Effect of Implementing a Developed Clinical Pathway on the Outcomes of Acute Myocardial Infarction Patients

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Abstract

Background: *Acute Myocardial Infarction (AMI) was a prevalent and potentially fatal emergency problem that encounters critically ill patients and still a serious medical condition that occurs when there is a lack of blood flow to the myocardial muscle resulting in permanent damage or even death if not treated quickly. Critical care nurses play a crucial role in the implementation of clinical pathway which is a standard of care through recognizing the importance of early and timely management as rapid resuscitation and early PCI that associated with better outcomes.* ***Objective:*** *This is an interventional study aimed to determine the effect of implementing a developed clinical pathway on the outcomes of acute myocardial infarction patients.* ***Settings:*** *This study was conducted in the Coronary Care Unit at Alexandria Main University Hospital, Egypt.* ***Subjects:*** *A convenience sample of 60 newly admitted adult patients with AMI were included in the study. Patients were assigned into two equal groups (30 patients each).* ***Tools:*** *Acute myocardial infarction patients' assessment; Acute Myocardial Infarction Patients' State-Trait Anxiety Inventory; Satisfaction Scale for Acute Myocardial Infarction Patients; and Clinical Pathway Patients' Variance Checklist were the four tools used to collect the data of this study.* ***Results:*** *There was a statistically significant difference between the study and control groups in relation to Acute Myocardial Infarction Patients' outcomes concerning their vital signs, ability to rest, activity without significant pain, physiological & psychological factors, anxiety level, satisfaction for provided care.* ***Conclusion:*** *implementation of the clinical pathway for acute myocardial infarction patients can lead to improvement of their management and outcomes.* ***Recommendations:*** *Critical care nurses should collaborate with other health team members in the implementation of the clinical pathway for acute myocardial infarction patients of care; hospital administration should conduct educational training programs to health care*

team members about the use of the clinical pathway for acute myocardial infarction patients and its importance in improving patients' outcomes.

Keywords: Patient Outcomes, Clinical Pathway, Myocardial Infarction.

Introduction

Acute myocardial infarction (AMI) is becoming more prevalent in both developed and developing nations, and as a result, hospital stays are becoming longer, which increases the financial burden on the patients (Bashir et al., 2022). The World Health Organization (WHO) estimates that 17.9 million people die each year from CVD, accounting for 32% of all fatalities, with MI and strokes accounting for 85% of all CVD deaths globally (WHO 2023). The prevalence of AMI has increased in recent years in younger age groups, and it now accounts for most cardiac deaths worldwide with a mortality rate of 10% to 13% (Kapur et al., 2020).

In Egypt, the number of people with coronary artery disease and AMI continue to be a major health problem due to spread of cumulative trends of as hypertension, diabetes, obesity, smoking, dyslipidemia, physical inactivity, unhealthy habits, eating fast food, and stress (Elkashef et al., 2022). According to the WHO rankings, Egypt is the most populous country and has more than 15% of the cardiovascular deaths in the Middle East and North Africa where coronary heart disease constitutes the first cause of deaths among Egyptian population (WHO, 2023).

Acute myocardial infarction patients require specific standardized care in either the acute settings or recovery department which is more patient-centered and organizes the care management process. The main method of reorganizing a care process is the development and application of the clinical pathway, which may eliminate differences in care management and enhance the outcomes of AMI patients. As a result, nurses are challenged to plan and deliver care that promotes the best clinical and health outcomes by utilizing novel care methods as a clinical pathway (Ragheb, et al., 2019). The clinical pathway (CP) is also known as a care pathway, crucial pathway, integrated care pathway, or an integrated care map, is regarded as the main instrument for illness management and quality assurance.

