Original Article

Care and NonCare-Related Activities among Critical Care Nurses: A Cross-Sectional Observational Time and Motion Study

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ABSTRACT

Background: Measurement of nursing activities is used for workload assessment, performance evaluation, and workforce management. **Objectives:** This study aimed to measure care and noncare-related activities among critical care nurses and to determine their contributing factors. **Methods:** This cross-sectional observational study was conducted from July to September 2017. All care and noncare-related activities of 70 critical care nurses in a public university hospital in Kashan, Iran, were assessed through the time and motion technique. Each nurse was observed throughout a 6-h morning shift. Data were collected using a nurse and patient characteristics questionnaire and care and noncare-related activities checklist. The paired and the independent-samples *t*-test, Mann–Whitney U-test, Kruskal–Wallis tests, and the one-way analysis of variance were used for data analysis. **Results:** The duration of nurses' care-related activities (249.10 ± 65.00 min, i.e., 69.2% of a 6-h shift) was significantly more than the duration of their noncare-related activities (111.00 ± 48.30 min, i.e., 30.8% of a 6-h shift). Respecting care-related activities, participants spent 53.5% of their time on direct care and the rest 46.5% on indirect care; whereas respecting noncare-related activities, they spent 76.5% of their time on personal activities (such as making personal calls) and the rest 23.5% on unit related tasks. The duration of nurses' activities had significant relationships with their unit, nurse–patient ratio, and patients' age, gender, and diagnosis. **Conclusion:** Critical care nurses spend their time mostly on care-related than noncare-related activities. Closer managerial supervision of nurses' activities, in-service educations about effective time management, and determination of the optimum nurse–patient ratio and the best task division schedule are needed to reduce nurses' workload, improve care quality, and enhance patient satisfaction.

KEYWORDS: *Critical care unit, Nursing care, Nursing management, Workload*

INTRODUCTION

Critical care units are the most important wards in hospitals.[1] In recent years, critical care nurses' workload has dramatically increased due to increases in care complexity and technological advancements.[2] Heavy workload may negatively affect nurses' quality of work life, care quality, and patient safety.[3]

Nurses' workload is multifactorial.[4] It is explained in terms of direct and indirect care.[5,6] Direct care includes all care-related activities performed at patient bedside,[7] while indirect care, which is patient-related activities performed away from the bedside, takes a large amount of nurses' time and mostly includes bureaucratic and clerical duties such as documentation.[8] However, there are some other activities which are not related to patient care but

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significantly affect the nursing workload.[9] These activities are unit-related and personal activities. Unit-related tasks are related to the management of the unit and pave the way for care provision to all patients.[10] Personal activities are related to nurses' personal lives and mostly include their activities of daily living. An earlier study reported that direct care, indirect care, unit-related, and personal activities, respectively, took 40.5%, 32.4%, 5%, and 21.9% of nurses' working time.[11] Another study also found that Iranian critical care nurses spent 56.83% of their working time on direct care (32.74%) and indirect care (24.09%) and the rest (43.17%) on personal activities.[12]

Most previous studies measured nurses' workload using workload measurement instruments,[6,13-15] and some other studies have measured workload through self-report methods.[12,16,17] Most of the workload measurement instruments in earlier studies did not include noncare-related activities which can significantly affect workload.[15,18] On the other hand, these instruments only "estimate" the nursing care time needed for each of the care-related activities. Accordingly, those studies provided no accurate information about the actual time nurses spent on care provision.[19] Besides, some of the earlier studies were conducted on small samples of nurses and hence provided findings with limited generalizability.[11,12] This study was conducted to narrow these gaps.

Direct observation and measurement of all nurses' care and noncare-related activities and considering the potential factors may add our existing knowledge about nursing workload and time distribution of different activities.

Objectives

This study aimed both to measure care and noncare-related activities among critical care nurses and to determine their contributing factors.

