

REVIEW

NURSING WORK ENVIRONMENT AND UNFINISHED NURSING CARE IN HOSPITAL SETTINGS – A SCOPING REVIEW

Elena Gurková^{ID}, Daniela Bartoníčková, Zdeňka Mikšová^{ID}*Department of Nursing, Faculty of Health Sciences, Palacký University in Olomouc, Czech Republic*

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Abstract

Aim: This scoping review aimed to summarize the evidence regarding the relationship between the nursing work environment and unfinished nursing care, and to offer a deeper insight into organizational factors of unfinished nursing care in hospital settings. A further aim of the study was to collate evidence about instruments for measurement of nurses' perceptions of the nursing work environment. **Design:** A scoping review was performed. **Methods:** A search was conducted in eight scientific databases. The final review included 22 studies and publications ranging from 2010 to 2020. Guidelines regarding scoping review methodology developed by the Joanna Briggs Institute were followed in our study. **Results:** The majority of studies included representative hospital and nurse samples, and had a cross-sectional design. Evidence indicates that the nursing work environment is a significant predictor of unfinished nursing care. The more favorable the nursing work environment, as perceived by nurses, the less frequently they reported unfinished nursing care events. The domains of the Practice Environment Scale of the Nursing Work Index were found to be significant predictors of unfinished nursing care. **Conclusion:** Nurses working in favorable conditions reported lower prevalence of unfinished nursing care. Improvements in staffing and resource adequacy were found to be the most significant factors predicting lower rates of unfinished nursing care. Refinement of factors in the nursing work environment and staffing are interventions that can mitigate unfinished nursing care. Further research should focus on the relationship between different dimensions of the nursing work environment and unfinished nursing care in hospital settings.

Keywords: implicit rationing of nursing care, missed nursing care, nurse work environment, scoping review, unfinished nursing care.

Introduction

Unfinished nursing care (UNC), (or other interchangeably used terms such as “implicit rationing”, “missed nursing care”, and “care left undone”) is a global phenomenon in health care, negatively associated with patient safety culture, quality of nursing care and nurse-related outcomes, such as nurse retention and job satisfaction (Jones et al., 2019). The predicted worldwide nursing shortage emphasizes the urgent need to facilitate a better understanding of this phenomenon in the international professional nursing community (Gustafsson et al., 2020). Indeed, there has been a growing body of research, over the last two decades, investigating the multifactorial nature of the phenomenon of UNC and cause-effect relationships with UNC, since they determine the type of interventions that can mitigate UNC events. Antecedents or contributing factors of UNC are defined and understood through influential; conceptual frameworks of UNC (Bail

& Grealish, 2016; Jones et al., 2015, 2019; Kalisch et al., 2009; Lucero et al., 2009; Schubert et al., 2007), which have been investigated across a variety of clinical settings, health care systems and cultures. In conceptual frameworks of UNC (Bail & Grealish, 2016; Kalish et al., 2009; Schubert et al., 2007), and in some measurements of this concept (e.g. the MISSCARE Survey, Kalisch & Williams, 2009), important variables related to the practice or the nursing work environment (NWE) have been established, including staffing and skill mix, interdisciplinary collaboration, autonomy and responsibility, nursing management, institutional organization and support, sufficiency of resources, and communication and teamwork (Zhao et al., 2020).

Rigorous hypothetical models explaining the multifactorial nature of this phenomenon have been replicated and tested in international studies, and several reasons why nursing care is neglected or delayed have been reported (Ausserhofer et al., 2014; Blackman et al., 2015, 2018). Contributing factors to, or predictors of UNC are important areas of empirical studies across different countries and multiple practice settings (Campbell et al., 2020; Lake

Corresponding author: Elena Gurková, Department of Nursing, Faculty of Health Sciences, Palacký University in Olomouc, Hněvotínská 976/3, Olomouc, Czech Republic; email: elena.gurkova@upol.cz

et al., 2020a; Jones et al., 2019). Predictors of, or contributing factors to UNC represent a complex mixture of nurse and patient characteristics, hospital and unit characteristics, organizational variables and attributes of NWE, and care philosophy that can negatively affect nurses' capacity to carry out care activities (Jones et al., 2015). Therefore, the research emphasis has predominantly focused on nursing human resources, various organisational variables (the nurse-patient ratio, perception of staffing or resources, type of the unit or hospital, and different shifts) and other aspects of the NWE (Ausserhofer et al., 2014; Blackman et al., 2015, 2018; Bragadóttir et al., 2017; Campbell et al., 2020; Duffy et al., 2018; Kalisch & Lee, 2012; Lake et al., 2020a, 2020b; Liu et al., 2018; Park et al., 2018; Zhao et al., 2020).

NWE characteristics were confirmed in recent research syntheses (Griffiths et al., 2020; Jones et al., 2015) as a stronger predictor of UNC than individual nurse variables (such as gender, age, education, experience, work role etc.). Current research syntheses (Cordeiro et al., 2020; Griffiths et al., 2020; Jones et al., 2015; Papastavrou et al., 2014a; Zhao et al., 2020) have identified two common organizational determinants of UNC – the NWE and staffing. Moreover, these reviews have discussed how supportive work environments with increased teamwork and effective communication between all health professionals, and adequate staffing are linked to lower UNC (Cordeiro et al., 2020; Zhao et al., 2020; Lake et al., 2020b). However, Zhao et al. (2020) have argued that previous empirical studies and syntheses failed to systematically explore the association between specific domains of the nursing work environment and UNC. This scoping review contributes to the existing evidence with a deeper insight into what is known about the association between specific domains of the NWE and UNC in hospital settings, and how nurses' perceptions of the NWE have been assessed in hospital settings. The purpose of the analysis is to deepen our understanding of the relationship between these two constructs, which could provide a basis for the type of interventions and implementation of supportive strategies for mitigating UNC and adverse events.