It is a well-defined standardized model of nursing care, diagnosis, and treatment that may successfully control the rise in healthcare costs and successfully raise nursing and medical standards (Fardhana & Nurwahyuni, 2019). Acute myocardial infarction clinical pathways (AMICP) are standardized protocols for the management of AMI that were created to optimize and streamline patient care, provide detail on the care processes and potential inefficiencies for more complex medical procedures. Moreover, it can help improve appropriate use of medications and treatments, improve patient triage to the appropriate level of care, and limit the use of invasive procedures while improving quality of AMI patient care (Ragheb, et al., 2019).

Critical care nurses play a significant role in the management of AMI patients. As a result, it is crucial that nurses coordinate and implement clinical pathway strategies that are specific to AMI patients. These strategies include management courses, where the clinical pathway is frequently a useful way to give nurses practical knowledge and practice on patients' care during their hospitalization to shorten their hospital stay (Hai et al., 2019).

Aims of the Study is to:

Determine the effect of implementing a developed clinical pathway on the outcome of acute myocardial infarction patients.

Research hypotheses

Patients who are subjected to clinical pathway exhibit better outcomes than those receiving the hospital routine care.

Materials and Method

Materials

Design: A quasi experimental research design was used to conduct this study.

Setting: This study was conducted in the Coronary Care Unit (CCU) at Alexandria Main University Hospital. The bed capacity of this CCU is fourteen beds.

Subjects: A convenience sample of 60 newly admitted adult patients with AMI (aged 18- 60 years old of both genders.) were included in this study. Patients were assigned into two equal groups (30 patients each); **group A** (control group) was subjected to the unit routine care, while **group B** (study group) was subjected to the clinical pathway of care. EP Info program applying the following parameters: population size of 150 newly admitted patients for three months, expected frequency = 50%, acceptable error = 10% and confidence coefficient = 95%.

Tool:

Four tools were used to collect the data of this study.

Tool One: Acute myocardial infarction patients' assessment:

This tool was developed by the researcher based on a thorough literature review (Hamato, 2015; Mohammed, 2014; Novobílský et al., 2015; Sambu, 2018). It was used to assess the physiological condition of the patient daily from the day of admission till transfer to the ward or till hospital discharge. This tool consists of three parts:

Part I: Socio-demographic data.

Part II: Admission data and GRACE Score.

Part III: Ongoing clinical parameters: this part was used to assess the following: vital signs, complications, criteria for discharge from CCU, hospital readmission within 30 days of discharge and pain assessment.

Tool Two: Acute Myocardial Infarction Patients' State-Trait Anxiety Inventory:

This tool was adopted from Spielberger et al. (1990) It was translated and standardized for Egyptians by Abdel-Khalek (1992). It was used to assess anxiety using the State-Trait Anxiety Inventory (STAI). The STAI was an administered analysis of reported anxiety symptoms. This inventory measures two dimensions of anxiety; as a state; and as a trait. Each dimension of the inventory consists of 20 items regarding the patient's anxiety feelings on a 4-point Likert scale ranging from 1 strongly agree to 4 strongly disagree. Some of the questions related to the absence of anxiety were reversed-scored. Only the state anxiety section of this scale was used in this study. The total score value ranges from 20 to 80, whereas the higher the score, the higher the patient's anxiety level.

Tool Three: Satisfaction Scale for Acute Myocardial Infarction Patients:

The researcher adapted this tool from Shalaby et al., (2010) to assess the myocardial infarction patients' satisfaction with the care process during their hospital stay. It was categorized under four parameters including physiological, psychological, care provider teams, and overall satisfaction. Whereas, physiological encompassed hospital environment (7 items), privacy (4 items), diet (4 items), sleep (3 items); and psychological included safety (10 items), respect (9 items), socialization (5 items); while care provider teams encompassed nursing, medical, auxiliary teams, and hospital administration (18 items); and finally overall satisfaction comprised (6 items). All these items were rated on a 3-point Likert scale (1 for dissatisfied, 2 for neutral, and 3 for satisfied). The total score value ranges from 66 to 198, whereas the higher the score, the higher the patient's satisfaction level., its reliability using Chronbach's alpha was 0.932.

