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ORIGINAL PAPER

Unfinished nursing care and its relationship to level of teamwork: the perspective of postgraduate nursing students

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Abstract

Aim: To investigate the reasons for unfinished nursing care (UNC), its prevalence and patterns, and to explore its relationship to level of teamwork as perceived by Slovak postgraduate nursing students. *Design:* A descriptive cross-sectional study. *Methods:* The study was conducted between November 2022 and January 2023. Data collection was carried out using a set of questionnaires that involved the Unfinished Nursing Care Survey tool to measure UNC and the Nursing Teamwork Survey (NTS) to investigate level of teamwork. The sample consisted of 159 postgraduate nursing students from five public universities in different regions of the Slovak Republic. *Results:* The mean composite score of UNC was 2.41 (SD = 0.71) and for the NTS, 3.25 (SD = 0.51). An overall weak association was found between UNC and Trust (r = -0.164), Backup (r = -0.157), Shared mental model (r = -0.158), and Team leader (r = -0.187). Teamwork did not predict perceptions of UNC. *Conclusion:* These findings suggest that nursing students are aware of the phenomenon of UNC and reflect on reasons for its occurrence, including ineffective teamwork among nursing staff. During clinical placements, nursing students should be integrated into nursing teams and the importance of teamwork should be emphasized during nursing studies. However, there is a need for further research to better understand and address these phenomena in nursing education and practice.

Keywords: clinical placement, clinical practice, nurse educators, nursing, nursing students, teamwork, unfinished nursing care.

Introduction

Nursing care often considered fundamental for patient well-being, involves a dynamic interplay of medical expertise, compassion, and meticulous attention to detail. However, amidst the intricate landscape of delivery of care in health care, the issue of unfinished nursing care (UNC) emerges as a complex challenge affecting both patients and nurses (Papastavrou & Suhonen, 2021). Also referred to as missed care or nursing care omissions, this phenomenon is a significant global concern in healthcare settings (Kalisch et al., 2013; Papastavrou & Suhonen, 2021). UNC involves situations in which essential nursing interventions are not completed as planned, often for varying reasons (Chiappinotto & Palese, 2022). These activities, such as administering medications on time, repositioning patients, offering emotional support, and promptly addressing patient concerns, are crucial to ensuring patient well-being and safety (Jones et al., 2015). Repercussions of leaving these tasks incomplete include patient discomfort, prolonged hospital stays, and compromised patient outcomes (Recio-Saucedo et al., 2018).

One of the modifiable factors that influence UNC, and thus the ability of nurses to perform all necessary activities for patients, is teamwork. Effective communication and teamwork are essential to ensure quality and safe patient care. Health care is a complex process, and even highly motivated and experienced individuals may make errors in its delivery due to limitations in human performance. Efficient teamwork and communication can help prevent errors that can result in subsequent harm to the patient or healthcare provider (Alkhaqani, 2022; Boamah et al., 2017). It is estimated that one in ten patients experiences direct harm during healthcare delivery, with almost 50% of these instances being preventable (Buljac-Samardzic et al., 2020). Quality nursing care respects the patient's rights and is derived from their needs. The nursing team that provides it is professionally prepared, motivated, and sets realistic goals that they adhere to (Kakeman et al., 2021). Dysfunctional team

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characteristics, such as ineffective conflict management, lack of mutual trust, team instability due to a combination of different shift lengths, or communication problems during shift handovers distinguish an inefficient team from a functional one (Kalisch et al., 2010; Kalisch & Lee, 2010). A higher level of teamwork, in practical terms, means a reduced occurrence of UNC (Kalisch & Lee, 2010; Witczak et al., 2021). Patient safety is one of the most serious and globally relevant healthcare issues, largely put at risk by the shortage of nurses and support staff (Ghezeljeh et al., 2021). Due to limitations in personnel, material-technical resources, and other factors, it is necessary to redistribute care among patients in daily nursing practice on the basis of its priority. Nurses are forced to minimize or omit certain tasks, increasing the risk of negative outcomes for patients (Gurková et al., 2020).