Aim

This scoping review adds to the existing literature by examining how the NWE has been investigated, and what domains of the NWE have an impact on UNC. The analysis aims to summarize the evidence regarding the relationship between the NWE and UNC, and to offer a deeper insight into organizational factors of UNC in a hospital context.

Methods

Design

Guidelines regarding scoping review methodology developed by the Joanna Briggs Institute (Peters et al., 2015), and the PRISMA-Sco checklist (Tricco et al., 2016) for scoping review were followed in our study. Five methodological steps for scoping reviews were applied: identifying a research question; identifying relevant studies; selecting studies; collecting data; summarizing data, and synthesizing results.

The following questions were specified to guide the scoping review:

1. What is known about the association between the NWE and UNC in hospital settings?
2. How have nurses' perceptions of the NWE been assessed in hospital settings?
3. Which instruments have been used to measure nurses' perceptions of the NWE in hospital settings?

Eligibility criteria

Selection of relevant studies began with specification of the inclusion criteria. After the initial search was carried out, qualitative and quantitative approaches in studies were identified. The qualitative approach examines how nurses working in acute-care hospitals experience UNC. Qualitative studies focus mainly on nurses' decision-making processes within increasing time constraints (e.g. Harvey et al., 2020). The qualitative studies did not directly relate to the research questions and were excluded from the analysis.

Studies were eligible for inclusion if they: a) reported the measurement of variables related to the NWE and UNC in hospital settings; b) included quantitative empirical results about the association between UNC and the NWE in hospital settings; c) were peer-reviewed and the full text was available; d) featured nursing staff in hospitals as participants. Studies without specific instruments measuring nurses' perception of the NWE or UNC, discussion papers, reviews, editorials, conference abstracts, books, reports, and dissertations were excluded.

Search strategy

A search of the literature was conducted in June 2020. The electronic databases Web of Science, PROQUEST, EBSCOhost Research Databases Platform, EBM Reviews, MEDLINE Complete, ScienceDirect, Scopus, and PsycInfo were used to gather data for a review of quantitative studies.

The search was limited to publications in English at title / abstract level, and only studies published

between 2000 (when the first influential nursing studies focusing on organizational attributes of hospitals were published) and the first quarter of 2020 were included. In the initial stage of the scoping review, a search in EBSCOhost Research Databases Platform was carried out to identify the search terms that would be most pertinent to the research questions. In the second step, the following search terms were used to cover all concepts emerging from contemporary nursing research regarding the umbrella term UNC: (“implicit rationing of nursing care” OR “missed nursing care” OR “unfinished nursing care” OR “nursing care left undone” OR “bedside rationing” OR “unmet nursing care needs” OR “task incompleteness” OR “failure to maintain” OR “omitted care”) AND (“working environment” OR “practice environment” OR “organizational variables” OR

“organizational climate” OR “nurse work environment”). In addition to the database search, a manual search of the references of the obtained articles, and a scan through the Google Scholar database were conducted. A further search through grey literature, or sources in other languages were not considered. In total, the search produced 2,789 sources.

Study selection inc. PRISMA flow diagram

A total of 2,789 studies were retrieved, from which 722 duplicates were removed. Studies were first screened by title and subsequently by abstract, leading to the exclusion of 2,023 articles. A total of 44 papers were read in full text. Only 22 studies were included in the final analysis. The retrieval process is depicted in Figure 1.

