninklijk besluit van 18 juni 1990 houdende vaststelling van de lijst van de technische verpleegkundige verstrekkingen en de lijst van de handelingen die door een arts aan beoefenaars van de verpleegkunde kunnen worden toevertrouwd, alsmede de wijze van uitvoering van die verstrekkingen en handelingen en de kwalificatievereisten waaraan de beoefenaars van de verpleegkunde moeten voldoen, B.S. 14 mei 2007.

81. Wet van 22 april 2019 inzake de kwaliteitsvolle praktijkvoering in de gezondheidszorg, B.S. 14 mei 2019.

82. Koninklijk besluit van 6 juni 2018 houdende wijziging van het koninklijk besluit van 12 januari 2006 tot vaststelling van de nadere regels om geregistreerd te worden als zorgkundige, B.S. 21 juni 2018.

83. Koninklijk besluit van 12 januari 2006 tot vaststelling van de nadere regels om geregistreerd te worden als zorgkundige B.S. 3 februari 2006.

84. Koninklijk besluit van 27 februari 2019 tot wijziging van het koninklijk besluit van 12 januari 2006 tot vaststelling van de verpleegkundige activiteiten die de zorgkundigen mogen uitvoeren en de voorwaarden waaronder de zorgkundigen deze handelingen mogen stellen, B.S. 18 maart 2019.

85. Vivet V, Durand C, De Geest A, Delvaux A, Jouck P, Miermans PJ, et al. Verpleegkundigen op de arbeidsmarkt 2016 - Eindrapport van de PlanKad gegevenskoppeling voor de beroepsgroep verpleegkundigen. Brussel: FOD Volksgezondheid, Veiligheid van de Voedselketen en Leefmilieu; 2018.

86. OECD. Health at a Glance 2019: OECD Indicators. Paris, France: OECD; 2019. Available from: https://www.oecd-ilibrary.org/sites/4dd50c09-en/1/2/8/5/index.html?itemId=/content/publication/4dd50c09-

en&mimeType=text/html&_csp_=82587932df7c06a6a3f9dab953040 95d&itemIGO=oecd&itemContentType=book

87. OECD. Health at a Glance: Europe 2018 - State of Health in the EU Cycle. OECD; 2018.

88. Devos C, Cordon A, Lefèvre M, Obyn C, Renard F, Bouckaert N, et al. Performance of the Belgian health system – Report 2019. Health Services Research (HSR). Brussel: Belgian Health Care Knowledge Centre (KCE); 2019. KCE Reports (313)

89. Koninklijk besluit van 23 oktober 1964 tot bepaling van de normen die door de ziekenhuizen en hun diensten moeten worden nageleefd, B.S. 7 november 1964.

90. JACIE. Hematopoietic Accreditation Manual cellular therapy 7th edition. 2018.

91. Detroyer V. Staffingsnormen accrediteringsprogramma's (personal communication). 2019.

92. Departement Welzijn, Volksgezondheid en Gezin. Algemene Ziekenhuizen [Web page]. Vlaamse Overheid [cited 17/07/2019]. Available from: https://www.departementwvg.be/zorginspectie/algemene-ziekenhuizen

93. Arrêté royal du 6 décembre 2010 modifiant l'article 20, § 1er, a), de l'annexe à l'arrêté royal du 14 septembre 1984 établissant la nomenclature des prestations de santé en matière d'assurance obligatoire soins de santé et indemnités, M.B. 21 décembre 2012.

94. Koninklijk Besluit van 15 december 1978 tot bepaling van bijzondere normen voor universitaire ziekenhuizen en ziekenhuisdiensten, B.S. 4 juli 1979.

95. Koninklijk besluit van 29 januari 2007 houdende vaststelling eensdeels, van de normen waaraan het zorgprogramma voor de geriatrische patiënt moet voldoen om te worden erkend en, anderdeels, van bijzondere aanvullende normen voor de erkenning van ziekenhuizen en ziekenhuisdiensten, B.S. 07 maart 2007.

96. Koninklijk besluit van 27 april 1998 houdende vaststelling van de normen waaraan een functie voor intensieve zorg moet voldoen om erkend te worden, B.S. 19 juni 1998.

97. Eisenkader Functie voor intensieve zorg. 2018 Available from: https://www.zorg-en-gezondheid.be/sites/default/files/atoms/files/eisenkader%20intensie ve%20zorg%20mei%202018.pdf

98. Koninklijk besluit van 15 juli 2004 houdende vaststelling van de normen waaraan de zorgprogramma's "cardiale pathologie" moeten voldoen om erkend te worden, B.S. 13 september 2004.

99. Koninklijk besluit van 21 maart 2003 houdende vaststelling van de normen waaraan het zorgprogramma voor oncologische basiszorg en het zorgprogramma voor oncologie moeten voldoen om te worden erkend, B.S. 25 april 2003.

100. Koninklijk besluit van 26 april 2007 houdende vaststelling van de normen waaraan het coördinerend gespecialiseerd oncologisch zorgprogramma voor borstkanker en het gespecialiseerd oncologisch zorgprogramma voor borstkanker moeten voldoen om te worden erkend, B.S. 20 juli 2007.

101. Koninklijk besluit van 2 april 2014 houdende vaststelling van de normen waaraan het gespecialiseerd zorgprogramma voor pediatrische hemato-oncologie en het satellietzorgprogramma voor pediatrische hemato-oncologie moeten voldoen om te worden erkend, B.S. 18 april 2014.

102. Koninklijk besluit van 19 april 2014 houdende vaststelling van de normen waaraan de zorgprogramma's "beroertezorg" moeten voldoen om erkend te worden, B.S. 8 augustus 2014

103. ACLVB. Federale gezondheidsdiensten (PC 330): sociaal akkoord 2017-2020 [Web page]. [cited 23-5-2019]. Available from: https://www.aclvb.be/nl/non-profit-en-onderwijs/gezondheidsinrichtingen-en-diensten/artikels/federale-gezondheidsdiensten-pc

104. Bond van Bedienden, Technici en Kaderleden (BBTK). Ontwerp sociaal akkoord private sector. 09-10-2017. Available from: http://www.bbtk.org/nieuws/Pages/Ontwerp%20akkoord%20private%20sector%20%20NL.pdf

105. Koninklijk besluit van 28 december 2011 betreffende uitvoering van het attractiviteitsplan voor het verpleegkundig beroep, in bepaalde federale gezondheidssectoren, wat betreft de premies voor de titels en bijzondere beroepsbekwaamheden en ongemakkelijke prestaties, B.S. 30 december 2011.

106. Paritair Comité voor de gezondheidsinrichtingen en -diensten (330). Collectieve arbeidsovereenkomst van 7 november 2013 met betrekking tot de harmonisatie van de barema's van de zorgkundigen. Belgian Federal Public Service Employment, Labour and Social Dialogue; 11 december 2013.

107. Paritair Comité voor de gezondheidsinrichtingen en -diensten (330). Collectieve arbeidsovereenkomst van 28 september 2016 tot het bepalen van sectorale referentiefuncties en een sectorale functieclassificatie. Belgian Federal Public Service Employment, Labour and Social Dialogue; 3 november 2016.

108. Paritair comite voor de gezondheidsinrichtingen en -diensten (PC 330). Rapporteringsprocedure aan de vzw if-ic met het oog op de voorbereidende werkzaamheden voor de invoering van een nieuwe sectorale functieclassificatie. 03 november 2016.

109. Paritair Comité voor de gezondheidsinrichtingen en -diensten (PC 330). Collectieve arbeidsovereenkomst van 11 december 2017 betreffende de invoering van een nieuw loonmodel voor de federale gezondheidsdiensten.

110. Paritair Comité voor de gezondheidsinrichtingen en -diensten (PC 330). Collectieve arbeidsovereenkomst van 11 december 2017 betreffende de procedures met betrekking tot de invoering van een nieuwe sectorale functieclassificatie.

111. Vlaamse Regering. Actieplan 3.0 Werk maken van werk in de zorg- en welzijnssector. 08 mei 2015 Available from: http://docs.vlaamsparlement.be/pfile?id=1259287

112. Vlaamse Regering. Conceptnota aan de leden van de vlaamse regering: Actieplan 4.0 Werk maken van werk in zorg en welzijn. 22 oktober 2018 Available from: https://www.zorg-en-gezondheid.be/sites/default/files/atoms/files/Actieplan%204.0_conceptnota.pdf

113. IFIC vzw. Available from: https://www.if-ic.org/nl

114. FOD Volksgezondheid, Veiligheid van de Voedselketen en Leefmilieu. Formeel advies 2015_02 van de Planningscommissie - Medisch aanbod. 2015

115. Intersectoraal fonds voor de gezondheidsdiensten. Opleiding tot zorgkundige voor de werknemers uit de sectoren van het paritair comité voor de gezondheidsinrichtingen en diensten PC 330.01. Available from: https://images.fe-bi.org/20191710853300_faq-wio-veelgestelde-vragen-zgk.pdf

116. Intersectoraal fonds voor de gezondheidsdiensten. Opleiding tot verpleegkunde voor de werknemers uit de sectoren van het paritair comité voor de gezondheidsinrichtingen en diensten PC 330.01. Available from: https://images.fe-bi.org/2019171040725_faq-vpk-werkgevers.pdf

117. Koninklijk besluit van 15 september 2006 tot uitvoering van artikel 59 van de wet van 2 januari 2001 houdende sociale, budgettaire en andere bepalingen, wat de maatregelen inzake vrijstelling van arbeidsprestaties en eindeloopbaan betreft, B.S. 29 septebmer 2006.

