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Congruence of Nurse Staffing and Activities with Patient Needs

Melita Peršolja

Abstract

This study aimed to discover the correlation between patient satisfaction with nursing care activities and staffing patterns. The research was conducted at the medical ward of a secondary care regional hospital in Slovenia over one month. Data was collected with regard to the following: (1) patients cared for daily and number of hours/patients day at the ward level, (2) patient needs (using a classification system), (3) nurse activities as observed at 10-minute intervals, and (4) the Patient Perception of Hospital Experience with Nursing tool. A total of 218 patients were involved, and their satisfaction with nursing care was found to be high. Patient satisfaction was negatively correlated with the number of patients cared for at the unit daily, but positively with the number of care hours per patient day, the proportion of registered nurses in the nursing team, the realized percentage of the registered nurse personnel requirements, and with some direct care activities. The correlation also revealed three process items (undivided attention, explanation, and things are done without asking) being the special strengths of nursing care activities. The results show that nurse-staffing and process patterns affect patient experience. It is thus recommended to increase the amount of nursing care offered by registered nurses, while nurses' competences can affect the process of care, and thus patient satisfaction.

Keywords: evidence-based healthcare management, nursing service hospital, patient satisfaction, quality of healthcare

1. Introduction

Patient satisfaction with hospital care has been defined as the degree of alignment between the care expected and actual care received, as perceived by patients [1]. Nurses have thus been recognized as the key factors influencing patient satisfaction because they are involved in almost every aspect of the healthcare process [2]. Although nursing care processes are integrated with other healthcare processes, when the quality of nursing care is poor, patients' satisfaction has been found to be low [3].

The use of a good structure increases the likelihood of good processes, and good processes increase the likelihood of good outcomes [4]. The best criteria with regard to reflecting the structure and process of nursing care and the related patient outcomes are the nursing-sensitive indicators [5]. The literature describes two general nursing-sensitive patient outcomes: adverse and positive. Some adverse patient outcomes that are potentially sensitive to nursing care are urinary tract infections, pneumonia, shock, upper gastrointestinal bleeding, longer hospital stays, failure to rescue, and 30-day mortality [6]. The main positive nursing-sensitive patient outcome is patient satisfaction with nursing care quality.

Structure in a healthcare context refers to the attributes of various material resources (facilities, equipment, money), human resources (supply of nursing staff, the skill level of staff, education of staff), and organizational factors (staff organization, methods of peer review, methods of reimbursement). In contrast, process denotes what is done in giving and receiving care. It includes patient activities in seeking care and receiving it, as well as practitioner activities in making the diagnosis and recommending or implementing treatment. An outcome denotes the effects of care on the health status of patients, including improvements in the patients' knowledge, and positive changes in their health status and behavior, as well as greater patient satisfaction with care [4].

According to the Donabedian model [7], some nursing care structural and process features are associated with the quality of care and thus capable of increasing patient satisfaction in hospitals. Regarding structure, the number of patients per nurse in a hospital [8–10], the nursing care hours per patient day [11], the proportion of registered nurses [8, 12], and the presence of registered or specialist nurses [13–15] all influence the quality of care as perceived by patients. Researchers have also associated nurse staffing with various patient, suggesting that a higher proportion of registered nurses could reduce preventable in-hospital deaths [8, 16–18], prevent falls [15], decrease the percentage of care left undone [19], and increase patient satisfaction [8–10]. Regarding the relevant processes, the total amount of direct patient care [20, 21], frequency of communication [22, 23], and organizational priorities with regard to the quality of care [8] have also been documented as affecting patients' satisfaction with nursing care.

However, the amount of nursing care and the mix of skills of the staff providing it are only proxy measures for what the nursing staff actually does daily at the bedside, and nursing activities can include both contact and no-contact time, as well as unproductive time [24]. In fact, according to published studies hospital nurses spend from 7.3% [25] to 54.2% [26] of their time on direct patient care, from 0% [27] to 59% [28] on indirect care, and from 14% to 17% on personal time [29]. Patient satisfaction is influenced by factors identified at the patient level [2, 30–33] along with nurses' kindness and competence with regard to performing technical procedures [34]. When items in the instrument represent patients' perceptions, there are no criteria against which criterion-related validity could be tested [3].