METHODS

Design and setting

This cross-sectional observational time and motion study was carried out in a public university hospital in Kashan, Iran. Study participants were all eligible nurses who worked in the seven critical care units of the hospital, namely, coronary care unit (CCU), general surgery intensive care unit (ICU), neurosurgery ICU, medical ICU, cardiac surgery ICU, postangiography unit, and postcardiac surgery ICU. Inclusion criteria were having a university degree in nursing, presence in the affiliated unit from the beginning to the end of the morning shift, and patient care through the case management nursing

care delivery system so that each nurse was responsible for all care-related activities of a patient.[20] Participants were excluded if they refused to stay in the study or left the study setting before the end of the morning shift. Accordingly, seventy critical care nurses were recruited to the study.

Study instruments

The study data were collected using a nurse and patient characteristics questionnaire and a care and noncare-related activities checklist.

Nurse and patient characteristics questionnaire

This questionnaire included items on nurses' demographic and professional characteristics (namely, age, gender, marital status, educational level, work experience, employment status, nurse–patient ratio, and type of critical care unit) and also on patients' demographic and clinical characteristics (namely, age, gender, and type of disease or medical diagnosis).

Care and noncare-related activities checklist

As a researcher-made instrument, this checklist was used to collect data on nurses' care and noncare-related activities. To develop this checklist, a comprehensive list of all nursing activities in critical care units was created through performing a literature review and using critical care nurses' job description provided by the Iranian Ministry of Health.[21] This checklist contained two parts. The first part was on nurses' care-related activities including direct care (45 items) and indirect care (12 items). The second part was on noncare-related activities including unit-related tasks (9 items) and personal activities (4 items). Eight faculty members affiliated to Kashan University of Medical Sciences, Kashan, Iran, evaluated the content validity of the checklist, which resulted in content validity index and the ratio of 0.84 and 0.91, respectively. Reliability assessment was performed through the interrater method. Accordingly, two raters simultaneously assessed the activities of seven nurses. Interrater intraclass correlation coefficient was 0.969 for direct care and 0.999 for indirect care, unit-related, and personal activities.

Observation technique

For data collection, the aforementioned checklist and the time and motion observation technique[22] were used to continuously observe and record the duration of all care and noncare-related activities of each participating nurse throughout a whole 6-h morning shift. Accordingly, data collection for all seventy participants was performed in a 2-month period. Observations were made by the first author and a nursing student who had been informed about the aim and method of the study and trained about the observation technique. During the observation of

each nurse, the observer followed the nurse from the beginning to the end of a morning shift. Nurses were not blinded for being observed. Time measurement was performed in the second using a stopwatch. For nurses who were responsible for care provision to more than one patient, a distinct checklist was completed for each of their patients. On the other hand, the time each nurse spent on noncare-related activities was measured using a single checklist irrespective of the number of patients assigned to that nurse.

Ethical considerations

This study was approved by the Ethics Committee of Kashan University of Medical Sciences, Kashan, Iran (approval code: IRR.KAUMS. NUHEMP.REC.1396.4). Necessary permissions for conducting the study were obtained from the research administration of the

university and the authorities of the study setting. All participants received information about the study objectives and provided written informed consent. To prevent nurses from changing their behaviors during observations, they were assured that all study instruments were completed anonymous, and the study findings would have no effect on their salaries, benefits, and periodical performance evaluation. Furthermore, the researcher attended as a trainee in each of the units a few days before collecting data so that her presence gets normal to nurses.

Data analysis

Statistical analyses were carried out using the SPSS for Windows (v. 16.0, SPSS Inc., Chicago, IL, USA). Data were summarized and presented using the measures of descriptive statistics such as mean,

Table 1: The relationships between the duration of care-related activities and nurse's characteristics

