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Effect of Clinical Pathway on Nursing Performance, Patient Outcomes and Length of Stay for Patients with Unstable Angina

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Abstract: *Clinical pathway is a popular tool to outline the sequence and timing of actions necessary to a desired outcome with optimal efficiency.****Aim:****to investigate effect of using clinical pathway on nursing performance, patient outcomes and patient length of stay with unstable angina at coronary care unit,Assuit University Hospital.* ***Study subjects****: included all nurses working in coronary care unit, (n=25) and all patients admitted to the coronary care unit with unstable angina within a period of nine months.* ***Study tools:*** *included four tools namelyI-personal data sheet for nurses, II- observation checklist to assess performance of nurses, III-personal data sheet for patients and IV- patient's outcomes tool.* ***Result:*** *there were statistical significant differences between control and study groups of patients in hospital length of stay and patient's complications itemsand there was statistical significant difference between nurses' performance pre and post application of clinical pathwayduring study periods.* ***Conclusion:*** *nurses' performance level improved and the undesired patient's outcomes decreased after clinical pathway application at study group compared to other groups*. ***Recommendation:****Apply the clinical pathway for unstable angina patients rather than the hospital routine care and organize training workshops and courses for nurses about implementation of clinical pathway according to patient's diagnosis in all intensive care units.*

Key words: *Clinical pathway, Nurse's performance, Patient outcomes.*

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I. Introduction

Clinical pathway is defined as complex interventions consisting of number of components based on the best available evidence and guidelines for specific conditions. It defines the sequencing and timing of health interventions and should be developed through the collaborative effort of physicians, nurses, pharmacists, and other associated health professionals **(Rotter, et al 2010).** Another view consider clinical pathway as structured multidisciplinary care plans used by health services to detail essential steps in the care of patients with a specific clinical problem **(Rotter, 2008).**

Vanhaecht, (**2007**) summarized characteristics of care pathway includes as: an explicit statement of the goals and key elements of care based on evidence, best practice, and patient expectations,the facilitation of the communication, coordination of roles, and sequencing the activities of the multidisciplinary care team, patients and their relatives,the documentation, monitoring, and evaluation of variances and outcomes; and the identification of the appropriate resources .

The benefits of clinical pathway were emphasized by**Tastan et al (2012)** aspromotion of patient and family satisfaction with care by providing detailed information on the treatment process, which enhances collaboration; improvement of job performance and the satisfaction of care team members via multidisciplinary communication and teamwork; reduction in hospital stays and costs by focusing on continuity of care and systematic and qualified patient care; and estimation of treatment costs**.**

Health-care professionals are facing with the challenges of providing high-quality patient care, while simultaneously cutting costs and decreasing in-hospital length of stay (LOS). This challenge has made the use of clinical pathways (CPs) very appealing, as a tool both for improving outcomes and for decreasing costs during a specific LOS **(El Baz et al, 2009).**

Expected outcomes for the interventions outlined in the clinical pathway may relate to physiology, patient activity level, learning, self-care, pain and symptom management, and readiness for transition or discharge. The pathway is very helpful for the novice nurse; by describing the standard of expected outcomes for a given time frame,it helps the nurse to assess the patient's progress toward a timely discharge and to detect any variances from the normal **(Barbara, 2009).**

II. Aim of the study

To investigate effect of using clinical pathway on nursing performance, patient's outcomes and length of stay for patients with unstable angina at coronary care at unitAssuit University Hospital.

Significance of the study

From clinical observation in the coronary care unit (CCU), it was observed that the number of patients with coronary diseases have increased over the last years . It was found that 415 patients with unstable angina admitted to coronary care unit between 1\3\2014 to 31\3\2015. These patients require intensive collaborative care to save their lives, and they are at risk for several complications. These complications in turn may have negative impact on the patient's physical and psychological condition will prolong patient's hospital stay. That is why there is an interest to conduct such type of study by using clinical pathway which, might safeguard this category of patients against serious complications , increase length of stay and improve nursing performance.

Study hypothesis

[To fulfill the aim of the present study, the following research hypotheses are formulated:
H1 - The performance of nurses who learn how to use clinical pathway will be improved.
H2 - The outcomes of unstable angina patient exposed to clinical pathway will be improved.
H3 - The length of stay will be decreased when clinical pathway is applied by nurses for unstable angina patients.