In Slovenia, a post transitional European country, the number of practicing nurses per 1 000 population is 8.8, and the ratio of nurses to physicians is 3.2 [35]. The problem is that when officially counting the number of nursing professionals, the nursing assistants (called health technicians) are included, and therefore the ratio between registered nurses and health technicians (which is currently 35:65) is in favor of the latter [36]. The Slovenian Chamber of Nursing and Midwifery prepared a proposal of human norms, where one of the four basic criteria was the calculation of staff needs resulting from patient classification system [37]. But although the percentage of categorized patients in hospitals is high, the collected data are not used for staff planning [38].

2. Aim

This study aimed to examine the connection between nurse staffing patterns, their process characteristics and the quality of care with regard to patient satisfaction with the nursing care received.

The specific objectives of this study were: [1] to identify the relevant nursing staff structural conditions (patient to nurse ratios, skill mix, and educational level); [2] to examine the nursing care activities performed by distinguishing

those direct and indirect care activities; [3] to examine patients' actual nursing care needs; and [4] to measure patient outcomes (with a focus on satisfaction with the nursing care received).

It was assumed that higher nurse staffing and more direct care activities are associated with an increased likelihood of meeting patient needs, and that higher perceptions of fulfilled needs would be reflected in higher patient satisfaction with nursing care.

3. Methods

3.1 Study design

A cross-sectional study was conducted in a Slovenian secondary care regional hospital, in 2014.

3.2 Setting

The researched hospital had 24 specialty departments with approximately 400 beds. Approximately 350 nursing care personnel rendered the services (mostly nursing technicians (n = 224; 66.47%), with a third of them being registered nurses (n = 103; 30.57%) and ten of them (2.97%) being support staff. The hospital dealt with nearly 15,000 prospective payment system episodes in one year. The annual bed occupancy was approximately 80%. This research focused on a medical ward with three units, a 94-bed capacity and nearly five hundred (n = 498) hospitalized patients during the research month. The medical unit participated in this study based on the criteria identified by a hospital expert advisory panel. The unit was selected based on the feasibility of the research process and the availability of participants. The hospital was anonymized at the request of the management of the institution.

3.3 Participants

As the study target, two populations were identified: (a) nursing staff and (b) patients.

a. Nursing staff: All registered nurses and nursing technicians (hereafter called *nursing staff*) were eligible. All nursing staff participated as subject matter experts over a total of nine observational days in one month. Sample size (43 subjects) was calculated based on the confidence level (95%), confidence interval (5%), and the number of total nursing staff employed (45 individuals) in the medical department. Two subjects (the department head nurse and an unlicensed practitioner) were excluded from the study because of their specific tasks.

b. Patients: A sample size of 217 subjects was calculated (confidence level (95%), confidence interval (5%), with an expected patient population of around 500 individuals in a one-month observation period). Therefore, all patients who were (I) admitted to the ward for at least 24 hours, (II) staying in the medical ward during the study period, (III) capable of communicating, and (IV) willing to participate, were invited to take part in the study. Out of the total 484 patients admitted to the ward during the study period, 218 were eligible.

On the research day, the researcher personally contacted all hospitalized patients capable of communicating. The patients were informed that a *study on nursing care* was being conducted, and offered the name of the person responsible and their

contact details when requested, and provided with details regarding what would happen to the information provided. If willing to cooperate, patients were offered a questionnaire to complete. When a patient was unable or unwilling to participate, one of their visitors was invited to complete the questionnaire instead.

3.4 Variables

3.4.1 Records

The daily census report, bed occupancy, and patient needs classification using the Slovenian patient classification system [39] were collected from the hospital every day. Data from nursing schedules and hospitalized patient numbers allowed the calculation of the number of patients per nursing staff (registered nurse, nursing technician), staff hours per patient day (registered nurse, nursing technician), and the proportion of graduate nursing staff hours. The principal investigator of the study collected data daily after the study approval and by contacting the chief nurse.