Tool Four: Clinical Pathway Patients' Variance Checklist:

This tool is an observational checklist that was developed by the researcher based on a thorough literature review (Ahmed et al. 2017; El-Baz, 2009; Mohammed, 2014; Ponte et al., 2014; Shalaby et al., 2010; Wang et al., 2012) to elicit the variation from the following aspects: assessment/monitoring, lab investigation, diagnostic procedures, pain management, medications, treatment/intervention, nutrition, mobility, elimination, and education /discharge

plan. It allows any deviations from the previously mentioned aspects to be documented and analyzed.

Method

Approval of the ethics committee of the faculty of nursing was obtained. An official approval to conduct this study was obtained from hospital administration after providing explanation of the aim of the study. The study tools were tested for content validity by 7 experts in the field of the study. The necessary modifications were done accordingly. A pilot study was carried out on 10% of the study sample to test the clarity and applicability of the research tools. Data collection took approximately six months from July 2021to December 2021.

Data were collected from group "A" (control group) first then from group "B" (study group) to avoid the double Hawthorne effect. The control group received routine hospital care as physician orders, while the intervention group was subjected to the established clinical pathway. The study was conducted in four phases:

Phase I: Patients' Assessment in which patients who met the inclusion criteria were assigned to two groups the control and intervention group (thirty patients each); group "A" the control group who received the hospital routine care, and group "B" the intervention group who received the developed clinical pathway after completing data collection from the control group. Whereas the initial assessment of every patient either in the control or intervention group was recorded using tool one.

Phase II: was developing the clinical pathway in which a committee was formulated consisting of clinical and academic experts, including: the head nurse of the coronary care unit, the senior coronary care intensivist, and a cardiologist, nursing staff with experience of more than 5 years in CCUs, dietitian, an ECHO cardiographer, and the researcher as a team coordinator. Then the developed pathway was encompassed by the following aspects: assessment/ monitoring, lab investigation, diagnostic procedures, pain management, medications, treatment/ intervention, nutrition, mobility, elimination, and education /discharge. It was revised and evaluated by experts in the field of specialty to test the content validity, then reliability was done statistically.

Phase III: was implementing the pathway in which the established pathway was implemented on the intervention group by the researcher from admission to patient's discharge following the clinical pathway aspects. During this phase, variances affecting the adherence to the developed pathway were monitored, analyzed, and recorded using tool four.

Phase IV: (Clinical Outcomes) was evaluating the outcomes of the used clinical pathway in which the researcher compared the health outcomes among both groups using tool one, two, and three for the following: pain, patient's satisfaction, anxiety level, achieving criteria for discharge, length of stay, hospital readmission.

Ethical Considerations:

Written informed consent was obtained from the patients after explaining the aim of the study. Patients' privacy was maintained during the implementation of the study. Confidentiality of the collected data was ascertained. The right to refuse to participate in the study was emphasized to the patients as well as the right to withdraw from the study at any time.

Results

Table 1 represents the distribution of the studied groups according to demographic characteristics and risk behaviors. In relation to gender, this table shows that female patients represent more than half (53.3%) of the study group while, male and female patients have equal presentations (50.0%) in the control group. Regarding age, it can be noticed that; the highest percentage in the study group (40.0%) were between 50 ≤60 years while, the highest percentage in the control group (36.7%) were between 40 < 50 years. Concerning occupation; it was found that, the highest percentage of both studied groups were housewives; precenting 43.3% of the study group and 46.7% of the control group. Regarding body mass index (BMI), overweight and obesity have equal presentation (46.7%) in the study group. While 40.0% and 33.3% respectively, of the control group were overweight and obese. In relation to smoking habits, 30.0% and 36.7%

of the study and control group, respectively, were smokers. On the other hand, 56.7% of each group reported that they had never smoked before. No statistically significant differences were observed between the two groups as regards demographic characteristics.