Nursing students, as future healthcare professionals, play a unique role in shedding light on the phenomenon of UNC and the factors affecting its occurrence. Their experiences during clinical placements, interactions with patients, and observations in healthcare settings contribute to their understanding of the challenges associated with this issue (Gibbon & Crane, 2018). Nursing students often grapple with factors that contribute to UNC, such as time constraints, high workloads, inadequate staffing levels, or ineffective teamwork. Witnessing instances in which registered nurses prioritize tasks based on urgency, leaving less critical tasks undone, shapes their perception of the healthcare environment and influences their professional values (Palese et al., 2021). Nursing students' perceptions of UNC may vary based on their exposure and clinical experiences. Some express frustration at witnessing incomplete tasks, recognizing the potential harm to patients (Scott et al., 2019), while others question the impact of organizational factors such as staff shortages on care quality. Nurses' concerns extend beyond patient outcomes to ethical considerations, creating an internal conflict between providing holistic care and navigating practical challenges (Gibbon & Crane, 2018).

Unfinished nursing care remains a relevant issue in health care, impacting patient outcomes and overall quality of care (Papastavrou & Suhonen, 2021; Recio-Saucedo et al., 2018). The opinions of nursing students, especially postgraduate ones, offer a fresh and insightful perspective on this challenge, reflecting their concerns, ethical dilemmas, and proposed strategies (Palese et al., 2021). Postgraduate nursing students typically have more clinical experience and exposure to real-world healthcare settings compared to undergraduate students. They have already completed their initial nursing education and may have worked as registered nurses or gained additional clinical experience during their postgraduate studies. This increased experience allows them to provide more insightful perspectives on UNC and teamwork dynamics in clinical practice. Additionally, these students have advanced their knowledge and skills through their additional education and training. They may have developed a deeper understanding of nursing concepts, including teamwork dynamics, leadership, and patient care management. Their advanced knowledge equips them to provide more nuanced insights into the relationship between UNC and teamwork (Kalfoss, 2017; Palese et al., 2023). By incorporating their voices into UNC discussions, both nursing education and practice can evolve to better address this complex issue and promote comprehensive, patient-centered care delivery.

Aim

To investigate the reasons for unfinished nursing care (UNC), its patterns and prevalence, and to explore its relationship to level of teamwork as perceived by Slovak postgraduate nursing students.

Methods

Design

A descriptive cross-sectional study was carried out according to the STROBE checklist, which can be found as Supplementary File 1 (von Elm et al., 2007),

Sample

All five Slovak public universities that provide a master's program in nursing were invited to participate in the investigation, and all granted permission to conduct the study. Once permission was granted for the study, respondents (postgraduate nursing students) were chosen by the convenience sampling method. A total of 269 surveys were distributed, with 159 returned, resulting in a response rate of 56.1%. No surveys were excluded due to incompletion and all 159 questionnaires were considered in the final analysis.

Data collection

Data collection was carried out between November 2022 and January 2023 using the Slovak version of the Unfinished Nursing Care Survey tool for Students (UNCS4S) (Palese et al., 2021)

and the Nursing Teamwork Survey (NTS) (Kalisch et al., 2010).

The first instrument was designed to measure UNC from the perspective of nursing students; more specifically, the tool invites nursing students undergoing clinical placement to report the frequency of their witnessing nurses omitting or delaying specific interventions over the previous seven days (Palese et al., 2021). The UNCS4S instrument was translated using the forward-backward translation method. It comprises 40 items categorized into two sections. The initial section includes an inventory of 22 nursing care activities that nurses might leave incomplete. Respondents are required to assess how often these activities were not completed during their recent clinical placement, using a six-point scale (0 – not applicable; 1 – never; 2 – rarely; 3 – sometimes; 4 – very often; 5 – always), with the operational definition of UNC corresponding to responses in the range from rarely to always. The second section of the instrument focuses on 18 suggested reasons for the occurrence of UNC. Respondents are tasked with rating the significance of each reason using a 5-point Likert scale (1 – not a significant reason; 2 – slightly significant reason; 3 – fairly significant reason; 4 – significant reason; 5 – a very significant reason).