3.4.2 Observations

At the nursing staff level, we used the Maribor Primary Health Care Patient Classification System instrument to measure the nursing care activities performed [40]. This instrument measures the nursing care activities divided into four categories:

1. Care contact time (direct patient care) includes all hands-on care, one-to-one observation or support for patients, and direct communication with patients.
2. Indirect contact time (indirect patient care) includes patient documentation, professional discussions to plan patient care, discharge planning, communication with patients' relatives and friends, ordering investigations, and shift handovers.
3. Other nursing activities: other patient-focused activities (completing nursing audits, checking clinical equipment), staff-focused activities (student support, giving and receiving training sessions, personal development reviews, rounds), and ward-focused activities (ensuring environmental safety and cleanliness, ordering or unpacking stock).
4. Unproductive time: personal staff time (staff meals, breaks) and wasted time (waiting for equipment, waiting for colleagues, etc.).

For the aims of the study, we planned 16 hours of observations in the research days, including morning and afternoon shifts (from 06:00 to 22:00). Observations were performed in such a way that all working days of the week were included in a range of one month, randomly selected by the principal investigator of the study. Throughout the observations, activities were recorded at intervals of 10 minutes (allowing six observations per hour). Data collection was performed by 18 third-year pre-trained nursing students who previously had at least eight weeks of clinical practice at the ward.

3.4.3 Survey

At the patient level, the 15-Item Single-Factor Patient Perception of Hospital Experience with Nursing (PPHEN) [3] tool was used. The tool was developed in the English language, and was translated into Slovenian according to standard

procedures for forward and backward translation [41]. The tool was piloted in a preliminary way in a group of 15 patients (not involved in this study) to test its comprehensibility and feasibility. The Cronbach's alpha for the PPHEN questionnaire in the Slovenian language was 0.905 ($n = 15$).

Patients' satisfaction was reported using a five-point Likert scale (1 = strongly disagree/not at all satisfied, 5 = strongly agree/completely satisfied). The responses to this were then turned into a patient satisfaction index including all the variables and ranging from 1 to 5, with higher scores indicating a higher degree of satisfaction with nursing care. Patients also answered some questions exploring demographic variables (e.g., age and gender) as well as data regarding whether the respondent was the patient or one of their relatives.

The questionnaires were distributed by nine third-year nursing students, who were not included in direct observations or in nursing care. On the research days, nursing activities were observed, and the patients included in the study (or their relatives) were invited to complete the questionnaire.

3.5 Ethics

Institutional review board approval was obtained from the Faculty of Health Sciences, University of Primorska, Slovenia, and from the hospital administration prior the start of the study. The study was conducted following the Code of Ethics for Nurses and Nurse Assistants, as well as the Declaration of Helsinki: Ethical Principles for Medical Research Involving Human Subjects [42]. Patient and nurse consent was obtained on-site.

3.6 Statistical methods

Reliability was reached in the data analysis, with the exclusion of three of the nine (i.e., 30%) previously selected observational days. These days were selected casually in advance before the data collection phase. Only the principal investigator was aware of which days were chosen. Therefore, a total of 7,732 (78.4%) out of 9,866 observed nursing activities were used in the final analysis. As a consequence, 149 (68.4%) out of the total of 218 gathered questionnaires were used.

Exploratory data analyses were performed to inspect the data and identify inconsistencies. IBM SPSS Statistics, version 21.0 (IBM Corp., Group NY, USA) was used for data analysis to consider the three levels of analyses, namely: the hospital unit, the individual nurse, and the patient. Preliminary data analyses were completed using descriptive and bivariate analysis techniques.

Quantitative data analysis was performed using descriptive methods: mean (M), standard deviation (SD), frequency (n), percentage (%), Pearson's correlation (r), and Spearman's correlation (R). Correlation strengths were set as follows: 0–0.09 not correlated, 0.1–0.3 weak, 0.31–0.6 medium, and 0.61–1 strong correlation [43]. The significance was set at $p < 0.05$.

4. Results

4.1 Nursing structure

Seven registered nurses worked regularly across the observed medical ward, aided by 36 nursing technicians. Therefore, a total of 43 individuals participated in this study, representing 95.6% of the nursing population.