Characteristic	n (%)	Duration of care-related activities (min)[a]			
		Direct care	P value	Indirect care	P value
Age (years)					
<30	10 (14.3)	129.3 ± 42.5	0.324[b]	105.4 ± 30.4	0.559[b]
30-39	50 (71.4)	137.4 ± 44		116.4 ± 32	
≥40	10 (14.3)	115.4 ± 36.5		120.2 ± 37.2	
Gender					
Male	8 (11.4)	119.5 ± 21.2	0.124[c]	105.5 ± 29.5	0.367[c]
Female	62 (88.6)	135 ± 45		116.4 ± 32.5	
Marital status					
Married	59 (84.3)	131.3 ± 40.4	0.385[c]	114.4 ± 32.5	0.589[c]
Single	11 (15.7)	143.5 ± 55.3		120.3 ± 31.5	
Work experience (years)					
<10	29 (41.4)	135.3 ± 44.1	0.739[c]	108 ± 30	0.092[c]
≥10	41 (58.6)	132 ± 42.5		121 ± 33.2	
Educational degree					
Bachelor's	64 (91.4)	132.5 ± 41.5	0.734[c]	116.2 ± 33.2	0.576[c]
Master's	6 (8.6)	139.1 ± 58.5		108.3 ± 21.4	
Employment status					
Formal	60 (85.7)	134 ± 43.3	0.765[c]	117.2 ± 32.4	0.303[c]
Informal	10 (14.3)	129.4 ± 42.6		105.5 ± 30.4	
Unit					
a: Surgical ICU	14 (20)	132.4 ± 32.5	<0.001[b]	116.3 ± 27	0.039[b]
b: Neurosurgery ICU	15 (21.4)	150.5 ± 27.5	a>g[d]	118.3 ± 23.2	g>e[d]
c: Medical ICU	10 (14.3)	105.4 ± 26.5	b>g[d]	99.3 ± 29.3	
d: Cardiac surgery ICU	10 (14.3)	157.2 ± 54.3	d>g[d]	123.5 ± 43.4	
e: Postcardiac surgery ICU	8 (11.4)	167.2 ± 41.2	e>g[d]	136.3 ± 39	
f: Postangiography	6 (8.6)	113.5 ± 38.4		125.5 ± 34	
g: CCU	7 (10)	81.3 ± 20.1		86.3 ± 10.4	
Nurse-patient ratio			0.001[b]		0.015[b]
a: 1:1	12 (17.1)	109.4 ± 28	b>a[d]	97.2 ± 30.3	d>a[d]
b: 1:2	36 (51.4)	146.5 ± 39.4	b>c[d]	119 ± 30.2	
c: 1:3	9 (12.9)	90 ± 23.5	d>c[d]	97.5 ± 19.1	
d: 1:4	8 (11.4)	148.4 ± 43.2		138.4 ± 33	
e: 1:5	5 (7.1)	147.3 ± 57.3		129.2 ± 42.1	

[a]Data presented as mean±SD, [b]The results of the one-way analysis of variance, [c]The results of the independent-sample *t*-test , [d]Statistically significant difference based on the results of the Tukey's *post hoc* test. CCU: Coronary care unit, ICU: Intensive care unit, SD: Standard deviation

Table 2: The duration of nurse's care- and noncare-related activities						
Activities	Minimum (min)	Maximum (min)	Mean ± SD (min)	95% CI	Percentage from total time	*P* value[a]
Care-related						<0.001
Direct care	47.16	235.59	133.2 ± 43.1	123.1-143.4	53.5	
Indirect care	46.22	237.01	115.4 ± 32.3	107.5-123.2	46.5	
Noncare related						<0.001
Personal	7.43	248.29	85 ± 46.1	74.0-96.0	76.5	
Unit-related	2.41	92.39	25.5 ± 16.3	22.0-29.5	23.5	

[a]The results of the paired-sample *t*-test. SD: Standard deviation, CI: Confidence interval

