

Nursing Workload and the Cost of Nursing Care at Mansoura Emergency Hospital

Wessam A. Elsayed¹, Wafaa F. Sleem¹ and Neamat M. Elsayed²

¹Nursing Administration Department, Faculty of Nursing, Mansoura University, Egypt

²Nursing Administration Department, Faculty of Nursing, Damanhour University, Egypt
Wessam pasiony@yahoo.com , dr_wafaasleem@yahoo.com, neamat_mohmed@yahoo.com

Abstract: Background: Nursing workload and cost of nursing care are considered two important concepts of management. The art of decreasing nursing workload and the cost of nursing care requires creative ways to make nurses use their time effectively and provide effective nursing care with less cost. **Aim:** The aim of the study is to determine the nursing workload and the cost of nursing care at Mansoura Emergency Hospital. **Design:** Cross-sectional analytical design was conducted at all general surgical and all general orthopedic units at Mansoura Emergency Hospital. **Methods:** The data was collected from 46 nurses working at the studied units and 143 patients already hospitalized at the studied units during the time of the study. Three types of tools were used for data collection include: Patient Assessment Sheet, Nursing Activity Observation Study Sheet, and Personal Monetary Sheet. **Results:** indicates that there is a highly significant positive correlation between nursing workload and cost of nursing care. That means the highly the workload is the highly the cost of nursing care.

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1. Introduction

The nursing workload and the cost of health care are important for health care managers. While they are increasing, society expects that all health care professionals will understand the issues surrounding workload and cost and be active participants in managing health care resources. Although resources are most often thought of in terms of dollars resources in health care must also include such things as buildings, equipment, supplies, personnel, and time as well. Each of these areas must be considered as manager try to understand how to manage resource effectively⁽¹⁾.

Nursing workload refers to the amount of performance required to carry out nursing activities in a specified time period^(2,3). The heavy workload of hospital nurses is a major problem for the health care system. Nurses are experiencing higher workloads than ever before due to four main reasons: first increased demand for nurses, second inadequate supply of nurses, third reduced staffing, increased overtime and finally reduction in patient length of stay⁽⁴⁾.

There are several important consequences of high nursing workload. Heavy nursing workload adversely affects patient safety, and negatively affects nursing job satisfaction and, as a result, contributes to high turnover, the nursing shortage and high nursing cost^(5,6). In addition to the higher patient acuity, work system factors and possibilities also contribute to the nurses' workload: nurses are expected to perform non professional tasks such as

delivering and retrieving food trays, housekeeping duties, transporting patients, and ordering coordinating or performing ancillary services⁽⁷⁾.

Understanding the level of nurse's workload and the goals of cost containment are crucial in determining appropriate human resource planning. However, understanding of what has an impact on the nurse's workload, cost of nursing care and what should be considered in the allocation of nursing resource is unclear and greatly dependent upon potentially inadequate systems of workload and cost measurement^(8,9).

Costing of nursing care refers as the cost of nursing care or intervention that are carried out by nurses as well as unit administration by head nurses. So, the nurses must focus on activities related to caring patients according to their requirements⁽¹⁰⁾.

Complicating fiscal planning in health care organizations today are the dual goals of cost containment and quality care, which don't always have a linear relationship. Cost containment refers to effective and efficient delivery of services while generating needed revenues for continued organizational productivity. Cost containment is the responsibility of every health care provider, and the viability of most health care organization today depends of their ability to use their fiscal resources wisely⁽¹¹⁾.

Staff nurses cannot control all the elements that impact health care costs; however, they can understand costs and have control over certain actions and resources in the clinical setting. To keep

costs down they must institute appropriate actions and use resources responsibly. Nurses' actions affect major cost factors such as length of stay. Nurses are directly involved with the control utilization of resources for each patient. Therefore nurses should be aware of what things cost, how they are paid for, how they are budgeted and how waste increases. They must maximize the resources available and recognize when they are inadequate and when patient safety is jeopardized⁽¹²⁾.