The second instrument was designed to measure levels of teamwork (Kalisch et al., 2010). The translation process for the NTS instrument is reported elsewhere (Kohanová et al., 2023) and followed the forward-backward method. Based on Salas' teamwork theory, the NTS evaluates the levels of teamwork in acute care settings, as perceived by various members of the nursing team, such as registered nurses, practical nurses, nurse leaders, and nurse aides. Comprising 33 items, the NTS is organized into five subscales aligning with Salas' teamwork theory: Trust (seven items), Team orientation (nine items), Support (six items), Shared mental models (seven items), and Team leadership (four items). Respondents are tasked with indicating the frequency with which they can characterize their team's behavior based on each statement. Respondents rate each item on a frequency scale (rarely – 1; 25% of the time – 2; 50% – 3; 75% of the time – 4; always – 5). The tool incorporates negatively worded items that require recoding, and higher scores indicate a more positive assessment of teamwork.

The questionnaire set included several sociodemographic variables relating to the respondents (e.g., age, previous work experience in healthcare) along with details relating to their educational program (e.g., year of study, previous clinical placements) and current (or last) clinical placement (e.g., who had responsibility for students, degree to which expected outcomes were met).

Data analysis

Data analysis was performed using the SPSS statistical program, version 25.0. Descriptive statistics (mean, frequency, SD) were used to illustrate UNC, the reasons for UNC, the level of teamwork (NTS and its subscales), and the characteristics of the sample.

Nonparametric tests were used in further analysis, based on the results of the Kolmogorov-Smirnov normality test ($p = 0.000$), indicating a non-normal distribution of the data. The Spearman correlation coefficient was used to explore the relationships between the prevalence of UNC and the level of teamwork. Multiple regression analysis was used to investigate predictors of UNC as perceived by nursing students, including the overall score of NTS and its individual subscales. The UNC mean score served as a dependent variable, with the NTS and its five subscales acting as independent variables. All findings were tested at a significance level of $p < 0.05$. The reliability of UNCS4S was assessed using the Cronbach alpha coefficient (α), resulting in 0.912 for the first section and 0.898 for the second section, confirming the tool as a reliable instrument to measure UNC of nurses as perceived by nursing students. The α for the NTS was 0.876.

Results

The sample consisted of 159 postgraduate nursing students from five nursing faculties in the Slovak Republic. Sample characteristics are reported in Table 1.

Reasons for UNC by nurses and its patterns and prevalence

The average composite score of the UNCS4S was 2.41 (SD = 0.70), indicating low prevalence of UNC as perceived by nursing students (see Table 2). In general, all nursing students reported instances in which nurses missed out one or more nursing care activities during their recent clinical placement. On average, each nurse missed out 12.4 nursing care activities. Nursing students indicated that one of the most frequently overlooked nursing care activities was spending time with patients and their caregivers (3.15 ± 1.06; 96.8%). In contrast, the least frequently omitted nursing care activity was the performance of bedside glucose monitoring as prescribed (1.89 ± 1.39; 40.9%).

Table 1 Sample characteristics

Variables				n = 159 (%)
Unit type	surgical			51 (34.5)
	anesthesiology / intensive care unit			21 (14.2)
	internal			31 (20.9)
	pediatrics			26 (17.6)
	other			19 (12.8)
Previous work experience in healthcare	yes			77 (48.4)
	no			82 (51.6)
Academic year	first			74 (47.1)
	second			83 (52.9)
Form of study	full-time			122 (78.7)
	part time			33 (21.3)
Shift type	including night shifts			17 (11.3)
	including daily / afternoon shifts			77 (51.3)
	including night and weekend shifts			7 (4.7)
	including daily / afternoon and weekend shifts			49 (32.7)
Responsibility for student	nurse / clinical nurse			16 (10.3)
	head nurse/coordinator nurse			68 (43.6)
	nurse teacher / clinical tutor			15 (9.6)
	nursing staff / nursing team			57 (36.5)
Degree to which expected outcomes were met	barely at all (unmet expectations)			19 (12.3)
	sufficiently			54 (34.8)
	largely			60 (38.7)
	completely (met expectations)			22 (14.2)
	M	**SD**	**Range**	
Age	25.38	5.95	20–51	