In the 94 available beds there were, on average, 80 patients/day. The nursing teams consisted mostly of nursing technicians (64%), which delivered 61.3% of nursing care. Each member of nursing staff cared for an average of three patients/day, and every registered nurse was responsible for an average of 8.5 patients/day.

The mean number of nursing staff hours per patient day was 3.64 hours, of which 1.41 hours were provided by registered nurses. The average percentage of registered nurse hours was 38.74%, ranging from 38.05% to 39.9% of total nursing staff hours (**Table 1**).

4.2 Nursing care process

About 36.8% (n = 2,842) of all nursing staff activities involved direct contact with patients, and hands-on care represented 27.5% of all recorded nursing activities. One-to-one observation was identified 336 times (4.2%), direct communication with patients 294 times (3.8%), and support being given to patients 98 times (1.3%).

About 18.5% of all nursing activities were indirect patient care. A large number of these were represented by dealing with patient documentation, professional discussion to plan patients' care, discharge planning, and communication with patients' relatives and friends (n = 538, 6.9%). Shift handovers were identified 469 times (6.1%) and ordering investigations and preparing for medical/technical procedures performed independently by nursing staff were recorded 425 times (5.5%).

Other nursing activities were recorded 2,013 times (26%): patient-focused activities 1,470 times (19%), ward-focused activities 446 times (5.8%), and staff-focused activities 97 times (1.2%). Unproductive time represented 9.5% (n = 735) of all observed activities, including personal staff time (n = 729, 9.4%) and wasted time (n = 6, 0.1%). Information was missing with regard to staff activities for 9.2% of the observations (n = 710) (**Table 2**).

Independent Variable / Constant	Total	
	n	%
Total hospitalized patients ¹ (average/day)	484 (80.67)	100
Category 1 ²	237	49.2
Category 2 ²	123	25.4
Category 3 ²	124	25.6
Total staff in unit ¹ (average/day)	160 (26.67)	100
Total RNs ¹	57	35.63
Total NTs ¹	103	64.38
No. patients/nursing staff	3.03	—
No. patients/RN	8.49	—
No. patients/NT	4.7	—
Average nursing care hours/patient day	3.64	—
RN hours	1.41	38.74
NT hours	2.23	—

¹Summary for 6 research days, 2 day shifts.
²patients classified using the Slovenian patient classification system; RN = graduated (registered) nurse; NT = nursing technician; nursing staff = RN and NT; Average nursing care hours/patient day = (((total nursing care staff on duty, 6 research days, 2 shifts) x no. hours worked per day) x 1,5) /No. hospitalized patients.

Table 1.
Independent variable characteristics.

Nursing care activities		% (n)
Direct patient care	Hands-on care	27.5 (2124)
	One-to-one observation	4.2 (326)
	Direct communication with patients	3.8 (294)
	Support to patients	1.3 (98)
	Sub-total direct patient care	36.8 (2842)
Indirect patient care	Patient documentation & professional discussion ^a	6.9 (538)
	Shift handovers	6.1 (469)
	Ordering investigations ^b	5.5 (425)
	Sub-total indirect patient care	18.5 (1432)
Other nursing activities	Other patient-focused activity	19 (1470)
	Ward-focused activity	5.8 (446)
	Staff-focused activity	1.2 (97)
	Sub-total other nursing activities	26 (2013)
Unproductive time	Personal staff time	9.4 (729)
	Wasted time	0.1 (6)
	Sub-total unproductive time	9.5 (735)
Missing data ^c		9.2 (710)
Total		100 (7732)

^a%, percent; n, number; ^a includes: patient documentation, professional discussion to plan patients' care, discharge planning, and communication with patient's relatives and friends; ^b includes individual medical–technical procedures done independently by nursing staff; ^c nursing activities that could not be observed, as the RN or the NA was not in the medical ward.

Table 2.
 Proportions of nursing care activities.

4.3 Patient needs

Nurses documented and evaluated the needs of 378 patients. Another 106 (21.9%) patients were evaluated during the exploratory data analysis, based on the documented relations between categories within the unit. Unit A had the highest (27%) percentage of patients classified into category 2 – which meant that the patients were assigned by default and received supportive or partial assistance from nurses. In unit B, more than half (55%) of the hospitalized patients were assigned to category 1, which meant that they did not receive assistance with hygiene care, mobility, elimination, and feeding, they did not have infusion lines, and their vital signs were monitored less than six times every 24 hours. A few patients were assigned to the demanding category 3. In unit C, more than two fifths (42%) of patients were assigned to category 3, and these required complete assistance with regard to hygiene care, mobility, elimination, and feeding; the patients received tube care, or their vital signs were monitored more than six times every 24 hours.

