Original Article
doi:10.31674/mjn.2025.v17i01.022

MJN

Effect of Implementing Nursing Guidelines on Improving Local Vascular Outcomes among Patients Undergoing Primary Percutaneous Coronary Intervention

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ABSTRACT

Background: Complications associated with cardiac catheterisation, such as vascular complications, which include haematoma and ecchymosis, are the most frequent and can worsen patient outcomes while exposing patients to longer hospital stays and increased hospital expenses. Nurses can predict complications and reduce the possibility of their occurrence. **Objectives:** To evaluate the effect of implementing nursing guidelines on improving local vascular outcomes among patients undergoing primary percutaneous coronary intervention. Methods: The study was carried out at a coronary care unit at Heart Hospital of Assiut University, Egypt, using a quasi-experimental research design. A purposive sampling of 150 patients was used. Three tools were utilised to collect data - patient assessment tool, predictive Vascular Complications Risk (VASCOR) score assessment and patients' outcomes tool. **Results:** The outcomes revealed that study populations were at high risk (78.7% and 73.3%) for developing vascular complications. The difference between study populations was statistically significant for haematoma (p=0.014), insertion site pain (p=0.001) and bleeding (p=0.016) after application of a cold compress. Regarding discharge criteria, the difference between study populations was statistically significant (P value 0.005). Length of stay at CCU was statistically significant (P value 0.001), shorter in the intervention group. **Conclusion:** The study confirmed that patients' outcomes can improve through early prediction of complications, and nursing guidelines were effective in improving patients' outcomes.

Keywords: Primary Percutaneous Coronary Intervention; Nursing Guidelines; Vascular Outcomes

INTRODUCTION

The mainstay of treatment for patients with ST Elevation Myocardial Infarctions (STEMI) is now Primary Percutaneous Coronary Intervention (PPCI). PPCI has demonstrated notable decreases in morbidity, mortality, and the risk of mechanical and arrhythmic consequences in comparison to fibrinolysis (Shakhgeldyan *et al*., 2024). Percutaneous coronary intervention (PCI) is a diagnostic process that can identify the presence of stenosis or occlusion in the coronary; furthermore, it enables the performance of coronary angioplasty, a therapeutic intervention that aims to expand restricted coronary arteries (Sari, 2024).

Vascular complications associated with cardiac catheterisation are minor and major. Stable haemorrhage, ecchymosis, and mild bleeding are examples of minor complications; massive haemorrhage requiring transfusion, retroperitoneal haemorrhage, embolism, thrombosis, vascular rupture, or perforation are major complications (Gupta *et al*., 2021). Compared to other diagnostic cardiac catheterisations, PCI complications are more common (Sokhanvar *et al*., 2023). Patient's clinical assessment by nurses is essential for identifying potential complications. Patient safety may be enhanced with early intervention in order to minimise complications if at-risk patients are detected (Romero *et al*., 2019).

The VASCOR risk score was developed to estimate the risk of vascular complications for patients

Received: March 20, 2025 Received in revised form: May 26, 2025 Accepted: June 10, 2025

undergoing interventional cardiology procedures. The VASCOR score might be an essential instrument enabling an appropriate clinical evaluation of patients at admission, with the aim of early identification of associated risks and the implementation of safety measures to limit the potential for complications (Paganin *et al.*, 2017). Studies demonstrate that radial artery haematoma is one of the most common complications associated with the transradial procedure (Khan *et al*., 2025). The incidence of vascular complications can be decreased more effectively when nurses utilise cold compresses. Reducing vascular complications, such as haematomas, may lead to shorter hospital stays and lower medical expenses for patients (Asy'ary *et al*., 2024).

Research Objectives

The primary objective is to evaluate the effect of implementing nursing guidelines on improving local vascular outcomes among patients undergoing primary percutaneous coronary intervention. Secondary objectives are to evaluate the accuracy of the VASCOR score in predicting the occurrence of vascular complications post-PPCI, and to evaluate the effect of using cold compresses in preventing vascular complications.

Research Hypothesis

H1: - There would be early detection of vascular complications post PPCI by using the VASCOR risk score.

H2: - The intervention group who received nursing guidelines had decreased intensity of vascular complications post PPCI than the control group.

H3: - There would be significant improvement in patients' outcomes post PPCI by implementing nursing guidelines.

METHODOLOGY

Setting

A quasi-experimental method was implemented to conduct this study. The study was conducted at the Coronary Care Unit, Heart Hospital, Assiut University, Egypt. A purposive sample of 150 patients was used in accordance with the inclusion criteria. The sample size was calculated using G*Power 3.1.9.2, a statistical program. The 95% confidence interval has 80% study power. Based on the aforementioned criteria, a sample size of 126 critically ill patients was computed by using the results of the study by Korkmaz and Karagözoğlu (2022). To overcome the drop factors, the sample size increased to 150 patients. Those patients were divided into two groups (control and intervention groups).