M – mean; SD – standard deviation

Table 2 Unfinished nursing care based on UNCS4S

No.	Item	n	M	SD	% of more than never*	Threshold of 5**
1	Go to patients without being called.	159	2.43	1.04	80.5	3.8
2	Supervise the tasks assigned to the nurse aides.	159	2.92	1.08	93.7	4.4
3	Spend time with patients and their caregivers.	157	3.15	1.06	96.8	10.8
4	Assess the effectiveness of the care provided, e.g., reviewing if nursing care needs have been met.	159	2.74	1.02	88.1	3.8
5	Emotionally support patients and their caregivers.	158	2.82	1.08	88.0	3.8
6	Communicate with patients and caregivers.	158	2.54	1.13	79.1	3.2
7	Teach patients and caregivers how to self-care at home.	159	2.57	1.18	82.4	5.0
8	Inform patients and their caregivers about nursing care they are receiving.	157	2.60	1.18	80.9	5.7
9	Ensure clinical teaching of nursing students.	159	2.80	1.12	86.8	7.5
10	Monitor the effects of administered medications.	158	2.30	1.15	70.9	5.1
11	Document properly the interventions provided and revisions to the care plan.	158	2.28	1.29	63.9	6.3
12	Prevent negative outcomes for patients at risk (e.g., falls, pressure ulcers, malnutrition).	157	2.30	1.12	71.3	3.2
13	Help dependent and / or with dysphagia patients to eat.	159	2.23	1.20	67.9	5.7
14	Help dependent and / or with dysphagia patients to drink.	158	2.22	1.14	69.6	3.2
15	Administer PRN* medications within 15 min of the patient's request.	158	2.49	1.17	82.3	5.7
16	Prevent healthcare-associated infections by adopting good clinical practice (e.g., hand hygiene between patients, closed urinary drainage system).	159	2.19	1.19	65.4	3.1
17	Check pressure ulcers and change dressing according to protocols.	157	2.12	1.27	66.9	3.8
18	Monitor pain as planned.	159	2.30	1.22	73.0	6.3
19	Perform clinical handover to adequately inform the next shift's nursing team. about patients' conditions.	159	2.07	1.33	57.2	8.2
20	Provide personal hygiene to patients who need it.	159	2.07	1.28	57.2	7.5
21	Record vital signs as planned.	158	1.97	1.24	51.3	6.3
22	Perform bedside glucose monitoring as prescribed.	159	1.89	1.39	40.9	10.1
Total score		159	2.41	0.68	-	-

*UNCS4S – Unfinished Nursing Care Survey for Students; M – mean; SD – standard deviation; *percentage of responses greater than 1 (never); **percentage of responses of 5 (always)*

Regarding the reasons for UNC, those related to human resources (4.16 ± 0.96; 98.1%) were most frequently reported (see Table 3). In general, the predominant reason for UNC was insufficient number of nurses (4.25 ± 0.98; 98.7%).

Table 3 Reasons for unfinished nursing care as measured with UNCS4S

Reasons for unfinished nursing care	n	M	SD	% of more than 1
Communication		3.21	0.88	92.4
1 Tension / conflicts within the nursing staff.	158	2.82	1.13	88.6
2 Incomplete or interrupted communication among nursing staff.	158	3.29	1.06	94.3
3 Tension / conflicts between nursing and medical staff.	158	3.19	1.15	92.4
4 Incomplete or interrupted communication between nursing and medical staff.	158	3.46	1.11	93.7
5 Lack of support / collaboration among team members.	158	3.29	1.13	93.0
Priority setting		3.19	0.88	94.4
6 Inadequate nursing care model (e.g., functional task-oriented model of care).	158	3.24	1.06	94.3
7 Inaccurate initial priority setting.	155	3.15	1.07	94.8
8 Inadequate priority reassessment during the shift.	157	3.18	1.09	94.3
Nurse aides supervision		3.35	0.87	95.6
9 Nurse aides missed or delayed the reporting of the tasks left undone.	158	3.42	1.11	96.2
10 Inadequate supervision of the tasks assigned to the nurse aides.	158	3.27	1.08	95.6
11 Incomplete or interrupted communication between nursing staff and nurse aides / assistive personnel.	159	3.38	1.03	95.0
Material resources		3.59	1.05	94.4
12 Medications prescribed not available.	159	3.55	1.31	91.8
13 Equipment not available / not functioning properly when needed.	158	3.78	1.17	96.2
14 Other departments did not provide the service expected (e.g., delay in diagnostic processes).	159	3.45	1.15	95.6
Human resources		4.16	0.96	98.1
15 Inadequate number of nurses.	159	4.25	0.98	98.7
16 Inadequate number of staff support.	159	4.08	1.06	97.5
Workflow predictability		3.86	0.97	95.5
17 Unexpected increase in the number of patients in critical conditions.	159	3.91	1.13	96.2
18 High number of hospitalisations / discharges during the shift.	159	3.83	1.08	96.9