118. FOD Werkgelegenheid, Arbeid en Sociaal Overleg. Sociale Maribel [Web page]. Available from: http://www.werk.belgie.be/socialemaribel/

119. FOD Volksgezondheid, Veiligheid van de Voedselketen en Leefmilieu. FAQ FINHOSTA: INHOUD. 30 september 2017.

Available from:
https://www.health.belgium.be/sites/default/files/uploads/fields/fpshealth_theme_file/faq_finhosta_-_inhoud_-_nieuwe_vragen_nl_bijgewerkt_dd_30112017.pdf

120. Koninklijk besluit van 30 juli 2018 tot wijziging van het koninklijk besluit van 28 december 2011 betreffende uitvoering van het attractiviteitsplan voor het verpleegkundig beroep, in bepaalde federale gezondheidssectoren, wat betreft de premies voor de titels en bijzondere beroepsbekwaamheden en ongemakkelijke prestaties, B.S. 09 augustus 2018.

121. Sermeus W, Gillet P, Tambeur W, Gillain D, Grietens J, Laport N, et al. Financing of hospital nursing care. Health Services Research (HSR). Brussels: Belgian Health Care Knowledge Centre (KCE); 2007 20/04/2007. KCE Reports 53 Available from: https://kce.fgov.be/publication/report/financing-of-hospital-nursing-care

122. Sermeus W, Van den Heede K. Patiëntenclassificatiesystemen als hulpmiddel bij toewijzing verpleegkundig personeel. Antwerpen: Kluwer; 2003.

123. FOD Volksgezondheid, Veiligheid van de Voedselketen en Leefmilieu. MZG: Personeelsgegevens. 2016. Available from: https://www.health.belgium.be/nl/mzg-personeelsgegevens

124. FOD Volksgezondheid, Veiligheid van de Voedselketen en Leefmilieu. MZG: Verpleegkundige gegevens. 2016. Available from: https://www.health.belgium.be/nl/mzg-verpleegkundige-gegevens

125. Janssens M, Delvaux A. Brochure "10 jaar MVG: 1988-1998" FOD Volksgezondheid, Veiligheid van de Voedselketen en Leefmilieu; 2003. Available from: https://www.health.belgium.be/sites/default/files/uploads/fields/fpshealth_theme_file/broch_mvg_88_98_nl_878017_nl.pdf

126. Van den Heede K, Michiels D, Thonon O, Sermeus W. Using nursing interventions classification as a framework to revise the Belgian nursing minimum data set. Int J Nurs Terminol Classif. 2009;20(3):122-31.

127. FOD Volksgezondheid, Veiligheid van de Voedselketen en Leefmilieu. Nationale feedback over de verpleegkundige gegevens van de MZG - 2015. 2016. Available from: https://www.health.belgium.be/sites/default/files/uploads/fields/fpshealth_theme_file/portahealth-fbdivg-nationaal-2015-12-31-nl_0.pdf

128. FOD Volksgezondheid, Veiligheid van de voedselketen en Leefmilieu. CODEERHANDLEIDING: Verpleegkundige Gegevens van de MZG. VG-MZG Officiële versie 1.6 Januari 2011. Available from: https://www.health.belgium.be/sites/default/files/uploads/fields/fpshealth_theme_file/20110125_codeerhandleiding_vg-mzg_januari_2011_officiele_versie_1_6.pdf

129. FOD Volksgezondheid, Veiligheid van de Voedselketen en Leefmilieu. Codeerhandleiding: Verpleegkundige Gegevens van de Minimale Ziekenhuis Gegevens VG-MZG Officiële versie 2.0. 2017. Available from: https://www.health.belgium.be/sites/default/files/uploads/fields/fpshealth_theme_file/codeerhandleiding_vg-mzg_-_september_2017_-_officiele_versie_2.0.pdf

130. FOD Volksgezondheid, Veiligheid van de voedselketen en Leefmilieu. Nationale Feedback van de MZG personeelsgegevens 2016 semester 1, 2016 semester 2. Available from: https://www.health.belgium.be/sites/default/files/uploads/fields/fpshealth_theme_file/portahealth-fb_dppg_rhmzg-2016-12-31-nl.pdf

131. Myny D, De Bacquer D, Van Hecke A, Beeckman D, Verhaeghe S, Van Goubergen D. Validation of standard times and influencing factors during the development of the Workload Indicator for Nursing. J Adv Nurs. 2014;70(3):674-86.

132. Myny D, Van Goubergen D, Limere V, Gobert M, Verhaeghe S, Defloor T. Determination of standard times of nursing activities

based on a Nursing Minimum Dataset. J Adv Nurs. 2010;66(1):92-102.

133. Sermeus W, Gillet P, Gillain D, Grietens J, Laport N, Michiels D, et al. Development and validation of nursing resource weights for the Belgian Nursing Minimum Dataset in general hospitals: a Delphi questionnaire survey approach. Int J Nurs Stud. 2009;46(2):256-67.

134. Schouppe L, Defloor T, Gobert M, Van Goubergen D. Workload Indicator for Nursing. 2007. Rapport SFP-FOD

135. Thonon O, Gillain D, Laport N, Sermeus W., Van Herck P, Robyns N. Profi(e)l DI-VH: Visualiseren en gebruik van zorgprofielen VG-MZG in het budget van financiële middelen (BFM). 2013. Available from: https://www.health.belgium.be/sites/default/files/uploads/fields/fpshealth_theme_file/20130522_samenvatting_van_het_onderzoeksrapport.pdf

136. FOD Volksgezondheid, Veiligheid van de Voedselketen en Leefmilieu. Handboek NRG new omschrijving van het model - klinische aspecten - versie 1.1. 2018.

137. FOD Volksgezondheid, Veiligheid van de Voedselketen en Leefmilieu. Handboek NRG new: methodologie en opbouw. 2019. Available from: https://www.health.belgium.be/sites/default/files/uploads/fields/fpshealth_theme_file/nl_handleiding_nrgnew.pdf

138. NICE. Safe staffing for nursing in adult inpatient wards in acute hospitals [Web page].2014 [cited 28/11/2018]. Available from: https://www.nice.org.uk/guidance/sg1/resources

139. Van de Voorde C, Van den Heede K, Beguin C, Bouckaert N, Camberlin C, de Bekker P, et al. Required hospital capacity in 2025 and criteria for rationalisation of complex cancer surgery, radiotherapy and maternity services. Health Services Research (HSR). Brussel: Belgian Health Care Knowledge Centre (KCE); 2017. KCE Reports (289)

140. MAHA analyse 2019. Context en uitdagingen voor de sector gezondheidszorg. 9 oktober 2019. Available from: https://www.belfius.be/about-us/dam/corporate/press-room/studies/recent/nl/Slides-MAHA_2019-NL.pdf

141. Gecoördineerde wet van 10 juli 2008 op de ziekenhuizen en andere verzorgingsinrichtingen, B.S. 7 november 2008.

142. Stephani V, Quentin W, Van den Heede K, Van de Voorde C, Geissler A. Payment methods for hospital stays with a large variability in the care process. Health Services Research (HSR). Brussels: Belgian Health Care Knowledge Centre (KCE); 2018 04/2018. KCE Reports 302 Available from: https://kce.fgov.be/sites/default/files/atoms/files/KCE_302_Payment_methods_hospital_stays_Report.pdf

143. Koninklijk besluit van 25 april 2002 betreffende de vaststelling en de vereffening van het budget van financiële middelen van de ziekenhuizen, B.S. 30 mei 2002.

144. UZ Leuven. Ontrafeling van het budget financiële middelen naar pathologiegroepen. Bijlagen. Januari 2018.

145. Sermeus W, Aiken LH, Van den Heede K, Rafferty AM, Griffiths P, Moreno-Casbas MT, et al. Nurse forecasting in Europe (RN4CAST): Rationale, design and methodology. BMC Nurs. 2011;10:6.

146. Ball JE, Murrells T, Rafferty AM, Morrow E, Griffiths P. 'Care left undone'during nursing shifts: associations with workload and perceived quality of care. BMJ Qual Saf. 2014;23(2):116-25.

147. Lake ET. The nursing practice environment: measurement and evidence. Med Care Res Rev. 2007;64(2 Suppl):104S-22S.

148. Bruyneel L, Van den Heede K, Diya L, Aiken L, Sermeus W. Predictive validity of the International Hospital Outcomes Study questionnaire: an RN4CAST pilot study. J Nurs Scholarsh. 2009;41(2):202-10.

149. Warshawsky NE, Havens DS. Global use of the Practice Environment Scale of the Nursing Work Index. Nurs Res. 2011;60(1):17-31.

150. Lake ET, Sanders J, Duan R, Riman KA, Schoenauer KM, Chen Y. A Meta-Analysis of the Associations Between the Nurse Work Environment in Hospitals and 4 Sets of Outcomes. Med Care. 2019;57(5):353-61.

151. Maslach C, Schaufeli WB, Leiter MP. Job burnout. Annu Rev Psychol. 2001;52:397-422.

152. Orindi BO, Lesaffre E, Sermeus W, Bruyneel L. Impact of Cross-level Measurement Noninvariance on Hospital Rankings Based on Patient Experiences With Care in 7 European Countries. Med Care. 2017;55(12):e150-e7.

153. The European Parliament and the Council of the European Union. Regulation (EU) 2016/679 of the European Parliament and of the Council of 27 April 2016 on the protection of natural persons with regard to the processing of personal data and on the free movement of such data, and repealing Directive 95/46/EC (General Data Protection Regulation) Office journal of the European Union 2016:1-88. 2016.

