

Cost of Nursing Care for Endoscopy Patients in Endoscopy Unit at Specialized Medical Hospital-Mansoura University

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Abstract: Nurses represent a major professional force in the delivery of health care services today. Innovation and excellence in all nursing practice is needed to contain costs while attaining positive, measurable outcomes. Administrators are necessary to organize health care services for optimal resource management with high quality outcomes at reasonable costs. The aim of the study was to determine the cost of nursing care for endoscopies patients in endoscopy unit. The study was conducted at endoscopy unit at Specialized Medical Hospital with 120 beds. Endoscopy unit include five rooms, three rooms of them for different types of endoscopy, one room for patients' preparation and the fifth room is nursing station. The study includes three groups of subject namely; head nurse (n=1), all staff nurses (n=12) and all patient converted to the endoscopy unit for three months (1367) were studied. Four tools which were used for data collection: the first tool was Observation Record; the aim of this record was to estimate the amount of time that nurses devoted to various nursing care activities by nursing personnel. The second tool was Patient Assessment Sheet, which aimed to determine the direct nursing care activities needed by endoscopy patients to be used as a basis for development of patient classification scheme. This sheet also contained standardized time value of each activity. The third tool was Attendance/Absenteeism Sheet, this tool is used to determine the number of allowable non productive hours of vacation, holidays, and sick leaves. Finally, to collect budgeted nursing hours per category of nursing personnel, Personnel Monetary Sheet was used. The results revealed redundancy of staff number working in endoscopy unit over needed which lead to replicate monthly salary budgets for nursing personnel. It is recommended that managing staff nurses time in coordination with the physicians' time which mean, distributing the work on all day instead of concentrating it in one or two hours which contributes to eliminate staff needed and cost containment.

Key words: Cost, Nurses, Time Utilization, Patient Classification System, Work Sampling Technique, Endoscopy Unit.

INTRODUCTION

Endoscopy Unit forms part of the overall Day Surgery Unit. It is very busy in performing diagnostic and therapeutic procedures. The purpose of the Endoscopy Centers is to care for patients in an environment that provides an appropriate level of nursing and medical care supervision (Medical Center Department of Nursing University of California, San Francisco, 2009). Mary (2000) The delivery of health care in the field of endoscopy is expanding. Comprehensive care of the patient undergoing an endoscopy procedure continues to be more critical in nature and more technically complex. For endoscopy procedures, this care is provided by specially trained endoscopy nurses (Gannett Health care Group, 2008).

Nurses represent a major professional force in the delivery of health care services today. Innovation and excellence in all nursing practice is needed to contain costs while attaining positive, measurable outcomes. All professional nurses have a role in managing care in the setting where they work. Practitioners are needed to provide cost-effective care for wellness', acute care, and chronic illness. In addition, administrators are necessary to organize health care services for optimal resource management with high quality outcomes at reasonable costs (Cherry and Jacob, 2005).

Cost is money expended for all resources used, including personnel, supplies, and equipment. The volume of service provided is the greatest factor affecting costs. Others factors include length of patient stays, salaries,

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prices of material, case mix, seasonal factors, and efficiencies such as simplification of procedures and quality management to prevent errors that increase patient complications and increase costs (Swansburg and Swansburg, 2002). Costs incurred in the delivery of a service or the making of a product are called total costs and may be direct or indirect, variable or fixed. A solid understanding of the types of costs and how they are related to endoscopy unit will allow nursing personnel to make more appropriate decisions on how to cut costs, determine break-even points and measure the effectiveness of any action (Marrelli and Hilliard, 1997).

Health care organizations are service institutions; the largest part of their operating budget typically is for personnel. For hospitals in particular, nurses are the largest group of employees and often account for the majority of the personnel budget. Staffing is the major area in which nurse managers can impact with respect to managing costs, and supplies is the second area. To understand why this is so, it is helpful to understand the concepts of fixed and variable costs. Fixed costs are costs that do not change in total as the volume of patients changes such as rent and administrative salaries. While variable costs are costs that vary in direct proportion to patient volume or acuity which include nursing personnel, supplies and medications (Wise, 1995). Expenditures also may be direct or indirect. Direct costs are expenses that directly affect patient care. For example, the salaries for nursing personnel who provide hands-on patient care are considered direct costs. Indirect costs are expenditures that are necessary but don't affect patient care directly. Salaries for directory or housekeeping personnel (Marquis and Huston, 2006).

