Journal of Research in Medical and Dental Sciences
2018, Volume 6, Issue 2, Page No: 120-128

Available Online at: www.jrmds.in
eISSN No. 2347-2367: pISSN No. 2347-2545

Investigating the Relationship Between Time of Nursing Service and Distribution of Force

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DOI: 10.5455/jrmds.20186217

ABSTRACT

For many organizations, the ability to have a sufficient number of employees at the right time is a very important factor in meeting the needs of the customers. To this end, this study aims to assess the relationship between nursing care time and number of nurses. This study is from the study group Descriptive-analytic. A tool for collecting information is based on a researcher-made checklist from 340 nurses. Data were analyzed using correlation coefficient and three way variance. According to the findings, the time spent on nursing services with the number of nurses in the surgical ward is significant and direct. If the internal and emergency departments and the three sections in total, this relationship is significant and indirect. Also, the three-way variance all three sections, shifts and nurses variables affect nursing care delivery time. There is no significant difference between the two surgical and surgical departments. the difference between the internal and the other two is significant. There is also no significant difference between morning and evening shifts. However, there is no significant difference between the shift of the night and the two shifts of the other hand, and there is no significant difference between the two and three nurses. between 5 nurses with other levels of difference is significant. Hospital managers are recommended to provide nurses with satisfactory planning and optimization of nursing power and proper use of nursing care on the quality of services and nurses' job satisfaction and satisfaction.

Key words: Nursing care, Timing, Hospital

HOW TO CITE THIS ARTICLE: Farideh Ahmadi , Ali komeili* , Anise nikravan, Investigating the Relationship Between Time of Nursing Service and Distribution of Force, J Res Med Dent Sci, 2018, 6 (2): 120-128, DOI: 10.5455/jrmds.20186217

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Received: 14/11/2017
Accepted: 30/01/2018

INTRODUCTION

With the advancement of human societies, the need for all kinds of health services is on the rise, while the financial resources allocated to the health and treatment are limited (1). The main pillar of the organizational structure of the health care institutions is hospitals whose main function is to meet the health needs of people and provide diagnostic and therapeutic services for various medical conditions, both surgical and non-surgical (2). All dimensions needed in the hospital, especially the manpower, should be balanced in a coordinated way so that the medical institutions can achieve the vital goals (3). If there is no plan for human resources management, then the organization will fail. Therefore, human resource planning is a major task of human resource management (4). Nursing services are one of the most important components of hospital services (5) and nurses are considered as the greatest source of human health care organizations and are

very important. So, the first and most important factor in improving the quality of care is to evaluate the nurses' activities in providing nursing care to patients in line with standards and evidence (1). It also accounts for 62% of the total staff and 36% of the total hospital costs (6). Many factors such as the type of service, the severity of the disease, the experience and the level of education of the nurses, the quality of supervision, access to assistant nurses, the architecture of the nursing unit, facilities and physical equipment, hours of work and work shifts affect the number of nurses to provide the desired services (7). But hospital managers should note that the use of a single version for all hospitals would not be beneficial and it would be advisable for each one to determine their own native standards according to their own requirements (8). Studying the distribution of nursing staff in selected hospitals of Ahvaz and Ilam regions, Bahadori et al found that the distribution of human resources in 89.5% of the hospital departments was lower than the standard of Ministry of Health, and only 2% of the departments had a nursing staff in accordance with the Ministry of Health standard, while 8.5% of the selected hospitals departments had the surplus of nursing staff. The greatest shortage of nursing staff has been observed in the emergency department of Ahvaz and Ilam hospitals (9). In addition to the lack of nursing force, it seems that in Iran, wasting of nursing resources is more than other countries, and nurses believe that they are not of suitable productivity in the existing conditions and their energy is more likely to be spent on administrative and secretarial affairs (10). Nurses are more likely to be accused of spending short time with their patients and often spend their time behind their desk (11). Lack of nursing staff in health centers is one of the most important problems in most hospitals and can have serious consequences for patients. Several researches show the relationship between nursing staff and the incidence of unwanted complications in patients. Mark and Stanton stated that shortage of staff in hospitals would increase the inability of effective care of patients and reduce the quality of nurses' performance. Increasing nursing capacity can have a positive effect on the quality of nursing care and job satisfaction of nurses (5).

Various methods have been used by organizations to estimate human resources for many years. Usually, the type of method used depends on the organization's goals, strategies and mission.