Table 3: The relationships between the duration of noncare-related activities and nurse's characteristics				
Characteristics	Duration of noncare-related activities (min)[a]			
	Personal	*P* value	Unit-related	*P* value
Age (years)				
<30	86.1 ± 44.3	0.710[b]	25 ± 15.2	0.438[b]
30-39	82.3 ± 46.5		24.5 ± 16.1	
≥40	95.6 ± 46.4		32.1 ± 19.3	
Gender				
Male	87 ± 33.4	0.894[c]	29.3 ± 15.1	0.525[c]
Female	84.4 ± 47.4		25.3 ± 16.4	
Marital status				
Married	86.4 ± 47.1	0.503[c]	26.1 ± 17	0.751[c]
Single	76.2 ± 41.1		24.3 ± 14	
Work experience (years)				
<10	80.5 ± 49.2	0.540[c]	23.5 ± 12.2	0.364[c]
≥10	87.5 ± 44		27.3 ± 18.5	
Educational degree				
Bachelor's	85.4 ± 77.4	0.686[c]	25.4 ± 16.5	0.774[c]
Master's	77.4 ± 51		27.5 ± 15	
Employment status				
Formal	84.5 ± 46.4	0.933[c]	26 ± 16.4	0.841[c]
Informal	86.1 ± 44.3		25 ± 15.2	
Unit				
a: Surgical ICU	86.2 ± 37.3	0.007[b]	23.4 ± 12.3	0.392[b]
b: Neurosurgery ICU	70.1 ± 30.4	g>a[d]	23.3 ± 23	
c: Medical ICU	78.1 ± 40.1	g>b[d]	24.4 ± 17.5	
d: Cardiac surgery ICU	70.1 ± 44.2	g>c[d]	27 ± 14.3	
E: Postcardiac surgery ICU	75.5 ± 50.2	g>d[d]	37 ± 16	
		g>e[d]		
f: Postangiography	93 ± 46		31.4 ± 11.3	
g: CCU	148.2 ± 57.2		18.3 ± 8.2	
Nurse-patient ratio				
a: 1:1	96.3 ± 36.4	0.001[b]	40.3 ± 21.1	<0.001[b]
b: 1:2	70.4 ± 37.3	c>b[d]	19.3 ± 12.2	a>b[d]
c: 1:3	140.5 ± 56.5	c>d[d]	20.4 ± 10.4	a>d[d]
d: 1:4	72.2 ± 37.2		31.1 ± 14.3	
E: 1:5	80.3 ± 46.2		38.5 ± 14.2	

[a]Data are presented as mean ± SD, [b]The results of the one-way analysis of variance, [c]The results of the independent-sample *t*-test, [d]Statistically significant difference based on the results of the Tukey's *post hoc* test. SD: Standard deviation, CCU: Coronary care unit, ICU: Intensive care unit

standard deviation, median, and absolute and relative frequencies. The Kolmogorov–Smirnov test was used to test normality. The relationships of the time nurses spent on care and noncare-related activities with nurses' and patients' characteristics were examined using the information obtained from all the 70 nurses through the independent-samples *t*-test, the one-way analysis of variance, the Tukey's *post hoc* test, and the linear regression analysis. Noncare-related activities were measured once and irrespective of the number of patients assigned to a particular nurse. Therefore, to minimize biases, only the data of the 12 nurses who had just one patient were used for examining the relationships of their noncare-related activities with patients' characteristics through the Mann–Whitney U-test and the Kruskal–Wallis tests. The level of significance was set at <0.05.

RESULTS

Most nurses were female (88.6%), aged 30–40 years old (71.4%), held bachelor's degree in nursing (91.4%) and had a work experience of more than 10 years (58.6%). Almost half of them (48%) were responsible for care provision to at most two patients [Table 1].

On average, nurses spent 249.10 ± 65 min of their time during a 6-h morning shift on care-related activities, corresponding to 69.2% of their total working time. They spent 110.9 min (30.80%) of their time on noncare-related activities in the morning shift. The duration of nurses' care-related activities was significantly greater than the duration of their noncare-related activities (*P* < 0.001) [Table 2].

Respecting care-related activities, participants spent 53.5% of their time on direct care and the rest 46.5% on indirect care; whereas respecting noncare-related activities, they spent 76.5% of their time on personal activities.

The time nurses spent on direct care had significant relationships with the type of their unit (*P* < 0.001) and nurse–patient ratio (*P* = 0.001). Similarly, the time related to indirect care had significant relationships with the type of unit (*P* = 0.039) and nurse–patient ratio (*P* = 0.015) [Table 1].

The duration of nurses' personal activities had significant relationships with the type of their unit (*P* = 0.007) and

nurses–patient ratio ($P = 0.001$). However, the duration of unit-related activities had a significant relationship only with nurse–patient ratio ($P < 0.001$) [Table 3].