154. Vereinbarung gemäß § 137i Absatz 1 Satz 10 SGB V über Sanktionen nach § 137i Absatz 5 SGB V bei Nichteinhaltung der Pflegepersonaluntergrenzen (PpUG-Sanktions-Vereinbarung), 26.03.2019. Available from: https://www.gkv-spitzenverband.de/media/dokumente/krankenversicherung_1/krankenhaeuser/pflegepersonaluntergrenzen/PpUG-Sanktions-Vereinbarung_26.03.2019.pdf

155. Bundesgesundheitsministerium für Gesundheit. Pflegepersonaluntergrenzen [Web page].2018 [cited 21/08/2019]. Available from: https://www.bundesgesundheitsministerium.de/personaluntergrenzen.html#c13749

156. Brücher BL, Deufert D. German nursing shortage in hospitals–Homemade by Profititis? 4open. 2019;2:12.

157. Wolfgang F. Neue Perspektiven in der Krankenhausfinanzierung Pflege und Qualität. Roeder & Partner Ärtze - Berater im Gesundheitswesen; 2018.

158. The German Federal Governement. Attracting more people to the nursing profession [Web page].2019 [cited 02/09/2019]. Available from: https://www.bundesregierung.de/breg-en/news/attracting-more-people-to-the-nursing-profession-1574976

159. Busse R. Safe staffing levels in Germany. Presentation. Leuven: 21/2/2019.

160. Friedrich S, Karwetzky C, Straub N, Diserens P, Penter V, Beivers A. Studie zur Pflegepersonalausstattung und „Pflegelast" in pflegesensitiven Bereichen in Krankenhäusern. KPMG; 2018. GKV-Spitzenverband / Deutsche Krankenhausgesellschaft e.V

161. Ousey K. The changing face of student nurse education and training programmes. Clinical Practice Development. 2011;7(1).

162. Seccombe I, Smith G, Buchan J, Ball J. Enrolled Nurses: A Study for the UKCC. The Institute for Employment Studies; 1997. IES 344 (1851842721) Available from: https://www.employment-studies.co.uk/system/files/resources/files/344.pdf

163. Nursing and Midwifery Council. Standards for pre-registration nursing education. London: 2010. NMC Available from: https://www.nmc.org.uk/globalassets/sitedocuments/standards/nmc-standards-for-pre-registration-nursing-education.pdf

164. Buchan J, Seccombe I, Charlesworth A. Staffing matters; funding counts. Workforce profile and trends in the English NHS. The Health Foundation; 2016. Available from: https://www.health.org.uk/sites/default/files/StaffingMattersFundingCounts.pdf

165. Royal College of Nursing. The UK nursing market labour review 2017. Available from: https://www.rcn.org.uk/professional-development/publications/pub-006625

166. Buchan J, Charlesworth A, Gershlick B, Seccombe I. A critical moment: NHS staffing trends, retention and attrition. February 2019. Available from: https://www.health.org.uk/sites/default/files/upload/publications/2019/A%20Critical%20Moment_1.pdf

167. Beech J, Bottery S, Charlesworth A, Evans H, Gershlick B, Hemmings N, et al. Closing the gap. Key areas for action on the health and care workforce. Nuffield Trust, the Health Foundation and the King's Fund; 2019. Available from: https://www.nuffieldtrust.org.uk/files/2019-03/heaj6708-workforce-full-report-web.pdf

168. Royal College of Nursing. Advanced Practice Standards. RCN standards for advanced level nursing practice [Web page].2018 [cited 12/12/2018]. Available from: https://www.rcn.org.uk/professional-development/advanced-practice-standards

169. Buchan J, Seccombe I, Gershlick B, Charlesworth A. In short supply: pay policy and nurse numbers. Workforce profile and trends in the English NHS. The Health Foundation; April 2017. Available from: https://www.health.org.uk/sites/default/files/Workforce%20pressure%20points%202017%20FINAL_0.pdf

170. NHS Improvement. Evidence from NHS Improvement on clinical staff shortages. A workforce analysis. February 2016. Available from: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/500288/Clinical_workforce_report.pdf

171. NHS Digital. NHS Vacancy Statistics England - February 2015 - March 2018, Provisional Experimental Statistics. 2018. Available

from: https://files.digital.nhs.uk/8F/D1CA73/nhs-vac-stats-feb15-mar18-eng-rep.pdf

172. Burton CR, Rycroft-Malone J, Williams L, Davies S, McBride A, Hall B, et al. NHS managers' use of nursing workforce planning and deployment technologies: a realist synthesis. 2018;6:36.

173. The King's Fund. What Has the Impact Been of Recent Caps on NHS Agency Staff Spend? London: 2016. Available from: https://www.kingsfund.org.uk/blog/2016/03/nhs-agency-staff-spend

174. House of Commons Library. NHS staff from overseas: statistics [Web page].2018 [cited 17/04/2019]. Available from: https://researchbriefings.parliament.uk/ResearchBriefing/Summary/CBP-7783

175. Dromey J. Why the government's pay rise for NHS workers is barely a pay rise at all. Newstatesman 22/03/2018. Available from: https://www.newstatesman.com/politics/health/2018/03/why-government-s-pay-rise-nhs-workers-barely-pay-rise-all

176. Ball J, Barker H, Griffiths P, Jones J, Lawless J, Burton CR, et al. Implementation, Impact and Costs of Policies for Safe Staffing in Acute Trusts. National Institute for Health Research - Policy Research Programme - Project: PR-ST-1115-10017. University of Southampton; 2019. Available from: https://eprints.soton.ac.uk/430184/1/7315_01_Safe_Staffing_Report_v3.pdf

177. Cavendish. The Cavendish Review: An Independent Review into Healthcare Assistants and Support Workers in the NHS and social care settings. July 2013. Available from: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/236212/Cavendish_Review.pdf

178. Two-thirds of NHS healthcare assistants doing nurses' duties, union finds. The Guardian 2018. Available from: https://www.theguardian.com/society/2018/apr/18/two-thirds-of-nhs-healthcare-assistants-doing-nurses-duties-union-finds

179. Francis R. Report of the Mid Staffordshire NHS Foundation Trust public inquiry: executive summary. The Stationery Office; 2013.

180. Keogh B. Review into the quality of care and treatment provided by 14 hospital trusts in England: overview report, NHS England. 2013.

181. Berwick D. Berwick review into patient safety: Recommendations to improve patient safety in the NHS in England. [Web page]. GOV.UK; 2013 [cited 28/11/2018]. Available from: https://www.gov.uk/government/publications/berwick-review-into-patient-safety

182. NHS England. How to Ensure the Right People, with the right skills, are in the right place at the right time A guide to nursing, midwifery and care staffing capacity and capability. National Institute for Health and Care Excellence (2015) Challenging Behaviour and Learning Disabilities: Prevention and Interventions for People with Learning Disabilities Whose Behaviour Challenges. NICE, London. 2013.

183. Lord Carter of Coles. Operational Productivity and Performance in English NHS Acute Hospitals: Unwarranted Variations. An Independent Report for the Department of Health; 2016. Available from: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/499229/Operational_productivity_A.pdf

184. Keogh K. Hundreds of hospitals in England fail to reach safe staffing levels. Nurs Stand. 2014;29(10):7.

185. NHS 'backtracking' on ward nurse numbers introduced after Mid Staffs. The Guardian 2015. Available from: https://www.theguardian.com/society/2015/oct/13/nhs-backtracking-on-ward-nurse-numbers-introduced-after-mid-staffs

186. NICE. Safe staffing Guideline: Scope. 2013. Available from: https://www.nice.org.uk/guidance/sg1/documents/safe-staffing-guideline-consultation3

187. Lawless J, Couch R, Griffiths P, Burton C, Ball J. Towards safe nurse staffing in England's National Health Service: Progress and pitfalls of policy evolution. Health Policy. 2019;123(6).

188. Health Foundation. In short supply: pay policy and nurse numbers Nurse staffing: can the new guidelines make a difference? 2017. Available from: https://www.health.org.uk/sites/default/files/Workforce%20pressure%20points%202017_nurse%20supplement%20FINAL_0.pdf

189. Smith E, Richards M, Durkin M, Cummings J. Safe staffing and efficiency. 2015 Available from: https://www.scribd.com/doc/284812516/NHS-safe-staffing-letter?secret_password=lfZBMqP3eNhgFhZjee87#from_embed

190. NHS patient safety fears as health watchdog scraps staffing guidelines. The Guardian 2015. Available from: https://www.theguardian.com/society/2015/jun/04/nhs-patient-safety-fears-nice-scrap-staffing-level-guidelines-mid-staffs-scandal

191. National Quality Board. Supporting NHS providers to deliver the right staff, with the right skills, in the right place at the right time 2016. Available from: https://www.england.nhs.uk/wp-content/uploads/2013/04/nqb-guidance.pdf

192. NHS Improvement. Developing workforce safeguards. Supporting providers to deliver high quality care through safe and effective staffing. October 2018. Available from: https://improvement.nhs.uk/documents/3320/Developing_workforce_safeguards.pdf

193. National Quality Board. Safe, sustainable and productive staffing. An improvement resource for adult inpatient wards in acute hospitals. 2018. Available from: https://improvement.nhs.uk/documents/584/FINAL_Adult_In-patient_Safe_Staffing.pdf

194. NHS Improvement. Care hours per patient day (CHPPD): guidance for acute and acute specialist trusts. 2018. Available from:

https://improvement.nhs.uk/documents/3177/CHPPD_guidance_-_acute.pdf

195. NHS Improvement. Care Hours per Patient Day (CHPPD) data [Web page].2018 [cited 07/12/2018]. Available from: https://improvement.nhs.uk/resources/care-hours-patient-day-chppd-data/

196. The Shelford Group. Safer Nursing Care Tool: Implementation Resource Pack. 2013.

197. Cummings J, Richards M. Hard Truths Commitments Regarding the Publishing of Staffing Data. 2014. Available from: https://www.england.nhs.uk/wp-content/uploads/2014/03/staffing-letter.pdf

198. Department of Health, Social Services and Public Safety. Delivering Care: Nurse Staffing in Northern Ireland. Section 1: Strategic Direction and Rationale for general and specialist medical and surgical adult in-hospital settings. 2014. Available from: https://www.publichealth.hscni.net/sites/default/files/dc-section1[1]%20FINAL%20PDF_0.pdf

199. Royal College of Nursing. Safe Staffing [Web page].2018 [cited 13/12/2018]. Available from: https://www.rcn.org.uk/employment-and-pay/safe-staffing

200. Department of Health, Social Services and Public Safety. Delivering Care: Nurse Staffing in Northern Ireland. Section 2: Using the Framework for general and specialist medical and surgical adult in-hospital care settings. 2014. Available from: https://www.publichealth.hscni.net/sites/default/files/dc-section2%5B1%5Dfinal%20PDF_0.pdf

201. Nurse Staffing levels (Wales) Act 2016: Statutory Guide, 2016.

202. Jones A, Whyley H, Doyle J, Bevan L. Development of approaches and legislation to optimise nurse staffing levels. Nurs Stand. 2018;33(5):27-31.