III. Subjects and methods

I. <u>Technical design :</u>

A) Research design.

Pre-experimental research design (control group, study group and follow up group) of patients used in the present study.

B) Setting.

This study was conducted in the coronary care unit at MainAssuitUniversityHospital. The unit started to work at 2009. The bed capacity of the unit was (n=24) beds and the total number of the nursing staff was (n=25) staff nurse. It will be transfer to CoronaryHospital with bed capacity (n=28) beds and total number of staff nurse is (n=43).

C) Subjects

The study subjects include:-
1- All nurses working in coronary care unit, at Main Assuit University Hospital (n=25). The sampling technique is the convenient one.
2- All patients admitted to the coronary care unit with unstable angina within a period of nine months throughout data collection were included in the study control group (n=50), study group (n=50) and follow up after three months (n=50).

D) Tools.

1- Personal data sheet for nurses include: sex, age,qualification, and years of experience.

2- Observation checklist: was developed based on the content of clinical pathway to assess performance of nurses which include nursing care for patient with unstable angina rating from (1) for done and (0) for not done The researcher measure nursing performance before, immediately and after three month of using clinical pathway . Clinical pathway (CPWs) (structured multidisciplinary care plans which detail essential steps in the care of patients with unstable angina (***Unstable Angina Clinical Pathway _ ER Medical affairs - www.hospital-forms.com/185.pdf*)**, includes: activity, test specimens, diet, medications, consults, IV solution, treatments, vital

signs, discharge planning, teaching and evaluation. That started from the first 15 minutes of admission to the third day.

3-Personal data sheet for patient include: name, sex, age, occupation, marital status, date of admission, date of discharge and date of readmission if founded.

4- Patients outcome stool: this tool is developed by the researcher to be used for patients with unstable angina to assess the outcomes that includes complications (severe arrhythmias, heart attack, post infarction, stable angina, heart failure, myocardial rupture, sudden cardiac death), hospital readmission and hospital mortality the score of response was (1) for Yes and (0) for No.

5-The length of stay: the researcher calculates the length of stay for patients with unstable angina for control & study group and follow up by using formula:

- Length of stay = date of discharge - date of admission.
- Average length of stay = Length of stay / Total number of discharges.

II- Administrative design:

An official permission had been obtained to collect necessary data from directors of the Main Assiut University Hospital, head department of coronary care unit at Main Assiut University Hospital.

Ethical consideration:

- Oral agreement was obtained from nurses who will participate in the study at coronary care unit.
- Written consent was obtained from patients that are willing to participate in study, after explaining the nature and purpose the study.
- Research proposal was approved from Ethical Committee in the faculty of nursing.
- There is no risk for study subject during application of research.
- The study was following common ethical principles in clinical research.
- Confidentiality and anonymity were assured.
- Study subject have the right to refuse to participate and or withdraw from the study without any rational any time.
- Study subject privacy was considered during collection of data.

III-Operational design

These include three phases:

1) Preparatory phase.

This phase took about three months from May to June 2015 to review the available literatures concerning the topic of the study and translation of the study tools from English to Arabic.

- **A pilot study.**

A pilot study was carried out to assess tool clarity, feasibility and applicability and reliability. Took about two months from June to August 2015 and carried out on 10% of study sample (10) patients and (10) nurses included in the study sample.Data collected from pilot study were analyzed and there were no necessary modifications done for the study tools.

2) Data collection phase:

A-The researcher in this phase took 50 patients as a control group &50 patients as a study group, then 50 patients for follow up, then observe the nurses when provide nursing care for patients with unstable angina (control group) by using an observation checklist this phase took about three months from September to November 2015.

B- The researcher gave an educational session for all available nurses (n=25) for five consecutive days, (divided nurses into five groups; every group was (5) to avoid shortage of nurses at unit) about unstable angina and teaches them how to apply clinical pathway from the time of admission till discharge.
The researcher usedteaching aids **(**PowerPoint and photographs), for illustrations and gave them booklets for unstable angina and clinical pathway.

C- The researcher observe the nurses performance and their application to the clinical pathway when provide nursing care for patients with unstable angina (study group) after assuring their knowledge using observation checklist this phase took about three months from March to May 2016.

D- The researcher made follow up observation for the nurses performance when provide nursing care for patients by using observation checklist, this phase took about three months from September to November 2016.
- There for the total period of observation 9 month.