The most appropriate method for estimating nursing force is using the chronometry. The most common method of chronometry is the direct method using the chronometer (12). This information can help identify and establish effective nursing care (5) when managers want to make changes to the way of providing care. Considering the importance of nursing profession and the lack of force in this profession, and given the special importance of speed of delivery of services to reduce mortality and disability and patient satisfaction, we try to determine the relationship between nursing care time and the number of nursing staff with the help of the chronometry tool is in the surgical-internal-emergency departments so that we can provide a suitable distribution of force and find a way to optimally use the nurses' work time to improve the level of patient satisfaction and treatment personnel as the ultimate goal of the organization (1).

MATERIALS AND METHODS

This cross-sectional study was carried out in Kamkar Arabnia Hospital in August 2017 under the supervision of Qom University of Medical Sciences. In interviews with the officials of each department, the routine nursing activities were extracted from the nursing activities checklist. Information gathering tool in the present research is the data collection form was taken from a researcher-construed checklist. The chronometry was used for determining the time required by each nurse in each work shift; so the researcher in different shifts referred to the hospital and the time of service by each nurse from the beginning of the shift to its end was measured by the chronometer.

Regarding the patients' reference's being affected by weekdays (holydays and weekends), the chronometry was continuously performed by all department nurses of the hospital during 10 days and 3 working shifts in the morning, evening and night. The number of nurses under study in three work shifts was 160 nurses in the emergency department, 110 people in the surgical department and 70 people in the internal ward, that is, in the morning shift 150 people and in the evening and night shifts 100 people in each one. Given the small size of the statistical population, all nurses were studied in 10 working days, the sampling method was not used. The work shifts were divided into two six-hour shifts and a 12-hour shift. For Statistical analysis of the findings the methods of

descriptive statistics such as mean index, relative frequency, standard deviation and Pearson correlation coefficient and three-way ANOVA were used.

RESULTS

The nursing care method is in all departments is based on the case, the degree and level of education of all the nurses section is undergraduate nursing.
According to the study of admission of emergency department patients, the beginning of night shift and morning shift had the highest number of referrals and the lowest number of reference is the evening shift (Table 1). The results of the surgical ward showed that the highest number of referrers was in the shift of the morning and the lowest number in the evening shift. The number of clients is highest in the hours between 8:00 and 11:00 and in the time range from 2 to 5 in the morning it amounts to the lowest (Table 2). In the internal ward, the highest number of referrers is in the shift of the morning and the lowest number in the shift of evening. The referring between the hours 11 and 14 gains altitude and the time range from 5 to 8 has reached the lowest level of acceptance (Table 3).
Regarding the time of implementation of nursing services, in the emergency department, the transmission of patient for the paraclinic services with a mean time of 45:00 minutes is a maximum time and the blood glucose control with a glucometer has a minimum time of 0:42 minutes (Table 4). The average time of emergency services in the same activities is shorter than the other departments under study of which the main cause has not been investigated in this research. In the surgery department, the transfer of patient for paraclinic services amounts to 1 hour and 15 minutes and the lowest time is related to nursing service of taking blood glucose by glucometer by 1: 09 minutes (Table 5). Also, in the internal ward, the maximum time to provide nursing service is related to the transfer of patient for paraclinic services for 1 hour and 10 minutes, and the minimum is nursing service of taking blood glucose by glucometer for 0: 51 minutes. (Table 6).

In the emergency department, the average nurses' care time per nurse is 15 hours and 04 minutes at 24 hours a day, and the average time spent on nursing services is the highest in the night shift and the lowest in the morning shift. The greatest difference of the time of nursing care is between morning and night shift (Table 7).

Each nurse cares for 13 hours and 54 minutes at 24 hours a day. Also, the average time taken to provide nursing services in the morning and night shifts is more than the evening shift (Table 8).

The average nursing care time per nurse in the internal ward is 11 hours and 31 minutes in 24 hours a day. Also, the most time spent on nursing services is in night shift and the lowest in the shift of the morning (Table 9).

The fluctuations provide mean nursing care time during the days under study in the emergency, internal and surgical departments. As you can see, in the emergency department, the time of care fluctuations are higher than in other departments, and in the surgery department, due to the lack of surgery performed by some doctors on holidays, the time for nursing care decreases at the end of the week and increases again. In the internal department, the little fluctuations will be seen (diagram 1).