Table 2 illustrates comparison between the studied groups in relation to clinical assessment of vital signs. This table shows that there were statistically significant differences between the two groups in relation to improvement of their body temperature, pulse, and respiration in the third day of the study (P= 0.002, 0.004, and <0.00), respectively.

Table 3 shows comparison between the studied groups according to pain intensity using numerical rating scale and use of analgesics. It can be noted that the majority of patients 80%, 83% in the study and control group respectively were complaining from severe pain in the 1st day of the study with no significant differences between the studied groups. Also, this percentage decreased to 10% and 6.7% on the 2nd day and 3rd day respectively in the study group. While in the control group more than half 53.3% of the patients complained of severe pain on the 2nd and 3rd day of the study. Moreover, it can be noticed that there was a significant difference between among the studied groups on the 2nd and 3rd day of the study p=0.001. Furthermore, as regard the use of analgesic medication, statistically significant differences were detected between the two groups in relation to analgesic intake on the third day, where P value was 0.002. Where, the majority (93.3%) of study patient group reported analgesic intake at 1st and 2nd day of the study, which was decreased at the 3rd day to be reported by only 6.7% of the study group.

Table 4 shows comparison between the studied groups according to discharge criteria for AMI patients. In relation to hemodynamic and rhythmic stability in 1st day of assessment, it can be noted that 80% of the study group and 56.7% of the control group were hemodynamically stable, with no significant differences detected between the two groups. Concerning, 2nd day of assessment, significant improvement in all discharge criteria can be identified among the study group as compared with the control group where p=<0. 001.In relation to, 3rd day of assessment, highly statistically significant improvement can be observed among the study group as compared with the control group in all discharge criteria P=<0.001.

Table 5 represents comparison between the studied groups according to length of hospital stay and readmission within 30 days: It can be noted from this table that about 50% of the study group and 60% of the control group spent 3 days in the hospital, with no significant difference between the two groups regarding the length of stay. It can be noted from the same table that, the majority of the study and control 93.3%, 90% respectively had not been readmitted to the hospital within 30 days of discharge. With no statistically significant difference between the studied groups.

Table 6 represents comparison between the studied patients according to their anxiety state inventory. Regarding state -trait anxiety inventory, it can be noted that the mean score of ASI was 70.50 ± 3.27 in the study group before application of AMI clinical pathway compared with 68.83 ± 5.15 in the control group. With no significant difference between the studied groups p= 0.140. While after application of AMICP, the mean score of ASI decreased to 40.87 ± 6.16 in the study group, while the mean score of ASI nearly did not change 68.0 ± 5.43 in the control group. With a significant differences p= 0.001.

Discussion

Since, the care of AMI patients is complex and poses a challenge to all health teams with the goal of reducing the length of stay (LOS), improving the treatment efficiency, and improving patients' satisfaction, CPs can effectively resolve patients' clinical symptoms and improve their quality of life. So, clinical care pathways protocols and guidelines can offer the best way to assure coordination, efficiency, quality, and safety during the

care of patients (American Nurses Association., 2020).

The current study has identified several sociodemographic determinants of AMI. The present study shows that most of the studied patients were females more than forty years old, housewives and, obese. This may be attributed to the risk being higher in women and the incidence of AMI is increasing and occurring earlier in life where the risk of AMI increases with age and is highest among women over 55 may be related to the effects of decreased estrogen where it plays a protective mechanism against the development of atherosclerosis. Also, the tendency of housewives and employees especially in office work activities to be less physically active, they tend to have a more sedentary life, weight gain.

Additionally, obese patients tend to have higher levels of blood pressure, cholesterol, and blood sugar, all of which are associated with an increased risk of AMI. Obesity can also cause inflammation, which can weaken the heart and predispose it to an increased risk of AMI. Finally, being overweight increases one's risk of developing diabetes, which is another risk factor for AMI.