3- Evaluation phase:

Upon the completion of clinical pathway implementation, the researcher measuring nursing performance, patient outcomes, and length of stay before and after using clinical pathway and follow up after three month .

IV-Statistical design:

Collected data were verified prior to computerized data entry and analysis by using statistical software package for social sciences (SPSS) v.g 20.program. Data were presented using descriptive statistics in the form of percentages also mean and standard deviations were calculated. For relation between variables (chi - square) and (paired simple t- test) were used, statistical significant was considered at P- value ≤ 0.05.

IV. Results

Table (1): Percentage distribution of personal data of the studied nurses (n= 25):

Items	No.	%
- Age:(years)		
20 - < 25	9	36.0
25 - < 30	11	**44.0**
≥ 30	5	20.0
Mean ± SD (Range)		26.72 ± 3.31 (21.0 – 35.0)
2- Qualification:		
Secondary Nursing School Diploma	13	**52.0**
Technical Nursing Institute	12	48.0
Years of experience in this department:		
< 5	9	36.0
5 - < 10	6	24.0
≥ 10	10	**40.0**
Mean ± SD (Range)		6.92 ± 5.33 (6 m – 20 y)
4- Marital status:		
Single	4	16.0
Married	17	**68.0**
Divorced.	3	12.0
Widow.	1	4.0

Table (2): Percentage distribution of personal data of the studied patients (n= 150):

Items	No.	%
Sex:		
Male	103	**68.7**
Female	47	31.3
Age:		
< 55 years	46	30.7
55 - < 60 years	45	30.0
≥ 60 years	59	**39.3**
Mean ± SD (Range)		64.17 ± 11.86 (46 – 66)
Occupation:		
Employee	43	**28.7**
Farmer	18	12.0
Housewife	42	28.0
Professional	9	6.0
Retirement	30	20.0
Worker	8	5.3
Marital status:		
Married	127	**84.7**
Single	2	1.3
Widow	20	13.3
Divorced	1	0.7
Hospital stay:		
< 3 days	72	48.0
≥ 3 days	78	**52.0**
Mean ± SD (Range)		2.78 ± 1.08 (1 – 6)

Table (3):The relationship between the total mean scores of nurses' performance levels (n= 25) to care for studied patients with unstable angina (n=150):

Items	Score	Groups of patients			P-value[1]	P-value[2]
		Control (n=50)	Study (n=50)	Follow-up (n=50)		
		Mean ± SD	Mean ± SD	Mean ± SD		
< 15 min	18	9.04 ± 3.47	17.44 ± 0.73	15.28 ± 2.89	0.000**	0.000**
15 – 60 min	18	7.60 ± 3.48	17.58 ± 0.57	15.28 ± 3.02	0.000**	0.000**
1 – 3 hours	17	7.32 ± 2.44	16.50 ± 0.86	14.28 ± 2.48	0.000**	0.000**
3 – 6 hours	12	6.24 ± 1.38	11.84 ± 0.37	10.64 ± 1.43	0.000**	0.000**
6 – 10 hours	12	5.72 ± 1.44	11.74 ± 0.44	10.68 ± 1.57	0.000**	0.000**
10 – 24 hours	12	6.44 ± 1.75	11.60 ± 0.49	10.44 ± 1.69	0.000**	0.000**
Day 2	15	5.94 ± 1.77	13.94 ± 0.91	11.12 ± 2.48	0.000**	0.000**
Day 3	9	4.74 ± 0.94	8.86 ± 0.35	8.22 ± 1.04	0.000**	0.000**

Table (4)Percentage distribution of patient's outcomes with unstable anginathrough the study groups(n= 150):

Items	Groups of patients						P-value[1]	P-value[2]
	Control (n=50)		Study (n=50)		Follow-up (n=50)			
	No.	%	No.	%	No.	%		
Complications								
Severe arrhythmia	41	**82.0**	7	14.0	14	28.0	0.000**	0.000**
Heart attack	22	**44.0**	1	2.0	5	10.0	0.000**	0.000**
Post infarction	2	4.0	0	0.0	1	2.0	0.495	0.558
Stable angina	20	**40.0**	0	0.0	3	6.0	0.000**	0.000**
Heart failure	9	18.0	0	0.0	0	0.0	0.003*	0.003*
Myocardial rupture	1	2.0	0	0.0	0	0.0	0.315	0.315
Sudden cardiac death	4	8.0	0	0.0	2	4.0	0.117	0.678
B- Hospital readmission up to six months	13	26.0	0	0.0	1	2.0	0.000**	0.000**
C- In-hospital immediate mortality or mortality at 26 week	3	6.0	1	2.0	4	8.0	0.617	0.695