To determine the cost of nursing care, several factors should be considered. Nursing charges should be quantifiable. A patient acuity system serves this purpose. The patient acuity system usually separates patients into four or five levels of nursing care and enumerates nursing requirements for each level. Changes could be set by level and negotiated with third-party payers. This cost could be separated from the cost of non-nursing requirements. Non-nursing tasks would be reassigned to ensure that the charge for nursing care reflect the actual cost of providing such care. A second method of costing nursing services is determining what share of total agency cost is attributable to nursing. This will vary by diagnosis-related group or patient acuity. An industry wide effort for each region could produce standards for nursing costs and charges (Roussel *et al.*, 2006). In determining the cost of nursing care the exact number of minutes spent seeing clients and providing nursing care services must be recorded. Then the nurses salaries can be divided by the time spent to determine the cost per minute or per hour of care (Loveridge and Cummings, 2000).

Patient classification systems are used to group patients into classes by using some specified criteria or indicators, e.g. needs of a patient, functional status or different nursing activities, amount and complexity of their nursing care requirements (Michael and Albert, 2008). The purpose of the Patient Classification System is to: measure nursing time in the unit, nursing hours per patient per day which is needed to provide patient care according to the hospital and the nursing department standards of care and practice, determine the number and category of staff (skill mix) needed for providing quality patient care, monitor changes in patient care needs, provide data on each patient care unit that can be utilized to project staffing needs. In addition, it is used to ensure that quality nursing care is provided in a safe environment, monitor the provision of quality nursing care according to international standards, improve patient satisfaction by providing required time to the patient according to his/her needs, enhance staff satisfaction by determining staffing needs and thus decreasing workload. Also, it is applicable to provide an information tool, allowing the rational management of the human resources through the optimization of the available nursing staff, allows for higher productivity, higher efficiency at work and allied to shorter hospital stays. (Faculty of Medicine American University of Beirut Medical Center (2009).

In hospitals, Patient Classification Systems are used to help managers predict nursing care requirements (Wise, 1995). Two types of Patient Classification instruments exist: prototype and factor evaluation. For a prototype system, it is necessary to calculate the average time used in caring for a typical patient in each category. For factor type significant care descriptors are identified and each patients need for care are measured to yield a sub scores for each descriptor. Sub scores are added to yield an overall dependency score (Mahmoud, 2002).

In the current system, hospitals allocate all patient care expenses to specific categories or cost centers that map to the Medical Cost Report (Centers for Medicare & Medicaid Services, 2005; Centers for Medicare & Medicaid Services, 2006). For example, medications would map to the pharmacy cost center, and an electrolyte panel would map to the lab cost center. Currently direct nursing cost is allocated to one of only two accommodation cost centers: routine (floor) care and intensive care (Welton, 2007). All nursing costs are treated as a lump sum and then averaged and standardized per patient day. Since direct nursing care hours and costs are highly correlated, this accounting approach implies that all patients within either the routine or intensive cost centers receive the same level of nursing care (Dalton, 2007).

Labor represents 65% of hospital operating costs and shortages in the supply of registered nurses as a leading driver of hospital cost increase (Clark *et al.*, 2007). The nurse managers have been concerned for costing nursing care because it influences on health care delivery in many areas. Therefore, nursing requires a cost allocation system that can define and measure the cost of providing nursing care according to patient need (Mahmoud, 2002).

So, the aim of the study was to determine the cost of nursing care for endoscopy patients in endoscopy unit.

MATERIAL AND METHODS

Setting:

The study was conducted at Specialized Medical Hospital with 120 beds. The hospital has the following units; cardiology, hepatogastric, diabetic and endocrine, cardiac catheterization, endoscopy, and 3 intensive care units for cardiac, hepatic and diabetic patients. The study took place in endoscopy unit which includes five rooms, three rooms for different types of endoscopy, one room for patients' preparation which includes three beds and the fifth room is nursing station.

Subjects:

The study includes three groups of subjects namely: head nurse (n=1), All staff nurses in work during the study period were included in the study (n=12) and All patient converted to the endoscopy unit for three months were studied (1367). The demographic characteristics of nursing personnel working in endoscopy unit explored that the head nurse was 26 years old while all the staff nurses observed were at the age group of 20 and under 25 years old. As regarding to the years of experience, the head nurse had four years of experience and all staff nurses had seven experience years. Regarding educational qualification, the head nurse had bachelor degree in nursing while, all staff nurses had diploma degree.

