# Impact of A Designed Nursing Clinical Pathway Guidelines on Acute Myocardial Infarction Patients' outcomes at Benha University Hospitals

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**Abstract**

Acute myocardial infarction is one of the most common life threatening diagnoses in hospital admissions. Most of the complications occur during the first few hours while the patients are likely to be in the hospital. Nurses are challenged to plan and provide care that promote the best clinical and health related outcomes utilizing novel care methods as clinical pathway. Clinical pathway have emerged as one of the most popular new initiatives intended to reduce costs while maintaining or even improving the quality of care. Therefore, **the aim of this study** was to examine the impact of a designed nursing clinical pathway guidelines on acute myocardial infarction patients outcomes at Benha University Hospitals. To fulfill this aim the following **Research hypotheses** were formulated H1) the mean total and subtotal knowledge scores of the study group subjects will be higher than those of the control group. H2) the mean total and subtotal practice scores of the study group subjects will be higher than those of the control group. H3) The mean total and subtotal compliance mean scores of the study group subjects will be higher than those of the control group. H4) Patients with acute myocardial infarction who are exposed to the designed clinical pathway guidelines will have lesser hospital stay than those who will not. H5) The frequency of post-acute myocardial infarction complications among the study group subjects will be lower than that among the control group ones. A **quasi experimental design** was utilized in this study. A convenience sample of 60 adult male and female patients was randomly divided into two equal and matched groups (control and study groups) (30 subjects each). The following tools were utilized for data collections; 1) Socio demographic and medical data sheet.,2) Pre-post knowledge questionnaire sheet.,3)Observational checklist .,4) Complication assessment sheet.,and5) Compliance assessment sheet., T**he present study revealed that** All research hypotheses were supported; the mean total and subtotal knowledge, practices ,and compliance scores of the study group subjects are significantly increased immediately after implementation of the nursing clinical pathway among the study group subjects than among the control group ones . A significant shorter length of hospital stay among the study group subjects as compared to that among the control group ones is documented. As well, complications were significantly lower among the study group subjects as compared to those among the control group ones. **In conclusion**, nursing

clinical pathway as an approach of care seemed to have a positive impact on acute myocardial infarction patient's outcomes. Further research studies on larger probability samples from different geographical locations at the Arab Republic of Egypt (ARE) are recommended to generalize the results.
**Key Words**: Nursing clinical pathway guidelines, acute myocardial infarction, and Patients' outcomes.

## Background

Clinical pathway has been identified as one way to promote evidence-based practice, reduce practice variation, and ultimately improve the quality of care and outcomes of patients with myocardial infarction **Christopher, *Cannon, and Joseph,* (2009*)***,defined acute myocardial infarction clinical pathway as a standardized protocols for optimizing and streamlining patient care. Clinical pathways have been developed in health care as multidisciplinary care plans that outline the sequence and timing of actions necessary for achieving expected patient outcomes and organizational goals regarding quality, costs, patient satisfaction and efficiency ***El-Baz, Middle, DiJk, Oosterhof,and Boonstra,(2007).***

The nursing clinical pathway for patient with acute myocardial infarction differ from traditional care plans in the following ways (1) it represent patient care plan rather than nursing care plan (2) it focused on the quality and efficiency of care (3) the interventions are designed along specific timelines, sometimes even in hour-by-hour detail, for indicated actions and pathways not only spell out these specific actions but also enumerate expected outcomes that serve as check points for the performance of the patient and the pathway. (4) if patient outcomes do not occur, variances, too, can be noted on the document, along with an explanation of causes, and if needed, a plan can be described to return the patient to the expected course of treatment and outcome ***(Olive, 2009).***

### Aim of the Study

The aim of this study was to examine the impact of a designed nursing clinical pathway guidelines on acute myocardial infarction patients' outcomes at Benha University Hospitals.

## Hypothesis

To fulfill the aim of this study the following research hypotheses were formulated:

**H1- T**otal mean knowledge and practice scores of the study group subjects will be higher than those of the control group.

**H2-** Total compliance mean scores of the study group subjects will be higher than those of the control group.

**H3-** Patients with acute myocardial infarction who are exposed to the designed clinical pathway guidelines will have lesser hospital stay than those who will not.

**H4-** The frequency of post acute myocardial infarction complications among study group subjects will be lower than the control group.

## SUBJECTS AND METHODS

**Research Design:** The study utilized a quasi-experimental design (pre/post control group).

**Subjects:** A sample of convenience 60 adult male and female patients admitted to The Critical Care Unit (CCU) with acute myocardial infarction .

**Setting:** The study was carried out at the Critical Care Department, Benha University Hospital.

**Tools: Four tools were constructed by the researcher.**

**1-Socio demographic and medical data sheet** :

This tool consists of two main parts: the first one is related to the socio-demographic characteristics such as; age. gender, occupation, marital status, level of education, income and family size. The second one covers clinical data related to co–morbidies such as; length of patient's stay in hospital, diagnosis, chief complaint, symptoms, past medical history,and risk factors.

**2- Pre-post knowledge questionnaire sheet:**

It was utilized for testing patient's knowledge about acute myocardial infarction. It covers: Knowledge related to the nature of patient's disease , prescribed drugs, complications of the disease ,diet, physical activities, sexual activity, dealing with stressful situations and the importance of follow–up .

*** Scoring system:**

Each right answer got one score with total scores of 100 for the 100 questions.