Nurses in Medical and surgical units at Mansoura University Hospital were consuming almost one third of their time in indirect care activities that eventually increase nurses workload as well as cost of nursing⁽¹⁰⁾. So, the present study will be conducted at Mansoura Emergency Hospital, to determine the effect of nursing workload on the cost of nursing care based on estimates of paid time of nurses caring for patients at Emergency Hospital.

2-Aim of the study:

The study aimed to determine the nursing workload and the cost of nursing care at Mansoura Emergency Hospital.

3- Materials and Methods:

Materials:

Study design:

Cross-sectional analytical design was used.

Setting:

Setting of the study: This study was conducted at all three general surgical units and all five general orthopedic units at Mansoura Emergency Hospital. The hospital has general surgical units, general orthopedic units, intensive care units and neurosurgical units. Largest number of patients admitted in the selected units. The average number of patients in the general surgical units is approximately (79-128 per month) and the average number of patients in the general orthopedic units is approximately (110-132 per month). The total bed capacity of this hospital is 131 beds.

(a) General surgical units with (18) beds.

(b) General orthopedic units with (34) beds.

Subjects :

Subjects of the study included two groups namely, patients and nurses.

Patients group:

All patients who were occupied in the previous setting no=143.

Nurses group:

All nurses working in the selected units, no=46 classified as:

- The number of study nurses in the general surgical units=23.

-The number of study nurses in the general orthopedic units=23.

Tools of data collection:

The data collection tools consisted of three tools:-

First tool:

Patient assessment sheet: this sheet was developed by Nassar,⁽¹³⁾ It was utilized to describe standard of direct patient care. It indicates time consumed for providing direct nursing care according patient requirement in the previous mentioned units. Patients will be categorized into four categories which include self care group, partial care group, total care group and intensive care group. This sheet covered eleven group of descriptors namely; mobility, bathing, hygiene, nutrition, elimination, vital signs, dressing, medication, specimen collection, drainage, position and pressure area, and mental state. The sheet also contained standardized time value of each activity. Besides information about the patient, as age, date of admission in addition to diagnosis.

Second tool:

Activity analysis observation sheet: this observation record was developed by Department of Health Education and Welfare⁽¹⁴⁾. It was utilized to describe how the nurses spent their time work on various activities namely: patient centered activities – personal centered activities – unit centered activities and other centered activities. . This sheet also provided information about type of activities performed by nursing personnel. The distribution of activities by period of work day which they occurred could be calculated and those activities that consume most of nurses time could be identified. It included two parts, the first part deal with the basic data of study nurses as unit name, name of observer, date of observation, shift and number of nurses assigned to the unit. The second part included the time of observation, type of personnel observed, area (subject matter or purpose), level (skill required to perform task) and a brief description of different activities.

Third tool:

Personal monetary sheet: this sheet was developed by Mahmoud⁽¹⁰⁾. It used to estimate the costs of nursing care hours. It includes benefits and monthly salary for nursing personnel in the study. This sheet included two parts: The first part included personal data about the studied nurses as: nurse name, unit, age, years of experience, and educational qualification. The second part included the monthly

salary and other fringe benefits of nursing personnel included in the study.

Methods:

Pilot study:

Pilot study was conducted on 15 patients, after the developments of the tool and before starting data collection to determine the applicability of the designed tool, and test clarity of the language. Data obtained from the pilot study were analyzed and accordingly necessary modifications were done. The pilot study excluded from the main studied sample.

Procedure:

The actual field work started from 5th of March 2010 till 11th of March 2010 for activity analysis observation record and from the beginning of April 2010 to the end of April 2010 for patient assessment sheet.

The data were collected by the researcher helped by 10 trained nurse interns from faculty of nursing. They attended four hours training session in work sampling technique followed by 3 hours of practice on some units of the above mentioned setting. The training was done by the researcher.

Three steps were done, firstly work sampling technique; secondly data analysis of patient needs assessment; and thirdly estimating nursing care cost.

Firstly:

Work sampling technique: Data obtained by the work sampling technique were used to estimate cost of time spent by nursing personnel on indirect patient care. Data collected were tabulated directly from the observation records. Totaling the number of times on activity was performed. Data were tabulated separately for each unit, for each shift. Daily results were computed first, and then used to obtain weekly results.