These findings are incongruent with Fan, & Zhang. (2021) who, reported in their study that female patient represented the highest percentage of studied patients in both the study and control group. As similar to, Mirza, Abdulsalam, and Khdhirc, (2018) reported that; most of their study patients were obese or overweight and concluded that acute coronary syndrome in young adults is an increasing health problem where obesity was found to be the most prevalent risk factor. Along the same line, those studies by Cocchio et al. (2019) and Lei & Bin. (2019) showed that risky behaviors and poor health habits can induce the occurrence of AMI among females.

Contradicting the result of the current study, the findings of Kim et al. (2019) reported that, the prevalence of myocardial infarction was greater in males than females while, the prevalence was higher in older females than in males in those patients with chronic diseases as diabetes, hypertension, and dyslipidemia.

The results of the current study revealed that clinical data can also be used to identify determinants of AMI where the past medical history of hypertension, diabetes, previous hospitalization with AMI, and positive family history are prevalent among the highest percentage of studied groups, and all are associated with an increased risk of AMI. Additionally, laboratory data such as high levels of cholesterol, blood glucose level, and coagulation profile can be a marker for an increased risk of AMI. Finally, data from scans such as echocardiograms can be used to diagnose AMI and to identify associated risk factors.

This may be attributed to the fact that both systolic and diastolic hypertension and diabetes are major risk factors for causing atherosclerosis in coronary blood vessels, resulting in a heart attack or MI. They share several risk factors in common with coronary artery diseases.

These findings were consistent with Greulich et al. (2019), concluded that acute ST-elevation myocardial infarction (STEMI) is a common acute and critical disease that requires rapid treatment within a limited window of time. Previous findings by Cao et al. (2022) indicated that hypertension, diabetes, coronary artery disease cerebral infarction, and hyperlipidemia were reported in the past medical history of the studied patients.

This finding was also, supported by Prabhakaran, and Jeemon. (2012) who indicated that a family history of myocardial infarction is an independent risk factor for AMI. Concerning vital signs, the mean values of body temperature, pulse, and respiration decreased significantly among AMI patients in the study group after the application of the AMI clinical pathway compared with AMI patients in the control group. It may be attributed to the organized approach to monitoring and responding to changes in a patient's condition and ensuring

that patients receive consistent, quality care throughout their hospital stay which can have an immensely positive impact on the improvement of vital signs. Through regular assessments, critical pathways enable critical care nurses to identify risks and intervene quickly thus leading to better patient outcomes.

In the same context Zhang et al. (2022) study. Who found that implementing a clinical pathway for AMI patients improved their vital signs compared to patients who did not receive the pathway. Specifically, the systolic and diastolic blood pressure, heart rate, and respiratory rate of patients receiving the pathway were significantly lower than those not receiving the pathway.

Another study conducted by Zhao et al. (2018), who assessed the effect of application of emergency nursing clinical pathway on the rescue effect of patients with AMI. They found that the emergency clinical pathway improved AMI temperature, pulse, respiration, blood pressure significantly improved than those through routine nursing methods.

On the other hand, Mahler et al. (2018) who revealed that the implementation of a clinical pathway for AMI patients did not influence their vital signs while comparing the vital signs of AMI patients receiving the clinical pathway versus those not receiving it and found no significant differences in the systolic and diastolic blood pressure, heart rate, and respiratory rate.

The results of the current study revealed significant improvement in pain in the study group compared with the control group in relation to the mean score of numerical pain rating scale (NRS) and use of analgesics. This can be due to the effect of patient education and self-management strategies are often included in CP, also use of pharmacological pain relief methods which can provide patients with the knowledge and tools to better manage their pain. These findings come in congruent with Sharp et al. (2019) who reported, that implementation of a heart care pathway as a standard risk stratification tool in the evaluation of AMI patients decrease symptoms of chest pain result in less inpatient care and non-invasive cardiac testing without impacting patient safety. Additionally, Mahler et al. (2018) concluded that; the implementation of the heart pathway was associated with decreased NRS significantly in the study group compared with the control group.