The number of required staff was calculated by adjusting the factors from three to two shifts (from 24 to 16 hours) based on the patient needs classification system and the standards of staff requirements [39]. The index of the actual and required quantity of nursing staff showed that the medical ward deficit ranged from 22% to 43%, and none of the observed units had enough nursing staff.

Patient satisfaction variables	M	Sd	Nursing staff hours/patient day (r)			Frequency of nursing staff activities (R)	
			RN	NT	RN + NT	All activities	Direct activities
The nurses helped me feel at ease in the hospital.	4.65	0.62	0.184**	0.059**	0.169**	0.025	0.006
The nurses' actions made me feel cared for.	4.59	0.66	0.122**	0.083**	0.098**	0.031	0.001
I was sure that nurses would be there when I needed them.	4.52	0.75	0.067**	0.044*	0.053**	−0.013	0.060**
The nurses made me feel relaxed when treatments were being done.	4.51	0.67	0.143**	0.142**	0.143**	0.025	0.031
The nurses gave me their undivided attention while caring for me.	4.50	0.72	0.075**	0.038	0.052*	−0.044*	0.028
The nurses helped my outlook become more realistic.	4.49	0.70	0.131**	0.128**	0.130**	0.008	0.039
The nurses helped me better deal with the unknowns of this hospitalization.	4.47	0.72	0.008	0.014	0.012	0.011	0.036
The nurses' explanations helped put me at ease.	4.44	0.87	0.049*	0.018	0.030	−0.010	0.033
My requests were promptly attended to by the nursing staff.	4.42	0.78	0.113**	0.104**	0.108**	0.011	0.028
The nursing staff helped me manage the fears I had about my illness.	4.35	0.91	0.126**	0.104**	0.113**	0.022	0.011
I know that due to the nurses' efforts some problems were avoided.	4.30	0.81	0.009	0.012	0.011	0.006	0.016

Patient satisfaction variables	M	Sd	Nursing staff hours/patient day (r)			Frequency of nursing staff activities (R)	
			RN	NT	RN + NT	All activities	Direct activities
I feel that the nurses understood what this illness means to me.	4.29	0.89	0.088**	0.069**	0.077**	0.003	0.017
I was sure that the nurses alerted others to my needs and requests.	4.27	0.81	0.106**	0.078**	0.089**	0.027	-0.013
Little things were done for me without asking.	4.21	0.91	-0.025	-0.050*	-0.041*	-0.015	0.055*
The nurses thought ahead about what I needed.	4.18	0.93	0.218**	0.190**	0.202**	0.023	0.051*
Patient satisfaction index	4.42	0.53	0.143**	0.125**	0.132**	0.008	0.042

RN, graduated (registered) nurse; NT, nursing technician; Nursing staff, includes RN and NTs; r, Pearson's correlation coefficient; R, Spearman's correlation coefficient; Statistical significance set at .95: ** < .00; * < .050; Correlation strength: .0-.09 not correlated, .1-.3 weak, .31-.6 medium, .61-.1 strong correlation [43]; Patient satisfaction index, includes all 15 variables measuring patient satisfaction.

Table 3.
Relations between the patient satisfaction, nursing staff hours and nursing care activities.

4.4 The patients’ perception of nursing quality

The respondents were mostly women (n = 82, 56.9%), with an average age of 67.4 years (SD = 14.7). Fifteen (6.9%) questionnaires were filled in by relatives, 95 (43.6%) patients were helped by the researchers to fill in the form, and the remaining 110 (50.5%) questionnaires were filled in by the patients. The variable patient satisfaction was computed by aggregating all the items from the questionnaire.