For a fixed number of patients, nurses in surgical, neurosurgery, and cardiac surgery ICUs spent significantly more time on care-related activities and less time on noncare-related activities compared with nurses in CCU. Moreover, after adjusting the effects of the "unit" variable, any decrease in nurse–patient ratio from 1:1 to 1:5 was associated with longer duration of care-related and shorter duration of noncare-related activities [Table 4].

Around 61.1% of patients were male, 47.9% of them aged more than 65 years, 23.4% of them suffered from cardiovascular disease, and 23.4% of them underwent open-heart surgery. The duration of nurses' direct care had significant relationships with patients' age ($P < 0.001$), diagnosis ($P < 0.001$), and gender ($P = 0.034$). Moreover, the duration of their indirect care had significant relationships with patients' age ($P = 0.001$) and diagnosis ($P < 0.001$) [Table 5].

After adjusting for the variable of "patient's age," the duration of care-related activities for patients with respiratory disease, open-heart surgery, and neurosurgery was significantly greater than the duration of care-related activities for patients who underwent angiography [Table 6]. However, no statistically significant relationships were found between patients' characteristics and the duration of nurses' noncare-related activities ($P > 0.05$) [Table 7].

DISCUSSION

This study showed that critical care nurses spent most of their working time on care-related activities. In line with this finding, two earlier studies reported that nurses spent most of their time on care-related activities.[17,23] This finding can be attributed to the patients' critical conditions and high level of dependence in critical care units. The findings of the present study also revealed that the time nurses spent on direct care were greater than the time they spent on indirect care. Similarly, two studies in Greece and Korea[5,24] found that nurses allocated most of their time to direct care (57.34% and 53.8%, respectively).

Respecting noncare-related activities, our findings indicated that nurses spent most of their time on personal activities rather than unit-related tasks (85.00 ± 46.1 vs. 25.5 ± 16.3 min). Similarly, a study in a critical care unit in Greece found that nurses spent 18.8% of their working time on personal activities and 3.2% on unit-related activities.[24] However, a study in emergency and critical care units in Iran showed that nurses spent a large amount of their working time on personal activities.[12] The greater amount of time nurses spend on personal activities rather than unit-related tasks can be attributed to the level of their professional commitment and their behavioral patterns. In other words, nurses with greater professional commitment may spend their spare time at work on doing activities such as patient education, while some nurses may spend their spare time on personal activities. Similarly, a study reported that although nurses had high levels of professional knowledge and skills, they allocated limited time for communication with their patients.[25] Moreover, the greater percentage of time that our participating nurses allocated to personal rather than unit-related activities may be due to the weaknesses in the managerial supervision of their activities, their limited familiarity

Table 4: Linear regression analysis for the nurse-related predictors of the duration of care and noncare-related activities

Model	Duration of care-related activities[a]		Duration of noncare-related activities[a]	
	β (95% CI)	*P* value	β (95% CI)	*P* value
Constant	307.5 (192.4-422.5)	<0.001	47.1 (−51.2-145.5)	0.341
Nurse-patient ratio: 1:1	−192.3 (−319.1-−66)	0.003	156.5 (48.4-265.1)	0.005
Nurse-patient ratio: 1:2	−127.5 (−251.4-−3.3)	0.044	108.5 (2.4-214.5)	0.045
Nurse-patient ratio: 1:3	−141.5 (−250.5-−32.4)	0.012	121.4 (28.5-214.3)	0.011
Nurse-patient ratio: 1:4	−8 (−63.5-47.4)	0.773	−9.5 (−57.4-37.4)	0.675
Surgical ICU	89.5 (28.3-150.4)	0.005	−61.4 (−113.4-−9.1)	0.022
Neurosurgery ICU	102.1 (35.2-168.5)	0.003	−71.5 (−128.4-−14.4)	0.015
Medical ICU	38 (−31-107)	0.275	−62.5 (−121.5-3.4)	0.308
Cardiac surgery ICU	120.3 (51.2-189.5)	<0.001	−72.5 (−132-−13.5)	0.016
Postcardiac surgery ICU	18.4 (−83.1-120.3)	0.714	56.4 (−30.2-143.5)	0.197
Postangiography	−64 (−179.4-51.3)	0.271	82.5 (−16-181.2)	0.099
	$r^2 = 0.546$		$r^2 = 0.403$	