Regarding the negative Pearson correlation coefficient and the level of significance less than 0.05, the correlation in the emergency and internal departments is significant and the nursing care time is associated inversely with the number of nurses. Also, in the surgical department, there is a direct relationship between the number of nurses and time spent on nursing care; with the increase in the number of nurses, the time for nursing care increases. In total, the three departments of the hospital are negative in Pearson correlation; their significance level is less than 0.05; the time of nursing care spent by each nurse has an inverse relation with the number of nurses in the hospital. Analysis of the findings also showed that the department, shift and the number of nurses are associated with the time of nursing services. There is no significant difference between the time of nursing care of the two emergency and surgery wards. However, there is a significant difference between the internal ward and the other two ones and the average time of nursing services in the internal ward is less than the other two. There is also no significant difference in nursing services time between morning and evening shifts. However, there is a significant difference between shift of night and two other shifts, and the average time of nursing services in night shift is more than the other two shifts. There is no significant difference between 2 and 3 nurses. But there is a significant difference between the 5 nurses and other nurses, and the average time for nursing

services when we have 5 nurses is higher than other times, but for the 6 nurses, the time was reduced.

DISCUSSION AND CONCLUSION

Nurses play a major role as the main organizers of hospitals in patient care, so improving their quality of care is one of the most important factors in accelerating the recovery of patients. With the proper management and proper arrangement of nurses, a step can be taken to improve nurses' performance.

According to the results of the studies conducted in the hospital, the type of department and work shift and the number of nurses are related to the time of nursing care, while we need more care time in the surgical and emergency departments than the internal ward. In confirming this, Heidari's study also showed that the structure of the department and the type of division of labor were a factor influencing the time nurses spend on nursing activities (5). By examining the relationship between emergency and surgery and internal departments, we can say there is no significant difference between the two emergency and surgical departments. However, there is a significant difference between the internal and the other two departments and the average time of nursing services in the internal ward is less than the other two.

Considering the high rate of patients in the emergency and surgical departments and consequently the high number of nurses in these two wards compared to internal one, we can say that the nursing care time and the time for nursing services is dependent on the overcrowd or not. With the increase in the number of patients, the time of services increases. In Kavousi's study, the reasons for the difference in the number of nurses in the departments are the difference in the number of clients (13). Also, by examining the type of service, we can refer to the type of service received and the time considered for providing that service. By reviewing services, we have come to the conclusion that the diversity of services and its provision time in the emergency and surgical departments is much higher than in the internal ward. For example, internal ward patients generally use oral medications, while patients in the surgical and emergency departments receive injectable drugs in a longer process. This study is not consistent with the results of the World Health Organization, which is based on 24 hours in emergency department, and six hours in internal and surgical wards. Abdullah and Levin (1985) have determined nursing care hours 7.4 hours per day, regardless of type of department. In this study, the time of nursing care in the emergency department has been recorded 15 hours and 4 minutes, and in the surgery department 13 hours and 54 minutes, and in the internal ward 11 hours and 34 minutes. Perhaps this difference is due to the method of data collection (self-report vs. observation) or factors such as department design, patient dependency, file quality and organization of nursing forces; these factors have not been addressed in this investigation (5).

By examining the relationship between morning, evening and night shifts, there is no significant difference in nursing care time between morning and evening shifts. But between night shift and two other shifts, the difference is significant, and the average time of nursing services in the night shift is more than the other two shifts. Tiperst (2009) reported the mean time of care by nurses in the morning shift to be 92 minutes, 74 minutes at evening shift and 43 minutes at night shift; its results are not consistent with our current study. Also, in the study of the distribution of nurses' workload in Golestan, the time spent on nursing services in the morning shift has been considered as to be 4 hours and in the evening shift as 3:15 and in the morning one as 3:30; no significant difference has been reported between work shifts (1). This difference can be attributed to the duration of the work shift that has not been mentioned in the studies.

With the help of the correlation test, we found that with the increase in the number of nurses in the emergency and internal departments the time of care taken by each nurse would be reduced. As a result, we should seek to optimize the number of nurses in these two wards so that the current resources do not go away and the nurses are in the right place. Regarding the relationship between the number of nurses in the internal ward there is not any significant difference between the number of nurses, while in the emergency department, with the increase in the number of nurses from 5 to 6, the time of care is reduced. In other words, the maximum efficiency, with respect to the proposed service, is 5 people. Due to the hospital limited resources the personnel distribution has a key role in improving the organization's productivity and performance.