Table (5): Correlation between nurses' performance levels and hospital length (n= 25):

Hospital length of stay	Nurses'performance levels		
	Control	Study	Follow-up
- r-value	-0.001	0.189	-0.060
- P-value	0.995	0.189	0.680

Figure (1): Percentage distribution of hospital length of stay for patients with unstable angina (n= 150):

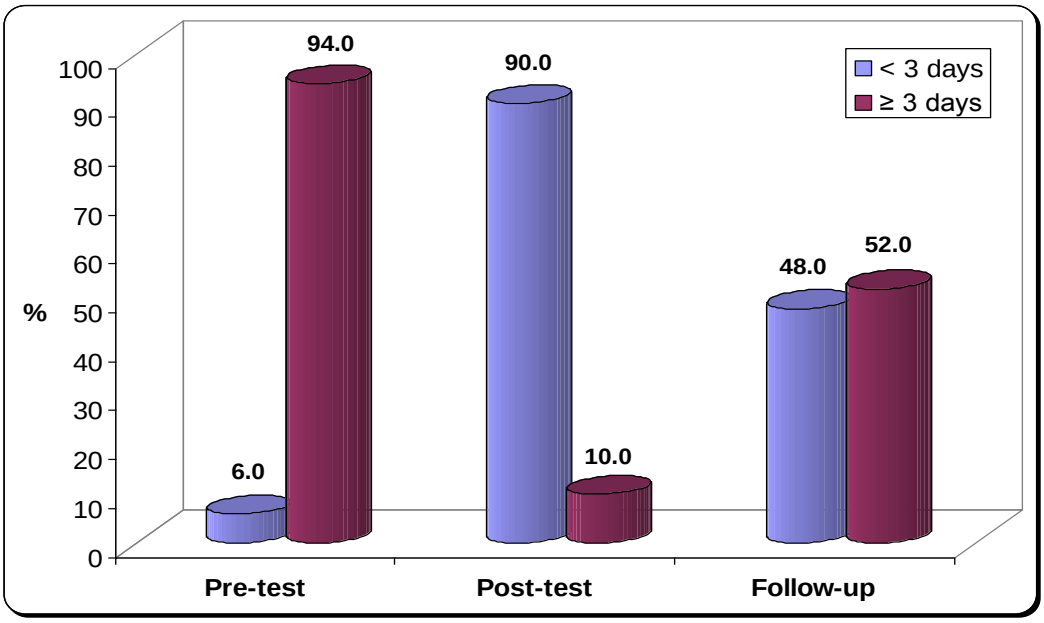

Figure (2): Mean scores of hospital length of stay for patients with unstable angina (n= 150):