Tools of Data Collection:

Four tools were used for data collection:

1. Observation Record:

The aim of this record was to estimate the amount of time that nurses devote to various nursing care activities by nursing personnel. The observation record was originally developed by U.S.A. Manual (1964). These nursing activities were subdivided into two major areas:

- a. Direct care activities, that occur in patients' presence and involve the giving of care, e.g., bedside care during endoscopy.
- b. Indirect care activities, undertaken by the staff and away from the patient. These were primarily concerned with unit maintenance, administrative activities, clerical work, housekeeping, and messenger services. They also include activities of personal nature which is considered in this study 20% as a standard of personnel fatigue daily (PFD) (Krajews and Ritzman, 1999).

2. Patient assessment sheet:

This sheet based upon several previous studies as (Mahmoud 2002; EL-sayed, 1996; Adam, 1992 and Nasser, 1979) with some modification according to the study area. The aim of this daily assessment sheet was to determine the direct nursing care activities needed by endoscopic patients to be used as a basis for development of patient classification scheme. This sheet also contained standardized time value of each activity based on Nassar (1979).

3. Attendance/absenteeism sheet:

This sheet are used to determine the number of allowable non productive hours of vacation, holidays, sick leaves and -----etc. for each nursing personnel through one year

4. Personnel Monetary Sheet:

Personnel monetary sheet are used to collect budgeted nursing hours per category of nursing personnel. This sheet included two parts. The first included demographic data about personnel of study. The second included the monthly salary and other fringe benefits of nursing personnel included in the study.

Methods of Data Collection:

Official agreement was obtained to carry out the study in the selected setting, a letter containing the aim of the study was directed from Faculty of Nursing, Mansoura University to Specialized Medical Hospital director and also nursing director to obtain their permission to conduct the study in their hospital, purpose and method of data collection were explained to each director. As well as a written permission was taken from the chairman of endoscopy unit.

1. Work Sampling Technique:

All nursing staff regularly assigned to endoscopy unit were observed at regular intervals every 15 minutes for all details actually performed by all nursing personnel for six consecutive working days excluding Fridays (endoscopy unit is off in Fridays). The data was collected by the researchers. The number of observations were converted to hours and further divided by the average patient census, provided the average amount of time spent on both direct care activities and indirect care activities calculated for each category of nursing personnel.

2. Patient Classification System:

a. Developing of criteria:

An experimental study was conducted for 6 days of March before actual data collection. This study was carried out on 132 patients to define patients categories and patient needs in endoscopy unit.

B. Patient Needs Assessment:

Daily assessment of needs of all patients in endoscopy unit was done by the researchers during April, May and June 2008. Each assessment ranged from 20 minutes to one hour.

To validate and consistent in the use of the tool of assessment, the criteria for patient classification were used as a guideline throughout six experts were asked to judge the items content of assessment sheet. The item agreed by 80% was included.

The endoscopy patients are observed in two categories of Patient Classification System which include self-dependence and partial dependence on staff nurses in their care based on Swansburg (1996).

Variation in the daily requirements of each patient on the endoscopy unit were computed to the time of the direct care needed by the patients. This was used as an average aggregate of the time required by each care group was obtained on daily basis. Data collected by the previous tool (patient classification assessment sheet) on daily basis were totaled for the month and sum total of the three months were obtained for the two care groups.

Total direct care load on endoscopy unit 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 pattern of the categories of patient falling in the various care groups were also determined on unit level.

3. Attendance/Absenteeism Sheet:

The attendance and time cards for all nursing personnel working in endoscopy unit during the period of study and for one year starting from first January till the end of December 2008. The actual working hours of all nursing personnel were determined.

4. Personnel Monetary Sheet:

A financial report was obtained from the accounting department at Specialized Medical Hospital during one year. This report included the salary of each nurse and other fringe benefits of each nursing personnel working in endoscopy unit. The budgeted nursing cost for nursing care = (direct nursing care hours + indirect nursing care hours) x budgeted nursing hours.