The mean of the perceived nursing quality rating was 4.74 (*above good/high*) (SD = 0.49) and ranged from 3 (*good*) to 5 (*high*). The highest average score was for the item concerning the nurses’ ability to help make the patients feel at ease, but the lowest average score was for the item concerning the nurses’ prediction regarding what the patients needed.

Patient satisfaction with nursing care was associated with the respondents’ status (patient or relative) (r = 0.278, p < 0.000), negatively correlated with the number of patients present daily at the unit level (r = -0.172; p < 0.00) and was predicted in nearly 10% (R² = 0.098) from the number of patients in 2nd to 4th category.

In contrast, the patient satisfaction index was positively correlated with the number of nursing care hours per patient day (r = 0.118; p < 0.01), significantly for both profiles. Registered nurses’ and nursing technicians’ hours per patient day, along with the index of registered nurses’ needed (needed vs. real number of registered nurses) predicted 5% (R² = 0.054) of patient satisfaction with nursing care.

Moreover, *undivided attention* and *explanation* were positively correlated only with the volume of registered nurses' work hours. However, the item *things are done without asking* was negatively correlated with the working hours of nursing technicians. Patients' satisfaction with nursing care was not significantly correlated with the frequency of nursing staff activities in general, while significant correlations were found between the patients' satisfaction variables and the frequency of some direct patient care activities (**Table 3**).

If selected items from the questionnaire are added to the three presented nursing staff structural variables (registered nurses and nursing technicians' hours on patient day, the index of registered nurses' need) – namely *The nurse, helped my outlook become more realistic; Little things were done for me without asking; I was sure that nurses would be there when I needed them; I know that due to the nurses' efforts some problems were avoided; The nursing staff helped me manage the fears I had about my illness; The nurses made me feel relaxed when treatments were being done* – then together they could predict 96% ($R^2 = 0.961$; $\alpha = 0.747$) of the hospitalized patients' perception of the quality of nursing care.

5. Discussion

This study describes the correlation between patient perceptions of the quality of nursing care and nurse structure and process variables. Hospitalized patients' perceptions of nursing care quality was measured with a questionnaire, the nursing process was directly observed, and the data on nursing workforce and patient structure were obtained from routine hospital data. The results indicate a significant association between certain constants (actual and needed staffing levels, some nursing activities) and patient satisfaction.

In the researched medical ward the average number of patients per registered nurse was high, and only a third of the overall nursing hours were conducted by nurses with a bachelor's degree. Although, the number of staff did not deviate from that expected in European hospitals [44], the observed staffing levels could provoke rushed judgments about low quality of care. However, it should be noted that in the observed hospital the management calculates the number of registered nurses and nursing technicians together (as nursing staff), ignoring evidence on higher nurse staffing levels being reflected in better patient outcomes [8, 15, 18, 45, 46]. With the use of two profiles of nursing staff, the productivity levels, number of nurse working hours and nurse–patient ratios appear to be good. But this hospital is employing cheaper nursing technicians instead of registered nurses, and this low-cost approach ignores actual patients care needs, actual unit occupancy rates, and staff competences and, as a consequence, the graduate staff are overloaded.

This study showed also that patients were more satisfied when the proportion of baccalaureate nurses in the nursing workforce was higher. While these results support the findings of previous studies [10, 47, 48], there is limited evidence correlating hospital nurse staffing with patient satisfaction in the literature [8, 30, 49, 50]. This study also found that patient satisfaction is positively correlated with the number of registered nurse working hours, with the index of actual and required registered nurses, and with the number of registered nurse and nursing technician working hours per patient day. Research reports positive patient outcomes when staffing levels allow a maximum of six patients to one registered nurse on a medical ward [51]. Similarly, other research finds that more patients per nurse result in higher rate of care left undone [19].