[a]The dependent variable, Nurse-patient ratio: 1:5 is considered as baseline group, CCU unit is considered as baseline group. CCU: Coronary care unit, ICU: Intensive care unit, CI: Confidence interval

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Table 5: The relationships between the duration of care-related activities and patients' characteristics

Characteristics	n (%)	Duration of care-related activities (min)[a]			
		Direct care	P value	Indirect care	P value
Age (years)			<0.001[b]		0.001[b]
a: 1-14	4 (2.4)	72.5 ± 34	c<b[d]	77.5 ± 24.5	c<a[d]
b: 15-44	20 (12)	73.5 ± 29.1	c<d[d]	61.3 ± 27.5	c<b[d]
c: 45-64	63 (37.7)	43.5 ± 28		41.2 ± 23.1	
d: ≥65	80 (47.9)	55.5 ± 30.5		49.1 ± 22	
Gender			0.034[c]		0.376[c]
Male	102 (61.1)	51.5 ± 29.3		47 ± 25.3	
Female	65 (38.9)	62.2 ± 32.5		50.3 ± 22.2	
Diagnosis			<0.001[b]		<0.001[b]
a: Cardiovascular disease	39 (23.4)	32.3 ± 13	b>a[d]	30.4 ± 12	b>a[d]
b: Respiratory disease	18 (10.8)	58.4 ± 14	c>a[d]	55.1 ± 17.5	c>a[d]
c: Open-heart surgery	39 (23.4)	61.1 ± 33.1	d>a[d]	49.5 ± 20	d>a[d]
d: General surgery	23 (13.8)	76.2 ± 28.3	e>a[d]	65.3 ± 22.5	e>a[d]
e: Neurosurgery	27 (16.2)	83.4 ± 27.4	b>f[d]	65.5 ± 29.2	b>f[d]
f: Cardiac catheterization	21 (12.6)	28.5 ± 14	c>f[d]	31.5 ± 14.2	c>f[d]
			d>f[d]		d>f[d]
			e>f[d]		e>f[d]

[a]Data presented as mean±SD, [b]The results of the one-way analysis of variance, [c]The results of the independent-sample *t*-test, [d]Statistically significant difference based on the results of the Tukey's *post hoc* test

Table 6: Linear regression analysis for the patient-related predictors of the duration of care-related activities

Model	Duration of care-related activities[a]	
	β (95% CI)	P value
Constant	65 (44.8-85.2)	<0.001
1-14 years	8.6 (−32.7-50)	0.680
15-44 years	12.4 (−7.6-32.5)	0.222
45-64 years	−6.3 (−20.5-7.8)	0.377
Cardiovascular disease	1.6 (−20.5-22)	0.945
Respiratory disease	45.5 (18.3-72.7)	<0.001
Open-heart surgery	48.8 (27.3-70.2)	<0.001
General surgery	75.5 (50.5-100.6)	<0.001
Neurosurgery	81.8 (57.6-106)	<0.001
r^2=0.453		

[a]The dependent variable, Age: ≥65 years is considered as baseline group, Diagnosis: Cardiac catheterization is considered as baseline group. CI: Confidence interval

with their job description,[26] and their reluctance to do unit-related activities because they consider that these activities are too much time-consuming.[16]

We also found that the time of care-related activities had significant relationships with the type of critical care unit and nurse–patient ratio. This finding may be attributable to differences in the condition of patients hospitalized in different critical care units. For instance, nurses in ICUs need to spend more time on doing a wide range of care-related activities due to the critical conditions of patients in these units.[5] Findings also showed that

after adjusting the confounding effects of the "unit" variable, lower nurse–patient ratio was associated with longer duration of nurses' care-related activities and shorter duration of personal activities. Similarly, some earlier studies reported that lower nurse–patient ratio significantly increases nurses' workload.[24,27]

Study findings revealed that nurses who provided care to just one patient spent greater amount of their working time on unit-related tasks than other nurses. This finding is attributable to the task division schedule in each shift so that nurses with lower number of patients are assigned more unit-related tasks as an in-charge nurse. Similarly, a study reported that in-charge nurses spent 24% of their working time on managerial and clerical tasks and less time on direct care.[17] However, we found no significant differences among nurses in different critical care units respecting the mean time of unit-related activities. This is probably due to the nearly same arrangement and clerical tasks for nurses in these units.