Statistical Analysis:

The statistical analysis of data done by using excel program and SPSS program statistical package for social science version 10. The collected data were grouped, organized, categorized, analyzed, and tabulated by using computer. Data were presented in the tables by using percentage, mean (M) and standard deviation (SD). T-test was performed to detect any significant difference between variables (e.g., between the two care groups included in the study and between actual and proposed salary cost per patient). Significant level was threshold at $p \leq 0.05$. the following formula is used to determine staffing required in endoscopy unit;

- (1) $X = \sum M_i * N_i$
- (2) $Y = M * N$
- (3) $Z = X + Y$
- (4) $S = (X + Y) / H$
- (5) $S^* = S1 * 1.15$

Where:

- (1) X = total time required for direct care

M_i = average amount of time required for direct patient care activities in hour/patient in a given care group.

N_i = number of patient in all care group.

- (2) Y = total time spent for indirect care (based on Mark, 1994)

M = number of minutes needed/patient for indirect care activities.

N = total number of patients.

- (3) Z = total time required for total workload

- (4) S = number of staff required

- (5) S* = number of staff replacement in off duty, annual and sick leave, vacation, holidays and -----etc.

1.15 = replacement factor (based on Andeson *et al.*, 1998 and Barrat and Schultz, 1997). The test was performed to detect any significant difference between care groups.

RESULTS AND DISCUSSION

Table (1) showed that the time spent by the study of subjects at the endoscopy unit in provision of patient care activities per six days per all patients, per day per all patients and per day per patients. Generally, the total time spent by the head nurses and the staff nurses providing direct care activities and in the indirect care activities were (12 minutes with percent 63.16% and seven minutes with percent 36.84%) respectively. As regard, head nurses spent 37 minutes providing direct care activities in six days for all patients, while these minutes are not explored when divided it on all patients and on six days. However, head nurses spent two minutes (100%) only in provision of indirect care activities per patient and per day. In the same line, staff nurses spent 12 minutes (70.59%) providing direct care activities while they spent 5 minutes (29.14%) only giving indirect care activities per patient and per day.

Table (2) showed the actual nursing salary cost of time spent by study subjects on various activities per patient and per day. Accordingly, the actual salary costs that paid for study subjects per patient and per day on direct care, indirect care and personal time were (18, 12, and 1.78 piaster) respectively. As regard, it is observed that head had (zero, four, and 113 piaster) on direct care time, indirect care time and personal time respectively. However, staff nurses received (18, 12, and 1.78 piaster on direct care time, indirect care time and personal time respectively.

Table (3) revealed the average daily number of patients and minutes required for direct care per patient in each care group in endoscopies unit. Regarding the table, the total mean and standard deviation of patients daily number was (17.54+ 9.3). This table showed significant difference ($t = 15.42$, $p = 0.000$) between self care group (A) and partial care group (B). The mean and standard deviation of patient daily number for self care group (A) and partial care group (B) were (16.40 + 8.68, 1.14 + 1.03) respectively. Accordingly, there was significant difference between the two study groups related to average of minutes per patient ($t = 34.06$, $p = 0.000$). as shown in this table, the mean and standard deviation of minutes required by self-care group (A) and partial care group (B) were (17:26 + 2.004, 37:43 + 4.05) respectively.

Table (4) explored the comparison between the actual and the required minutes for direct patient care activities per patient and per day. Generally, this table depicts significant differences ($t = 32.60$, $p = 0.000$) between mean and standard deviation of the time spent in the direct care activities required by each patient per day (19 + 2.32) and the actual time spent by head nurse and staff nurses in providing direct care activities (12 + 3.25).

Table (5) showed the nursing salary cost per patient in care groups observed in endoscopy unit. As regard, the nursing salary cost for direct care was one pound and 78 piaster and three pounds and 84 piaster for each patient in group (A) and group (B) respectively. However, the nursing salary cost for indirect care was 72 piaster for each patient in the two group. Generally, the total costs were two pounds and 50 piaster and four pounds and 56 piaster for each patient in group (A) and group (B) respectively.

Table (6) showed the mean cost of nursing salary per hour. Regarding the table, the average of cost of the nursing personnel salary per hour was (2.80 + 0.32). As well as, the mean of the head nurse and the staff nurses cost per hour were three pounds and 41 piaster and two pounds and 75 piaster respectively.