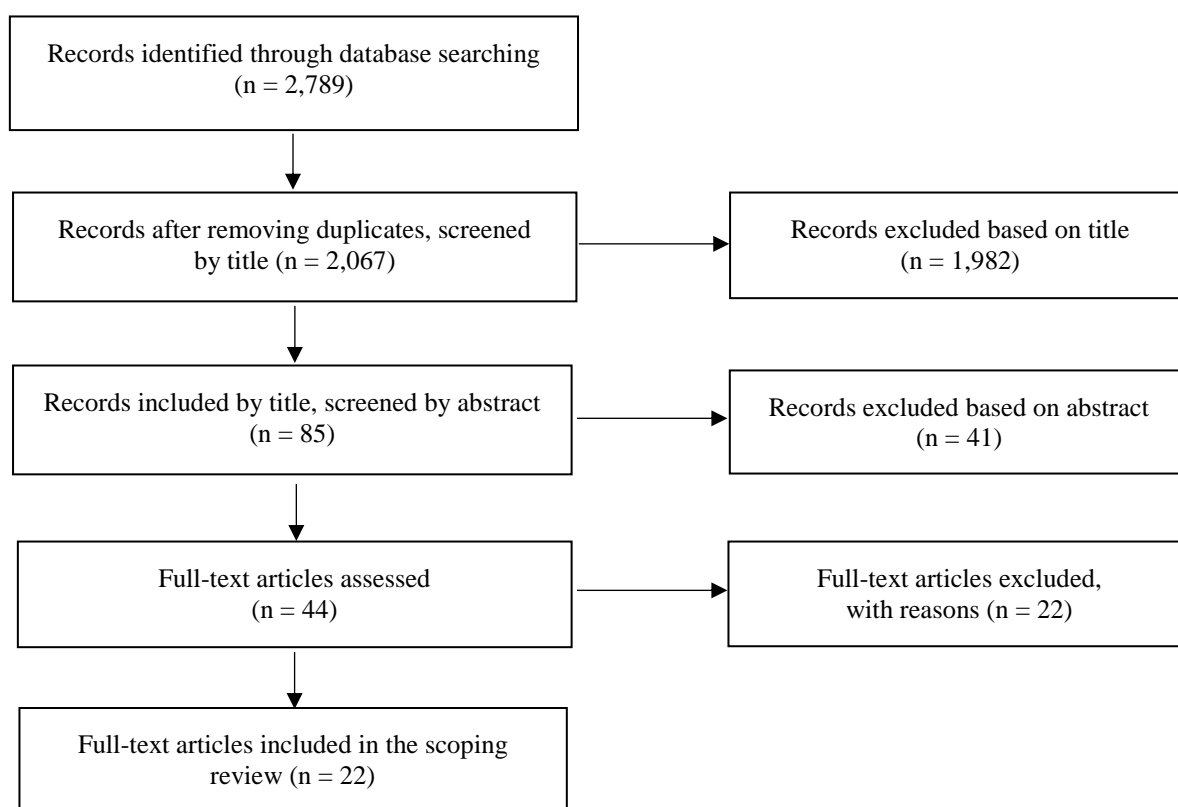


Figure 1 Flow diagram of the retrieval process

A substantial number of quantitative studies reported UNC and the NWE associated with patient or nurse outcomes. These studies did not clearly match the research questions (the relationship between specific domains of the NWE and UNC, and measurement of the NWE). Therefore, studies reporting the relationship between UNC and hospital safety climate or between UNC, the NWE and patient-centred care or patient and nurse outcomes were excluded. In addition, studies focusing solely on the relationship

between UNC, staffing adequacy, or workload which did not report associations with the work environment were excluded. Studies conducted in nursing homes or using only instruments for measuring UNC without tools for measuring the NWE were also excluded. Instruments for measurement of nurses' perceptions of the NWE in hospital settings were only those extracted from the included studies.

Evaluation of quality of articles

The results of studies were retrieved and synthesized by two independent reviewers.

Data were abstracted on sample characteristics (participants, type of hospital and unit), NWE and UNC measurements, methods of data analysis, main results, validity / reliability). These variables were cardinal to the research questions.

Data extraction

Data were further analysed by using a descriptive numerical and qualitative content analysis, which was organised and reported thematically with the stated research questions (Gustafsson et al., 2020).

Results

Characteristics of included studies

The final review included 22 studies and publications ranging from 2010 to 2020. Ten of the included studies were conducted in the United States, one in Canada, in Brazil, in Australia, and in South Korea, and eight in European countries (Cyprus, Czech Republic, Iceland, Switzerland, United Kingdom, and Sweden). One study was an influential multinational study – the RN4CAST (*Nurse forecasting: human resources planning in nursing*) study (Ausserhofer et al., 2014), conducted in 12 European countries. Four European studies (one in Switzerland, two in the United Kingdom, and one in Sweden) were published as part of the RN4CAST study (Table 1). The majority of studies used regression models (linear or logistic) for data analysis.

The sample size in the studies ranged from 29 to 33,659 professional nurses. The number of participating hospitals ranged from one to 488 (Ausserhofer et al., 2014). Some studies conducted in the United States employed data from the Multi-State Nursing Care and Patient Safety Survey (Brooks Carthon et al., 2015; Lake et al., 2017; 2020a, 2020b), or used secondary data from the National Database of Nursing Quality Indicators® (e.g.: Park et al., 2018; Smith et al., 2020a). Most studies used specific settings only, such as medical-surgical units, intensive care units (ICUs), neonatal or pediatric ICUs (NICUs / PICUs), general pediatric setting, and labor and delivery units (Table 1). Twenty-one studies had a cross-sectional design, and the remaining study was a two-period panel study in which participants were examined ten years apart (Lake et al., 2020b). Therefore, the evidence base was limited to cross-sectional descriptive studies that did not permit causal inference.

The majority of studies included representative hospital and nurse samples (mainly studies which

were conducted according to the RN4CAST protocol – Aiken et al., 2018; Ausserhofer et al., 2014; Ball et al., 2014, 2016; Schubert et al., 2013).

Characteristics of instruments used to measure nurses' perception of the NWE and UNC

Five studies (published as substudies of the RN4CAST study) used the conceptual framework developed by Schubert et al. (2007). Four of these substudies used the Tasks Undone survey with thirteen items (TU-13) for measurement of UNC. However, this framework, based on the implicit rationing approach, is represented by another parent instrument – the Basal Extent of Rationing of Nursing Care (BERNCA) Instrument (Schubert et al., 2007). The list of thirteen items in the TU-13 was informed by the BERNCA (Schubert et al., 2007). The task undone approach, using task undone tools, was applied in eight studies (Brooks Carthon et al., 2015; Hessels et al., 2015; Lake et al., 2017, 2018, 2020a; Park et al., 2018; Smith et al., 2020a).