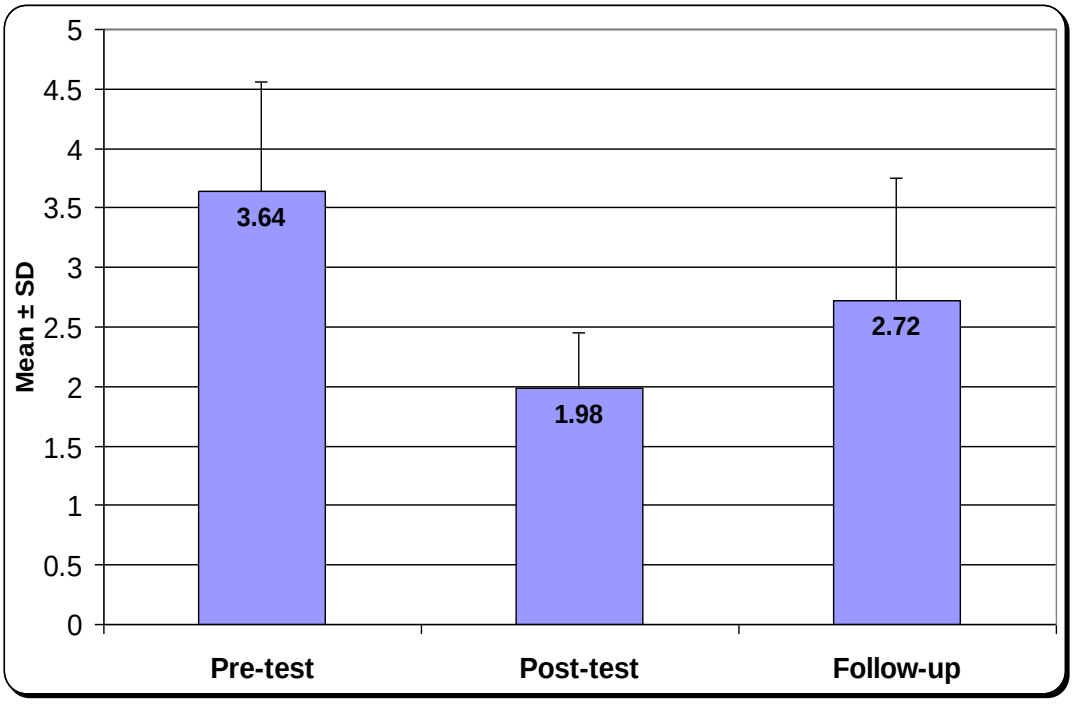

Figure (3): Correlation between nurses' performance levels and their age and years of experience.

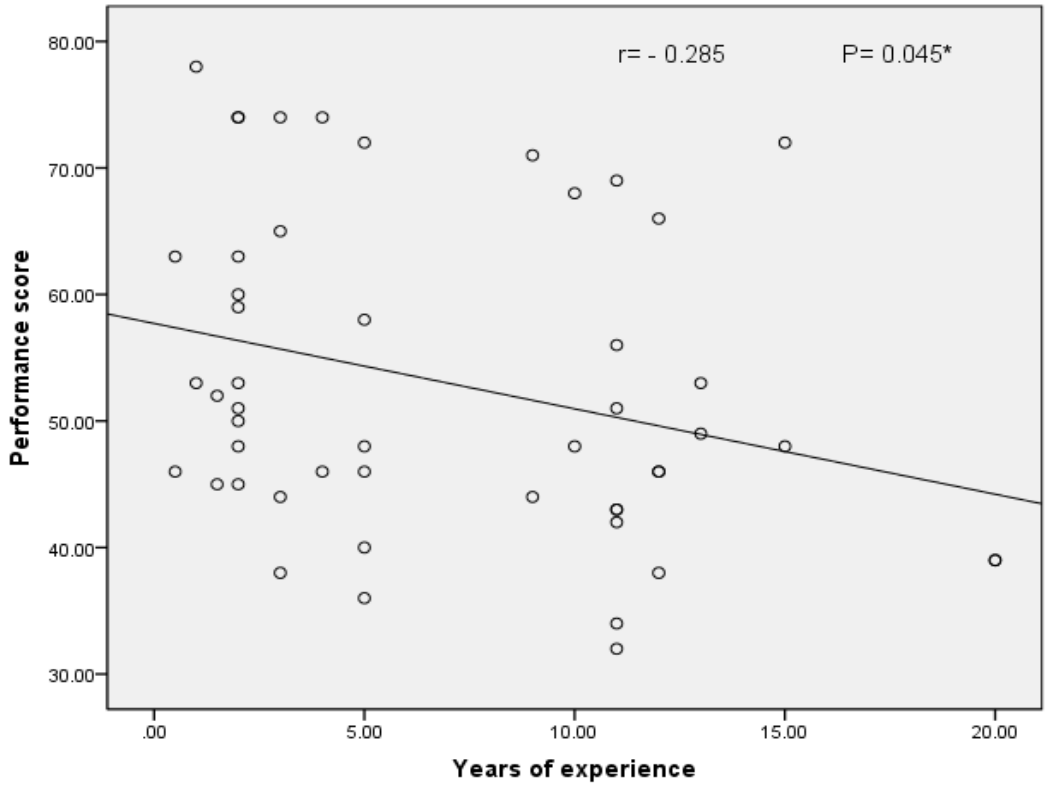

Table (1): reveals that (44.0%)ofnurses' age range from 25 to less than 30 years old, more than half (52.0%) of them were having secondary nursing school diploma, (40.0%) of them having experience more than 10 years in coronary care unit and the majority of them (68.0%) were married.