Observations suggest that registered nurses need to engage in a great variety of tasks, and spend a great deal of time locating the information needed for individual

patients. Health education, clinical references, consulting, and coaching were the least frequent activities in the registered nurses' working days. We were not able to observe a fifth of the registered nurses' activities, as these were done outside the medical ward. These activities could thus not be classified in the observations, but were described by the staff as nursing tasks on other medical units, meetings with management, quality teams, and so on. Moreover, the results show that the patients noticed the individual attention they received from registered nurses while they cared for them, and that their explanations helped them feel more at ease. Nurses are known to spend more time with patients than other health professionals, and that enables them to show the caring attitude which is sensitive to patients' reports of quality of nursing care [52]. Registered nurses have a wide range of nursing knowledge and good communication skills, are alert to changes in the patients' status and have the competencies needed to do all the activities that arise in nursing care. Nursing technicians have fewer competencies, and care for fewer patients than registered nurses – certain tasks are thus not delegated from registered nurses to technicians, but the vice versa. This could mean that patients would benefit if mixed staffing models, like the one observed in this study, would include more nurses with bachelor's degrees.

We used a hierarchical four-grade nursing care classification system to assess nursing care levels for patients at different acuity levels. This system identifies the staffing levels required to achieve appropriate nursing care, although unfortunately it is not used in practice yet. When we compared the actual nursing levels, the conventional patient-to-nurse ratio and the nurses needed on the basis of patients' classification, we found severe shortages. Individual patient requirements were not respected, as a 38% shortage of registered nurses was measured. Therefore, nursing staff requirements should be considered as a predictor of the quality of nursing services [53], and having enough nurses to meet patient needs could be reflected in higher patient satisfaction with nursing care [8, 54].

According to the findings of the current study, patient satisfaction was not correlated with the frequency of contact care activities performed by the entire nursing staff. Contrary to what is documented in studies in high-income countries [13, 21], where the time that nurses spend in direct care activities was found to be a determinant of patient satisfaction, our patients valued the number of hours worked by nurses. The proportion of direct patient care activities performed by all nursing staff was higher (36.8%) than that documented previously [29]. However, the majority of observed contacts included hands-on-care and were focused on the patient's physical needs (e.g. hygiene, food intake, mobility, medical/technical procedures), while a limited proportion of activities was devoted to regular patient observations, communication, or support. In contrast, some authors [55] have found that nurses spend most time communicating with patients and charting or reviewing information. The different findings could be the result of different research protocols, where communication is documented as an individual task, as in our study, instead of being a part of a multitasking activity.

The results of the correlations also revealed three process items (*undivided attention*, *explanation*, and *things are done without asking*) that are the special strengths of nursing care. Some authors [33, 56] have also stated that the most important factors that influence patient satisfaction are perceived nurse caring, nursing kindness, and the technical aspects of care, while others focus on individual patient characteristics [2, 30, 31].

In general, the patients in this study reported high satisfaction with the nursing care they received. Some previous research also reported a comparable average satisfaction index, ranging from 4.0 to 4.5 [3], but other studies also reported lower perception levels [48, 57]. It was found that the quality of bedside nursing care is also affected by the related hospital services such as the quality of beds,

the quality and cleanliness of bed linens, the number of bathrooms available, and the quality of the bathrooms available, cleanliness of the toilets, and ventilation and lighting in the wards [52]. The high satisfaction perceived by our patients could therefore reflect good hospital services or, at contrary, a paternalistic perspective, where patients believe that healthcare workers are doing their best with the limited resources available [58], and therefore are less demanding.

6. Conclusion

This paper supports nursing management efforts for a higher proportion of registered nurses in the nursing staff structure, and an increased volume of overall nursing staff working hours. The results show that the more the needs of patients that are detected, the higher the satisfaction regarding nursing care. Managers could use the patient needs categorization system as in this study to facilitate decisions on staffing requirements and therefore predict patient satisfaction.

Patients do not only perceive the presence and value of registered nurses when they are at their bedsides. The competencies registered nurses acquire at the academic level can also affect the care given, and thereby the perceptions of patients, who feel higher levels of satisfaction. Overall, our findings suggest that the health system requires more highly skilled healthcare professionals.

Acknowledgements

Special thanks for article revision and professional consulting to Prof. Mirko Markič, Ph.D.; and Dragica Blatnik, the head nurse of Izola hospital for support in organizing the study; and to patients and nurses in the researched hospital units.

Conflict of interest

The author declares no conflict of interest.

Author details

Melita Peršolja
Faculty of Health Sciences, University of Primorska, Unit Nova Gorica, Delpinova,
Nova Gorica, Slovenia

*Address all correspondence to: melita.persolja@fvz.upr.si

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