According to the criteria for discharge, the current study results revealed a significant improvement among the study group as compared with the control group in relation to the criteria of discharge. Where critical care nurses can quickly and accurately assess a patient's risk for complications and direct them to appropriate follow-up care and treatments, which lead to improvement in discharge criteria, faster hospital discharges, and improved patient outcomes, as well as a reduction in healthcare costs.

This comes in line with Daghash, Lim Abdullah, & Ismail. (2020) concluded that implementing acute coronary syndrome care pathways helps to organize care processes and decrease treatment delays as well as improve the patient outcomes and discharge criteria without adverse consequences for patients or additional resources and costs.

In relation to the length of hospital stay, the current study finding documented a shorter hospital stay period among the highest percentage of study group subjects, as well as the control ones with no statistically significant differences between the two studied groups in relation to the length of hospital stay. This could be attributed to decrease the recurrent of angina symptoms and nonfatal MI rates were found after implementation of CP among study group.

Similar findings were documented by, Siswanto, & Chalidyanto. (2020). Indicated that CP has no impact in reducing the length of hospital stay. Additionally, Menurunkan, & Inap. (2020) concluded in their study to assess the effect of CP compliance in reducing the length of hospital stay that; compliance with the clinical pathway did not have any correlation with the length of stay.

These findings also come in contrast with Bashir et al. (2022. They found that the

mean length of hospital stay reduced significantly in the intervention group compared to the control group.

As regards readmission within 30 days; there was no statistically significant differences between both groups. In this context Aziz et al. (2012) who assessed the recurrent angina symptoms and nonfatal MI rates and found a significant decrease in both. However, in terms of the readmission rate, there was no significant reduction. In relation to AMI Patients' State-Trait Anxiety Inventory; the findings of the present study depicted that the mean scores of STAI decreased significantly in the study group after the application of the AMI clinical pathway compared with the control group. This can be attributed to providing clear and well-defined strategies and psychological care and support information for treatment that are tailored to the individual patient. Offering a structured approach to treatment helps to reduce uncertainty and provide patients with a greater sense of control by having a better understanding of their condition, they can be better informed and better able to make informed decisions about their health. Also, the reduction in the amount of time spent waiting for tests and treatments, which can help to reduce patient anxiety.

The results of the current study come in line with Baghaei, Parizad, Sharifi, & Alinejad. (2021) randomized controlled trial. They evaluated the effect of continuous nursing care programs on anxiety levels, and episodes of chest pain after AMI; the results revealed a significant reduction in the mean scores of traits and state anxiety after discharge in the intervention group compared with the control group.

Additionally, Mohamed, et al. (2018) study that evaluated the effect of modified clinical pathway guidelines on congestive heart failure patient's satisfaction at the coronary care unit. They found that there was a significant decrease in the anxiety level in the study group compared with the control group on discharge.

Conclusion

The use of the clinical pathway as the implementation of acute myocardial infarction patients is associated with significant improvement in patient outcomes. The clinical pathway for acute myocardial infarction rather than routine hospital care. This clinical pathway is useful in facilitating rapid implementation, identification, and timely treatment of those patients which may have a positive impact on patient outcomes.

Recommendations

- Based on the findings of the current study, it can be recommended that:
- Apply the clinical pathway for acute myocardial infarction rather than the routine hospital care.
- Organize training workshops and courses for nurses about implementation of clinical pathway.
- Assess barriers for implementation of the clinical pathway for acute myocardial infarction in intensive care units in future studies.
- Implement quality improvement strategies to enhance appropriate use of risk assessment scales of acute myocardial infarction patients.