**3- Observational checklist**:

It was utilized to observe study group performance level. It covered the following areas: Measuring Radial Pulse , Counting Respiration , Measuring Temperature, Performing Range – Of – Motion Exercises to head, shoulder, elbow, forearm, hip, knee, ankle , Performing Cough And Deep Breathing Exercises.

*** Scoring system**:

Each item was scored: Zero →if not done, (1) → for an incomplete performance, and (2) →for an action that has been done correctly. The total scores were (142).

4**a Complication assessment sheet**: It was designed to evaluate and monitor patient for the development of complications such as re infarction, cardiac dysrhythmias, heart failure, cardiogenic shock; it is recorded statistically as numbers and percentages**.**

4b **Compliance assessment sheet**: This tool was developed to measure patient's adherence to the prescribed management protocol by using health behavior scale.

It contains five main sections pertaining to the actions of the prescribed clinical nursing pathway guidelines. There are namely as follows: prescribed diet, stopping smoking, performing activities, taking medications, modifying responses to stressful situations.

*** Scoring system:**

Each Likert scale questions was scored as follows: (0) indicating that the patient did not perform the action, (1) indicating that he/she sometimes performing the action and (2) indicating that he / she is performing the action regularly. The total patient's compliance scores = (80).

**Procedure:**

The current study was carried out on two phases; preparation, implementation and evaluation.

**1) Preparatory phase :**

During this phase the researcher performed the following:

- Permissions of data collection and implementation of the study in Critical Care Department were obtained from the critical care administrative personnel
- Reviewing of medical records was done to fill in the socio-demographic and medical data. A questionnaire sheet was used for assessing subject's knowledge. Direct observation and physical examination were utilized to fill in the patient complication, performance, compliance, and satisfaction sheet and variance analysis was done.
- The researcher met three days weekly with the clinical pathway multidisciplinary team for three months and focused on completing one day of the pathway at each meeting.
- As regards preparation of the instructional management booklet, the theoretical contents of the booklet were concerned with; disease related facts, as definition of myocardial infarction, determining the possible causes of myocardial infarction, etc. The practical contents of the instructional booklet consisted of counting the radial pulse, measuring body temperature, cough and deep breathing exercises….etc.

**2) Implementation and evaluation phases:**

Once an official permission was granted data of the current study were collected from August 2007 to December 2008.

Daily, the researchers approached the responsible nursing supervisors as well as, the responsible physician of the Critical Care Department, to identify the number of newly admitted patients who have Acute Myocardial Infarction (AMI). Then, patients who matched the inclusion criteria were assigned randomly to either control group or study group (30 matched patients in each group) according to their arrival to the Critical Care Department.

The control group subjects were observed on daily basis to monitor complications, and hospital stay. Each patient was approached individually to fill in socio-demographic and medical data sheet, pre/ knowledge questionnaire sheet, pre/observational checklist, and pre/compliance sheet from hospital admission until discharge then follow-up periods.

The study group subjects were exposed to the routine hospital care as well as to nursing clinical pathway guidelines. Each of them was observed on daily bases to fill in complications, and hospital stay, each patient was approached individually to fill in the socio-demographic and medical data sheet, post/knowledge questionnaire sheets, post/observational checklist, post/compliance from hospital admission until discharge, then at follow-up periods .

## RESULTS

The majority of both study and control group subjects were males (73.3% & 73.3% respectively), married (83.3% & 80% respectively), illiterate (50% & 50% respectively), their age above 50 years old (53.3% & 46.7% respectively) with a mean of (50.73 ± 10.34 and 50.1 ± 10.04 respectively). Their income was ranged between 200 to 500 Egyptian pounds per capita,with a mean of (347.66±113.63 and 358.83±112.9). As regards occupation, more than one third (33.3%) of both groups were retired. Their family size ranged between 4-6 members (76.7% & 56.7%) with a mean number of (6 ± 1.1& 7 ± 2). No statistically significant differences were detected between the two groups in relation to the above mentioned demographic variables, which indicate that the two groups were nearly homogeneous.

**Table (1)** Revealed that the total and subtotal mean knowledge scores of both groups were markedly low with no significant statistical differences between them except in relation to knowledge about nature of the disease and sexual activity,the control group subjects got slightly higher mean scores compared to the study group subjects. However, post nursing clinical pathway guidelines implementation, an obvious improvement in all total and subtotal knowledge items among the study group subjects with highly statistically significant differences between the two groups for all items. However, a slight decline occurred after three months post nursing clinical pathway guidelines implementation among both groups subjects, with highly statistically significant differences between the two groups.

**Table (2)** showed that the total and subtotal mean practice scores of both groups were markedly low with no significant statistical differences between them. However, post nursing clinical pathway guidelines implementation, an obvious improvement in all total and subtotal practice items among the study group subjects with a highly statistically significant differences between the two groups. However, a slight decline occurred after three months among both groups subjects, with highly statistically significant differences between the two groups.

**Table (3)** demonstrated that the total and subtotal compliance mean scores of both groups(study control) were markedly low with no significant statistically differences between them. However, post nursing clinical pathway guidelines implementation, the compliance mean scores of the study group subjects was higher than those of the control group in all total and subtotal items of compliance to therapeutic regimen with a highly statistically significant differences between both groups. However, a slight decline occurred after one and three months among both groups' subjects, with statistically significant differences.