203. Christie B. Safe staffing legislation will be introduced in Scotland. BMJ. 2018;361:k2352.

204. NHS education for Scotland. NHS Scotland Workforce Planning [Web page].2018 [cited 13/12/2018]. Available from: http://www.knowledge.scot.nhs.uk/workforceplanning/resources/nursing-and-midwifery-workload-and-workforce-planning-tools.aspx

205. Health and Social Care Act. Regs 2014. Regulation 18: Staffing. London: The Stationery Office;, 2014. Available from: http://www.legislation.gov.uk/ukpga/2014/23/contents/enacted

206. Care Quality Commission. Health and Social Care Act 2008 (Regulated Activities) Regulations 2014: Regulation 18 [Web page].2018 [cited 13/11/2018]. Available from: https://www.cqc.org.uk/guidance-providers/regulations-enforcement/regulation-18-staffing#guidance

207. NHS Oxford Health. Safe staffing Levels [Web page].2018 [cited 12/12/2018]. Available from: https://www.oxfordhealth.nhs.uk/support-advice/safe-staffing-levels/

208. Borneo A. Staffing for Safe and Effective Care Nursing on the Brink. Royal College of Nursing; 2018.

209. Bode M. Hancock will 'consider' safe staffing legislation in England [Web page]. NursingTimes;2018 [cited 13/12/2018]. Available from: https://nursingnotes.co.uk/hancock-will-consider-safe-staffing-legislation-in-england/

210. Longhurst C. Guidance on safe staffing shies away from set ratio. Nurs Stand. 2017;31(19):9.

211. Royal College of Nursing. Mandatory Nurse Staffing Levels. London, UK: 2012.

212. Safe Staffing Alliance. Manifesto for safe staffing [Web page].2018. Available from: http://www.safestaffing.org.uk/downloads/manifesto-for-safe-staffing/

213. Mitchell G. Mid Staffs lessons being lost, as review finds progress on safe nurse staffing not sustained. Nursing Times 16/04/2019. Available from: https://www.nursingtimes.net/news/workforce/nurse-staffing-levels-still-putting-patients-at-risk-finds-major-review/7028634.article

214. Gerdtz MF, Nelson S. 5-20: a model of minimum nurse-to-patient ratios in Victoria, Australia. J Nurs Manag. 2007;15(1):64-71.

215. The State of Queensland. Hospital and Health Boards (Safe Nurse-to-Patient and Midwife-to-Patient Ratios) Amendment Bill 2015. Available from: https://cabinet.qld.gov.au/documents/2015/Nov/PatientRatiosBill/Attachments/ExNotes.PDF

216. NSW Nurses and Midwifes Association. Ratios. It's a matter of life and death. 2018. Available from: http://www.nswnma.asn.au/wp-content/uploads/2018/06/PHS-Ratios-Claim-Kit-2018-FINAL.pdf

217. Stein-parbury J. Nursing Around the World: Australia. The Online Journal of issues in Nursing. 2000;5(2).

218. The Department of Health. Appendix iv: History of Commonwealth involvement in the nursing and midwifery workforce [Web page].2013 [cited 05/03/2019]. Available from: http://www.health.gov.au/internet/publications/publishing.nsf/Content/work-review-australian-government-health-workforce-programs-toc~appendices~appendix-iv-history-commonwealth-involvement-nursing-midwifery-workforce

219. Hilless M, Healy J. Health care systems in transition: Australia. Copenhagen: WHO Regional Office for Europe; 2001. Available from: http://www.euro.who.int/__data/assets/pdf_file/0003/120288/E74466.pdf

220. Australian Nursing & Midwifery Federation. Nursing education: registered nurse. 2016. Available from: http://anmf.org.au/documents/policies/P_Nursing_education_RN.pdf

221. Australian Nursing & Midwifery Federation. Nursing education: enrolled nurse. 2016. Available from: http://anmf.org.au/documents/policies/P_Nursing_education_EN.pdf

222. Healy J, Sharman E, Lokuge B. Australia. Health system review. European Observatory on Health Systems and Policies; 2016. Health Systems in Transition 8(5) Available from: http://www.euro.who.int/__data/assets/pdf_file/0007/96433/E89731.pdf

223. Australian Institute of Health and Welfare. Nursing and midwifery workforce 2015. 2016. Available from: https://www.aihw.gov.au/reports/workforce/nursing-and-midwifery-workforce-2015/contents/who-are-nurses-and-midwives

224. Victoria State Government. Health assistant (nursing) [Web page]. [cited 05/03/2019]. Available from: https://www2.health.vic.gov.au/health-workforce/reform-and-innovation/assistant-and-support-workforces/health-assistant-nursing

225. Australian College of Nursing. Assistants in Nursing: position statement. 2016.

226. Australian Nursing & Midwifery Federation. Assistants in nursing. 2016. Available from: http://anmf.org.au/documents/policies/P_Assistants_in_nursing.pdf

227. Parliament of Australia. Chapter 2 - Nurse shortages and the impact on health services [Web page].2004 [cited 05/03/2019]. Available from: https://www.aph.gov.au/Parliamentary_Business/Committees/Senate/Community_Affairs/Completed_inquiries/2002-04/nursing/report/c02

228. Health Workforce Australia. Health Workforce 2025. Doctors, Nurses and Midwives: Volume 1. An Australian Government Initiative; March 2012. Available from: http://pandora.nla.gov.au/pan/133228/20150419-

0017/www.hwa.gov.au/sites/uploads/FinalReport_Volume1_FINAL-20120424.pdf

229. Health Workforce Australia. Australia's future health workforce – nurses. Detailed report. An Australian Government initiative; August 2014. Available from: https://www1.health.gov.au/internet/main/publishing.nsf/Content/34AA7E6FDB8C16AACA257D9500112F25/$File/AFHW%20-%20Nurses%20detailed%20report.pdf

230. Gordon S, Buchanan J, Bretherton T. Safety in numbers: Nurse-to-patient ratios and the future of health care. Cornell University Press; 2008.

231. Victorian Government. Safe Patient Care (Nurse to Patient and Midwife to Patient Ratios) Act 2015 No. 51 of 2015 Available from: http://www.legislation.vic.gov.au/Domino/Web_Notes/LDMS/PubStatbook.nsf/f932b66241ecf1b7ca256e92000e23be/D297E4BA50FA4DAFCA257EDD00091998/$FILE/15-051aa%20authorised.pdf

232. Victorian Government. Nurse & Midwife To Patient Ratios To Be Enshrined In Law [Web page].2015 [cited 05/03/2019]. Available from: https://www.premier.vic.gov.au/nurse-midwife-to-patient-ratios-to-be-enshrined-in-law/

233. Victoria State Government. Safe Patient Care (Nurse to Patient and Midwife to Patient Ratios) Act 2015 [Web page]. [cited 05/03/2015]. Available from: https://www2.health.vic.gov.au/health-workforce/nursing-and-midwifery/safe-patient-care-act

234. Victoria State Government. Safe Patient Care (Nurse to Patient and Midwife to Patient Ratios) Act 2015. Frequently asked questions – Managers and Employers. 2015. Available from: http://www.health.vic.gov.au/__data/assets/pdf_file/0008/924695/FAQ-Employers.pdf

235. Parliament of Victoria. Safe Patient Care (Nurse to Patient and Midwife to Patient Ratios) Amendment Bill 2018. Available from: http://www.legislation.vic.gov.au/domino/Web_Notes/LDMS/PubPDo

cs.nsf/ee665e366dcb6cb0ca256da400837f6b/E424C12F9BD01CECCA25836700827600/$FILE/591002bi1.pdf

236. Heslop L, Plummer V. Nurse staff allocation by nurse patient ratio vs. a computerized nurse dependency management system: a comparative cost analysis of Australian and New Zealand hospitals. Nurs Econ. 2012;30(6):347-55.