The other demographic and professional characteristics of the participating nurses' had no significant relationships with the time they spent on care and noncare-related activities. However, two earlier studies reported significant relationships between the mean time of care-related activities and nurses' demographic characteristics.[16,24] These contradictory findings may be attributable to the differences in the samples of the studies. In other words, while our study was conducted

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Table 7: The relationships between the duration of noncare-related activities and patient's characteristics

Characteristics	n (%)	Duration of care-related activities (min)[a]			
		Direct care	P value	Indirect care	P value
Age (years)					
b: 15-44	4 (33.4)	115.5 (58.3-120.1)	0.386[b]	39.3 (21-57.5)	0.880[b]
c: 45-64	3 (25)	97.2 (85.1-155)		38.3 (35.4-47.1)	
d: ≥65	5 (41.6)	31.3 (49.1-151.2)		31.3 (14.2-92.4)	
Gender					
Male	5 (41.6)	58.3 (49.1-155)	0.465[c]	47.1 (14.2-92.4)	0.685[c]
Female	7 (58.4)	97.3 (57.3-151.2)		35.4 (23.3-55.2)	
Diagnosis					
b: Respiratory disease	2 (16.6)	118.4 (117.1-120.1)	0.115[b]	38.1 (21-55.2)	0.860[b]
c: Open-heart surgery	3 (25)	58.1 (57.3-155)		35.4 (25-47.1)	
d: General surgery	4 (33.4)	106 (97.2-151.2)		35 (23.3-44)	
e: Neurosurgery	3 (25)	54.1 (49.2-58.3)		57.5 (14.2-92.4)	

[a]Data are presented as median (P 10-90), [b]The results of the Kruskal-Wallis test, [c]The results of the Mann-Whitney U-test

on a small sample of nurses, the samples in those two studies were rather large.

Study findings also indicated the significant relationships of the mean time of care-related activities with patients' age, gender, and diagnosis. However, the effect of patients' diagnosis on the time of care-related activities was greater than their age and gender. Two other studies also reported the same finding.[15,28]

The present study did not find a significant relationship between patients' demographic and clinical characteristics and the time spent on noncare-related activities. Unit-related tasks are more determined by organizational policies than patients' characteristics. Moreover, we used the data obtained from only 12 patients to determine these relationships. Data from larger samples of patients may provide more conclusive results.

The main limitation of this study was the probable effect of direct observation of nurses' activities on their performance which might have resulted in deliberate modifications to their performance during observations. The small sample size was another limitation of the study. Moreover, the time of noncare-related activities of each nurse was once measured irrespective of the number of his/her patients; thus, the relationships of this time with patients' characteristics were measured using the data obtained from the 12 nurses who had only one patient.

While previous studies provided "estimates" about the time nurses spent on their activities at work, this study provided detailed information not only about the time distribution of critical care nurses' activities but also about its contributing factors. As this study was conducted in the critical care units of a single hospital, multicenter studies are recommended to assess the time distribution of nurses' activities and its contributing personal, professional, and organizational factors.

CONCLUSION

This study shows that critical care nurses spend most of their working time on care-related activities, mainly direct care. On the other hand, they spend a great portion of the rest of their working time on personal activities, and the minimum time of the nurses is allocated to unit-related tasks. Nurse–patient ratio and patients' diagnosis play significant roles in determining the time distribution of nurses' activities. The findings of this study highlight the necessity of closer managerial supervision of nurses' activities, in-service educations for nurses about effective time management, and determination of the most optimum nurse–patient ratio and the best task division schedule for nurses in each work shift. These strategies may help reduce nurses' workload, improve the quality of care services, and enhance patient satisfaction.

Conflicts of interest

There are no conflicts of interest.

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