**Table (4)** revealed that 93. 3% of the study group subjects compared to 26. 7 % of the control group subjects stayed between 5-7 days, with a mean hospital stay of 5. 133±0.498 and 7.966±0.7063 days respectively. A highly statistically significant difference was found between the two groups.

**Table (5)** demonstrated that 46.6 % compared to 70 %, 26.7% compared to 56.6% and 20 % compared to 46.6%, of both study and control group subjects respectively developed complications throughout the three assessments (during hospitalization, after one month ,and after three months) with a highly statistically significant difference between them ($X^2_{df2}$ = 7.84 & p- values of <0.001).

**Table (6)** documented that during hospitalization 56.6% of the control group had negative patient variances as compared 30% of the study group ones, while the minority of both study and control groups (16.6 % & 10%, respectively) had positive patient variances. with a statistically significant difference between them ( $X^2$ = 3.737, at P < 0.05). Concerning physician variances , the same table demonstrated that (26.6% and 36.6%) of the study and control groups had negative physician variances,whereas 16.6% and10% of the study and control groups had positive physician variances , with a statistically significant difference between them ( $X^2$ = 3.655, at P < 0.05).

As regards hospital variances, the same table showed that more than half of the study and control group subjects 56.6 % and 50 % respectively had negative hospital variance,with no significant statistically difference between them ($X^2$ = 0.072,at P >0.05).

Concerning nursing variances, 43.3 % of the control group had negative nursing variance as compared to13.3 % of the study group ones, however minorities of both study and control groups (16.6% & 3.3% respectively) had positive nursing variance. with a statistically significant difference between them ($X^2$ = 6.65, at P < 0.001).

considering hospital discharge variances, 53.3 % of the control group had negative hospital discharge variances as compared to 43.3 % of the study group ones, while minorities of both study and control groups (16.6% & 13.3% respectively) had positive hospital discharge, variances, with no statistically significant difference between them ( $X^2$ = 0.318, at P >0.05).

**Table (1):**

Differences between study and control group subjects in relation to knowledge mean scores all through the study period.

| Assessment periods / variables | Before $\overline{X}$ ± SD | Immediately after $\overline{X}$ ± SD | After three months $\overline{X}$ ± SD | F- ratio |
|---|---|---|---|---|
| **-Nature of patient disease** | | | | |
| **Study** | 3.4±1.8 | 9.4±2.06 | 7. 23±1. 82 | **74 . 417*** ** |
| **Control** | 4. 3±1. 3 | 4.2±1.30 | 3.83 ± 0.97 | **1. 1006 N.S** |
| **T - value** | **2. 1435*** | **11. 711*** ** | **9. 042*** ** | |
| **-Prescribed drugs** | | | | |
| **Study** | 4. 97±1. 5 | | | |
| **Control** | 5. 53±1. 38 | 10. 66 ±1.79 | 8.3±1. 715 | **86 . 349*** ** |
| **T - value** | **1. 544 N.S** | 5.2 ± 1.35 | 4.43±1. 20 | **5 . 333*** |
| | | **13. 349*** ** | **10. 131*** ** | |
| **-Complications of disease** | | | | |
| **Study** | 0. 97±1. 05 | 3. 566 ± 0. 76 | 3± 0. 73 | **73 . 589*** ** |
| **Control** | 1. 37±1.2 | 1. 366 ± 1. 196 | 1. 33 ± 1. 192 | **0 . 003 N.S** |
| **T- value** | **1. 379 N.S** | **8. 527*** ** | **6. 549*** ** | |
| **- Diet** | | | | |
| **Study** | 6. 97 ± 1. 68 | 15. 466 ± 2. 39 | 12. 13 ± 2. 23 | **117. 958*** ** |
| **Control** | 6. 73 ±1. 53 | 6. 43 ± 1. 89 | 5. 566 ± 1. 667 | **3. 674*** |
| **T - value** | **0. 570 N.S** | **16. 254*** ** | **12. 946*** ** | |
| **- Physical activity** | | | | |
| **Study** | 3.9 ±1. 54 | 8.2 ± 1. 013 | 6. 53 ± 1. 147 | **87. 043*** ** |
| **Control** | 4.33±1. 33 | 4.4 ± 1. 33 | 4.1±1. 164 | **0. 433 N.S** |
| **T- value** | **1. 165 N.S** | **12. 459*** ** | **8. 154*** ** | |
| **- Sexual activity** | | | | |
| **Study** | 1. 93±0.679 | 3.466 ± 0. 56 | 3.066±0.73 | **42. 101*** ** |
| **Control** | 2.43±0.558 | 2.43 ± 0.615 | 2. 43± 0.15 | **0. 0135 N.S** |
| **T- value** | **3. 125** ** | **6. 861*** ** | **4.676*** ** | |
| **-Dealing with stressful situations** | | | | |
| **Study** | 4.6 ± 0. 66 | 7. 53 ± 0. 618 | 6. 366 ± 0.836 | **124. 723*** ** |
| **Control** | 4.77± 0.88 | 4.2± 0. 79 | 3.86 ± 0. 805 | **8. 771** ** |
| **T - value** | **0. 826 N.S** | **18. 196*** ** | **11.826*** ** | |
| **- Follow-up** | | | | |
| **Study** | 5.77±1. 11 | 11. 166 ±1. 267 | 9. 266±1.590 | **121. 325*** ** |
| **Control** | 6. 03±1. 39 | 5. 766 ±1. 45 | 5±1. 21 | **4. 306*** |
| **T - value** | **0. 815 N.S** | **15. 384*** ** | **11. 719*** ** | |
| **- Total** | | | | |
| **Study** | 32.5 ±6.55 | 69.46 ± 8.71 | 56.13±9.185 | **33. 723*** ** |
| **Control** | 35.46± 8.019 | 34.03 ± 8.07 | 30.566±7.05 | **3. 081 N.S** |
| **T- value** | **1.566 N.S** | **16.342*** ** | **12.092*** ** | |