Table (2): illustrates that, the highest percentage of the studied patients (68.7%) were male, (39.3%) of them aged more than 60 years old, (28.7%) of them were employee , the majority of them (84.7%) were married and more than half of them (52.0%) stayed in hospital more than three days.

Table (3): illustrates that the highest mean scores was in study group, slightly decrease in follow up group as regard to all nurses' performance levelsat all study periods from (0-15 min to Day 3).
There were statistical significant differences between control, study and follow up groups as regard to nurses' performancelevelsat all study periods **(P= 0.000*).**

Table (4): regards to outcomes: it can be noted that the highest percentage of complications was (82.0%) of patients had sever arrhythmia, (44.0 %) had heart attack, and (40.0%) had stable angina in control group. While the lowest percentage of all complications was in study group and the percentage slightly increased of all complications was in follow up group. For hospital readmission up to six months, the highest percentage (26.0%) of patients was in control group compared to others groups. In relation to In-hospital immediate mortality or mortality at 26 week the highest percentage (8.0%) of patients was in follow up group compared to others groups.

There were highly statistical significant differences between control, study and follow up groups as regard to complication items (severe arrhythmia, heart attack, stable angina and heart failures) and hospital readmission up to six months**(P= 0.000*).**

Table (5):reveals that, there was positive correlation but no statistical significant difference between nurses' performance levels and hospital length of stayof study group. While there were negative correlation and no statistical significant difference between nurses' performance levelsand hospital length of stay of control and follow up groups.

Figure (1): asregards to hospital length of stay, the majority of patients (90.0%) at study group stay in hospital (< 3 days), while (94.0%) of control group stay in hospital (≥ 3 days).

Figure (2): the highest mean score (3.64 ± 0.92) was at control group .There were highly statistical significant differences in control, study and follow up groups as regard to hospital length of stay **(P= 0.000*).**

Figure (3):reveals that, there was a statistical significant difference between nurses' performance levels and years of experience of nurses (0.045*). There were negative correlation between nurses' performance levels and age (-0.133).

V. Discussion

The present study confirmed that, regarding personal characteristics of nurses working in the coronary care unit less than half of nurses' age ranged from 25 to < 30 years this might be due to the system followed by the director of nursing transferring old age nurses every five years from intensive care units to general units, more than half of them have secondary nursing school diploma and the majority of them were having experience ≥ 10 **(Table 1)**. The researcher found increase performance of nurses this might be due to relationship between education and experience with performance. This finding consistent with **Al-Ahmadi , (2009)** who mention that the education has a positive influence on job performance and there was relationship between education and performance. Also reported that the years of experience had strong predictors of job performance and work experience influences job performance also had a strong impact on work attitudes.

The present study revealed that the majority of patients were male, aged ≥ 60 years old, and they stayed in hospital more than ≥ 3 days **(Table 2).**Thisfinding consistent with **the National Library of Medicine, (2017)** which reported that older age and male gender are at higher risk for unstable angina.

From the findings of the present study it appeared that there was improvement in nurses' performances levels in caring for patients with unstable angina for all items from the first 15 minutes to the third day were in the study group. There were statistical significant differences between control, study and follow up groups as regard to nurses' performance at all periods **(Table 3)**. This might be occur after using clinical pathway and training which lead to improving performance levels of nurses and increase nurses' satisfaction and autonomy. This finding consistent with **Schrijvers, (2012)** who reported that from the advantage of clinical pathway is increasing the job satisfaction of employees as job descriptions and responsibilities derived from the work process become clearer. Clarity within the set framework offers more autonomy, allowing employees to start a routine act independently without waiting for the approval of superiors. A nurse can start acting independently and work ahead. Dedicated, passionate professionals provide better care for the patient.

In addition, the result was consistent with **Kul et al, (2012)** whose mentioned that the pathways are a learning tool for professional individual and organizational team, that define different tasks to be learned, which affects performance of employees. The result was also consistent with **Cheah, (2000)** who mention that the clinical pathways, implemented in the context of an acute care general hospital, is able to significantly improve care processes through better collaboration among healthcare professionals and improvements in work systems.
The current study revealed that the patient's outcomes (complication, hospital readmission, and mortality)were decreasedfor study group compared to control and follow up groups **(Table 4).** This might be occurring after applying clinical pathway which has positive effect on patient's outcomes while it is decreased in follow up may be due to attrition and it is not a system in the unit . This finding consistent with **Timothy,(1999)** who mentioned in his study that no increase in complications (morbidity or mortality) in the pathway patients as compared to other groups.The result was also consistent with**Kingston (2000)** whose reported that improvement of patient outcomes is a primary benefit of the utilization of clinical pathways.