Table 1: Distribution of the studied groups according to demographic and risk behaviors characteristics:

Demographic &Risk behaviors	Intervention group (n = 30)		Control group (n = 30)		χ^2	p
	No.	%	No.	%		
Gender						
Male	14	46.7	15	50.0	0.067	0.796
Female	16	53.3	15	50.0		
Age						
21 < 30 years	5	16.7	4	13.3	1.584	MCp= 0.718
30 < 40 years	2	6.7	5	16.7		
40 < 50 years	11	36.7	11	36.7		
50 ≤60 years	12	40.0	10	33.3		
Occupation						
Manual	4	13.3	0	0.0	4.249	MCp= 0.234
Employee	9	30.0	12	40.0		
Housewife	13	43.3	14	46.7		
Not working	4	13.3	4	13.3		
Residence area						
Urban	14	46.7	13	43.3	0.067	0.795
Rural	16	53.3	17	56.7		
Marital status						
Single	7	23.3	8	26.7	0.158	0.924
Married	17	56.7	17	56.7		
Widowed	6	20.0	5	16.7		
Level of education						
Illiterate	7	23.3	4	13.3	8.756	MCp= 0.107
Read and write	0	0.0	2	6.7		
Primary	3	10.0	7	23.3		
Preparatory	4	13.3	1	3.3		
Secondary	12	40.0	7	23.3		
University and above	4	13.3	9	30.0		
BMI						
Normal weight (18.50-24.99)	2	6.7	8	26.7	4.421	0.110
Overweight (25-29.99)	14	46.7	12	40.0		
Obese (30 or more)	14	46.7	10	33.3		
Smoking habits						
Current smoker	9	30.0	11	36.7	0.880	MCp= 0.699
Ex-smoker	4	13.3	2	6.7		
Never	17	56.7	17	56.7		

χ^2: **Chi square test**; MC: **Monte Carlo**; p value for comparing between the studied groups.

Table 2: Comparison between the studied groups in relation to clinical assessment of vital signs:

Clinical assessment (Vital Signs)	Intervention group (n = 30)	Control group (n = 30)	t	p
	Mean ± SD	Mean ± SD		
Temp				
Day 1	37.50 ± 0.18	37.39 ± 0.23	1.985	0.052
2nd day	37.33 ± 0.22	37.44 ± 0.23	1.817	0.074
3rd day	37.23 ± 0.16	37.39 ± 0.22	3.234*	0.002*
Pulse				
Day 1	93.87 ± 3.27	93.73 ± 3.27	0.158	0.875
2nd day	93.07 ± 3.44	92.40 ± 3.41	0.753	0.454
3rd day	90.17 ± 3.91	93.27 ± 4.13	2.985*	0.004*
Respiration				
Day 1	24.10 ± 3.17	23.60 ± 3.55	0.576	0.567
2nd day	24.43 ± 2.75	23.23 ± 3.28	1.536	0.130
3rd day	22.37 ± 3.17	25.57 ± 3.14	3.932*	<0.001*
Blood pressure				
Systolic				
Day 1	119.73 ± 6.05	121.23 ± 5.92	0.971	0.335
2nd day	118.57 ± 6.46	119.93 ± 6.70	0.804	0.425
3rd day	120.17 ± 6.26	120.30 ± 5.21	0.090	0.929
Diastolic				
Day 1	80.57 ± 5.06	80.53 ± 6.29	0.023	0.982
2nd day	80.87 ± 5.22	81.57 ± 4.81	0.540	0.591
3rd day	78.80 ± 5.65	80.60 ± 6.71	1.124	0.266

t: **Student t-test; ***: Statistically significant at $p \leq 0.05$

Table 3: Comparison between studied groups according to the pain intensity using numerical rating scale and the use of analgesics.