N.S = Not significant *** =** significant at p value = 0.05
** = significant at 0.01 ***= significant at 0.001

**Table (2)**:
Difference between study and control group subjects in relation to practice mean scores all through the study period.

| Assessment Periods / Variables | Before $\overline{X}$ ± SD | Immediately after $\overline{X}$ ± SD | After three months $\overline{X}$ ± SD | F- ratio |
|---|---|---|---|---|
| - **Measuring pulse** | | | | |
| **Study** | 3.6±1.052 | 7 .3±0. 862 | 5.866±0.921 | **112. 184*** ** |
| **Control** | 3.87±1.28 | 3.93±1.289 | 3.7±1.187 | **0. 264 n.s** |
| **T - value** | **0. 880 n.s** | **11. 908 *** ** | **7. 905*** ** | |
| - **Measuring respiration** | | | | |
| **Study** | 2.57±1.02 | 5.266±0. 512 | 4.466 ± 0. 618 | **98. 996*** ** |
| **Control** | 2.77±1.05 | 2.966±0.948 | 2.8±0.909 | **0 . 348 n.s** |
| **T- value** | **0.749 n.s** | **11. 699*** ** | **8. 309*** ** | |
| - **Measuring temperature** | | | | |
| **Study** | 8.8±4.118 | 28.7± 4.450 | 22.333 ± 3.952 | **7. 1616 *** ** |
| **Control** | 10.03±4.102 | 9.5 ± 3.575 | 8.633 ± 3.060 | **1. 114 n.s** |
| **T - value** | **1. 1593 n.s** | **18. 426*** ** | **15. 022*** ** | |
| - **Range of motion exercises** | | | | |
| **Study** | 5.833±1.551 | 16.3 ± 3.532 | 12.2 ± 3.350 | **92. 687 *** ** |
| **Control** | 5.566±1.96 | 5.4 ± 2.059 | 4.63 ± 1.99 | **1. 7882 n.s** |
| **T - value** | **0. 585 n.s** | **14. 611 *** ** | **10. 647*** ** | |
| - **Cough &deep breathing exercises** | | | | |
| **Study** | 5.8± 2.023 | 16.33 ± 3.737 | 13.433 ± 3.422 | **90. 5261*** ** |
| **Control** | 6.3±1.965 | 5.93 ± 2.080 | 5.43 ± 1.78 | **1. 345 n.s** |
| **T- value** | **0. 905 n.s** | **13. 707 *** ** | **11. 368 *** ** | |
| - **Elasticized stockings** | | | | |
| **Study** | 3.666±1.135 | 6.266± 0.512 | 5.766 ± 0.715 | **80. 234*** ** |
| **Control** | 3.63±0.91 | 3.9±1.075 | 3.766 ± 0.955 | **0. 529 n.s** |
| **T- value** | **0.1358 n.s** | **10.903*** ** | **9.216*** ** | |
| - **AMI drugs** | | | | |
| **Study** | 5.133 ± 0.884 | 8.366 ± 0.795 | 7.366 ± 0.912 | **30. 858*** ** |
| **Control** | 4. 866 ± 0.88 | 4.8 ± 0.79 | 4.2 ± 0.83 | **5. 580*** |
| **T- value** | 1.171 n.s | 17. 395*** | 14.197*** | |
| - **Total** | | | | |
| **Study** | 35.5± 9.615 | 88.833 ±12.712 | 71.766 ±12.104 | **161. 119 *** ** |
| **Control** | 37.3± 10.48 | 36.43± 9.95 | 33.266 ± 8.977 | **1. 354 n.s** |
| **T- value** | **0. 693 n.s** | **17.782*** ** | **13.995*** ** | |

N.S = Not significant
** = significant at 0.01
* = significant at p value = 0.05
***= significant at 0.001

**Table (3):**

Difference between study and control group subjects in relation to compliance mean scores all through the study period.