237. Australian Nursing & Midwifery Federation Tasmanian Branch. NHPPD vs. patient ratios. 2016. Available from: https://web.anmftas.org.au/wp-content/uploads/2016/08/ANMF-Tas-Branch-NHPPD-vs-Patient-Ratios.pdf

238. Australian Nursing & Midwifery Federation Victoria Branch. Ratio improvements and new ratios first bill tabled in the 59th Victorian Parliament. What do the proposed changes mean for you? [Web page].2018 [cited 05/03/2019]. Available from: http://www.anmfvic.asn.au/campaigns/2018/10/30/~/media/81f65768e6f644eebad8aa6eb49694be.pdf

239. ANBC News. Victoria to get 600 new nurses and midwives under hospital ratio overhaul [Web page].2018 [cited 05/03/2019]. Available from: https://www.abc.net.au/news/2018-07-19/victorian-government-moves-to-boost-nurse-ratios-in-hospitals/10012684

240. Queensland Government. Nurse to patient ratio legislation introduced [Web page]. 2015 [cited 16/04/2019]. Available from: http://statements.qld.gov.au/Statement/2015/12/1/nurse-to-patient-ratio-legislation-introduced

241. Queensland Health. Nurse-to-patient ratios. Information Sheet. 2016. Available from: https://www.health.qld.gov.au/__data/assets/pdf_file/0032/666419/npr-general-info-sheet.pdf

242. Queensland Government. About ratios [Web page]. 2016 [cited 16/04/2019]. Available from: https://www.health.qld.gov.au/ocnmo/nursing/nurse-to-patient-ratios/nurse-patient-ratios-faqs

243. Queensland Health. Frequently asked questions [Web page]. 2016 [cited 05/03/2019]. Available from: https://www.health.qld.gov.au/ocnmo/nursing/nurse-to-patient-ratios/nurse-patient-ratios-faqs

244. Queensland Health. Business Planning Framework: a tool for nursing and midwifery workload management. 5th Edition. State of Queensland 2016. Available from: https://www.health.qld.gov.au/__data/assets/pdf_file/0035/666908/bpf.pdf

245. Queensland Government. Statewide nurse-to-patient ratios [Web page]. 2018 [cited 05/03/2019]. Available from: http://www.performance.health.qld.gov.au/HospitalHealthService/NurseToPatientRatios/99998

246. Aiken LH, McHugh MD. New Evidence on Impact of Safe Nurse Staffing Interventions. ICN - Beyond Healthcare to Health. Singapore: International Council of Nurses; 30/06/2019.

247. Aiken L. More nurses means more nurses. Kai Tiaki Nursing New Zealand. 2019;25(6).

248. QNMU. Ratios save Lives - Phase 2 [Web page]. 2018 [cited 05/03/2019]. Available from: https://www.qnmu.org.au/DocumentsFolder/Ratios%20website/Phase%202/Ratios%20Save%20Lives%20Phase%202%201017%20FINAL.pdf

249. Quinn R. Review of Apprenticeship Training in Ireland. 2014. Available from: https://www.education.ie/en/Publications/Policy-Reports/Review-of-Apprenticeship-Training-in-Ireland.pdf

250. Begley CM, Brady A. Irish diploma in nursing students' first clinical allocation: the views of nurse managers. J Nurs Manag. 2002;10(6):339-47.

251. Bradley M. Report of the Review of Undergraduate Nursing and Midwifery Degree Programmes. 2012.

252. Ryan D. Third-level nurse education: learning from the Irish experience. Br J Nurs. 2008;17(22):1402-7.

253. Rami J, Short T. The Bachelor of Science (Hons) Nursing in Ireland. 2014. Available from: http://doras.dcu.ie/19867/1/Rami_nursing.pdf

254. Health Service Executive. Nursing [Web page]. [cited 20/11/2018]. Available from: https://www.hse.ie/eng/staff/jobs/eligibility-criteria/nursing.html

255. Health Service Executive. Performance Profile April - June 2018 Quarterly Report. 2018. Available from: https://www.hse.ie/eng/services/publications/performancereports/april-to-june-2018-quarterly-report.pdf

256. Department of Health. Developing a Policy for Graduate, Specialist and Advanced Nursing & Midwifery Practice: Consultation Paper. Office of the Chief Nurse, Department of Health; March 2017.

257. Department of Health. Health in Ireland: Key Trends in 2017. 2017. Available from: https://health.gov.ie/wp-content/uploads/2018/01/Key-Trends.pdf

258. Wells J, White M. The impact of the economic crisis and austerity on the nursing and midwifery professions in the Republic of Ireland– 'boom','bust'and retrenchment. Journal of Research in Nursing. 2014;19(7-8):562-77.

259. Kingston G, Devitt C, Bobek A. Migrant workers in the Irish healthcare sector. Trinity College Dublin; 2015.

260. Government of Ireland. Health in Ireland: Key Trends 2018. 2018.

261. Health Service Executive. Health Service Employment Report: January 2019. 2019. Available from: https://www.hse.ie/eng/staff/resources/our-workforce/workforce-reporting/health-service-employment-report-jan-2019-.pdf

262. McKenna H, Keeney S, Hasson F. Evaluation of the Irish Pilot Programme for the Education of Health Care Assistants. Government of Ireland 2003; 2003.

263. Health Service Executive. Report of the High Level Group on Health Care Assistants Regarding the Implementation of the Health Care Assistants Programme 2006. Available from: https://www.hse.ie/eng/staff/resources/hrstrategiesreports/report%20of%20the%20high%20level%20group%20on%20health%20care%20assistants%20regarding%20the%20implementation%20of%20the%20hca%20programme.pdf

264. INMO. INMO Position Statement: Health Care Assistant. Irish Nurses and Midwifes Organisation; 2016. Available from: https://www.inmo.ie/tempDocs/INMO%20Position%20%20Statement%20HCA_Executive%20Council_Adopted%202%20February%202016%20(003).pdf

265. INMO. Review of the healthcare assistants role [Web page]. [cited 21/11/2018]. Available from: https://www.inmo.ie/Article/PrintArticle/6652

266. Drennan J, Hegarty J, Savage E, Brady N, Prendergast C, Howson V. Provision of the Evidence to Inform the Future Education, Role and Function of Health Care Assistants in Ireland. School of Nursing and Midwifery, University College Cork; 2018.

267. Health Service Executive. Review of Role and Function of Health Care Assistants. December 2018. Available from: https://www.hse.ie/eng/staff/resources/hrstrategiesreports/health-care-assistant-review-final-report-2018.pdf

268. Francis R. Report of the Mid Staffordshire NHS. Foundation Trust Public Inquiry. 2013. Available from: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/279124/0947.pdf

269. Health Information and Quality Authority. Report of the investigation into the quality, safety and governance of the care provided by the Adelaide and Meath Hospital, Dublin incorporating the National Children's Hospital (AMNCH) for patients who require acute admission. 2011. Available from:

270. Scott A, Kirwan M, Matthews A, Lehwaldt D, Morris R, Staines A. Report of the Irish RN4CAST Study 2009-2011: A nursing workforce under strain. 2013. Available from: http://doras.dcu.ie/19344/1/RN4CAST_FINAL_report_18_April_2013_DORAS.pdf

271. Department of Health. Taskforce on Staffing and Skill Mix [Web page].2018 [cited 16/04/2019]. Available from: https://health.gov.ie/office-of-the-chief-nursing-officer/our-policies/taskforce-on-staffing-and-skill-mix-for-nursing/

272. Department of Health. Framework for Safe Nurse Staffing and Skill Mix in general and Specialist Medical and Surgical Care settings in Adult Hospitals in Ireland in 2018: Final Report and Recommendations by the Taskforce on staffing and Skill Mix for Nursing. Department of Health: Office of the Chief Nurse; 2018. Available from: https://health.gov.ie/wp-content/uploads/2018/04/Nursing-Taskforce-Report.pdf

273. Twigg D, Duffield C, Bremner A, Rapley P, Finn J. The impact of the nursing hours per patient day (NHPPD) staffing method on patient outcomes: a retrospective analysis of patient and staffing data. Int J Nurs Stud. 2011;48(5):540-8.

274. Department of Health. Health Services Capacity Review 2018 - Executive Report Review of Health and Capacity requirements in Ireland to 2031- Findings and recommendations. 2018. Available from: https://health.gov.ie/wp-content/uploads/2018/01/Health-Service-Capacity-Review-2018-Executive-Report.pdf

275. Drennan J. Expert meeting on safe staffing policies (Leuven 21/02/2019). 2019.

276. INMO. Recruitment & Retention Phase 2 - Update 4 [Web page].2019 [cited 16/04/2019]. Available from: https://www.inmo.ie/Home/Index/8135/13483

https://www.hiqa.ie/system/files/Tallaght-Hospital-Investigation-Report.pdf

277. INMO. Ten reasons for members to vote YES to proposals. 2019. Available from: https://www.inmo.ie/tempDocs/10%20reasons%20to%20vote%20YES.pdf

278. Drennan J, Savage E, Hegarty J, Murphy A, Brady N, O'Connel S, et al. Evaluation of the 'Pilot Implementation of the Framework for Safe Nurse Staffing and Skill Mix: report 3. University of Cork, Ireland; 2018.

279. Drennan J, Savage E, Hegarty J, Murphy A, Brady N, O'Connel S, et al. Evaluation of the 'Pilot Implementation of the Framework for Safe Nurse Staffing and Skill Mix: Final report. University of Cork, Ireland; 2017.

280. Statista. Number of RNs in the US since 2001 to 2016 [Web page]. [cited 04/04/2019]. Available from: https://www.statista.com/statistics/185734/number-of-registered-nurses-in-the-us-since-2001/

281. Bureau of Labour Statistics. Occupational employment and wages [Web page]. [updated May 2017; cited 04/04/2019]. Available from: https://www.bls.gov/oes/2017/may/oes291141.htm

282. Bureau of Labour Statistics. Licensed practical and licensed vocational nurses [Web page]. [cited 04/04/2019]. Available from: https://www.bls.gov/ooh/healthcare/licensed-practical-and-licensed-vocational-nurses.htm

283. Bureau of Labour Statistics. Nursing Assistants and orderlies [Web page]. [cited 04/04/2019]. Available from: https://www.bls.gov/ooh/healthcare/nursing-assistants.htm

284. California Health Care Foundation. Califronia's Licensed Vocational Nurses [Web page].2017 [updated August 2017; cited 04/04/2019]. Available from: https://www.chcf.org/wp-content/uploads/2017/12/PDF-AlmanacQRG_2017LVNs.pdf

285. Massachusetts Board of Registration in Nursing. Statistics about Massachusetts nursing licensees [Web page]. [cited 04/04/2019].