Totaling of data was derived from the weekly and a distribution of total number of activities per shift, per unit. Summary data in which the number of observations was converted to hours and further divided by the average patient census provided the average amount of time spent on both direct and indirect care activities.

Secondly:

Data analysis of patient needs assessment: Estimating the cost of time spent by nursing personnel on direct nursing care based on patient requirement. Patients are categorized to four groups (group A: self care group, group B: partial care group, group C: intermediate care and group D: intensive care group). Variations in the daily requirements of each patient on the various units were computed to determine the time of direct care needed by patients. This was used on average

aggregate of the time required by each care group was obtained on day basis.

Total direct care load on the different units was obtained by identifying the number of patients in each care group and the average time of direct care time required by each care group. In addition variations in the daily patterns of the categories of patients falling in the various care groups were also determine on unit level.

Thirdly: Estimating nursing care cost:

(a) Estimating the actual nursing care cost

Identify the actual cost of nursing care hours in surgical and orthopedic units per patient per day per shift based upon the observation sheet as the following steps:

1. Sum total work hours rendered by all nursing personnel on direct, indirect and non productive activities throughout six days of study.
2. Divide total work hours for nursing personnel by the average number of patients during six days of study for each shift to calculate number and percent of hours/ minutes spent by nursing personnel on direct, indirect and non productive activities per patient per shift throughout six days.
3. Divide total work hours of all nursing personnel per patient per shift by six days to estimate the number and percent of hours/minutes of nursing care per patient per shift per day.
4. Sum total monthly salaries and other fringe benefits during six months for all nursing personnel in the study units based upon the monthly monetary sheet.
5. Divide total income for all nursing personnel by the number of work hours throughout six months about 1080 (30 days in month \times 6 month= 180 days, then total work hours in six months is $180 \times 6(\text{work day hours})= 1080$ hours, then the total work hours during six months was calculated.

(b) Estimating the proposed nursing care cost:

1. Identify the proposed cost of nursing care hours in surgical and orthopedic units per patient per shift and per day and based upon identifying the nursing workload per patient per shift per day, as the following steps:
2. Get a record of the categories for each patient care group on each unit for 30 consecutive days.
3. Get a record of direct nursing care minutes required for each patient on a daily basis.
4. Sum the number of patients in each care group for each day and for month of the study.
5. Sum the number of minutes of direct nursing care of patients in each care group for each day, and month of the study.
6. Aggregate total number of patients in each care group over the three months of the study.

7. Aggregate total number of minutes of care for patients in each care group over the three months of the study.
8. Divide total number of patients in each care group by the number of daily observation to find the daily average number of patients in each care group for each unit.
9. Divide the aggregate total number of patients in this care group by the number of patients in this care group to find the average minutes required for providing direct nursing care per patient per shift per day.
10. Calculate total income for all nursing personnel during one month and divided by 30 days to find the proposed budgeted nursing hour, then divided on 60 minutes to find the cost of minutes.
11. Multiply the budgeted nursing minutes to time workload to estimate the proposed nursing care per patient per shift per day.

(c) Estimate cost of staff requirements:

Estimating nursing manpower required to staff of these units is based on the amount of direct care required by each group of patients (derived from patient needs assessment) and the amount of indirect activities spent on each unit (obtained from work sampling technique). To determine staffing needs and their costs, the following steps were followed:

1. Sum the number of minutes of direct nursing care per patient in each care group per day.
2. Multiply the number of minutes care group by the number of patients in that care group and aggregate the total for all groups to obtain the total number of minutes of direct care required for all patients.
3. Multiply the total indirect workload time by the average number of patients to calculate the indirect care time consumed for all patients.
4. Adding the total indirect care time to the total direct care time needed for the four categories, and then the nursing workload hours can be obtained.
5. Dividing the total nursing workload minutes on the hours of work hours day 24 hours (6, 6 and 12 hour) to determine number of staff needed per day.
6. Estimate of budgeted of nursing care hour by identifying the monthly salary plus shift benefits for all nursing personnel from monetary sheet and divided on 30 days to identify the budgeted per day, then divided on the work hours day 24 hour to identify the budgeted hour of nursing care
7. Multiply the number of staff required to the average monthly salary to calculate the budgeted nursing staff in the selected inpatient units.