Six studies (Bragadóttir et al., 2017; Duffy et al., 2018; Kim et al., 2018; Pereira et al., 2020, Smith et al., 2020b; Zeleníková et al., 2020) used the missed care approach. This approach is represented mainly by the MISSCARE Survey (Kalisch & Williams, 2009). Three studies (Campbell et al., 2020; Papastavrou et al., 2014b; Schubert et al., 2013) used implicit rationing of nursing care, represented by the BERNCA or the Perceived Implicit Rationing of Nursing Care survey (PIRNCA, Jones, 2014). Three studies were conducted on NICUs and PICUs using specific tools (the Neonatal Extent of Work Rationing Instrument – NEWRI or TU with 17 items) (Rocheffort & Clarke, 2010; Smith et al., 2020a), or using the MISSCARE instrument (Pereira et al., 2020). The most frequently used instrument for the NWE was the Practice Environment Scale of the Nursing Work Index (PES-NWI), applied in 17 studies. One study used the Nursing Teamwork Survey (Bragadóttir et al., 2017), two studies used the Revised Nursing Work Index (NWI-R, Rocheffort & Clarke, 2010; Smith et al., 2020a), and in the remaining two studies, the NWE was measured by the Revised Professional Practice Environment (RPPE, Papastavrou et al., 2014b; Zeleníková et al., 2020).

Relationship between the NWE and UNC

All included studies confirmed unambiguously that a favorable NWE had a significant inverse relationship with UNC. Only two studies showed a low association between UNC and the NWE (Papastavrou et al., 2014b; Zeleníková et al., 2020). However, the RPPE was used in these two studies for assessing domains of the NWE.

Results of studies in which the PES-NWI was used have shown significant associations between these two constructs. However, most studies calculated a composite score averaging scores of the dimensions to delineate the overall NWE. Seven studies (Campbell et al., 2020; Kim et al., 2018; Park et al.,

2018; Rochefort & Clarke, 2010; Schubert et al., 2013; Smith et al., 2020a; Zeleníková et al., 2020) evaluated associations between domains of the PES-NWI and UNC. Improved staffing and resource adequacy were found to be the most significant factors predicting lower prevalence of UNC.

Table 1 Description of studies used in the scoping review (Part 1)

Study	NWE measurements	UNC measurements	Participants, hospitals and units	Data analysis	Main results	Validity / reliability
Aiken et al. (2018), UK RN4CAST-England study	PES-NWI	RN4CAST Survey UNC was measured by the TU tool with 13 items – TU 13	A representative sample of 2,963 RNs from 31 NHS trusts and 46 hospitals was used. General medical, surgical or mixed medical-surgical units were randomly selected.	Nurse survey data were used from the 2010 RN4CAST-England study. Regression models with and without control variables were performed.	Significant association was found between UNC and NWE. Better work environments were related to lower UNC ($b = -0.26$, 95%; CI: -0.48 to -0.04).	The cross-sectional design allows for no causal inferences. Validated measurements were used.
Ausserhofer et al. (2014) RN4CAST-study 12 European countries (Belgium, England, Finland, Germany, Greece, Ireland, The Netherlands, Norway, Poland, Spain, Sweden and Switzerland)	PES-NWI	RN4CAST Survey TU 13	A representative sample of 33,659 professional nurses from 12 countries and 488 hospitals was used. General medical, surgical or mixed medical-surgical units were randomly selected.	Nurse survey data were used from the RN4CAST-study (2009–2011). A multiple multilevel linear regression model was employed. Simple three-level regression models were applied to test the associations between the covariates (NWE) and UNC, and then multiple three-level regression analyses were performed.	Significant association were found between UNC and NWE. Better work environments were related to lower UNC ($b = -2.19$; $p < 0.0001$).	The cross-sectional design allows for no causal inferences. Validated measurements were used. Random effects were included for the hospital and country level.
Ball et al. (2014), UK	PES-NWI	RN4CAST Survey TU 13	A representative sample of 2,917 RNs and unregistered nurse support workers or HCSW from 46 hospitals (401 wards) was used. Mixed medical-surgical units were selected.	Nurse survey data were collected from RNs in England according to the RN4CAST protocol. Multi-level regression models were performed.	Negative associations were found between UNC and NWE. The more favourable NWE perceived by nurses, the less frequently they reported UNC events ($r = -0.32$; $p < 0.001$).	The cross-sectional design allows for no causal inferences. Validated measurements were used.

Table 2 Description of studies used in the scoping review (Part 2)

Study	NWE measurements	UNC measurements	Participants, hospitals and units	Data analysis	Main results	Validity / reliability
Ball et al. (2016), Sweden	PES-NWI	RN4CAST Survey TU 13	A representative sample of 10,174 RNs and unregistered nurse support workers from 79 acute hospitals was used. General medical, surgical units were selected.	Nurse survey data were from the RN4CAST-study conducted in Sweden (2010). Two multi-level regression models were performed.	Negative associations were found between UNC and NEW (OR = -0.516; $p < 0.001$).	The cross-sectional design allows for no causal inferences. Validated measurements were used.
Bragadóttir et al. (2017), Iceland	Nursing Teamwork Survey-Icelandic	The MISSCARE Survey	A representative sample of 867 RNs from 27 medical, surgical and ICU inpatient units in 8 hospitals in Iceland was obtained.	Correlational and regression statistics were employed.	Nursing teamwork was found to be a significant predictor of UNC (predicted 14% of the variance in UNC after controlling for unit type, role, age and staffing adequacy).	The cross-sectional design allows for no causal inferences. Validated measurements were used.
Campbell et al. (2020), USA	PES-NWI	PIRNCA Survey	A representative sample of 950 RNs was used. Medical-surgical, ICU and others (specialities not speciated) units were selected.	Surveys were administered as part of the Alabama Hospital Staff Nurse Study. Multiple linear regressions were used.	Negative associations were found between UNC, five subscales and a composite score of the PES-NWI. Domains of the PES-NWI were found to be significant contributing factors to UNC.	The cross-sectional design allows for no causal inferences. Validated measurements were used. The results have limited generalizability (data were obtained only from Alabama) and study had a low response rate. PES-NWI scores were obtained only at the individual level and exploration of unit or hospital level work environments was not possible.