Available from: https://www.mass.gov/service-details/statistics-about-massachusetts-nursing-licensees

286. IOM. The future of nursing: Leading change, advancing health. National Academies Press Washington, DC; 2011.

287. American Nurses Association. ANA applauds IOM's release of 'future of nursing' report [Web page].2010 [cited 04/04/2019]. Available from: https://www.nursingworld.org/~4af375/globalassets/docs/ana/ethics/iomreport100510.pdf

288. Aiken LH, Mullinix CF. The nurse shortage. Myth or reality? N Engl J Med. 1987;317(10):641-6.

289. Aiken LH, Sochalski J, Anderson GF. Downsizing the hospital nursing workforce. Health affairs. 1996;15(4):88-92.

290. Institute of Medicine Committee on the Adequacy of Nursing Staff in Hospitals and Nursing Homes. In: Wunderlich GS, Sloan F, Davis CK, editors. Nursing Staff in Hospitals and Nursing Homes: Is It Adequate? Washington (DC): National Academies Press (US); 1996.

291. Donaldson MS, Corrigan JM, Kohn LT. To err is human: building a safer health system. National Academies Press; 2000.

292. Aiken LH, Clarke SP, Sloane DM, Sochalski J, Silber JH. Hospital nurse staffing and patient mortality, nurse burnout, and job dissatisfaction. Jama. 2002;288(16):1987-93.

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

294. Aiken LH, Clarke SP, Cheung RB, Sloane DM, Silber JH. Educational levels of hospital nurses and surgical patient mortality. Jama. 2003;290(12):1617-23.

295. Page A. Keeping patients safe: Transforming the work environment of nurses. National Academies Press; 2004.

296. Olley R, Edwards I, Avery M, Cooper H. Systematic review of the evidence related to mandated nurse staffing ratios in acute hospitals. Australian Health Review. 2018.

297. IHSP. AB 394: California and the Demand for Safe and Effective Nurse to Patient Staffing Ratios. March 2001. Available from: https://nurses.3cdn.net/a985cdaf1305cc6478_f3m6b0kw8.pdf

298. Shojania KG, Duncan BW, McDonald KM, Wachter RM, Markowitz A. Making health care safer: a critical analysis of patient safety practices. Evid Rep Technol Assess (Summ). 2001;43(1):668.

299. Spetz J. The California Experience Following Implementation of Minimum Ratios in 1999 [Web page].2005 [cited 04/04/2019]. Available from: https://masshealthpolicyforum.brandeis.edu/publications/pdfs/25-Mar05/Spetz.pdf

300. Kasprak J. California RN staffing ratio law. 2004 Available from: https://www.cga.ct.gov/2004/rpt/2004-R-0212.htm

301. Terasawa E. California's minimum nurse-staffing law and its impact on hospital closure, service mix, and patient hospital choice. University of Pennsylvania; 2016.

302. Donaldson N, Shapiro S. Impact of California mandated acute care hospital nurse staffing ratios: a literature synthesis. Policy, Politics, & Nursing Practice. 2010;11(3):184-201.

303. Serratt T. Staffing patterns before and after mandatd nurse to patient ratios in California hospitals. San Francisco: University of California; 2009.

304. Cook A. Is there a nurse in the house? The effect of nurse staffing increases on patient health outcomes. Pittsburgh, PA: Carnegie Mellon University; 2009.

305. Armstrong RA. Mandated Staffing Ratios: Effect on Nurse Work Satisfaction, Anticipated Turnover, and Nurse Retention in an Acute Care Hospital [Unpublished doctoral dissertation]. VA: George Mason University; 2004. Available from: https://books.google.be/books?id=31XwHAAACAAJ

306. Mitchell MG. Before and after Assembly Bill 394: Nursing ratios. In: Proceedings of Proceeding of Upsilon Beta Chapter of Sigma Theta Tau International Poster Presentations; 2008; Fullerton: California State University Fullerton.

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

308. Burnes Bolton L, Aydin CE, Donaldson N, Storer Brown D, Sandhu M, Fridman M, et al. Mandated nurse staffing ratios in California: a comparison of staffing and nursing-sensitive outcomes pre-and postregulation. Policy, Politics, & Nursing Practice. 2007;8(4):238-50.

309. Aiken LH, Sloane DM, Cimiotti JP, Clarke SP, Flynn L, Seago JA, et al. Implications of the California nurse staffing mandate for other states. Health services research. 2010;45(4):904-21.

310. Antwi YA, Gaynor MS, Vogt WB. A bargain at twice the price? California hospital prices in the new millennium. In: Proceedings of Forum for Health Economics & Policy; 2009: Berkeley Electronic Press.

311. Reiter KL, Harless DW, Pink GH, Mark BA. Minimum Nurse Staffing Legislation and the Financial Performance of C alifornia Hospitals. Health services research. 2012;47(3pt1):1030-50.

312. Spetz J, Chapman S, Herrera C, Kaiser J, Seago JA, Dower C. Assessing the impact of California's nurse staffing ratios on hospitals and patient care. San Francisco: University of California, San Francisco, Center for California Health Workforce Studies; February 2009. Available from: https://www.chcf.org/wp-content/uploads/2017/12/PDF-AssessingCANurseStaffingRatios.pdf

313. Chapman SA, Spetz J, Seago JA, Kaiser J, Dower C, Herrera C. How have mandated nurse staffing ratios affected hospitals? Perspectives from California hospital leaders. Journal of Healthcare Management. 2009;54(5):321-35.

314. Hickey PA, Gauvreau K, Jenkins K, Fawcett J, Hayman L. Statewide and national impact of California's staffing law on pediatric cardiac surgery outcomes. Journal of Nursing Administration. 2011;41(5):218-25.

315. Reiter KL, Harless DW, Pink GH, Spetz J, Mark B. The effect of minimum nurse staffing legislation on uncompensated care provided by California hospitals. Medical Care Research and Review. 2011;68(3):332-51.

316. McHugh MD, Kelly LA, Sloane DM, Aiken LH. Contradicting fears, California's nurse-to-patient mandate did not reduce the skill level of the nursing workforce in hospitals. Health Affairs. 2011;30(7):1299-306.

317. Mark BA, Harless DW, Spetz J, Reiter KL, Pink GH. California's minimum nurse staffing legislation: results from a natural experiment. Health services research. 2013;48(2pt1):435-54.

318. Munnich EL. The labor market effects of California's minimum nurse staffing law. Health economics. 2014;23(8):935-50.

319. Serratt T, Harrington C, Spetz J, Blegen M. Staffing changes before and after mandated nurse-to-patient ratios in California's hospitals. Policy, Politics, & Nursing Practice. 2011;12(3):133-40.

320. Tellez M. Work satisfaction among California registered nurses: a longitudinal comparative analysis. Nursing economic$. 2012;30(2).

321. Spetz J, Harless DW, Herrera C-N, Mark BA. Using minimum nurse staffing regulations to measure the relationship between nursing and hospital quality of care. Medical Care Research and Review. 2013;70(4):380-99.

322. Weichenthal L, Hendey GW. The effect of mandatory nurse ratios on patient care in an emergency department. The Journal of emergency medicine. 2011;40(1):76-81.

323. McHugh MD, Carthon MB, Sloane DM, Wu E, Kelly L, Aiken LH. Impact of nurse staffing mandates on safety-net hospitals: Lessons from California. The Milbank Quarterly. 2012;90(1):160-86.

324. Cook A, Gaynor M, Stephens Jr M, Taylor L. The effect of a hospital nurse staffing mandate on patient health outcomes: Evidence from California's minimum staffing regulation. Journal of Health Economics. 2012;31(2):340-8.

325. Cox KS, Anderson SC, Teasley SL, Sexton KA, Carroll CA. Nurses' work environment perceptions when employed in states with and without mandatory staffing ratios and/or mandatory staffing plans. Policy Polit Nurs Pract. 2005;6(3):191-7.

326. Mark B, Harless DW, Spetz J. California's minimum-nurse-staffing legislation and nurses' wages. Health Affairs. 2009;28(2):w326-w34.

327. Spetz J. Nurse satisfaction and the implementation of minimum nurse staffing regulations. Policy, Politics, & Nursing Practice. 2008;9(1):15-21.

328. Spetz J, Herrera C. Changes in nurse satisfaction in California, 2004 to 2008. Journal of Nursing Management. 2010;18(5):564-72.

329. Leigh JP, Markis CA, Iosif A-M, Romano PS. California's nurse-to-patient ratio law and occupational injury. International archives of occupational and environmental health. 2015;88(4):477-84.

330. Chan TC, Killeen JP, Vilke GM, Marshall JB, Castillo EM. Effect of mandated nurse–patient ratios on patient wait time and care time in the emergency department. Academic Emergency Medicine. 2010;17(5):545-52.

331. Serratt T. California's nurse-to-patient ratios, Part 2: 8 years later, what do we know about hospital level outcomes? Journal of Nursing Administration. 2013;43(10):549-53.

332. Serratt T. California's nurse-to-patient ratios, Part 1: 8 years later, what do we know about nurse-level outcome? Journal of Nursing Administration. 2013;43(9):475-80.

333. Gale S, Noga PM, Vitello-Cicciu J. Partnership Paramount in Efforts to Influence Nurse Staffing Legislation. Nurse Leader. 2015;13(5):23-5.