Mary, (2002) who mentioned that the patient outcomes can be improved by the use of pathways that improve process of care measures. Implementation of pathways focused on improving the quality of care, critical pathways will be useful in improving outcomes of patients.

In addition, the result was consistent with **Dean, (2010)** who reporting that patient complications found lower rates when clinical pathways were used.

Also, the finding was in the same line with **Herck et al, (2004)**whoseasserted that the use of care pathways has been associated with reduced hospital complications and strong positive effects on safety and quality of care. Moreover, **Kul et al, (2012)** mentioned that the implementation of CPs can achieve a reduction in some of the patient outcomes such as mortality rate, readmission rate, LOS and costs of hospitalization, CPs reduced hospital mortality. Also readmission rate decreased in the care pathway groups.

The length of stay (LOS)in hospitals is often used as an indicator of efficiency of care provided. Many of the studies assessed length of hospital stayby used different time span measures. The current study revealed that decreased in the duration of hospitalization for patients within study group than control group. There were highly statistical significant differences in control, study and follow up groups as regard to hospital length of stay **Figure (1,2).** This might be occur after applying clinical pathway for study group because the patients in this group stay few days less than other patients in control group This finding consistent with **Timothy, (1999)** who mentioned that the implementation of the pathway produced significant decreases in length of stay and cost in the pathway group as compared to the pre pathway group. Also the result consistent with **Amr, (2014)** who asserted that theusing of the clinical pathway resulted in decreased length of hospital stay than not use clinical pathway.
On other hand **El Baz et al, (2009),**asserted that the implementing a CP decreased hospital delay (number of days the patient spent in the hospital from admission to discharge).
From the findings of the present study it was clear that, there was a significant negative correlation between nurses' performance levels and years of experience and age of nurses **Figure (3).**This finding inconsistent with **Chung et al, (2015)** who mentioned that the positive relationship between work experience and job performance and work experience expecting higher job performance while he consistent with this study in performance levels with age who mentioned that there was correlation between workers' age and number of years of service.when people reach a certain age, their work ability significantly decreases. Young workers in some job can maintain certain physical abilities to perform essential tasks and the work ability of workers aged older working were examine the correlations between their ages, the numbers of years they worked, and their cognitive abilities decreased so the older workers were at least as productive as younger.

The findings of the present study revealed that, there was positive correlation but no statistical significant difference between nurses' performance levels and hospital length of stayin study group. While there were negative correlation and no statistical significant difference between nurses' performance levels and hospital length of stay incontrol and follow up groups. Because improve in nurses' performance levels lead to decreased length of stay which occur after using the clinical pathway **Table (5)**. This finding consistent with **Barbieri,et al (2009)** who mentioned that the use of clinical pathways significantly decreased the number of postoperative complications, and this was observed for all the complications, therefore it is possible to conclude that bothreduction of LOS and clinical outcome improvements can be attributed to a better organization of care.

VI. Conclusion

The highest mean scores of nurses' performance were in study group, and then slightly decrease in follow up group at all study periods from (0-15 min to Day 3). There were statistical significant differences between control, study and follow up groups as regard to nurses' performanceat all study periods.

-The patient's outcomes had decreased after applying the clinical pathway at study group compared to other group. There were highly statistical significant differences in control, study and follow up groups as regard to all complications items and hospital readmission up to six months.

-The highest percentages of the study group patient stay in the hospital less than 3 days while the control group patient stayed more than 3 days. There were highly statistical significant differences in control, study and follows up groups as regard to hospital length of stay.

VII. Recommendation(s)

- The manager of coronary care unit should use the clinical pathway as an audit tool in their periodic assessment of nurses‟ competency skills.
- Organize training workshops and courses for nurses about implementation of clinical pathway according to patient's diagnosis in all intensive care units.
- Development and application of clinical pathways in other areas of clinical specialties.
- Study the staff satisfaction and cost effectiveness after implementation of the clinical pathway.
- Study the effect of using the clinical pathway on nursing students‟ educational achievement in simulation labs and clinical settings.

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