Ethical consideration:

The purpose of the study was explained to the administrative personnel, the written permission was obtained from the faculty of nursing, Mansoura University to the hospital administrator, heads of surgical and orthopedic units and the director of nursing service department to carry out this study. Verbal consent obtained from patients before their inclusion in the study. Any patient has the right to withdrawal from the study at any time. Nature and aim of the study was explained to each member of the participants.

4-Statistical analysis:

Data collected were analyzed and results were tabulated by using frequency, percentage (%), mean(X), and standard deviations (S.D±). Data were summarized using the arithmetic means as an average describing the central tendency of observation. Test of significance were used to compare study groups using t- test and analysis of variance (ANOVA). Correlation coefficients tests. P- Value, which were less than 0.05 and 0.01 were considered as statistically significant.

5- Results

Table (1) Showed individual characteristics of the studied nurses, according to the table the total number of nurses was 46 nurse and all were included in the study and equally distributed in surgical and orthopedic unit, as regard to the age the most number ranged from 20 to less than 26 and 31 to less than 36 years old (19 - 41.3 %). While the least aged less than 5 years (1 - 2.2 %). Nurses who have 5 and less than 11 years of experience record the highest percent (21- 45.6 %), while the least have less than 5 years of experience (4- 8.7 %). The educational qualifications of the studied nurses were diploma degree.

Table (2) Showed comparison between the average nursing workload minutes in the in patient units during the different shifts. According to the table the total minutes required for individual surgical patient throughout full day for provision nursing care is 161 minutes higher than that in orthopedic units 158 minutes. On the other hand indirect care minutes required for individual surgical patient throughout full day is (91) minutes higher than orthopedic patient s (65 minutes). There was however every patient in orthopedic units required (93 minutes) higher minutes for provision direct nursing care during three shift than in surgical units (70 minutes). As for as every patient in surgical and orthopedic units consumed more time for provision nursing care during both morning and night shifts than afternoon shift.

Table (3) Showed the comparison between the nursing salary cost in the in patient units during the different shifts. According to the table costs of one full day nursing care for individual patient in surgical units is (55 pound and 92 piaster) lesser than that in individual orthopedic patients (64 pound and 55 piaster) the total nursing care costs for individual patient in surgical units during morning shift is (6 pound and 21 piaster) for direct nursing care and 12 pound for indirect nursing cost salary during the morning shifts than in orthopedic units during the same shift. The orthopedic units had the higher nursing cost during morning and night shifts in surgical units at the same two shifts.

Table (4) showed the correlation coefficient between nursing workload and the cost of nursing

care at surgical units. According to the table there is highly positive significant correlation between nursing workload at all patient care group and the cost of nursing care for group (D) at surgical units. On the other hand, there is no positive significant correlation between nursing workload for all patient care groups and the cost of nursing care provided for all patient care group at surgical units.

Table (5) showed the correlation coefficient between nursing workload and cost of nursing care. According to the table there is a highly significant positive correlation between the nursing workload for all patient care groups in orthopedic units and the cost of nursing care for all patient care group at orthopedic units.

Table (1) Individual characteristics of studied nurses (n=46).

Characteristics	Studied nurses	
	No.	%
Department		
Surgical.	23	50
Orthopedic.	23	50
Age in years		
<20	1	2.2
20-	19	41.3
26-	5	10.9
31-	19	41.3
>36	2	4.3
Years of experience		
<5	4	8.7
5-	21	45.6
11-	13	28.3
16-	8	17.4
>20	-	-
Educational Qualification		
Diploma degree	46	100

Table (2): Total average nursing workload minutes in patient units during the different shifts (n=46).