Table 3 Description of studies used in the scoping review (Part 3)

Study	NWE measurements	UNC measurements	Participants, hospitals and units	Data analysis	Main results	Validity / reliability
Brooks Carthon et al. (2015), USA	PES-NWI	An inventory of 10 common nursing activities that nurses left incomplete.	Large random samples of 20,605 professional bedside nurses were obtained from 419 hospitals. The purpose of the study was to examine the relationship between the NWE, UNC and heart failure readmissions. The type of unit was not mentioned in the study.	Secondary data of 419 general acute care hospitals in the USA were used. Data were collected through the Multi-State Nursing Care and Patient Safety Survey. A set of mixed-level, robust fixed effects logistic regression models were performed.	Nurses working in favourable conditions reported lower prevalence of UNC. Higher percentage of nurses reported being unable to talk to (47.5% vs 37.1%; $p < 0.001$), complete care plans for their patients (40.5% vs 31.9%; $p < 0.001$) or teach (38.1% vs 25.2%; $p < 0.001$) in poor as compared to good working environments.	Hospital-level measurements of UNC were calculated. Validated measurements were used only for the measurement of the NWE. The cross-sectional design allows for no causal inferences.
Duffy et al. (2018), USA	PES-NWI	The MISSCARE Survey	Small random sample of RNs ($n = 138$) was obtained from one regional referral hospital. The RNs were obtained from 17 inpatient units and the emergency department.	Both correlational analyses and stepwise regression analyses were employed.	Negative strong associations were found between UNC and NEW ($r = -0.477$).	The cross-sectional design allows for no causal inferences. Validated measurements were used. The results have limited generalizability.
Hessels et al. (2015), USA	PES-NWI	RN4CAST Survey UNC was measured by the TU tool with 12 items – TU 12	A representative random sample of 7,679 nurses from 70 hospitals in New Jersey was used. Nurses provided inpatient care at the bedside (the type of units were not mentioned).	Authors performed multiple regression techniques with robust procedures using Huber-White sandwich variance estimators.	Each of the five subscales and a composite score of the PES-NWI was confirmed to be the inverse predictors of UNC ($\beta = -0.47$ to -0.77 , $p < 0.01$). For every full point increase in the hospital score on the composite PES-NWI, indicating a better work environment, there was a 13.7% decrease in the percentage of necessary care that is left undone by nurses in hospitals.	The cross-sectional design allows for no causal inferences. Validated measurements were used.

Table 4 Description of studies used in the scoping review (Part 4)

Study	NWE measurements	UNC measurements	Participants, hospitals and units	Data analysis	Main results	Validity / reliability
Kim et al. (2018), South Korea	PES-NWI	The MISSCARE Survey	A small sample of staff nurses (n = 188) working in general wards and ICU was obtained from one university tertiary hospital.	Both correlational analyses and multiple regression analyses were employed.	Nurse manager ability, leadership, and support of nurses ($\beta = -0.26$; $p = 0.004$), staffing and resource adequacy ($\beta = -0.31$; $p = 0.001$), ($\beta = -0.19$, $p = 0.041$), were found as the influential factors. Some dimensions of the PES-NWI were not confirmed to be significant predictors of UNC. MC was more common in poor versus better work environments (1.9 vs 1.2; $p < 0.01$). For 9 of 12 nursing activities, the prevalence of MC was significantly higher in poor environments ($p < 0.05$). The largest work environment effects were observed for the timely administration of medications and patient surveillance (OR = 0.47). The odds that a nurse missed care were 40% lower in better work environments and increased by 70% for each additional patient.	The cross-sectional design allows for no causal inferences. Validated measurements were used. The results have limited generalizability.
Lake et al. (2017), California, Florida, New Jersey and Pennsylvania	PES-NWI	The questions about 12 nursing care “activities which were necessary but left undone because the nurses lacked the time to complete them” on the most recent shift worked were developed.	The sample consists of 2,187 paediatric nurses from 223 hospitals working on ICU and acute paediatrics.	Logistic and linear regression models were used.	MC was more common in poor versus better work environments (1.9 vs 1.2; $p < 0.01$). For 9 of 12 nursing activities, the prevalence of MC was significantly higher in poor environments ($p < 0.05$). The largest work environment effects were observed for the timely administration of medications and patient surveillance (OR = 0.47). The odds that a nurse missed care were 40% lower in better work environments and increased by 70% for each additional patient.	The cross-sectional design allows for no causal inferences. Validated measurements were used only for the measurement of the NWE. The results have limited generalizability (the data from 2006 to 2008 were collected).