334. West E, Barron DN, Harrison D, Rafferty AM, Rowan K, Sanderson C. Nurse staffing, medical staffing and mortality in intensive care: an observational study. International journal of nursing studies. 2014;51(5):781-94.

335. Ballotpedia. Massachusetts Question 1, Nurse-Patient Assignment Limits Initiative (2018) [Web page].Massachusetts: Ballotpedia;2018 [cited 10/04/2019]. Available from: https://ballotpedia.org/Massachusetts_Question_1,_Nurse-Patient_Assignment_Limits_Initiative_(2018)

336. Law AC, Stevens JP, Hohmann S, Walkey AJ. Patient outcomes after the introduction of statewide ICU nurse staffing regulations. Critical care medicine. 2018;46(10):1563-9.

337. Rie M. Why Did Massachusetts Enact Universal ICU Maximal Patient Nurse Staffing Ratios? Critical care medicine. 2018;46(10):1683-4.

338. de Cordova PB, Rogowski J, Riman KA, McHugh MD. Effects of Public Reporting Legislation of Nurse Staffing: A Trend Analysis. Policy, Politics, & Nursing Practice. 2019:1527154419832112.

339. Nationale Raad voor Ziekenhuisvoorzieningen. Advies met betrekking tot de organisatorische normen binnen het operatiekwartier. NRZV/D/44-3. 11 juli 1991.

340. Serratt T. California's nurse-to-patient ratios, Part 3: 8 years later, what do we know about patient level outcomes? J Nurs Adm. 2013;43(11):581-5.

■ APPENDICES

APPENDIX 1. INTRODUCTION CHAPTER

A search was conducted by one researcher (who also sifted and summarized the papers) to identify systematic reviews for the introduction chapter of the scientific report. This search did not aim to be exhaustive neither did we aim to conduct a systematic review of reviews. We report the search strategy for reasons of transparency.

Appendix 1.1. Search strategy

Database: Ovid MEDLINE(R) and Epub Ahead of Print, In-Process & Other Non-Indexed Citations and Daily <1946 to March 13, 2019>

Search Strategy:

----

1   Nursing Staff, Hospital/ (43454)

2   "nursing staff".mp. (71698)

3   "patient-to-nurse ratio".mp. (232)

4   "Personnel Staffing and Scheduling"/ (16486)

5   "nursing work environment".mp. (137)

6   "nurse working environment".mp. (3)

7   "care left undone".mp. (24)

8   "missed nursing care".mp. (114)

9   "OUTCOME ASSESSMENT (HEALTH CARE)"/ (66749)

10   "patient outcome$".mp. (47403)

11   "nurse outcome$".mp. (151)

12   "nursing outcome$".mp. (481)

13   MORTALITY/ (41013)

14   failure-to-rescue.mp. (611)

15   mortality.mp. (1045843)

16   ((("nursing" or nurse) adj2 sensitive) and outcome$).mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms] (387)

17   "nurse staffing".mp. (1385)

18   1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 17 (83187)

19   9 or 10 or 11 or 12 or 13 or 14 or 15 or 16 (1136799)

20   18 and 19 (3855)

21   limit 20 to systematic reviews (341)

Appendix 1.2.   Included studies

We retrieved 341 titles and abstracts in our search for systematic reviews. We decided to add an additional limit, i.e. studies published after 2010, which resulted in a total of 239 studies. From these we retained 32 reviews for full-text selection. A further reduction (e.g. no systematic review or not about staffing and outcome) resulted in 21 included reviews.

Appendix 1.3. Table with included reviews and author conclusions

Ref	Research question/ aim	Search data	Sources searched	Included studies	Target population/ setting	Author conclusions
NURSING WORKING CONDITIONS							
Bae (2011)	To evaluate the relationship between nurse working conditions and patient outcomes	Jan 2000-Oct 2009	CINAHL, PubMed, PsycINFO, JSTOR, Ovid, Web of Science	11	Healthcare facilities	The findings of this review suggested that the evidence supporting positive relationships between working conditions and patient outcomes is inconclusive. Further studies of a longitudinal and interventional nature in various settings are needed to advance knowledge of the complex contextual and multivariate influences among nurse working conditions and patient outcomes. Efforts to improve working conditions should be made in various healthcare work settings to ensure patient safety and improve patient quality of outcomes.
Bae (2014)	To evaluate the effect of nurse overtime and long work hours on nurse and patient outcomes	2000-2013	CINAHL, Cochrane, PubMed, PsycINFO, JSTOR, Ovid, Web of science	24 (21 studies)	Healthcare facilities	The findings of this review suggested that evidence supporting positive relationships between working long hours (e.g. 12h shifts) and adverse outcomes to the nurses is strong. However, to make a conclusion of the positive relationship between long work hours and adverse patient outcomes (less pronounced), more evidence is needed.
Clendon (2015)	To determine the effect of working 12h or more on a single shift in an acute care hospital setting compared with working less than 12h on rates of error among nurses	-August 2014	JBI, Cochrane, Medline, CINAHL	13	Acute hospitals	The risk of making an error appears higher among nurses working 12h or longer on a single shift in acute care hospitals. Hospitals and units currently operating 12h shift systems should review this scheduling practice due to the potential negative impact on patient outcomes. Further research is required to consider factors that may mitigate the risk of error where 12h shifts are scheduled and this cannot be changed.
Stalpers (2015)	To evaluate relationships between characteristics of the nurse work environment and five nurse-sensitive patient outcomes in hospitals	2004-2012	Medline (PubMed), Cochrane, Embase, and CINAHL	29	Hospitals	In the present systematic review scientific evidence was found on the effects of nurse staffing and other characteristics of the work environment (i.e. collaborative relationships, experience, and education) on falls, pain, management and pressure ulcers. Our findings emphasize the need for longitudinal research with well-defined

Ref	Research question/ aim	Search data	Sources searched	Included studies	Target population/ setting	Author conclusions
						outcome measures and comparable samples of hospitals or hospital units.
Petit dit Dariel (2015)	To evaluate the effect of Magnet accreditation on objective nurse and patient outcomes.	1994-2014	CINAHL, Medline, Embase, Academic Search Complete and Web of Science	10	Hospitals	Research measuring the impact of Magnet accreditation on outcomes using methodologically robust designs is lacking. While existing studies suggest that Magnet accreditation, or the characteristics underpinning the Magnet label, offers an interesting opportunity to attract and retain staff and promote good practice, more rigorous designs are needed to establish causal links between the accreditation and outcomes. The complexity of organizations makes it difficult to apply such designs to establish a link between the intervention and the anticipated outcomes. While accreditation continues to be generally accepted as an important driver to improve quality and safety in healthcare organizations, there is still limited evidence to confidently verify that it is the best use of resources.
Copanitsanou (2017)	To evaluate the association between work environment and patient- and nurse outcomes	-March 2016	Medline	10	Hospitals	A good work environment constitutes a determinant factor for high care quality, and at the same time relates to improved outcomes for the nurses.
STAFFING MODELS						
Butler (2011)	To explore the effect of hospital nurse staffing models on patient and staff-related outcomes	Inception-May 2009	DARE, CENTRAL, EPOC, PubMed, CINAHL, CAB Health, etc.	15	Hospitals	Interventions relating to hospital nurse staffing models may improve some patient outcomes, particularly the addition of specialist nursing and specialist support roles to the nursing workforce. Interventions relating to hospital nurse staffing models may also improve staff-related outcomes, particularly the introduction of primary nursing and self-scheduling. However, these findings should be treated with extreme caution due to the limited evidence available from the research conducted to date.
NURSE STAFFING (NBR and qualification) AND PATIENT AND NURSE OUTCOMES						

Ref	Research question/ aim	Search data	Sources searched	Included studies	Target population/ setting	Author conclusions
Wilson (2011)	To identify any association between nurse staffing and clinical outcomes in hospitalised children	1993-2010	Cochrane, JBI, Medline, CINAHL	8	Hospitalised children	There is evidence that levels of nurse staffing (RN NHPPD and skill mix) are associated with clinical outcomes of children. Standardisation of nurse-sensitive indicators and measures of nurse staffing will enable empirical research. Further research to find the levels of Registered Nurse hours per patient day and proportion of Registered Nurse in the skill mix that maximises children's clinical outcomes is still required.
McGahan (2012)	To examine the relationship between nurse staffing levels and the incidence of mortality and morbidity in adult intensive care unit patients	2002-2011	Medline, CINAHL, PsycINFO, Australian digital thesis database	19	Adult ICU	While an overall statistical association between increased nurse staffing levels and decreased adverse patient outcomes was not found in this review, most studies demonstrated a trend between increased nurse staffing levels and decreased adverse patient outcomes in the intensive care unit which is consistent with previous literature. Further more robust research methodologies need to be tested in order to more confidently demonstrate this association and decrease the influence of the many other confounders to patient outcomes.
Shekelle (2015)	To evaluate the relationship between nurse staffing ratios and in-hospital death	2009-Sep 2012	Web of Science	15 + 2 (reviews)	Hospitals	Nurse staffing ratios have a relationship with reductions in hospital-related mortality in most published studies. However, lack of a published evaluation of an intentional change in RN staffing from some initial value (for example, 6 patients to 1 RN on general medical wards) to some lower patient–RN staffing value (such as 5:1 or 4:1) limits conclusions on increasing nurse staffing ratios as a patient safety strategy. All longitudinal published studies to date have assessed natural variations in RN staffing. The concern also remains that mortality is not reduced by increased nurse staffing but by something the nurses do. Determining what this is and how it can best be facilitated should be the goal of an effective patient safety strategy.
Liao (2016)	To investigate the relationship between nurse educational preparation and patient outcomes	2003-2015	CINAHL, Medline, Cochrane databases,	6	Hospitals	This meta-analysis suggests that there is significant association between nurse educational level and patient mortality and failure to rescue. More research, conducted