Table (7) explored the comparison between the actual and proposed of nursing salary costs per patient per day in endoscopies unit. It can be observed the significant difference ($t = 7.34, p = 0.000$) between the actual mean of nursing salary costs (12.95 + 3.41) and the proposed mean of nursing salary costs (8.31 + 2.36) per patient and per day.

Table (8) showed the differences between actual and required number of nursing staff per day in endoscopy unit. According to the table, the actual nursing staff working in the endoscopy unit were one head nurse and 12 staff nurses while the nursing staff needed were .05 head nurse and 1.31 staff nurse per day with the difference increased by 11.74 from the nursing personnel.

Table (9) revealed the comparison between the actual and proposed monthly salary budgeted for nursing personnel in endoscopy unit. Regarding the table, the total actual monthly salary budget for nursing personnel was L.E. 5801 while the proposed monthly salary budget for the nursing personnel must be 596 and 92 piaster with the difference increase by L.E. 5204.

Table 1: Time spent by study subjects at endoscopy unit in provision of patient care activities per six days per all patients, per day per all patients and per day per patients

Subjects, days and patients	Direct care		Indirect care		Total	
	Hour : min.	%	Hour : min.	%	Hour : min.	%
For six days for all patients						
- Head nurse	00:37	14.68	3:35	85.32	4:12	100
- Staff nurses	21:02	70.42	8:50	29.58	29:52	100
Total	21:39	63.55	12:25	36.45	34:04	100
Per day for all patients						
- Head nurse	00:06	15.38	00:33	84.62	00:39	100
- Staff nurses	03:50	69.28	01:42	30.72	05:32	100
Total	3:56	63.61	02:15	36.39	6:11	100
Per day per patient						
- Head nurse	00:00	00.00	00:02	100	00:02	100
- Staff nurses	00:12	70.59	00:05	29.41	00:17	100
Total	00:12	63.16	00:07	36.84	00:19	100

Table 2: The actual nursing salary cost of time spent by study subjects on various activities per patient and per day.

Subjects	Nursing salary costs				Total Costs		
	Direct Time	%	Indirect Time	%	Personal Time	%	X ± SD
Head nurse	0.00	0.00	0.04	3.42	1.13	96.58	1.17 ± 0.56
Staff nurses	0.18	19.78	0.08	8.79	0.65	71.43	0.91 ± 0.24
Total	0.18	8.65	0.12	5.80	1.78	85.58	2.08 ± 0.13

Table 3: Average of the daily number of patients and minutes required for direct care per patient in each care group in endoscopy unit.

Patient Care Group	Average of minutes per patient			Average of patients daily number		
	X ± SD	t	P	X ± SD	t	P
Self Care Group (A)	16.40 ± 8.68	15.42	0.000	17:26 ± 2.004	34.06	0.000
Partial Care Group (B)	1.14 ± 1.03			37:43 ± 4.05		

Table 4: Comparison between actual and required minutes for direct patient care activities per patient and per day.

Direct care per patient per day		t	
P			
Required time based on assessment		Actual time based on observation	
X ± SD		X ± SD	
19 ± 2.32		12 ± 3.25	32.60 0.000

Table 5: The nursing salary cost per patient in care groups observed in endoscopy unit.

Patient care group	Direct care cost (L.E.)	Indirect care cost (L.E.)	Total costs (L.E.)
Group (A)	1.78	0.72	2.50
Group (B)	3.84	0.72	4.56

Table 6: The mean cost of nursing salary per hour in L.E.

Nursing personnel	X ± SD
Head nurse	3.41 ± 00.00
Staff nurses	2.75 ± 0.27
Average	2.80 ± 0.32

Table 7: Comparison between the actual and proposed of nursing salary costs per patient per day in endoscopy unit.

Salary cost per patient in L.E.			
Actual	Proposed	T	P
12.95 ± 3.41	8.31 ± 2.36	7.34	0.000

Table 8: Difference between actual and needed number of nursing staff per day in endoscopies unit.

Actual nursing staff		Required nursing staff			Difference	
Head nurse	Staff nurses	Total Y1	Head nurse	Staff nurses	Total Y2	Y2 – Y1
1	12	13	0.05	1.31	1.36	11.74

Table 9: Comparison between the actual and proposed monthly salary budgeted for nursing personnel in endoscopy unit.