Randomisation Procedure

The participating patients were randomised in a 1:1 ratio to either group using a basic method of simple randomisation: flipping a coin. With two groups (control versus intervention), the side of the coin (i.e., heads—control, tails—intervention) determined the assignment of each patient.

Inclusion Criteria

The study included adult patients over 18 years of both sexes who were recently admitted to the Coronary Care Unit (CCU) with ST-Elevation Myocardial Infarction (STEMI) and treated with Primary Percutaneous Coronary Intervention (PPCI).

Exclusion Criteria

Patients were excluded from the study if they had received thrombolytic therapy, had a previously known coagulation disorder, or presented with haemorrhage or haematoma at the insertion site prior to catheter withdrawal. These criteria were set to ensure patient safety and maintain the integrity of outcome assessments.

Study Tools

Three tools were used to collect data. Tool I, the Patient Assessment Tool, was developed by the researcher to gather sociodemographic data (age, gender) and risk factors (hypertension, diabetes, insertion route, and obesity). Tool II, the VASCOR Risk Score Assessment Tool (adopted from Paganin *et al.*, 2017; used by Romero *et al.*, 2019), was designed to predict vascular complications in PPCI patients. It included six items

totalling 13.5 points, with a score ≥3 indicating high risk. Tool III, the Patients' Outcomes Tool (adopted from Manda & Baradhi, 2018), assessed post-PPCI complications, CCU stay duration, and discharge status.

The study followed three phases: preparatory, implementation, and evaluation. During the preparatory phase, necessary approvals were obtained from hospital authorities and the faculty of nursing. A pilot study with 15 patients (10%) tested tool feasibility, requiring no modifications. Content validity was confirmed by five experts in critical care and emergency nursing, establishing the Content Validity Index (CVI).

Reliability

Reliability of the developed tools was determined through using the Cronbach alpha reliability test: for tool I, $r = 0.735$ and tool III $r = 0.741$. Reliability of the developed nursing guidelines was determined through using the Cronbach alpha reliability test: for the developed nursing guidelines $r = 0.781$

Ethical Consideration

This study received ethical approval from the Faculty of Nursing Research Ethics Committee, Assiut University, Egypt with reference number 1120220523 on 15th December, 2022.

Implementation Phase

Study Group Allocation and Initial Assessment

The study involved 150 patients who were equally divided into two groups: a control group and an intervention group. Upon admission to the Coronary Care Unit (CCU) following PPCI, patients were assessed for sociodemographic characteristics and risk factors using Tool I. Subsequently, the VASCOR Risk Score was evaluated using Tool II to predict the likelihood of vascular complications.

Intervention and Control Procedures

The control group received routine post-PPCI care as ordered by the resident physician. In contrast, the intervention group received specific nursing guidelines that included immediate safety measures for all patients. Additionally, high-risk patients (VASCOR score ≥3) in the intervention group received cold compress applications as part of the intervention protocol.

Team Roles and Implementation

The research team consisted of the lead researcher and five trained staff nurses. With permission from the chief physician and under the supervision of a resident physician, the researcher administered safety measures, removed sheaths, and applied cold compresses during the morning shift. The five staff nurses monitored and documented patient complications during hospital stays—two on the afternoon shift and three on the night shift—by recording observations in patient charts.

Training and Quality Assurance

To reduce observer bias and ensure data reliability, all research assistants underwent extensive training before the study commenced. The training included three sessions focused on study protocols, intervention guidelines, and outcome assessment tools. The researcher also conducted regular site visits to supervise data collection, ensure adherence to procedures, and validate the quality of the data collected.

Outcome Assessment and Study Timeline

Patient outcomes were assessed at three time points: admission, the first day, and at discharge using Tool III. Outcomes included the occurrence of complications and discharge criteria. Data collection occurred over six months, from August 2023 to January 2024, involving 150 patients admitted with STEMI and treated with PPCI at the CCU.

Nursing Guidelines

Post-PPCI Procedural Care

Post-procedural care following percutaneous coronary intervention (PPCI) focuses on ensuring patient

stability and preventing complications. The patient is placed in a supine position with the affected leg kept straight and the head of the bed elevated no more than 30 degrees. Continuous ECG monitoring is used to assess cardiac activity, and the patient is observed for contrast hypersensitivity and other warning signs. Vital signs, oxygen saturation, and peripheral pulses are monitored every 2 hours for the first 6 hours, then less frequently. The puncture site is regularly checked for bleeding, haematoma, skin colour changes, and pain consistency. Patients are encouraged to drink fluids within the first 12 hours post-procedure. If the antecubital vessels were accessed, the arm is immobilised. Manual pressure is applied upon catheter removal, and any bleeding at the site requires pressure until it stops.