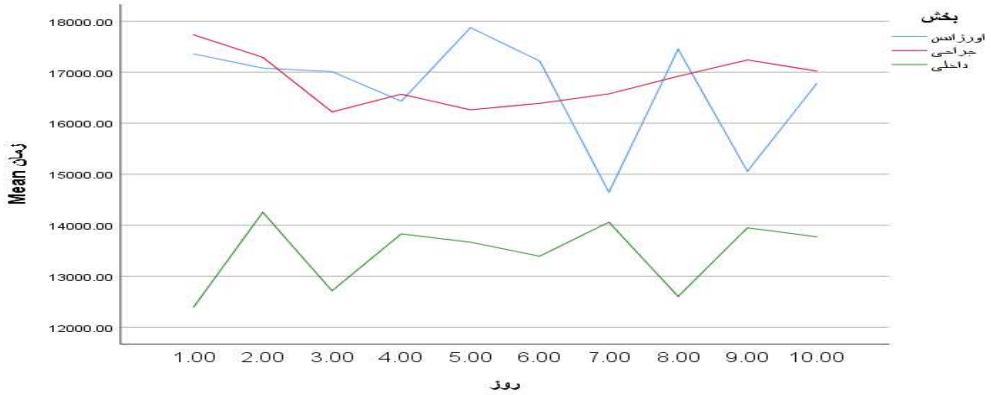

Diagram 1. Fluctuations in the time of nursing care in the studied days by separate departments in Kamkar-Arabnia Hospital

Table 1 . Frequency distribution of variables of patient arrival in emergency department

variable	Time period	Total number of clients per month	Average clients per day	Percent of frequency of average clients per day
Client in morning shift	8-10:59	206	6.6	15.7
	11-13:59	192	6.1	14.6
Client in evening shift	14-16:59	163	5.2	12.4
	17-19:59	161	5.1	12.3
Client in night shift	20-22:59	193	6.2	14.7
	23-1:59	195	6.2	14.9
	2-4:59	96	3٠9	7.3
	5-7:59	101	3.2	7.7

Table 2. Frequency distribution of variables of patient arrival in surgery department

variable	Time period	Total number of clients per month	Average clients per day	Percent of frequency of average clients per day
Client in morning shift	8-10:59	498	16.06	38%
	11-13:59	148	4.7	11%
Client in evening shift	14-16:59	60	1.9	4%
	17-19:59	91	2.9	7%
Client in night shift	20-22:59	70	2.2	5%
	23-1:59	48	1.5	3%
	2-4:59	29	0.9	2%
	5-7:59	145	4.6	11%

Table 3. Frequency distribution of variables of patient arrival in internal department

variable	Time period	Total number of clients per month	Average clients per day	Percent of frequency of average clients per day
Client in morning shift	8-10:59	27	0.8	13%
	11-13:59	57	1.8	28%
Client in evening shift	14-16:59	24	0.7	12%
	17-19:59	27	0.8	13%
Client in night shift	20-22:59	26	0.8	13%
	23-1:59	25	0.8	13%
	2-4:59	11	0.3	5%
	5-7:59	6	0.2	2%

Table 4. Mean and standard deviation of time for providing nursing different services in emergency department

Row	Provided nursing services (minute)	Mean time of providing services	Standard deviation
1	Patient admission to emergency department	8:39	245.3
2	Control process of vital symptoms	2:56	36.06
3	Glucose control with glucometer	0:34	8.5
4	Process of getting the ECG	3:49	85.19
5	Process of giving medicine	5:02	105.63
6	Stomach catheterization	0:27	18.8
7	Urinary catheterization	0:45	29.9
8	Informing the physician for a patient visit	0:50	35.5
9	Following up paraclinic cases and counseling	1:02	39.4
10	Carrying out affairs related to the transfer of the patient to other departments	4:06	63.1
11	Process of patient transmission for paraclinic services	18:19	381.05
12	Entering information on HIS	0:56	17.5
13	Registration and Reporting	2:32	112.9
14	Shift delivery	3:27	51.6
15	Getting a verbal instruction from a physician	1:05	60.8
16	Separating and installing angihect	2:18	73.7
17	Taking blood sample	3:12	53.1
18	Accompanying a physician for a visit	1:18	15.5
19	Checking physician's order and cardboard refinement	2:05	38.7

Table 5. Mean and standard deviation of time for providing nursing different services in surgery department

Row	Provided nursing services (minute)	Mean time of providing services	Standard deviation
1	Patient admission to emergency department	8:42	164.2
2	Control process of vital symptoms	2:54	49.3
3	Process of accepting and delivering the patient from the department to the operating room	5:11	153.8
4	Process of patient delivery from recovery to department	2:31	29.01
5	Initial Evaluation of patient	4:00	71.7
6	Process of giving medicine	514	149.1
7	Process of applying and blood transfusion	0:26	6.5
8	Stomach catheterization	0:38	20.1
9	Urinary catheterization	0:25	6.3
10	Getting a verbal instruction from a physician	1:01	53.7
11	Carrying out affairs related to the transfer of the patient to other departments	1:42	36.8
12	Informing the physician for a patient visit	1:03	23.7
13	Process of patient transmission for paraclinic services	1:47	108.7
14	Entering information on HIS	4:30	249.7
15	Oral education and patient pamphlet	1:50	27.08
16	Registration and Reporting	2:46	125.4
17	Shift delivery	11:47	365.7
18	Accompanying a physician for a visit	11:04	393.6
19	Taking blood with a glucometer	2:43	109.9