| Assessment / Periods / Variables | Before $\overline{X}$ ± SD | Immediately after $\overline{X}$ ± SD | After one month $\overline{X}$ ± SD | After three month $\overline{X}$ ± SD | F- ratio |
|---|---|---|---|---|---|
| **- Diet** | | | | | |
| **Study** | 6.66 ±0.91 | 13.47±1.43 | 11.93±1.39 | 9.93±1.46 | **144.367*** ** |
| **Control** | 6.10 ± 1.33 | 6.33± 1.62 | 6.566±1.498 | 6.033± 1.28 | **0.831 N.S** |
| **T - value** | **1.931 N.S** | **18.111*** ** | **14.427*** ** | **11.048*** ** | |
| **- Smoking** | | | | | |
| **Study** | 6.83±0.90 | 13.93±1.15 | 11.87±1.50 | 9.933±1.982 | **26.979*** ** |
| **Control** | 6.97±1.74 | 7.566±1.66 | 7.066 ±1.569 | 6.266±1.481 | **3.175*** |
| **T- value** | **0.372 N.S** | **17.301*** ** | **12.1212*** ** | **8.131*** ** | |
| **- Activity** | | | | | |
| **Study** | 6.1±1.45 | 12.0±1.61 | 10.23±1.41 | 8.83 ±1.44 | |
| **Control** | 5.93±1.84 | 5.77± 2. 08 | 5.83±1.83 | 5.5 ± 1.57 | **82. 382*** ** |
| **T - value** | **0.392 N.S** | **13. 0146*** ** | **10. 451*** ** | **8. 612*** ** | **0. 294 N.S** |
| **- Medication** | 7.07±1.03 | 14.5 ± 0.846 | 12.5±1.06 | 10.8±1.58 | **214.092*** ** |
| **Study** | 7.13±1.71 | 7.433±1.54 | 7.17±1.51 | 6.03±1.45 | **4. 616*** |
| **Control** | **0.1824 N.S** | **22. 0843*** ** | **15. 875*** ** | **12.192*** ** | |
| **T - value** | | | | | |
| **- Stress** | 6.23±1.23 | 12.47±1.31 | 10.733±0.93 | 8.87± 1.18 | **151.0353*** ** |
| **Study** | 5.73±1.73 | 5.6 ±1.65 | 5.3 ±1.370 | 4.833± 1.16 | **2. 0711 N.S** |
| **Control** | **1. 292 N.S** | **17. 927*** ** | **17. 9900*** ** | **13.398*** ** | |
| **T- value** | | | | | |
| **- Total** | 32.9±3.78 | 66.2± 4.028 | 57.266±3.395 | 47.566±7.896 | **411. 992*** ** |
| **Study** | 31.77±7.22 | 32.66± 7.381 | 31.933±6.657 | 28.666±5.838 | **1. 967 N.S** |
| **Control** | **0.7623 N.S** | **21. 848*** ** | **18. 5685*** ** | **10.542*** ** | |
| **T- value** | | | | | |

N.S = Not significant  * = significant at p value = 0.05

** = significant at 0.01  ***= significant at 0.001

**Table (4):**
Differences in hospital stay / Days among study and control group subjects.

| **Item** | **Study group n = 30** | | **Control group n = 30** | | **Total n = 60** | | **T-P values** |
|---|---|---|---|---|---|---|---|
| | **No** | **%** | **No** | **%** | **No** | **%** | |
| **Hospital in days** | | | | | | | |
| < 5 | **2** | **6.7** | **0** | **0.0** | **2** | **3.3** | |
| **5-7 days** | **28** | **93.3** | **8** | **26.7** | **36** | **60** | **18. 044*** ** |
| >**7 days** | **0** | **0.0** | **22** | **73. 3** | **22** | **36.7** | |
| $\overline{X}$ **±SD** | **5. 133 ±0.498** | | **7.966 ± 0.7063** | | **6. 55 ± 1.54** | | |

***= Significant at P< 0.001

**Table (5):**

Comparison between the two studied groups as regards to complications developed throughout the study periods (n=60).

| **Study periods** | Complications | | | | $X^2_{df2}$ | P- value |
|---|---|---|---|---|---|---|
| | **Study group** | | **Control group** | | | |
| | **N** | **%** | **N** | **%** | | |
| During hospitalization | 14 | 46.6 | 21 | 70 | 7.84*** | <0.001 |
| After one month | 8 | 26.7 | 17 | 56.6 | | |
| After three months | 6 | 20 | 14 | 46.6 | | |

***= Significant difference at P< 0.001

**Table (6):**

Comparison of variance numbers developed among the study and control group subjects during hospitalization ( n= 60).

| Types / Variables | Study group | | Control group | | $X^2$ | p-value |
|---|---|---|---|---|---|---|
| | N | % | N | % | | |
| **+ Patient variances** | 5 | 16.6 | 3 | 10.0 | 3.737* | <0.05 |
| **- Patient variances** | 9 | 30 | 17 | 56.6 | | |
| **+ Physician variances** | 5 | 16.6 | 3 | 10.0 | 3.655* | <0.05 |
| **- Physician variances** | 8 | 26.6 | 11 | 36.6 | | |
| **+ Hospital variances** | 3 | 10.0 | 2 | 6.7 | 0.072 | >0.05 |
| **- Hospital variances** | 17 | 56.6 | 15 | 50 | | |
| **+ Nursing variances** | 5 | 16.6 | 1 | 3.3 | 6.65 | <0.001 |
| **- Nursing variances** | 4 | 13.3 | 13 | 43.3 | | |
| **+ Hospital discharge variances** | 5 | 16.6 | 4 | 13.3 | 0.318 | >0.05 |
| **- Hospital discharge variances** | 13 | 43.3 | 16 | 53.3 | | |

N.S = Not significant *** =** significant at p value = 0.05
** = significant at 0.01 ***= significant at 0.001

**Discussion**

The current study revealed that, nearly three quarters) of both study and control group subjects were males. This may be attributed to the Egyptian culture in which, Egyptian man is responsible about family members and financial resources, which put him in a high stress. Another possible explanation is that, half of both studied groups were smokers before the nursing clinical pathway implementation. In addition to the fact reported by ***Parrott (2008)*** that, smoking adversely affects cell lining of the coronary arteries. So, blood flow is reduced and it causes at least 25–30 % of cases of acute myocardial infarction.