Ref	Research question/ aim	Search data	Sources searched	Included studies	Target population/ setting	Author conclusions
			ANA publications, and the digital dissertation database			in nonsurgical patients and non-Western countries, is needed.
Audet (2018)	To evaluate associations between nurse education and experience and the occurrence of mortality and adverse events in acute care hospitals	1996-August 2017	Medline, PubMed, CINAHL, Scopus, Campbell, Cochrane	27	Hospitals	Evidence suggests that higher nurse education (higher proportion of RNs with baccalaureate degrees) is associated with lower risks of mortality and failure to rescue. The evidence in support of these associations is stronger for failure to rescue than for mortality, and more robust for surgical patients compared to non-surgical patients.
						Since this body of evidence stems mainly from large hospital-level cross-sectional studies, it is not possible at this point to provide any evidence-based policy recommendations regarding the optimal proportions of baccalaureate-educated RNs that are required by a specific patient at any given point during a hospitalization. Longitudinal studies are needed to better ascertain these associations and determine the specific thresholds that minimize risks.
						Further studies are needed to better document the association of nurse education and experience with other nursing-sensitive adverse event.
Wynendaele (2019)	To evaluate the relationship between the patient-nurse ratio staffing method and nurse employee outcomes	-Feb 2018	PubMed, Embase, Web of Science, CINAHL, Cochrane Library and the ERIC databases	30	Hospitals	A relationship between the patient-nurse ratio (also NHPPD) and specific staff-related outcomes (e.g. job dissatisfaction, burnout, needle stick injuries, care left undone,) is confirmed by various studies. However, apart from the patient-nurse ratio other variables have to be taken into consideration to ensure quality of care (e.g. skill mix, the work environment and patient acuity).
						Hospital management should pursue the access and use of reliable data so that the validity and generalizability of

Ref	Research question/ aim	Search data	Sources searched	Included studies	Target population/ setting	Author conclusions
						evidence-based research can be assessed, which in turn can be converted into policy guidelines.
Shin (2018)	To assess the relationship between nurse staffing and nurse outcomes through meta-analysis.	Jan 2000-Nov 2016	CINAHL, PubMed, PsycINFO, Cochrane, Ebsco, RISS, DBPIA	13	Hospitals	The study findings demonstrate that higher patient-to-nurse ratio is related to negative nurse outcomes (e.g. burnout, intention-to-leave, needle stick injuries). Future studies assessing the optimal patient-to-nurse ratio level in relation to nurse outcomes are needed to reduce adverse nurse outcomes and to help retain nursing staff in hospital settings.
Mitchell (2018)	To examine the relationship between hospital staffing and healthcare-associated infections	Jan 2000-Nov 2015	CINAHL, Medline, PubMed	54	Hospitals (nurse and physician staffing ➜ limited number of studies)	Despite the data being observational, there is a growing and updated evidence base demonstrating the relationship between staffing characteristics and HAIs. The findings support advocacy for effective use of staffing resources and will inform health care managers and professional organizations on future changes to hospital staffing, as they relate to infection prevention
Driscoll (2018)	To evaluate the association between nurse staffing levels and nurse-sensitive patient outcomes in acute specialist units.	2006-2017	Medline, CINAHL, PsycINFO, Embase, HMIC, Cochrane, Web of Science and Index to Theses	35	Specialist acute care units	Patient-to-nurse ratios influence many patient outcomes, most markedly in hospital mortality. More studies need to be conducted on the association of patient-to-nurse ratios with nurse-sensitive patient outcomes to offset the paucity and weaknesses of research in this area. However, there needs to be greater homogeneity in the nurse-sensitive end points measured and the calculation of the NPR. Such metrics should not be used in isolation but can contribute to a 'triangulated' approach to the decision-making process about safe and sustainable nurse staffing levels. This would provide further evidence for recommendations of optimal patient-to-nurse ratios in acute specialist units.
Griffiths (2016)	To summarize evidence on nurse staffing and patient outcomes and discuss the complex challenges that arise when attempting to apply evidence into practice	1993-2014	CEA registry, CDSR, CENTRAL, CINAHL, DARE, Econlit, Embase,	35 primary studies and 2 reviews	Hospitals	The evidence base for associations between nurse staffing and patient outcomes is exclusively comprised of observational studies. This evidence is broadly consistent with a protective effect for increased nurse staffing in relation to a range of patient safety outcomes, care processes and nurse outcomes. A skill mix that is richer in RNs (as opposed to licensed practical nurses or care

Ref	Research question/ aim	Search data	Sources searched	Included studies	Target population/ setting	Author conclusions
			HTA database, Medline including In-Process, NHS EED, HEED,			assistants) is associated with improved outcomes. Higher levels of care assistant staffing are not associated with improved outcomes. While desired positive changes in nurse staffing levels were achieved though mandatory minimum staffing policies, direct evidence of benefits for patients from these policies is scant, although the Western Australian nursing hours per patient day methodology was associated with an increase in staffing and evidence of improved outcomes. We found no evidence for the effect of using tools designed to measure the requirement for nursing care at the patient level or any other approach to determine nurse staffing requirements. Economic studies give widely varying estimates of the costs relative to benefits (in terms of lives saved) for increases in nurse staffing. Three limitations that are likely to lead to endogeneity in many previous studies: omitted variables, which refers to the absence of control for variables such as medical staffing and patient case mix; simultaneity, which occurs when the outcome can influence the level of staffing just as staffing influences outcome; and common-method variance, which may be present when both outcomes and staffing levels variables are derived from the same survey.
Twigg (2014)	To determine the cost effectiveness of increasing nurse staffing or changing the nursing skill mix in adult medical and/or surgical patients	-2013	Medline, CINAHL, SPORTDiscus and PsycINFO	4	Hospitals	This review was unable to determine conclusively whether or not changes in nurse staffing levels and/or skill mix is a cost-effective intervention for improving patient outcomes due to the small number of studies, the mixed results and the inability to compare results across studies. The way comparisons were made does not allow the identification of a nurse patient ratio or skill mix that is most cost effective. In general, it seems that although increasing nurse staffing and/or changing skill mix has a beneficial effect on patient outcomes, this effect comes at a cost. It is up to payers to determine whether or not this cost is acceptable. It may be that from a hospital perspective, increasing nurse staffing is not a cost-effective intervention whereas from the societal perspective it is, however more

Ref	Research question/ aim	Search data	Sources searched	Included studies	Target population/ setting	Author conclusions
						high-quality studies are required in this area, using a well-defined reference base case.
Hill (2017)	To evaluate association between nurse staffing levels and mortality in acute secondary care settings	1994-2016	Cochrane, CINAHL, BNI, OVID, EBSCO	5	Acute hospitals	All of the research papers reviewed showed a relationship between the quality of care patients received from nurses and outcomes. However, only half of them showed a direct relationship between nursing time and patient mortality, so more research is needed.
			MISSED NURSING CARE			
Recio-Saucedo (2017)	To evaluate the impact of missed nursing care on outcomes in adults, on acute hospital wards and in nursing homes	?	Medline, CINAHL, Scopus	14	Hospitals and nursing homes	The review shows the modest evidence base of studies exploring missed care and patient outcomes generated mostly from nurse and patient self-reported data. To support the assertion that nurse staffing levels and skill mix are associated with adverse outcomes as a result of missed care, more research that uses objective staffing and outcome measures is required.
Griffiths (2018)	To identify nursing care most frequently missed in acute adult inpatient wards and to determine evidence for the association of missed care with nurse staffing	2006-June 2016	Cochrane, CINAHL, Embase and Medline	18	Hospitals	Low Registered Nurse staffing is associated with reports of missed nursing care in hospitals. Missed care is a promising indicator of nurse staffing adequacy. The extent to which the relationships observed represent actual failures, is yet to be investigated. As such while the association between staffing and missed care is substantial it is unlikely that most care omissions are directly linked to staffing levels only. Reports of missed care cannot in themselves be used to track nurse staffing adequacy, although changes in the rate or frequency or reports could indicate nurse staffing problems.

APPENDIX 2. INTERNATIONAL COMPARISON

Appendix 2.1.   California: selection of reviews and original studies

PUBLISHED LITERATURE REVIEW (Author, Year)	Donaldson et al., 2010[302]	Serratt, part 1[332]	Serratt, part 2[331]	Serratt, part 3[340]	Handsearch

Original publications (n=29)				
Aiken et al., 2010[309]		X		
Antwi et al., 2009[310]	X			
Armstrong, 2004[305]	X	X		
Burnes Bolton et al., 2007[308]	X	X		X
Chan et al., 2010[330]			X	
Chapman et al., 2009[313]	X	X	X	X
Cook, 2009[304]	X			
Cook et al., 2012[324]		X		X
Cox et al., 2005[325]		X		
Donaldson et al., 2005[307]	X	X		X
Hickey et al., 2011[314]		X	X	X
Leigh et al., 2015[329]					X
Mark et al., 2009[326]	X		X	
Mark et al., 2013[317]		X		X
McHugh et al., 2011[316]		X		
McHugh et al., 2012[323]		X		
Mitchell, 2008[306]	X			
Munnich, 2014[318]					X
Reiter et al., 2012[311]		X	X	
Reiter et al., 2011[315]		X	X	
Serratt, 2009[303]	X			
Serratt et al., 2011[319]		X	X	
Spetz, 2008[327]	X	X		
Spetz et al., 2009[312]	X	X	X	X
Spetz and Herrera, 2010[328]		X		
Spetz et al., 2013[321]					X

Tellez, 2012[320]		X			
Terasawa, 2016[301]					X
Weichenthal and Hendey, 2011[322]	X		X	X	