UNCS4S – Unfinished Nursing Care Survey for Students; a 5–point Likert scale, from 1 'not a significant reason' to 5 'a very significant reason'

Teamwork level as perceived by nursing students

The mean score on the NTS instrument was 3.25 (SD = 0.50) out of 5, indicating that ideal teamwork was perceived to have occurred slightly above 50% of the time during the last nursing work shift, according to postgraduate nursing students (indicated by response option 3). Among the subscales, Shared mental model received the highest rating (3.73 ± 0.62). In contrast, the Team orientation subscale obtained the lowest rating (2.87 ± 0.61). Detailed descriptive characteristics of the NTS tool are presented in Table 4.

Association between the prevalence of UNC and the level of teamwork

The correlation analysis indicated a low association between overall UNC score and the individual subscales of the NTS (see Table 5), as follows: Trust (r = -0.164), Backup (r = -0.157), Shared mental model (r = -0.158), and Team leadership (r = -0.187). With increasing levels of teamwork, UNC estimates decreased. Statistically significant relationships were confirmed between the level of teamwork and individual reasons for UNC. With an increase in overall NTS score, the score for reasons connected with the supervision of nurses decreased (r = -0.172). Furthermore, with an increase in the team orientation subscale, the score for reasons connected with the supervision of nurse aides decreased (r = -0.192).

Multiple regression analysis was performed to examine the relationship between the mean score of UNC and individual variables (the overall score of the NTS, and individual subscales of the NTS), thus revealing the predictors of UNC as perceived by nursing students. Model 1 (R2 = 0.055; Adj R2 = 0.018; F = 1.476; p = 0.190) was not statistically significant. Teamwork and its individual subscales did not predict nursing student perceptions of UNC in our study.