Unit/ Shift	Surgical units		Total	Orthopedic units		Total
	Direct care/minutes	Indirect care /minutes		Direct care/ minutes	Indirect care/ minutes	
Morning	18	34	52	31	19	50
Afternoon	15	35	50	17	13	30
Night	37	22	59	45	33	78
Total	70	91	161	93	65	158

Table (3): Total nursing salary cost in the inpatient units during the different shifts (n=46).

Unit/ Shift	Surgical units		Total	Orthopedic units		Total
	Direct care cost L.E*	Indirect care cost L.E*		Direct care cost L.E*	Indirect care cost L.E*	
Morning	6.21	12	18.21	12.50	7.89	20.39
Afternoon	5	12.16	17.16	6.76	5.12	11.88
Night	12.77	7.78	20.55	18.45	13.83	32.28
Total	23.98	31.94	55.92	37.71	26.84	64.55

* Libber Egyptian.

Table (4): Correlation Coefficients between nursing workload and cost of nursing care at surgical units (n=46).

	Nursing Workload at Surgical Units					
			Group (A)	Group (B)	Group (C)	Group (D)
Cost Of Nursing Care	Group (A) cost	r	0.61	.026	0.46	0.94
		t	0.08	0.49	0.20	0.179
	Group (B) cost	r	0.23	0.74*	0.52	0.50
		t	0.53	0.02	0.14	0.16
	Group (C) cost	r	0.64	0.66	0.74*	0.73*
		t	0.06	0.05	0.02	0.02
	Group (D) cost	r	0.84**	0.77*	0.91**	0.92**
		t	0.004	0.014	0.001	0.000

** Significant at the 0.01 level. * Significant at the 0.05 level.

Table (5): Correlation Coefficient between nursing workload and cost of nursing care at orthopedic units (n=46).

	Nursing Workload at Orthopedic Units					
			Group (A)	Group (B)	Group (C)	Group (D)
Cost Of Nursing Care	Group (A) cost	r	0.93**	0.95**	0.94**	0.92**
		t	.000	0.000	0.000	0.00
	Group (B) cost	r	0.75**	0.81**	0.80**	0.85**
		t	0.01	0.00	0.00	0.00
	Group (C) cost	r	0.82**	0.88**	0.87**	0.91**
		t	0.006	0.00	0.00	0.00
	Group (D) cost	r	0.61	0.71*	0.69*	0.79*
		t	0.079	0.03	0.03	0.01

** Significant at the 0.01 level. * Significant at the 0.05 level

6-Discussion

Nursing workload and cost of nursing care are two important concepts of management. The art of decreasing nursing workload and the cost of nursing care requires creative ways to make nurses use their time effectively and provide effective nursing care with less cost⁽¹⁵⁾. Nurse administrators have used data of workload measurement tools to justify and defend nursing costs. Nurse administrators constantly have to compete for resources in the face of budget restrictions. Diagnostic and therapeutic managers have historically used workload tools to identify their resource needs but nurses have traditionally had little or no information or data generated by tools that may not adequately capture the essence of nursing work⁽¹⁶⁾.

In the present study, the work sampling technique provides an insight about the time actually spent by each nursing staff for each patient during every shift, per day with respect to direct care activities, indirect care activities and non productive activities in the selected units.

As regard to time spent by nursing staff on direct nursing care activities, the present study showed that almost half of nurses' time spent on direct care activities throughout various shifts consequently the least percent of time was spent in indirect care activities. This result may be related to that all patient admitted to Emergency Hospital are critical patients and need more direct care rather than indirect care this explain the highest portion of

nurses' time spent on direct care activities. This was disagreed with another researchers^(17,18) when revealed that indirect care activities consumes a more portion of staff nurses' time so that relieving nurses from indirect nursing activities would permit spending of more of nurses' time in direct aspect of patient care and on quality of care rendered.

As regard to indirect care activities the result of the present study showed that despite that all staff nurses spent a portion of their time in indirect care activities, this time was very limited. These nursing activities involved maintaining patient record, charting care given, checking physician's orders, preparing medication and treatment trays and setting up and immediate aftercare of equipment. This may be attributed to the fact that the system of assigning personnel to activities in the hospital was mostly case method. Furthermore, the units studied had the lowest nurse- to- patient ratio (the unit capacity is one nurse per shift). This is disagreed with many authors^(19,20). Who found these activities seem to absorb an excessive amount of the nursing personnel time throughout various shifts. Consequently the least percent of nurse's time was spent with patient care.

