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A TIME-MOTION STUDY IN INTENSIVE CARE UNIT USING DIRECT CARE NURSING TOOL

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ABSTRACT

In Nursing, direct care assessment is one of the significant components of nurse performance appraisal and workload identification. The study's purpose is to compare time-motion and the need for direct nursing action between junior and senior nurses in the intensive care unit. This study was conducted for three months in an intensive care unit for 30 nurses. Six investigators observed each nursing direct care action applied by the 34 nurses. Data were collected using the daily log form, then analyzed using descriptive statistics and inferential statistic was independent t test. 35 types of natural care nursing were observed from 30 nurses listed in a nursing daily log. The longest mean time is personal hygiene, with an average time of 14.33 minutes. The shortest average time is respiratory therapy using a nebulizer with a mean of 1.43 minutes. The minimum nursing hours per patient day is 365 minutes (6.08 hours), and the maximum time is 542 minutes (9.03 hours) per day. Direct care means the score is 495 minutes (7.82 hours per day). This study found no significant differences in spending times between senior and junior nurses with t = 0.038, p = 0.970. This study found that the direct nursing action in the intensive care unit is related to nurse workload; this requires the same time for each type of nursing action.

Keywords: intensive care; nurses; time-motion study

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INTRODUCTION

Nursing management consists of two crucial parts of the area, including nursing leadership and management of patient care (Weiss et al, 2019). A time-motion study is one of the components of patient care management (Sinsky, et al., 2016). Taylor explained that time-motion studies could be described as detailed observations of the time needed to perform specific tasks (Conti, 2013). For example, nursing direct and indirect care (called nursing action). Organizing health services, including nursing actions, is very complex, thus demanding that health workers follow standards of knowledge and science (Permenkes, 2016). Good standards that are followed by the productivity of health staff will create quality nursing care (Association, 2015). Time motion is one measure of performance achievement that is based on standards. Nurses are the spearhead of patient care and represent a crucial and

limited resource; the effectiveness and efficiency of the nurses are essential to the promotion of safe patient care and hospital quality performance.

Types of clinical such as paediatrics or surgery were significantly associated with the demand for health care staff (Van Oostveen, Gouma, Bakker, & Ubbink, 2015). One of the various nurses is the emergency nurse, that usually works in the emergency or high care room, such as an Intensive Care Unit. Spending time or time motion in the high care unit is challenged, where the nurses struggle to devote time to critical patients. It is argued that complex nursing care can cause nurse workload; as a result, it can neglect part of the nursing actions (Giltinane C. L., 2013); on the other hand, the study by Orique, Patty, and Woods found that there was a no significant relationship between nurse workload and missed nursing care (Orique, Patty, & Woods, 2016). This study conducted a time and motion study to investigate an evidence-based concept on how high care unit nurses spend their time and the difference in time expenditures between senior and junior nurses.

METHOD

The study was conducted in an Intensive Care Unit (ICU) for three months in a hospital in Indonesia. Six professional students who were characterized participated on observation in the study. The population in this study were patients who hospitalized in the Intensive care room and the samples were patients who categorized total and intensive care that received direct nursing action were 35 patients. The sample of nurses who provided direct nursing actions were 34 nurses with the minimum criteria of diploma education, worked as a nurse for at least 5 years and had received training. They undertook observation of each shift rotation in the research unit. We launched observation on 34 nurses who contributed a substantial amount of care. We applied a time-motion study form to measure the patients' demand for nursing care. First, we identify all nursing actions in the ICU using a daily log form. Second, based on the list of direct nursing care, then we made a list of time-motion study observation sheets that consisted of some nursing actions, observation time and motion study. The observation sheet comprised six components of direct care nursing action (DCNA): 1) Observation and monitoring that provided nine DCNA, 2) Self-care, which consists of eight DCNA, 3) Diet, food and drink, which consists of seven DCNA, 4) Medication consist of seven DCNA, 5) Somatic therapy which consists of five DCNA, and 6) Health education consists of four DCNA. To keep a representative sample of patients, we involved all patients in ICU with the intensive care acuity system. We determined all high care nurses with the requirement of training and especially competency. We analyzed data in the Statistical Package of v. 20 (IBM SPSS). Categorical data are provided as distribution. Continuous variables are summarized as means and analyzed using the dependent t-test to measure the comparative spending time between senior and junior nurses. The comparison was conducted based on all DCNAs that have been collected and calculated on the total time required.