Table 1 Description of studies used in the scoping review (Part 5)

Study	NWE measurements	UNC measurements	Participants, hospitals and units	Data analysis	Main results	Validity / reliability
Lake et al. (2018), California, Pennsylvania, Florida, New Jersey	PES-NWI	The questions about 12 nursing care “activities which were necessary but left undone because the nurses lacked the time to complete them” on the most recent shift worked was developed.	A retrospective, secondary analysis of 1,037 staff licensed nurses was performed on 134 NICUs in four large U.S. states (39% response rate). The nurses were classified into three groups based on their percent of infants of black race.	Regression models were used.	A better practice environment (i.e., a one unit increase in the PES-NWI composite score) decreased the odds of MC by more than half (OR = 0.32; 95% CI = 0.20–0.53; p = 0.00).	The cross-sectional design allows for no causal inferences. Validated measurements were used. The results have limited generalizability (the data were from 2006, some data for PES-NWI were missing in up to 2.8% of cases).
Lake et al. (2020a), California, Florida, New Jersey and Pennsylvania	PES-NWI	Nurses answered whether 12 nursing care activities were necessary but left undone because they lacked the time to complete them’ during the most recent shift they worked (two of them were then omitted due to lack of clinical relevance in the unique L&D setting).	Data from 1,313 L&D registered nurses in 247 hospitals from a four-state nurse survey conducted between 2005–2008 in four large U.S. states (39 percent response rate) were used.	Regression models and ANOVA were employed.	Nurses on average missed 1.25 of 10 activities. The MC frequency was 0.89 lower in better work environments compared with poor work environments. In better as compared to poor NWEs, the odds (OR = 0.38) and frequency (CI = -0.89) of MC was significantly lower. The mean OR across significant MC activities was 0.39 for good NWEs. Pain management was the MC activity on which the NWE had the largest effect (OR = 0.30). Other significant activities identified included care planning, comforting / talking with patients, teaching / counselling patients and families, care documentation, patient surveillance and care coordination.	The cross-sectional design allows for no causal inferences. Validated measurements were used only for the measurement of the NWE. The results have limited generalizability (the data were from 2005–2008).

Table 1 Description of studies used in the scoping review (Part 6)

Study	NWE measurements	UNC measurements	Participants, hospitals and units	Data analysis	Main results	Validity / reliability
Lake et al. (2020b), California, Florida, New Jersey and Pennsylvania	PES-NWI	Measured by using the survey question “On the most recent shift / day you worked, which of the following activities were necessary but left undone because of time constraints?”	The data used were from 23,650 nurses surveyed in 2006 and 14,935 surveyed in 2016 in 458 hospitals in four large U.S. states from a four-state survey.	Regression models were used.	In hospitals with improved work environments or nurse staffing, the prevalence and frequency of MC decreased significantly – in hospitals with improved (or stable) work environments: 11% (or 6%) fewer nurses reported MC in 2016 ($p < 0.001$); 0.86 (or 0.55) fewer care activities were missed in 2016 ($p < 0.001$); the prevalence of MC was reduced by one SD and total MC was reduced by 1.3 SDs.	A two-period panel study was used. Validated measurements were used only for the measurement of the NWE. The results have limited generalizability (the scales were used after 10 years).
Papastavrou et al. (2014), Cyprus Republic	RPPE	BERNCA	A sample consisting of 318 nurses from ten medical and surgical units of five general hospitals participated in the study.	The Kendall’s tau correlation coefficient was employed.	The results showed that between two scales there was a small but significant correlation ($\tau = -0.234$; $p < 0.001$). This indicated that nurses who were not satisfied with their work environment (low level on RPPE) also reported that they frequently were unable to perform basic nursing tasks (high level on BERNCA).	A descriptive, correlational, cross-sectional design allows for no causal inference. Validated measurements were used. Generalisability of the results is limited for each country.
Park et al. (2018), U.S. states	PES-NWI	A question asking RNs whether or not they missed any of the 16 essential care activities because of time constraints	This study sample included 1,583 units from 371 U.S. acute care hospitals, containing responses from 31,650 RNs.	Adjusted multilevel logistic regression analysis was performed.	The results showed that good working environment units had 63.3% lower odds of having RNs MC activities than poor working environment units (OR = 0.377; 95% CI 0.335–0.425; $p < 0.001$). Similarly, moderate working environment units had 36.7% lower odds as compared to poor working environment units (OR = 0.633; 0.95% CI 0.568–0.705; $p < 0.001$).	A descriptive, correlational cross-sectional design allows for no causal inference. Validated measurements were used only for the measurement of the NWE. Generalisability of the results is limited for each country.

Table 1 Description of studies used in the scoping review (Part 7)

Study	NWE measurements	UNC measurements	Participants, hospitals and units	Data analysis	Main results	Validity / reliability
Pereira Lima Silva et al. (2020), Brasil	PES-NWI	The MISSCARE-BRASIL instrument	A small sample of professionals (n = 29) working in three ICUs was obtained.	Both descriptive and comparative analyses were used.	ICU 1 presented a worse mean of evaluation in the PES subscale “Adequacy of the staff and resources”. This ICU also exhibited the highest percentage of omission of care. In ICU 2, which is considered to be a “favourable” working environment, there was retained the lowest rate of omission of care. It was proved, that the professional practice environment, as well as the workload, may be predictive factors for the omission of assistance.	A descriptive, quantitative and cross-sectional design allows for no causal inference. Validated measurements were used. Generalisability of the results is limited for each country (very small sample; the statistical methods used cannot be traced).
Rocheffort & Clarke (2010), Canada	NWI-R	NEWRI	The sample consisted of 339 nurses (61.3%) working in nine NICUs) from the province of Quebec.	Linear regression models were fitted.	A favourable work environment was related to lower levels of reported nursing care rationing. The rationing of parental teaching, support, infant comfort care, discharge planning and care coordination was approximately 11% lower when nurse staffing and resource adequacy were rated. Similarly, reductions of respectively 5.7% and 7.7% in the rationing of life support, technologically oriented nursing care and patient surveillance would be expected between the best and worst ratings of nurse staffing and resource adequacy.	A cross-sectional correlational survey design allows for no causal inference. Validated measurements were used. Generalisability of the results is limited within the country in question.