Personnel classification	Actual budget in L.E.		Proposed budget in L.E.		Budget increase or decrease %	
	No. of staff	Budget	No. of staff	Budget		
Head nurse	1	614.48	0.05	30.72	- 583.76	95
Staff nurses	12	5186.57	1.31	566.20	- 4620.37	89
Total	13	5801.05	1.36	596.92	- 5204.13	89.7

Discussion:

Endoscopy Unit forms the part of the overall Day Surgery Unit. It is very busy in performing diagnostic and therapeutic procedures. (Brooker & Nicol, 2003 & Medical Center department of nursing university of California, San Francisco, 2009). The care of endoscopic procedures is provided by specially trained endoscopy nurses. They have the responsibility for care and knowledge of adult patients diagnosed with, or suspected with gastrointestinal or respiratory problems who are undergoing diagnostic or therapeutic treatment and/or procedures. (Gannett Health care Group, 2008). Costing out nursing services is performed as a method of determining the specific costs of the nursing services provided to client and it is nearly equal to two third of the health organization labor costs (Leddy, 1998). The aim of the present study was to determine the cost of nursing care for endoscopy patients in endoscopy unit.

The present study shows that the nurses spend large proportions of their time on direct patient care while the head nurse spends most of her time on indirect patient care. This may be explained by the fact that the main responsibility of nurses is in providing direct care to endoscopy patient during pre-, intra- and post-procedure. While the head nurse of endoscopy unit is responsible for the management of assigned nursing unit, assesses, plans, directs, implements and evaluates patient care to comply with established standards of nursing practice and performance. Communicates effectively both inter and interdepartmentally, strives for the excellence of the unit and establishes a cohesive team approach to the delivery of patient care and also responsible for the human resource function at unit level Beilenhoff and Sauerbruch (2004) supported this view.

This finding was inconsistent with the results of Hendrich *et al.* (2008) who found that nurses devote large proportions of their time to documentation, medication administration, and care coordination and somewhat less time to patient care activities. Again, Capuano *et al.*, 2004; Upenieks & Abelew, (2006) reported that the nurses desired to spend less time in nonessential activities such as paperwork and locating physicians and supplies. In addition, Kiekkas *et al.* (2005) found that nurses spend 35.2% of their time on direct clinical care, 11.6% on patient assessment, 7.0% on communication with patients, 7.2% on communication with other persons, 8.6% on clerical nursing duties, 9.3% on documentation and 2.3% on non-nursing duties, and 18.8% on personal activities. Mahmoud (2002) reported that almost half of the head nurses and a more portion of staff nurse spend time on indirect care activities.

In the present study, the findings revealed that the actual salary cost that is paid for head nurse & staff nurses per patient and per day was high on activities of personal time compared to the activities of direct and indirect care. This may be due to the reason that the head nurse & staff nurses spend more time on personal activities. That's due to the increase in the number of staff nurses assigned in endoscopy unit. This allows the staff nurses to spend a little amount of their time in direct care activities. According to El-Sayed (1996) the availability of more nurse hours for patient does not always result in more and better nursing care. This emphasize the urgent need for nurse managers to take a strong leadership role in the reorganizing and management of nursing time, guiding and supporting nurses toward accomplishment of quality nursing care. In addition, the physicians come to endoscopy unit too late in the morning and start working only from 10:00 o'clock and leave at 11 am or 12 noon to the maximum. They concentrate their work in one or two hours only a day and the highest frequency of time spent by staff nurse was spent on waiting to assist physician or personal activities. Therefore the proper utilization of nursing time is needed to rearrange the time spent on standby or personal activities. This was supported by Mahmoud (2002) who found that the highest frequency of time spent by nursing personnel on stand-by activities (e.g. waiting to assist physician in endoscopy procedures or personal activities (e.g., eating, drinking and social talking).

Among the study results, the average daily number of patients in endoscopy unit was 18 patients. The number of patients among self dependence care group was higher than the partial dependence care group. In this respect, Lee & McCormick (2003) stated that about 83 patients were admitted in endoscopy unit in every two months. Also, Carpenter (2007) reported that there were about 36 cases a day which performed endoscopy.

The average time required for direct patient care were more for patients who are classified as partial dependence care group than for patient classified as self dependence care group in endoscopy unit. This may be due to the reason that many patients who attend the endoscopy unit are from the outpatient and self dependence care, In this point of view, Kelly-Heidenthal (2004) mentioned that nursing care is not an identical product delivered in assembly-line fashion. It varies remarkably in intensity, in depth, and in breadth across patients, consistent with their unique, individual dependency needs. In addition, Hammermüller *et al.* (2007) pointed out that the dimensioning of nursing human resources implies in identifying and characterizing the clientele, regarding the demand of their needs.