RESULTS

A total of 30 nurses were observed in the Intensive Care Unit (ICU). The observation was applied to nurses who provide direct nursing care services (direct care) to 34 patients. Table 1 showed that the majority range of participants' ages were 18-25 (73%), female (69%) more than males, and the length of work were less than 15 (85%) years. It can be seen on the table that the nurse should have a training requirement; almost 50% of the nurses had skill training in the intensive care unit.

Table 1.
Respondent characteristics (n= 30)

Respondent Characteristics	f	%
Age		
18-40	25	73
40-61	9	27
Gender		
Male	11	31
Female	23	69
Education		
Diploma	17	50
Bachelor	17	50
Length of work		
≤ 15 years	29	85
>15 years	5	15
Number of trainings		
5-8 times	18	52
> 8 times	16	48

Table 2.
Profile of Patient Intensive Care

Respondent Characteristics	f	%
Age		
21-40	17	48.5
41-60	18	51.5
Gender		
Male	15	43
Female	20	57
Patient Acuity		
Total Care	26	74
Intensive care	9	26
Length of stay (day)		
Min	9	
Max	16	
Mean	12	

Table 2 shows the profile of the patients in the intensive care unit. All acuity patient classification of total and intensive care. As can be seen in table 2 of the patients' characteristics described that the ages of the patients more than 41 years old were 48.5%, less than 40 years old 51.5%, female 43%, male 57%. Next, the length of stay of the patients was a minimum of 9 days, a maximum of 16 days and an average of 12 days. The patients' acuity comprised of total care 74% and intensive care 26%.

A daily log of nursing actions observed by the professional nurse included: injecting, counting infusion drops, calculating fluid balance, personal hygiene like bathing patients, measuring blood pressure and other vital sign examination, medication, health education and others. The distribution of the DCNA spend time can be seen in table 3.

Table 3.
Direct Care Nursing Action Distribution

No.	CDNA	Mean	Min	Max
1.	Personal hygiene	14.33	4	39
2.	Oxygenation	3.00	3	3
3.	Injection of medicine	3.00	2	3.6
4.	Suction	2.31	2	5
5.	Extubating	3.6	3	5
6.	Wound care	7.00	3	14
7.	Take blood sample	12.00	3	20
8.	Diagnostic examination	12.66	11.7	20
9.	Oral hygiene	3.00	1	5
10.	Syringe pump application	2.50	1	3
11.	Tracheostomy care	7.83	4	16
12.	ECG examination	3.58	2	5
13.	Infuse pump application	2.67	1	4
14.	NGT management	3.40	3	4
15.	Bronchial washing	2.71	2	4
16.	Heating Up	9.50	5	14
17.	X-Ray Preparation	2.33	1	12
18.	NGT application	5.50	5	6
19.	Replacing infusion flabotle	1.00	1	1
20.	Colostomy Care	3.20	3	4
21.	Replacing DC	6.00	5	7
22.	Infusion fluid observation	1.29	1	2
23.	Replacing of bandages	3.33	2	4
24.	Infusion remove	3.67	2	7
25.	Remove IV needle	10.40	8	15
26.	Nebulizer therapy	1.43	1	2
27.	Nursing supervision	13.50	12	19
28.	Feed the patient	2.25	2	3
29.	New patient hand over	13.40	14	16
30.	Apply computer monitor	4.25	4	5
31.	Family Heath Education	12.30	10	14.00
32.	Blood Preasure measurement	3.02	2.7	3.5
33.	Health assessment	11.22	9.20	12.00
34.	Heart rate and temperature	2.02	2.5	3.05
35.	Fluid Balance	13.20	12.20	14.03

Table 3 shows 35 types of direct nursing care for the patient in the intensive care unit. The table also provides the mean, minimum, and maximum nursing action spending time.