Table 1 Description of studies used in the scoping review (Part 8)

Study	NWE measurements	UNC measurements	Participants, hospitals and units	Data analysis	Main results	Validity / reliability
Schubert et al. (2013), German, French, Switzerland	PES – NWI-R	BERNCA	Data from 1,633 registered nurses working in randomly selected medical, surgical or medical-surgical units of acute care hospitals from the German, French and Italian speaking regions of Switzerland were collected.	Nurse survey data were used from the RN4CAST-study (2009–2010). Multilevel regression analyses were developed.	It was proved that the unit level staff resource adequacy, a dimension of the nurse practice environment, was significantly associated with rationing ($\beta = 0.181$; $p < 0.001$). Moreover, the two studied nurse practice environment dimensions – “nurse manager ability”, and “collegial nurses & physicians” were not, as proposed, significantly associated with rationing, either in the separate (p -value = 0.062–0.866) or in the adjusted model (p -value = 0.186–0.905).	The cross-sectional design allows for no causal inferences. Validated measurements were used.
Smith et al. (2020a), U.S. states	JES PES-NWI The impact of PES-NWI and TU was testing with JES. There wasn't testing association between PES-NWI and TU.	Measured by the following question that included 17 care activities specific to NICU: “On the most recent shift you worked, which of the following nursing activities were necessary but left undone due to time constraints?”	There were 5,824 staff, RNs, 303 NICUs and 280 hospitals from U.S. states included.	Secondary data from the 2016 National Database of Nursing Quality Indicators Registered Nurse Survey were used. Both linear and logistic regressions were calculated.	The missed nursing care was associated with a 0.35 SD decrease in the job enjoyment scale. A one SD increase in the work environment score was associated with a 0.36 SD significant increase in job enjoyment.	The cross-sectional design allows for no causal inferences. Validated measurements were used only for the measurement of the NWE. The results have limited generalizability.
Smith et al. (2020b), Australia	NWI-R-A	Assessed by asking nurses to identify from a list of 13 activities which items were considered to be “Necessary but left undone because you lacked time to complete them?” during their last nursing shift.	A total of 383 nurses from small Australian rural hospitals completed the survey.	Pearson's r and Independent-sample t -tests were used.	There were moderately significant negative correlations between care left undone and the NWI-R: a total mean ($r = -0.36$; $p < 0.01$). Nurses who reported leaving care left undone had statistically significant lower perceptions of the nursing practice environment ($p < 0.001$). The effect sizes ranged from 0.25 to 0.51 reflecting moderate to medium differences in nursing practice environments.	The descriptive, cross-sectional design allows for no causal inferences. Validated measurements were used only for the measurement of the NWI-R: A. The results have limited generalizability.

Table 1 Description of studies used in the scoping review (Part 9)

Study	NWE measurements	UNC measurements	Participants, hospitals and units	Data analysis	Main results	Validity / reliability
Zeleníková et al. (2020), Czech Republic	RPPE	The MISSCARE survey	The sample included 513 general and practical nurses providing direct care in nine Czech hospitals.	Spearman's correlation coefficient was used.	The overall score of missed nursing care negatively correlated with the RPPE total score (-0.2141). It means that a better professional practice environment reflected a lower level of missed nursing care.	The descriptive, cross-sectional design allows for no causal inferences. Validated measurements were used. The results have limited generalizability.

BERNCA – Basel Extent of Rationing of Nursing Care; β – the regression beta coefficient; CI – confidence interval; HCSW – Healthcare Support Workers; ICU – intensive care unit; JES – Job Enjoyment Scale; L&D – labour and delivery; MC – missed care; MISSCARE survey – Missed Nursing Care Survey; NEWRI – Neonatal Extent of Work Rationing Instrument; NHS – National Health Service; NICU – neonatal intensive care unit; NWE – nursing work environment; NWI-R – Nursing Work Index-Revised; NWI-R-A – Nursing Work Index-Revised: Australian; OR – odds ratio; p – the level of statistical significance; PES-NWI – Practice Environment Scale of the Nursing Work Index; PIRNCA – Perceived Implicit Rationing of Nursing Care Survey; RNs – registered nurses; RN4CAST – Nurse Forecasting: Human Resources Planning in Nursing study; RPPE – Revised Professional Practice Environment scale; r – correlation coefficient; SD – standard deviation; TU – Task undone tool; UK – United Kingdom; UNC – unfinished nursing care

Discussion

This scoping review aimed to map the evidence about the impact of the NWE on UNC and to identify which implications are important for further research.

Methodological issues of included studies

The literature about the NWE and UNC is substantial and continues to expand internationally; however, it is hindered by inconsistencies in the use of terminology, or a wide variety of operationalizations to represent these two constructs (Jones et al., 2019; Norman & Strømseng Sjetne, 2017). Moreover, the majority instruments for measurement of the NWE and UNC were developed in the United States; thus the dimensions of the NWE or activities included in UNC instruments may not reflect specific work settings in other countries. Most studies in this area focused predominantly on nurses' perceptions of the NWE and UNC. Few studies measured UNC from a patient perspective or with objective measures of objective indicators. Concerning the measurement of UNC, Palese et al. (2019) have emphasized a transition from self-reported UNC measures to objective measures of objective indicators. There was substantial variation in which nursing activities and work environment domains were assessed by the instruments. Interventions related to mobilization / ambulation support, surveillance, and, especially, activities related to emotional and psychological needs (or activities for which the desired time and endeavour are hard to approximate [Mantovan et al., 2020]) were consistently reported among the top five missed activities in both the missed care and in the implicit rationing approach (Bragadóttir et al., 2017; Duffy

et al., 2018; Kim et al., 2018; Park et al., 2018; Pereira et al., 2020; Zeleníková et al., 2020).