Pain Assessment		Intervention group (n = 30)		Control group (n = 30)		χ^2	p
		No.	%	No.	%		
Pain intensity (NRS)	**Day 1**						
	Mild pain	1	3.3	1	3.3	0.419	MCp= 1.000
	Moderate pain	5	16.7	4	13.3		
	Severe pain	24	80.0	25	83.3		
	2nd day						
	Mild pain	1	3.3	1	3.3	13.739*	MCp <0.001*
	Moderate pain	26	86.7	13	43.3		
	Severe pain	3	10.0	16	53.3		
	Worst pain	0	0.0	0	0.0		
	3rd day						
	Mild pain	23	76.7	5	16.7	23.603*	MCp <0.001*
	Moderate pain	5	16.7	9	30.0		
	Severe pain	2	6.7	16	53.3		
Analgesics	**Day 1**					0.741	FEp= 0.671
	Yes	28	93.3	26	86.7		
	2nd day					0.741	FEp= 0.671
	Yes	28	93.3	26	86.7		
	3rd day					9.317*	0.002*
	Yes	2	6.7	12	40.0		

χ^2: **Chi square test**; MC: **Monte Carlo**; FE**: Fisher Exact**; * Statistically significant at $p \leq 0.05$

Table 4: Comparison between studied groups according to the discharge criteria.

Criteria for discharge	Intervention group (n = 30)		Control group (n = 30)		χ2	p
	No.	%	No.	%		
Day 1						
Able to rest without pain	1	3.3	1	3.3	0.000	^{FE}p=1.000
Perform activities of daily living	1	3.3	1	3.3	0.000	^{FE}p=1.000
No evidence of complications	6	20.0	6	20.0	0.000	1.000
No symptoms of residual ischemia	1	3.3	1	3.3	0.000	^{FE}p=1.000
Hemodynamic stability	7	23.3	9	30.0	0.341	0.559
2nd day						
Able to rest without pain	25	83.3	1	3.3	39.095*	<0.001*
Perform activities of daily living	27	90.0	1	3.3	45.268*	<0.001*
No evidence of complications	29	96.7	10	33.3	26.447*	<0.001*
No symptoms of residual ischemia	25	83.3	1	3.3	39.095*	<0.001*
Hemodynamic stability	24	80.0	17	56.7	3.774	0.052
3rd day						
Able to rest without pain	30	100.0	1	3.3	56.129*	<0.001*
Perform activities of daily living	30	100.0	1	3.3	56.129*	<0.001*
No evidence of complications	30	100.0	10	33.3	30.000*	<0.001*
No symptoms of residual ischemia	25	83.3	1	3.3	39.095*	<0.001*
Hemodynamic stability	30	100.0	17	56.7	16.596*	<0.001*

χ^2: **Chi square test**; FE**: Fisher Exact**; *Statistically significant at $p \leq 0.05$

Table 5: Comparison between studied groups according to the length of hospital stay and readmission within 30 days:

Criteria	Intervention group (n = 30)		Control group (n = 30)		χ^2	p
	No.	%	No.	%		
Length of stay in hospital						
3	15	50.0	18	60.0		
4	8	26.7	6	20.0	1.348	^{MC}p= 0.739
5	5	16.7	3	10.0		
6	2	6.7	3	10.0		
Readmission within 30 days of discharge						
Yes	2	6.7	3	10	0.218	^{MC}p= 1.000

χ^2: **Chi square test;** MC: **Monte Carlo**; *Statistically significant at $p \leq 0.05$

Table 6: comparison between studied groups according to their anxiety state inventory.

Anxiety state inventory	Intervention group (n = 30)	Control group (n = 30)	t	p
	Mean ± SD	Mean ± SD		
Before application of AMICP Total score	70.50 ± 3.27	68.83 ± 5.15	1.496	0.140
After application of AMICP % Score	34.78 ± 10.26	80.0 ± 9.04	18.108*	<0.001*
t_1 (p_1)	**23.436*(<0.001*)**	**1.495 (0.146)**		

t: **Student t-test**; t_1**: Paired t-test**; p: p value for comparing between the studied groups.
p: p_1 value for comparing between **before** and **after** in each group; * Statistically significant at $p \leq 0.05$.

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