Table 4 Teamwork level as perceived by nursing students

Items	n	M	SD	%*
Subscale 1: Trust		3.18	0.77	
4 Team members communicate clearly what their expectations are of others.	159	2.82	1.17	8.2
23 My team readily engages in changes in order to make improvements and new methods of practice.	159	2.94	1.15	10.7
24 Team members readily share ideas and information with each other.	159	3.27	1.08	15.7
25 Team members clarify with one another what was said to be sure that what was heard is the same as the intended message.	159	3.44	1.09	17.7
31 Team members value, seek and give each other constructive feedback.	159	2.91	1.07	8.2
32 When someone does not report to work or someone is pulled to another unit, we reallocate responsibilities fairly among the remaining team members.	159	3.53	1.19	25.8
33 Team members trust each other.	159	3.35	1.14	17.0
Subscale 2: Team orientation		2.87	0.61	
5 Team members ignore many mistakes and annoying behavior of teammates rather than discussing these with them.	159	3.19	1.27	20.8
11 Some team members spend extra time on breaks.	159	3.03	1.36	21.4
13 When a team member points out to another team member an area for improvement, the response is often defensive.	159	2.75	1.07	5.7
15 If the staff on one shift is unable to complete their work, the staff on the on-coming shift complains about it.	159	2.41	1.28	8.2
16 Staff members with strong personalities dominate the decisions of the team.	159	2.11	1.08	3.8
17 Most team members tend to avoid conflict rather than dealing with it.	159	2.75	1.11	8.2
18 Nursing assistants and nurses do not work well together as a team.	159	3.66	1.27	36.7
22 Feedback from team members is often judgmental rather than helpful.	159	3.18	1.20	17.0
26 Team members are more focused on their own work than working together to achieve the total work of the team.	159	2.81	1.22	6.9
Subscale 3: Backup		3.46	0.67	
3 Team members frequently know when another team member needs assistance before that person asks for it.	159	2.96	1.20	10.7
19 The nurses who serve as charge nurses or team leaders are available and willing to assist team members throughout the shift.	159	3.46	1.27	25.2
20 Team members notice when a member is falling behind in their work.	159	3.67	0.99	20.8
21 When the workload becomes extremely heavy, team members pitch in and work together to get the work done.	159	3.55	1.10	22.6
28 Within our team, members are able to keep an eye out for each other without falling behind in our own individual work.	159	3.35	0.97	11.3
30 Team members willingly respond to patients other than their own when other team members are busy or overloaded.	159	3.56	1.01	20.8
Subscale 4: Shared mental model		3.73	0.62	
1 All team members understand what their responsibilities are throughout the shift.	159	3.99	0.98	33.3
7 Team members know that other members of their team follow through on their commitment.	159	3.54	1.10	20.1
9 My team believes that to do a quality job, all of the members need to work together.	158	3.70	1.14	29.7
10 The shift change reports contain the information needed to care for the patients.	159	4.40	0.90	61.6
12 Team members respect one another.	159	3.34	1.05	14.5
14 Team members are aware of the strengths and weaknesses of other team members they work with most often.	159	3.50	1.01	18.2
29 Team members understand the role and responsibilities of each other.	159	3.69	0.90	19.6
Subscale 5: Team leadership		3.11	0.81	
2 The nurses who serve as charge nurses or team leaders monitor the progress of the staff members throughout the shift.	159	3.14	1.23	15.1
6 When changes in the workload occur during the shift, a plan is made to deal with these changes.	159	2.50	1.21	5.0
8 The nurses who serve as charge nurses or team leaders balance workload within the team.	159	3.26	1.21	18.2
27 The nurses who serve as charge nurses or team leaders give clear and relevant directions. as to what needs to be done and how to do it.	159	3.57	1.16	24.5
Overall NTS score		3.25	0.50	

**percentage of responses of 5 (always)*

Table 5 Correlations between unfinished nursing care and level of teamwork

	Overall UNC score	Communication	Priority setting	Nurses' aides' supervision	Material resources	Human resources	Workflow predictability
Trust	-0.164*	-0.079	0.009	-0.083	-0.057	-0.064	0.032
Team orientation	0.013	-0.120	-0.101	-0.192*	-0.097	-0.098	-0.118
Backup	-0.157*	-0.063	-0.006	-0.137	0.033	0.058	0.094
Shared mental model	-0.158*	-0.131	-0.038	-0.111	0.085	0.074	0.120
Team leadership	-0.187*	0.015	0.037	-0.042	0.005	-0.003	-0.054
Overall NTS score	-0.156	-0.123	-0.035	-0.172*	-0.054	-0.039	0.004

** $p \leq 0.05$*

Discussion

Research in UNC has mainly focused on the viewpoints of registered nurses working in various acute care clinical disciplines (Papastavrou & Suhonen, 2021). Previous studies carried out within the European region, including Slovakia, have focused on evaluating the psychometric properties of selected UNC measures, the factors that contribute to the prevalence of UNC in different contexts, and the underlying mechanisms of this phenomenon. These include organizational variables related to nurses, characteristics of the work environment, and patient safety culture (Gurková et al., 2020; Witczak et al., 2021). In recent years, an increase in studies investigating the phenomenon of UNC from the perspective of nursing students has been observed internationally. These studies have mainly been qualitative in nature and only recently has an instrument measuring this phenomenon been developed by Italian researchers (Palese et al., 2021). As future members of the healthcare team, nursing students are expected to identify and report deviations from standard care and factors that may influence quality and safe care, including teamwork. The investigation of student encounters with UNC during their clinical rotations could contribute to the development of recommendations for improvements in educational and managerial practices, and the clinical learning environment (Palese et al., 2023).