Relationship between the NWE and UNC

UNC activities are a mediator between the NWE and patient safety (Liu et al., 2018), or between nursing staffing levels and patient outcomes (Griffiths et al., 2020). A negative relationship was found between nurses' perceptions of patient safety climate and UNC (Ausserhofer et al., 2013; Gurková et al., 2020). Hospital or unit types were found to be a factor contributing significantly to UNC. Statistically significant differences were found between critical care units and mother-baby units (Duffy et al., 2018), and between surgical and medical units (Papastavrou et al., 2014b). Differences in UNC between unit types could be explained by different nurse-patient ratios in various unit types, especially when comparing medical-surgical units and ICUs (Campbell et al., 2020). In qualitative studies, nurses' experiences of UNC were described as “the process of intuitive, situational decision-making and priority setting” (Mantovan et al., 2020). Nurses use several strategies to limit levels of UNC, such as postponing tasks and working overtime, reducing quality, or team strategies (Jones et al., 2015; Mantovan et al., 2020).

Based on the most significant associations found, the NWE was a significant predictor of UNC. The more favorable the new, as perceived by nurses, the less frequently they reported UNC events. Studies using the RPPE showed a low association between UNC and the NWE (Papastavrou et al., 2014b; Zeleníková et al., 2020). On the other hand, some domains of the PES-NWI were found to be significant contributing factors to UNC. Seven studies (Campbell

et al., 2020; Kim et al., 2018; Park et al., 2018; Rochefort & Clarke, 2010; Schubert et al., 2013; Smith et al., 2020b; Zeleníková et al., 2020) evaluated associations between specific domains of the PES-NWI and UNC. However, most studies calculated a composite score averaging scores of the dimensions to delineate the overall NWE, which do not provide a basis for specific interventions or supportive strategies for mitigating UNC events. The significant relationship between the NWE and UNC was also confirmed in nursing homes (Zúñiga et al., 2015). Negative associations were found between UNC, five subscales and a composite score of the PES-NWI in two studies (Campbell et al., 2020; Smith et al., 2020).

Improving staffing and resource adequacy was found to be the most significant factor predicting lower prevalence of UNC activities in regression analyses performed in several studies (Kim et al., 2018; Park et al., 2018; Rochefort & Clarke, 2010; Schubert et al., 2013; Zúñiga et al., 2015). Zhao et al. (2020), in their recent systematic review, have concluded that two domains of the PES-NWI (staffing and resource adequacy; and teamwork) had a great impact on prevalence of UNC. In the South Korean study, two domains of the PES-NWI (nurse manager ability, leadership, and support of nurses; and staffing and resource adequacy) were found to be influential factors of UNC. Park et al. (2018) identified three domains (staffing and resource adequacy; nurse-physician relations; and nurse participation in hospital affairs) that were significantly related to UNC.

Recent research syntheses (Cordeiro et al., 2020; Zhao et al., 2020) have emphasized that there is a continuing need to explore the potential differential impact of dimensions of the NWE on UNC events. Almost all included studies had a cross-sectional design that did not allow causal inferences. Refinement of factors in the NWE and staffing are interventions that can mitigate UNC (Lake et al., 2020b). Therefore, longitudinal studies providing causal evidence are needed (Lake et al., 2020b). Stressing the relationship between UNC and organizational changes in longitudinal studies is a potential strategy for improving patient safety (Lake et al., 2020b).

In general, attributes of the NWE have not been systematically examined as important contributing factors of UNC in Central European countries. Previous studies have mainly focused on the prevalence and pattern of UNC, differences in UNC according to a selected hospital or unit variables, and associations between safety climate and UNC (Gurková et al., 2020; Zeleníková et al., 2020). This scoping review is a product of the initial stage

of a research project concerned with investigating the association between the NWE and UNC. Based on the results of this scoping review, in the next step of the project we will investigate the relationship between nurses' perceptions of domains of the NWE and UNC in acute care hospitals in the Czech Republic.

Limitation of study

The search was limited to electronic scientific databases accessible to the authors' institutions, and to publications in English.

Conclusion

Nurses working in favorable conditions reported lower prevalence of UNC. Results of studies in which the PES-NWI was used have confirmed that the NWE is a significant predictor of UNC. Seven studies explained the relationship between individual factors or specific domains in the NWE and specific nursing activities left undone. Improved staffing and resource adequacy was found to be the most significant factor predicting lower prevalence of UNC activities. Refinement of the factors in the nursing work environment and in staffing are interventions that can mitigate UNC. Researchers should pay more attention to the relationship between different NWEs and prevalence of unfinished nursing care in hospital settings.

Ethical aspects and conflict of interest

The authors declare no potential conflicts of interest with respect to the research, authorship and / or publication of this article. The research protocol was approved by the Ethical Committee of the Faculty of Health Sciences of Palacký University Olomouc.

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Author contributions

Concept and design (EG), analysis and data interpretation (EG, DB, ZM), preparation of the manuscript (EG, DB), critical revision of manuscript (EG, DB, ZM), final revision (EG, DB, ZM).

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