Supporting this study findings of **Ahmed (2008),** found that, the prevalence of myocardial infarction was greater in males than females and this may be related to the effects of estrogen as protective mechanism against the development of atherosclerosis.

As well, **Al-Wossaby (2007)**, in a similar found that the percentage of male patients (82%) was higher than that of female ones. As well, the ***National Center of Health Statistics (2003)***, in a study entitled as" outcomes of acute st-elevation myocardial infarction patients, who underwent primary percutaneous coronary intervention "on 236 AMI patients at a university hospital in Bangkok, published master of nursing science thesis, Mahidol University. Stated that, the percentage of

male patients (72%) was higher than that of female patients (27.1%). In addition to the finding reported by **Anderson (2007)** that, the prevalence of myocardial infarction is higher in men than women.

The current study result denoted that for more than half of both groups, their age was more than 50 years and more than one third of them were retired. Of relevance to the tendency of retired people to be less physically active, they tend to have more sedentary life. Supporting to this finding***, Ahmed (2008***) revealed that, the majority of patients were between ages of 50 to less than 60 years. And rationalized this findings by stating that, aging makes people less physically active that can interpret the incidence of myocardial infarction.

The findings of the current study also demonstrated that, the majority of both the study and controls(83.3 % & 80%) were married, their family size was more than six members, and half of them were illiterate with an income of relatively low. Supporting to these study findings, ***Arab (2003)*** in a similar study, found that more than half of the studied patients were married (55%), illiterate (54.0%), and more than third were manual workers (36.0%) and had insufficient family income per month.

On the other hand ***Haidar (2005***) and ***Ahmed (2008)*** revealed that their study subjects were working technical jobs and their educational level was secondary level. The level of education has an effect on the behavior and the beliefs of patients to accept the illness and modify their life style according to prescribed therapeutic regimen.

Congruent with this finding **Swearingen (2008*)***,reported that, the major clinical manifestation of acute myocardial infarction is chest pain, which is similar to angina pectoris but more severe and unrelieved by nitroglycerin. The pain may radiate to the neck, jaw, shoulder, back, or left am. AMI may also be associated with less common clinical manifestations, including nausea or dizziness, dyspnea, palpitation, cold sweat, or paleness.

On the same line, **Haidar (2005)** mentioned that about half of the study patients had a positive family history of coronary artery disease. This can be used in motivating the patients to modify their lifestyle patterns. As well as,**Abdel-Gabar (2004*)and* Ahmed (2008)**, and in a study entitled " A plan of care discharge for cardio-thoracic surgery patients", search in nursing science , stated that the majority of subjects were hypertensive, diabetic and had a family history of cardiac disease.

.On the same line **Mosaad (2000), Latini, et al, (2003), Arab (2003), Carpeggiani, et al, (2004), Haidar (2005),** , **Linton (2007** demonstrated that ,most of thier studied patients were smokers , had high fat diet, weren't practicing exercises and were under stress.

**Considering hospital stay**, the current study finding documented a shorter hospital stay period among the study group subjects as compared to the control ones. This could be attributed to the relative decrease in the number and duration of complications. Therefore, this pathway might have been contributed to the improvement of the quality of care provided which might be reflected on the length of hospital stay to an acceptable minimum time through early recognition and interventions of medical complications, nursing or social problems solved that necessitate no more prolonged hospitalization period.

Supporting this study finding similar studies were carried out by the **National Heart Attack Alert Program (NHAAP) Coordinating Committee (2002)**, **Vanhaecht et al., (2005)**; and **El-Hadary (2009),** in her study entitled "Impact of a designed nursing clinical pathway on the outcome of patients with acute heart failure" on 60 patients at the Critical Care Department of El-Manial University Hospital; and previous **Kucenic and Meyers (2000)**, in their study entitled "Impact of a clinical pathway on the care and costs of myocardial infarction" on 110 patients at Kansas University Medical Center at Kansas City.All these studies Documented a shorter hospital stay period among the study group subjects as compared to the control group ones.

***Lee and Anderson (2006)***, in a multiple regression analysis study entitled "The association between clinical pathways and hospital length of stay: A case study" at a rural hospital in Mid Western State, reported that only one (the clinical pathway for myocardial infarction) out of the five pathways studied showed an association with a statistical significant decrease in the length of hospital stay.

**According to acute myocardial infarction complications,** the current study result revealed that, the study group subjects had lower incidence of complications as compared to control group ones through the different assessment periods in spite of the similarity of base line co-morbidities. Supporting several studies as those of this finding **Nichole*,Walls,andGoldman*,(1999),Jacavone,*Dantels,andTyner,* (2004),The clinical quality improvement network investigators (2005)**, **El-Hadary (2009),and Lemmens, *Vanzelm* , *Borel and Van Hillegers* (2009)**, reported that patients who were treated according to the clinical pathway showed a decrease in complication rate as compared to patients from the conventional care group.

In agreement with these findings **Ryan (2000**), in a study entitled "Impact of different clinical pathway on outcomes of patients with acute st-segment elevation myocardial infarction undergoing primary percutaneous coronary intervention: the rapid AMI study", on 546 consecutive patients at the department of cardiology, RUIJIN Hospital, Shanghai, China, concluded that clinical pathway was associated with a reduction in complication rate between pathways versus non pathway group.