Table 6. Mean and standard deviation of time for providing nursing different services in internal department

Row	Provided nursing services (minute)	Mean time of providing services	Standard deviation
1	Initial Nursing Evaluation	3:47	61.2
2	Patient admission	11:11	217.3
3	installing angihect	3:05	53.6
4	Control process of vital symptoms	1:26	21.5
5	Shift delivery	7:59	33.7
6	Process of applying and blood transfusion	1:42	22.8
7	Getting phone orders from physician	1:16	41.5
8	Registration and Reporting	6:34	168.5
9	Following up paraclinic cases and counseling	0:19	7.8
10	Process of patient transmission for paraclinic services	24:03	1048.1
11	Entering information on HIS	1:33	41.9
12	Oral education and patient pamphlet	0:51	20.3
13	Taking blood with a glucometer	0:44	8.1
14	Process of getting the ECG	0:52	14.05
15	Accompanying a physician for a visit	4:00	122
16	Process of giving medicine	4:15	69.9
17	Stomach catheterization	0:30	22.1
18	Dressing change	3:27	294.1
19	Urinary catheterization	2:27	102.6

Table 7. Descriptive Indices of Nursing Services Time in Emergency Department

variable	Mean (minute)	frequency	Standard deviation	Minimum time	Maximum time
Mean Nursing Services Time by Nurse	222	24%	2471.7	148	292
	318	35%	26330	163	333
	364	41%	26393.3	257	433
	904	100%	-	568	1058

Table 8. Descriptive Indices of Nursing Services Time in Surgery Department

variable	Mean (minute)	frequency	Standard deviation	Minimum time	Maximum time
Mean Nursing Services Time by Nurse	314	37%	1335.8	250	342
	215	25%	3103.7	205	306
	305	38%	2448.8	221	383
	834	100%	-	676	1031

Table 9. Descriptive Indices of Nursing Services Time in Internal Department

variable	Mean (minute)	frequency	Standard deviation	Minimum time	Maximum time
Mean Nursing Services Time by Nurse	187.3	27%	968.2	161	216
	249.5	36%	2001	175	312.6
	254.8	37%	3122	156	378.7
	691.9	100%	-	492	907.3

Utilizing a large number of personnel without any need for them leads to waste of resources. Sunrich and Jebelli (2007) developed a linear optimization model with a simulation model and in Different department of hospitals came to conclusion that having fewer treatment forces and reducing the patient's residence time they have the same therapeutic outcome.

In the surgical ward, increasing the number of nurses will increase the time spent on nursing care. Regarding the fact that nurses of surgical ward in the morning shift have an average of 5:15 for

nursing services, we must prevent the reduction of the quality of nursing work by managing time. In Gander's study, nurses have stated that shortage of time and employees, excessive work, presence of additional forms, and other causes make them prioritize tasks that seem to be of equal importance, which, according to the results, it is with consistent our study. Because nursing staff prefers taking care of patients in overcrowded times to accurately recording their actions (14).
The shortage of nursing staff in hospitals leads to an increase in inability to take special care of patients and to reduce the quality of nurses' performance. Needleman and Buerhans, in their research, observed a relationship between the number and composition of nursing staff and the incidence of unwanted complications (hospital infections and hospitalization increase) in internal and surgical patients; they stated that the increase in nursing forces reduces the incidence of these unwanted effects by 25% (3).

It is possible to reduce the amount of time spent on official services and non-nursing tasks by modifying the physical environment, access to work equipment, communication, type of forms, completing the forms, use of computers and software programs. The lack of familiarity of staff and the lack of continuing education and their inadequate selection will increase the need for human resources. So, it seems that conducting training workshops such as time management and conflict management, quality improvement management and other courses for nursing managers seems to be effective. Therefore, it is necessary to consider the needs of human resources in addition to improving methods and organization of work, resource management and system improvement.

Such studies are effective for hospital managers and provide a scientific insight into the factors affecting the number of nurses required in the department. By designing a model for estimating the number of nursing staff required, this study allows for proper planning of nursing staff for hospital managers and senior managers of Qom University of Medical Sciences.

Appreciation
We express our appreciation for the cooperation of the management and authorities of Kamkar-Arabnia Hospital departments under the supervision of Qom University of Medical Sciences.

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