Our study aimed to investigate the reasons for UNC, its patterns and prevalence, and to explore its relationship to level of teamwork from the perspective of Slovak postgraduate nursing students. The reasons for UNC and its patterns and prevalence as perceived by nursing students in this study were consistent with previous findings reported in European studies focusing on registered nurses. The most frequent UNC activities included spending time with patients and their caregivers, providing adequate supervision for delegated tasks, offering emotional or psychological support, and evaluating the effectiveness of care. These activities were considered to have lower priority, suggesting that nurses therefore have less difficulty leaving them unfinished (Palese et al., 2021). In contrast, according to recent studies among nurses (Zeleníková et al., 2023) and nursing students (Palese et al., 2021), activities that were least frequently left unfinished were prescribed (e.g., checking pressure ulcers and dressing changes according to protocols) and related to treatment (recording vital signs, pain monitoring) or technically oriented (bedside glucose monitoring). This is consistent with existing empirical evidence on UNC patterns. The common characteristic of frequently unfinished care areas is their low probability of having a direct impact on patient health status, their time-consuming nature, and their less frequent supervision in the ward (Jones et al., 2021). An Italian study using the UNCS4S tool (Palese et al., 2021) reported a similar UNC pattern and an identical list of areas of care most frequently unfinished. Despite students reporting a variety of interventions as unfinished, the overall level indicated that they perceived UNC to occur rarely to occasionally in this study. This aligns with the range of UNC by nurses in the Italian validation study (Palese et al., 2021) and several studies in the Czech Republic (Zeleníková et al., 2023), Slovakia (Kalánková et al., 2020) and Poland (Witczak et al., 2022). In a previous Slovak study using the Perceived Implicit Rationing of Nursing Care (PIRNCA) instrument (Gurková et al., 2020), nurses reported a lower average number of incomplete nursing care activities per nurse (7.3 elements compared to 12.4 in this study) and a lower mean composite score (1.47 compared to 2.41 in this study) than students. The variance could be attributed to the different instruments and contexts in both studies. The similarity in UNC patterns reported among nursing students and nurses suggests that prioritization skills or habits related to implicit rationing are developed during the early stages of education (Palese et al., 2023) as part of a hidden curriculum. Inadequate staffing levels and the unpredictable nature of the workflow stand out as key contributors to UNC as perceived

by nursing students in this study. These factors were also identified as the main causes of UNC in the Italian study (Palese et al., 2021) and various studies conducted in the Czech Republic (Gurková et al., 2021; Zeleníková et al., 2023). The insufficiency of human resources, coupled with unforeseen increases in patient numbers or the severity of conditions on hospital wards, has consistently emerged as a leading factor contributing to UNC in numerous studies internationally. Given the scarcity of nurses and the limited number of nursing graduates in Slovakia, nursing students play a crucial role in the replenishment of the workforce and the addressing of the growing demand for healthcare. Slovakia faces a significant public health challenge characterized by a low nurse density, with a nurse-to-population ratio below the EU average (5.7 nurses per 1,000 people compared to 8.4). Furthermore, Slovakia is one of the few European countries in which these ratios have consistently declined since 2000, and the number of nursing graduates has more than halved between 2009 and 2019 (OECD / European Observatory on Health Systemsand Policies, 2021).

Our study evaluated the level of teamwork using the overall score of the NTS tool and its individual subscales. The overall score, at 3.25 (SD = 0.50) from a total of 5, suggests that ideal teamwork was perceived to have occurred slightly above 50% of the time during the last nursing working shift, as reported by postgraduate nursing students. In a recent Slovak study, registered and practical nurses reported a better perception of teamwork in acute care facilities (Kohanová et al., 2023). A higher score in teamwork evaluation was also achieved by Australian nurses (Costello et al., 2021), American nurses (Kalisch & Lee, 2010), and Turkish nurses (Taskiran Eskici & Baykal, 2022). Regarding the evaluation of NTS subscales, Shared mental model was the most highly rated subscale in the current study, which is in line with other studies (Costello et al., 2021; Kalisch & Lee, 2010; Taskiran Eskici & Baykal, 2020). This evaluation represents well-established processes for patient handovers, including handovers, and positive relationships within the nursing team. Team orientation achieved the lowest score in our study, reflecting the results of national and international studies (Costello et al., 2021; Kalisch & Lee, 2010; Kohanová et al., 2023; Taskiran Eskici & Baykal, 2022). This indicated less effective conflict solutions, inadequate provision of feedback and acceptance, and a tendency to prioritize personal goals over team goals.