**Patient knowledge,** the present study revealed a higher increase in the study group subjects knowledge mean scores immediately post nursing clinical pathway implementation than before as compared to control group ones, with a highly statistically significant differences. This may be attributed to the study group and their families' readiness and being anxious to learn.

Supporting the previous finding **Dowsey (1999*), Khowaja (2003), Buckley, et al., (2007), El-Baz (2008) ,and El-Hadary (2009),** reported that knowledge scores of the study group subjects who participated in the nursing clinical pathway were higher than that of the control group. This may be due to that education of patients and their relatives during the clinical pathway implementation appeared to have a positive influence on the patients' recovery with earlier discharge from hospital. As well, attending information seminars and group discussion assisted in reducing the length of hospital stay.

On the same line, **Abd-El-Rhman (2001*)*** found that there was an obvious improvement in quality of care and improvement in patient knowledge level post

clinical pathway implementation and added that educational booklet helps patients become aware of the expectations for each day of their hospitalization, thus reducing anxiety associated with illness and hospitalization.

On the other hand, **Ahmed (2008)** revealed that self efficacy scores of the patient's ability to control chest pain, daily living task and routine activities at home increased significantly after cardiac rehabilitation program and continued in increasing significantly after one month of discharge, and rationalized the study findings to the fact that, cardiac patients make new interpersonal relationships especially with other patients with coronary artery disease because, they need to know more about the disease, its effect and their experience with their illness.

Additionally, **Bailey (2004),** in a study entitled "Patients and nurses perceptions of the cardiac patients learning needs", carried out on 40 participants at the Florida State University, documented that cardiac patients are concerned with how to manage their disease process at home. As well **Fisher (1997*),*** in a study entitled " implementing of a clinical pathway in the cardiology service" in a master thesis in health care administration, Water Reed Army Medical Center, Washington, showed that a statistically significant improvement in patient's knowledge about disease along the six months post clinical pathway implementation due to increase patient's t concerns.

The current study showed a positive correlation between knowledge scores and age among study group subjects all through the different assessments with highly statistically significant differences. In agreement with these findings, **Mohamed (2006)** and **Salloum (2008),** reported a significant correlation between age of patients and their personal knowledge about disease and what should be done to maintain or improve their status. Incongruent with the previous finding **Abo-Alizm (2003)** found no statistically significant correlation between age of patients and their information scores.

**Patient's practice,** the present study revealed an obvious improvement in practice scores of the study group subjects immediately post nursing clinical pathway implementation than pre-nursing clinical pathway implementation. This may be attributed to the study group subjects and their families' readiness and being anxious to learn and their continuous reading in the practical booklet, with a decrement to practice mean scores of the study group after third month following nursing clinical pathway implementation. These results could be due to time factor in moving the patients to daily life work. Supporting to this finding, ***Patricia*** **(2006),** identified that, pathways embody practice guidelines, while at the same time allowing variations in the activity of the provider and in patient response.

The benefits of pathways are that they provide a measurable system of integrated management and enable patients to be involved in their own care as mentioned by ***Christopher, Cannon, and Joseph,*** **(2009).**Teaching that emphasizes self care is a critical component of cardiac disease management programs. Self care includes both maintaining and management. As well, **Lennie and Carter, (2008),** clarified that self care maintenance refers to exercising, maintaining normal body temperature, and taking medications. Self care management is a cognitive process that includes recognizing signs and symptoms, evaluating their importance, implementing a self care treatment strategy and evaluating its effectiveness

Similarly, **Ahmed (2008)** revealed that self efficacy scores of the patients ability to perform exercises increased significantly after cardiac rehabilitation program. It may be related to the sense of control over their illness, and to the degree to which they could deal with the daily activities according to the knowledge which they received from educational sessions.
Concerning patients' performance for measuring radial pulse, the current study revealed that a highly statistically significant improvement was detected among study group subjects post nursing pathway implementation as compared to the control ones. In agreement with this finding, **El-Hadary (2009),** demonstrated that, the study group subjects showed a higher post mean scores of practice related to measuring radial pulse throughout the study periods as compared to the control group subjects.

Regarding patient's performance related to measuring body temperature, the current study showed that the level of study group patients performance was higher than that of the control group subjects post nursing clinical pathway implementation with a statistically significant difference as compared to pre-nursing clinical pathway implementation. These finding agreed with **Mohr (2003)** and **Mohamed (2006),** findings which reported that, there was a significant difference and improvement between pre and post-program implementation only in the study group regarding measuring body temperature after the presence of no significant difference pre-program implementation. This difference in the patients performance might be related to the skills they acquired from implementation of program.

As regards performance as range -of- motion exercises to all body parts, there was a highly statistically significant difference between pre- and post- nursing clinical pathway implementation among both the study and control group subjects,with decrement in the study group subjects performance during the third month following nursing clinical pathway implementation. These findings are in accordance with **Mohamed (2006*)*** who revealed that there were highly significant differences between the study and control group subjects post program and along with follow-up period regarding their practice about neck, shoulder and elbow exercises.

In relation to patient's performance about taking medications correctly, the current study revealed a higher significant improvement among the study group subjects post nursing clinical pathway as compared to the control group subjects. In agreement with these findings, **Eaton (2003*)***, in a study entitled "Hospital patients say they are not fully informed about drugs". stated that, education and explanations to patients surrounding safe administration of their medication has been identified as an important aspect of patient care by the Joint Commission International Accreditation (JCIA).