Table 4.
Distribution of Direct Care Nursing Spend Time

Distribution	Times
Maximum direct care nursing	14.33 minutes
Minimum direct care nursing	1.43 minutes
Maximum direct care nursing	9.03 hours per day
Minimum direct care nursing	6.08 hours per day
Mean score direct-care	7.82 hours per day

It can be seen in table 4 that the most prolonged mean time duration is personal hygiene (bathing), with an average time of 14.33 minutes. The shortest average duration of time is the respiratory procedure for using a nebulizer with a mean time of 1.43 minutes. So based on the study, the minimum nursing hours per patient day is 365 minutes (6.08 hours), and the maximum time is 542 minutes (9.03 hours) per day, with the direct-care mean score being 495 minutes (7.82) hours per day.

Table 5.
Spending Time Between Senior and Junior Nurses

Group	Mean	Sd	t	Sig
Senior	5.8415	5.492	.038	.970
Junior	5.7955	5.420		

Table 5 describes that the group means between senior and junior nurses are statistically different; on the other hand, the value in the "Sig. (2-tailed)" row is more than 0.05; were looking at the group statistic table, we can see that those nurses who had junior experience same as senior experience in spending time. This study found no significant differences in spending times compared with $t = 0.038$, $p = 0.970$.

DISCUSSION

As seen in tables 1 and 2, the number of nurses is 30, while the average number of patients per day is 12; this shows that the number of nurses to provide nursing care to patients with intensive acuity is not balanced. A study found that staffing patterns may not balance to achieve patient outcomes in an intensive paediatric care setting with a high acuity patient level (Rogowski et al., 2015). It can be reported that an average of 12 patients (71%) out of 17 beds available in the ICU per day (see table 2), so it could be needed more activities and services in inpatient care by the nurses. The analysis of the average of patients per day in the ICU can be categorized as high care (Sudra, 2010). The outstanding value from the average number of patients is recommended to be no more than 85% per day (Huber, 2017).

Thirty-five types of Direct Nursing Action (DNA) were observed and listed based on daily logs in this study (Tuinman, 2016). Other studies found that most nursing staff spent the most time on direct care interventions, particularly primary physiological care like personal hygiene and fluid requirements (Westbrook, 2011). Within one working day, the intensive care nurses spent an average of 469.50 minutes or 7.8 hours providing nursing services directly to patients. Huber explained that the average takes eight hours for nurses to provide direct nursing care to patients in intensive care categories (Huber, 2017). Direct care activities in the intensive care unit tend to be complex. However, the workload could be handled by nurse practicians such as professional nurse students (senior students), who commonly help check vital signs, suction, position patients, replace infusion bottles and provide nutrition through Naso Gastric Tube (NGT) so that the direct nursing care activities that nurses should carry out are reduced.

As seen in the result of the senior and junior nurses, there was no significant difference between them. Most nurses spent time with intensive care patients who did not change (Tuinman, 2016). Work patterns were commonly applied to functional methods. Westbrook et al. found no multidisciplinary care teamwork among health staff in nursing care (Hermans & Van den Berghe, 2015). Task time distribution is commonly similar, junior nurses tend to do simple tasks, and the senior nurses do the more complex task; however, the average spending time was not significantly different. Looking at the direct care nursing categories of junior and senior nurses' services that were not different may be due to the similar complex task between

them. The frequency distribution of patient classification may also cause it according to the bed occupation rating.

Another reason may be the distribution of the acuity patient in intensive and total care (89%) with an average of 10 patients per day, and intermediate care has two patients per day. A study by Connor et al. (2021) argued that the Intensive Care Unit needs Complexity Assessment acuity and became to nursing workload; this is because the ICU focuses on dealing with critical patients whose conditions are unstable and requires extra supervision and treatment (Larsson, 2017). Such as patients with severe trauma, post-significant surgery and critical complications of various diseases. Direct care such as medication tasks has been observed in this study. However, indirect care, like professional communication that consumed much time, was not observed in direct care nursing action. In contrast, Mendoza and Heredero suggested that digital and manual communication is essential to developing institution relationships (Lacayo-Mendoza & Pablos-Heredero, 2016); this study may improve nursing action services. In the nursing professional relationship, communication is required for the sustainably nursing process (Nursalam, 2014).

CONCLUSION

The emergency patient has placed an unpredictable request on providing nursing care in the ICU. Experienced nurses and the amount of the nursing workload is essential. This study found that they were more able to use time effectively in carrying out nursing actions in the ICU than junior nurses. The workload can be one of the stress factors related to work performance. Therefore, it is better to manage the number of nursing staff in the ICU considering the patient understanding and personal seniority.

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