Among the study results, it was observed that the time spent in the direct care activities required by each patient per day was more than the actual time spent by the head nurse and the staff nurses in providing direct care activities. This may be due to the lack of control to assure compliance of the nursing practice with predetermined standards to get the high quality of patient care. This is supported by Kirsch and Tolbott (1990) who stated that a patient should be addressed according to predetermined standards and in conjunction with a quality assurance program.

The study done by Uoon (2000) Who founded that the mean hours of direct nursing care per patient per day per duty were 69.3 min for day duty, 64.7 min for evening duty, 88.2 min for night duty, 38.7 min for shift duty. Again (Heinz, 2004) reported that the percentage of time spent in direct care activities ranged from 30% to 55%, with the average 37% of nurse time spent at the bedside. However, in examining processes and systems of current practice in our study, not all nursing care hours are spent at the bedside nor are they provided by nurse. Generally, the total time spent by the head nurses and the staff nurses providing direct care activities and in the indirect care activities were (12 minutes with percent 63.16% and seven minutes with percent 36.84%) respectively.

The nursing salary cost for direct care was higher than the indirect care for each patient in self dependence care group and partial dependence care group. The mean of cost of the head nurse salary per hour was higher than staff nurses. In this respect Codey (2005) indicate that increased professional nurse workload associated with under staffing may be linked with increased intentions to leave direct patient care or nursing entirely. In an online survey of 7,300 RNs seeking information on perceptions of changes in nursing practice in the preceding two years, the American Nurses Association found that 56 percent of those completing the survey believed that their time available for direct patient care had decreased. An overwhelming number of respondents (5,560 or 76%) stated that they had experienced increased patient care loads. Furthermore, the respondents indicated that their belief on patient care declined as a result of inadequate staffing (51%), decreased nurse satisfaction (45%), and delays in providing basic care (42%). Salary is an influential factor in the employment decisions of those completing graduate education. Recently, the National League for Nursing reported that in the North Atlantic region of the country, the median salary for full-time faculty at the rank of assistant professor was \$45,417 in 2002. Furthermore, in baccalaureate and higher degree programs the median salary was \$50,000, in associate degree programs it was \$44,592, and in diploma programs it was \$43,510.

It can be observed that there was significant difference between the actual mean of nursing salary costs and the proposed mean of nursing salary costs per patient and per day and the actual mean of nursing salary costs higher than the proposed mean of nursing salary costs. Mayo school of health Sciences College of Medicine, (2003) respect with this result.

In the present study, the results revealed the redundancy of the number of staff working in endoscopy unit this factor explains the replication of monthly salary budgets for nursing personnel. This finding was in disagreement with Mahmoud (2002) and Adams (1992) who calculate the actual and required number of staff revealed that, in general terms, there was shortage of manpower number. In addition this finding was agreement with the Society of Gastroenterology Nurses & Associates, Inc. (2004) who stated that the minimum registered nurse staffing in gastrointestinal endoscopy setting must have one registered nurse in the pre-procedure area, one registered nurse in each procedure room & one registered nurse in the post-procedure area. In the same line, Gloucestershire Hospitals N H S Foundation Trust (2009) supported this point of view. In addition, Jones *et al.*, (2001) mentioned that The endoscopy unit was staffed by five nurses.

Recommendations:

In the light of the foregoing, the following recommendations are suggested:

- 1- Managing staff nurses times by coordinating the physicians' time which mean, distributing the work on all day instead of concentrating it in one or two hours which contributes to eliminate the staff needed and the cost containment.
- 2- It is essential to involve the physicians and nurses of the endoscopy unit in cost containment and make them realize that their actions will ultimately bring good results.
- 3- The supervisor should welcome nurses suggestions to cost-effectiveness and time management.
- 4- Cost incentives motivate cost containment and reward desired behavior of nurses e.g., motivate nurses for creative ideas for saving resources as well for perfect attendance
- 5- It is often necessary for the nursing managers to receive additional training in budgets and finances.
- 6- Establishing valid and reliable patient classification system is essential for nursing administration and must be introduced to 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.

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