**Patients Compliance to Therapeutic Regimen in** the current study demonstrated a higher compliance mean scores post nursing clinical pathway implementation among the study group subjects compared to control group ones, with decrement to compliance mean scores following first and third months post nursing clinical pathway implementation. This may be due to that the patients having terminated the prescribed therapeutic regimen at home, which might make them, tend to feel normally.

These findings agreed with El-**Hadary (2009*)***, who denoted significant adherence to the prescribed therapeutic regimen throughout the study periods among the study

group subjects who were exposed to nursing clinical pathway as compared to the control ones. This may be attributed to the execution of the predetermined patient and family teaching plan. The success of such plan was inspired from the underlying philosophy of compliance that is, the illness can be controlled if the patient complies with the prescribed regimen through providing the related knowledge and skills in order to perform self care.

The current study showed a higher significant compliance to diet guidelines among the study group subjects post nursing clinical pathway implementation than the control group ones. In agreement with this finding **Mohamed (2006*)*** showed that, there was a significant improvement in compliance with diet regimen of patients in the study group after implementation of the counseling program.

However, the dietary compliance scores of the study group subjects were decreased at third month post nursing clinical pathway implementation. Supporting this study finding **El-Shenawi (2000),** reported that, the experimental group patient's compliance was decreased significantly in relation to diet. This could be attributed to many factors that could intervene to affect patient's ability to follow the special diet which was prescribed, these include: likes and dislikes, new foods, economic and cultural factors.

The present study also revealed that compliance to smoking cessation was decreased after one and three months post nursing clinical pathway implementation. In agreement with this finding, **Ahmed (2008*)***, stated that, there was a fact that many smokers who have had an acute myocardial infarction stopped smoking spontaneously, but most of them started to smoke again after a period of time. These findings agreed with **EL- Shanwi (2000**), **Haider (2005), Fung (2005)**, and **Mohamed (2006).**

The findings of the current study showed that compliance to the prescribed activity was higher among the study group subjects rather than control group subjects post nursing clinical pathway implementation. Supporting to this finding, **El-Hadary (2009*)*** revealed that, adherence to the recommended activity was quite high among the study group patients, which could be attributed to the significant total and subtotal mean scores of knowledge as compared with the control group ones. This viewpoint emphasized the essential need to incorporate the patient's personal motivated goals for health when planning their activities' regimen. The success of this mutual planning was reflected in patient's behavior as well as the degree of compliance with the agreed activities regimen.

As well, **Mohamed (2006*)*** showed that, the majority of patients in the study group were complying with activity regimen during the firs three months, while this compliance decreased gradually to near half at six months and near quarter of them at one year.

The current study revealed that compliance to medication guidelines was higher among the study group subjects rather than among the control group ones post nursing clinical pathway implementation. This finding may be attributed to that patients were receiving clear detailed medication knowledge by the researchers after mapping the pharmacological plan with the cardiologist before discharge, as well as during the follow-up period. In agreement with these findings, **El-Hadary (2009*)*** revealed that

the study group subjects demonstrated a therapeutic alliance regarding to the prescribed medications post program implementation.

**Variance Analysis** of results in the current study revealed that the control group subjects had greater negative variance of patient care as compared to the study group subjects, which means that the study group subjects had more compliance to the prescribed care plan. This finding agreed with **El-Hadary (2009*)***, who reported that patients of the study group had lesser negative variance of patient care as compared to the control group ones. This might be related to the raised awareness regarding pathway which encouraged multidisciplinary critical care team members to adhere to the guidelines and standards set in the pathway.

This study finding was supported by **Khowaja (2003*)***, who showed that variance identified in care delivery in the study group was improved due to clinical pathway intervention, thus improving the core process of patient care. Furthermore, clinical pathway intervention was able to achieve the reported benefit related to outcome variances, such as multidisciplinary collaboration, increased interaction among health care teams and open communication, and significantly improved admission, nursing, physician and hospital related variances.

This finding was supported by **Fox*, Moran, and Maccormick* (2003*),*** who revealed that pathway variance is a useful way of identifying patients whose clinical trajectory is unexpected. Additionally, **Santoso, *Iau , Lim , and Koh* (2002*)***, concluded that, the implementation of clinical pathway has improved consistency in patient's treatment and the quality of patient outcome. In addition, variance analysis of the clinical pathway has shown to be valuable for problem identification to improve patient care.

## Conclusion

**Based on the study findings, one can conclude that:**

Application of the nursing clinical pathway can improve patients' knowledge, enhance their performance of self management practices such as counting pulse, measuring temperature and performing range of motion for all body parts. It also increases patient's compliance to therapeutic regimen, increases patients and their family satisfaction, reduces complications and the negative variances as well as reduces length of hospital stay.

## Recommendation

**Based on the current study findings the following are recommended**:

- Establishment of patient-education unit attached to the critical care department.
- Regular training sessions for all myocardial infarction patients to encourage them to perform disease monitoring measures.
- Provision of instructional booklet for acute myocardial infarction patients admitted to critical care department and their family members to increase health awareness and to improve the level of knowledge.
- Establishment of hotline phone contact between patients and the critical care team for rapid easy access to manage urgent conditions .
- Expansion of nursing clinical pathway model ( replication of the study on a larger probability sample selected from different geographical areas. .

- Workshops and seminars should be organized to raise awareness of health team personnel and hospital administrators about benefits of clinical pathways for their profession,

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