In this study, most of the correlations between the overall UNC score and individual subscales of the NTS were low (although statistically significant) and the percentage of variance accounted for was low. However, this is the first study to explore the association between UNC and the level of teamwork perceived and reported by nursing students. To the authors' knowledge, there are few studies focusing on the examination of this association from the perspective of registered nurses. Those there are indicate that increasing teamwork scores lead to a decrease in perceived UNC (see, e.g., Bragadóttir et al., 2017; Chapman et al., 2017; Taskiran Eskici & Baykal, 2022; Kalisch & Lee, 2010). Internationally, teamwork has also predicted perceptions of UNC. The overall NTS score represented between 16.0 and 24.0 percent of the variance in UNC (Bragadóttir et al., 2017; Taskiran Eskici & Baykal, 2022). Additionally, increased teamwork scores led to a decrease in UNC estimates in acute care settings (Ghezeljeh et al., 2021; Xu et al., 2022). In our study, teamwork did not predict UNC perceptions as reported by nursing students. Despite the confirmed association between UNC perception and level of teamwork, this relationship is rarely studied and reported in the field of nursing. Evidence suggests that effective teamwork and communication is associated with lower perceived UNC. Further research into these issues is warranted. The difference in results regarding the perceptions of nurses and nursing students about the relationship between UNC and teamwork may be due to the different levels of experience with teamwork and the specific position of students on the ward during clinical practice. During clinical practice, students may be more focused on staff-student relationships than specific attributes of teamwork. In the case of nursing students, more emphasis might be placed on staff-student relationships due to their impact on the quality of their clinical practice and their sense of belonging (Levett-Jones et al., 2009).

Limitation of study

Although the design of the cross-sectional study provided valuable preliminary insights into nursing students' perceptions of UNC and levels of teamwork, it is important to interpret these findings in the light of their inherent limitations, including potential selection bias and social desirability bias. For a more comprehensive understanding, future research employing longitudinal or experimental designs,

coupled with qualitative methods, could offer a more profound exploration of the intricate interplay between UNC and levels of teamwork.

Conclusion

This study sheds light on the reasons for UNC and its patterns and prevalence as perceived by Slovak postgraduate nursing students. Our results align with the existing body of evidence, reflecting UNC patterns consistent with those reported among registered nurses in European studies. The study emphasizes the critical role of nursing students in addressing the public health challenge faced by Slovakia – i.e., low nurse density and a decline in nursing graduates. With the scarcity of human resources and the unpredictability of workflow identified as key contributors to UNC, nursing students have emerged as pivotal to the rebuilding of the healthcare workforce and to meeting the growing demand for care. Furthermore, our study explores the association between UNC and teamwork as perceived by nursing students, confirming a statistically significant relationship for several NTS subscales. This adds a valuable perspective to the limited literature on this association, which has focused primarily on registered nurses. Although international studies have indicated that higher teamwork scores predict a decrease in UNC estimates, our findings among nursing students do not align with this trend. The intricate interplay between UNC and teamwork, as perceived by nursing students, suggests a nuanced relationship that deserves further exploration.

In essence, our study contributes to the growing understanding of UNC in nursing education, providing insight into patterns, contributing factors, and the intricate dynamics between teamwork and UNC. The findings have implications for curriculum development, management practices, and overall improvement of the clinical learning environment, with the aim of equipping future healthcare professionals with the skills needed to address these complex challenges in patient care.

Ethical aspects and conflict of interest

The study was approved by the Ethics Committee of the Jessenius Faculty of Medicine in Martin, Comenius University in Bratislava (EC 44/2022). The demographic data of the participants were processed in accordance with the Regulation of the European Parliament and the EU Council 2016/679 of 27.04.2016 on the protection of persons in connection with the processing of personal data and the free movement of such data.

The authors declare that they have no potential conflicts of interest with respect to the investigation, authorship, and/or publication of this article.

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Author contributions

Conception and design (DK, EG), data collection (DK, EG), data analysis and interpretation (DK, EG), manuscript draft (DK, EG), critical revision of the manuscript (DK, EG), final approval of the manuscript (DK, EG).

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