In the present study the nursing personnel workload reach its peak during night shifts. This was accorded with studies carried out by **Byrness**⁽²¹⁾ and **Hassan et al.**,⁽²²⁾ which reported that the highest utilization of nursing time in productive activities was reported during the night shift. This also agreed with study carried out in 1988⁽²³⁾ when revealed that

night shift nurses are busy completing their assignment tasks instead of eating and having breaks. while, This was disagreed with **Mahmoud**⁽¹⁰⁾, who mentioned that nursing workload reached its peak during morning shifts. This may be due to the admission of new cases, insufficient number of nurses in these morning shifts and absence of support staff who will help the nurse on their indirect activities and therefore, nurses will have more time for providing direct activities and spent with patients. This view is agreed with another studies^(24,25) by increase in number of support staff, may be the most important step the hospital can take to ease pressure on the dwindling nursing force. They also stated that if support staff were assigned to transfer and messenger duties and all other activities that are clearly not patient care, nurses could have up to 10% more time for essential nursing tasks and be relieved of some of the least satisfying duties

The finding of the present study revealed that nurses work at Surgical units were overloaded rather than nurses work at Orthopedic units. This result may be related to decrease the number of Surgical units rather than Orthopedic units and increase the number of surgical patients which make nurses provide total care (direct and indirect) for all patients (over number of patients on less number of units). This result is accorded with the results of the studies carried out by **Said**⁽²⁶⁾ and **Sleem**⁽²⁷⁾, who showed that staff nurses spent more time at surgical units than the medical units.

The result of the present study showed that the cost of one full day nursing care for individual patient in orthopedic units is more than the cost of one full day nursing care for individual patient in surgical units. This result may be related to increase the number of patients and the number of orthopedic units also increase the length of stay for orthopedic patients in the hospital which need more care (direct/indirect). This result is supported by another result⁽¹⁰⁾ which stated that the cost of nursing care in surgical units is more than the cost of nursing care in medical units.

In the present study, the cost of nursing care provided during night shift is higher than the cost of nursing care provided in other shifts. This is may be related to the length of night shift (it considered double morning shift). This result is supported by another studies^(28,29) when stated that nursing care at night shift considered the highest cost rather than morning and afternoon shifts.

The present study revealed that there was a relationship between nursing workload and the cost of nursing care in both surgical and orthopedic units. According to another study results^(16,30,31) nursing workload is associated strongly with the cost of

nursing care in intensive care units in USA who mentioned that the higher the workload the higher the cost of nursing care.

7-Conclusion

In the present study it concluded that there is a high significant positive correlation between the nursing workload and the cost of nursing care that means the higher the workload is, the higher the cost of nursing care. Also, the time spent by nursing personnel in direct care activities was insufficient in the studied units throughout the different shifts which could seriously affect the quality of care rendered by these patients and finally, nurses were consuming the almost one third amount of their time in indirect care activities throughout the three shifts.

8-Recommendations

Based on the results of the study, the following was recommended:

- 1- Job redesign of hospital nursing personnel should be made which is essential to decrease nursing workload, cost and ensure quality.
- 2- Budgetary planning is one of the most important functions of administrative personnel to ensure better nursing care with effective cost.
- 3- Patient classification system must be introduced to the Egyptian Hospitals that will contribute to effective utilization of nursing personnel and will provide data and facts for appropriate allocation of nursing skills to meet patients' needs.
- 4- The ratio of nurses to patients should be well estimated through the three shifts.
- 5- Management personnel in the hospital should pay attention and increase concern about some concept (through training programs) as workload, cost, quality, productivity and demonstrate these concepts in hospital nursing department.

Corresponding author

Wafaa F. Sleem

Nursing Administration Department, Faculty of Nursing, Mansoura University, Egypt

dr_wafaasleem@yahoo.com

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