Femoral Puncture Site Care

For femoral access, care is guided by the protocol from Korkmaz & Karagözoğlu (2022). After catheter removal, the researcher applied manual pressure for 15 minutes. The process includes checking the pulse at the site and applying firm pressure using three fingers positioned proximally along the artery. Initially, pressure is applied intensely to obliterate the distal pulse for 3–5 minutes, followed by a gradual reduction in pressure while maintaining hemostasis. The pressure is sustained for a total of 15 minutes while the healthcare provider stands parallel to the puncture site.

Radial Puncture Site Care

Radial site care, based on guidelines from Shahid *et al*. (2020) and Korkmaz & Karagözoğlu (2022), begins with placing an oxygen saturation probe on the accessed hand to assess patent hemostasis. Deflation of the compression device begins at 45–60 minutes, removing 3–5 mL of air every 10–15 minutes. If bleeding occurs, air is reinflated to restore hemostasis. Once the device is fully deflated, the radial pulse and site are checked for bleeding. A cold compress (15–18°C) is applied for 15 minutes without direct skin contact, followed by a sterile pad for four hours. After this period, the site is examined for haematoma, bleeding, ecchymosis, and pain, and the patient is gradually mobilised. The site is re-evaluated on the first day and again at discharge.

Evaluation Phase

All patients post-PPCI are evaluated at admission, on the first day, and at discharge for the occurrence of complications (haematoma, bleeding, painful catheter insertion site, ecchymosis, oozing in the insertion site, and retroperitoneal hematoma), discharge criteria (discharge to home, referral to the department, and death), and length of stay at CCU.

Statistical Analysis

IBM SPSS 28.0 software was used for all of the analysis. The chi-square test was performed to compare categorical data, and the results are shown as frequencies, percentages, mean ± SD, and median. The examination of the Receiver Operating Curve (ROC) was performed. Calculations were made to determine the Area Under the Curve (AUC) and its 95% Confidence Interval (CI). Calculations were made to determine the specificity, sensitivity, Negative Predictive Value (NPV), Positive Predictive Value (PPV), and their 95% Confidence Interval (CI). A p-value of less than 0.05 was deemed significant.

RESULTS

After studying 150 patients with myocardial infarction post-PPCI. The mean age in the intervention and control groups, according to the current study, was 57.87 ± 7.64 and 55.63 ± 8.79, respectively. In terms of gender, a significant proportion of patients in the intervention and control groups were male (80.0% and 73.3%, respectively) (Table 1).

Table 1: Percent Distribution of Intervention and Control Groups Sociodemographic Data

Socio-Demographics Data	Intervention Group (n= 75)		Control Group (n= 75)		*P*-value
	No	%	No	%	
Gender					
Male	60	80.0%	55	73.3%	0.334
Female	15	20%	20	26.7%	
Mean ± SD	57.87 ± 7.64		55.63 ± 8.79		0.098

Data expressed as mean (SD), frequency (percentage)

Illustration of Vascular Complications Risk Score (VASCOR) score elements, which include six items totalling 13.5 points: >6F introducer sheath (4.0 points), PCI procedure (2.5 points), prior interventional cardiology procedure (2.0 points), anticoagulant therapy with warfarin (Marevan) or phenprocoumon (Marcoumar) (2.0 points), female sex (1.5 points), and age ≥ 60 years (1.5 points) (Table 2).

Table 2: Risk Score for Prediction of Vascular Complications (VASCOR) Risk Score

Characteristics	Weight Points
>6 French introducer sheath	4
Percutaneous coronary intervention procedure	2.5
History of vascular complication after prior interventional cardiology procedure	2
Prior use of Warfarin (Marevan) or *phenprocoumon (Marcoumar)* anticoagulant	2
Female sex	1.5
Age ≥ 60 years	1.5

Table 3 shows risk factors of the intervention and control groups. As regards hypertension, it was observed that 34.7% and 52% were hypertensive, and 21.3% and 37.3% were diabetic, respectively. Regarding hypertension and diabetes mellitus, it was noticed that there was a statistically significant difference between intervention and control groups with *P* values of 0.032 and 0.031, respectively.

Table 3: Percentage Distribution of Study and Control Groups Related to Risk Factors (n = 150)

Risk factors	Study (*n*= 75)		Control (*n*= 75)		*P*-value
	No.	%	No.	%	
Hypertension	26	34.7%	39	52.0%	0.032*
Diabetes Mellitus	16	21.3%	28	37.3%	0.031*
Insertion route					
Femoral	61	81.3%	58	77.3%	0.545
Radial	14	18.7%	17	22.7%	0.545
Obesity	11	14.7%	10	13.3%	0.814

*Chi square test *A Statistically significant p ≤ 0.05*

Regarding Vascular Complications (VASCOR) risk score category of intervention and control groups, it was observed that most patients were at high risk for developing vascular complications (78.7 % and 73.3%), respectively Figure 1.

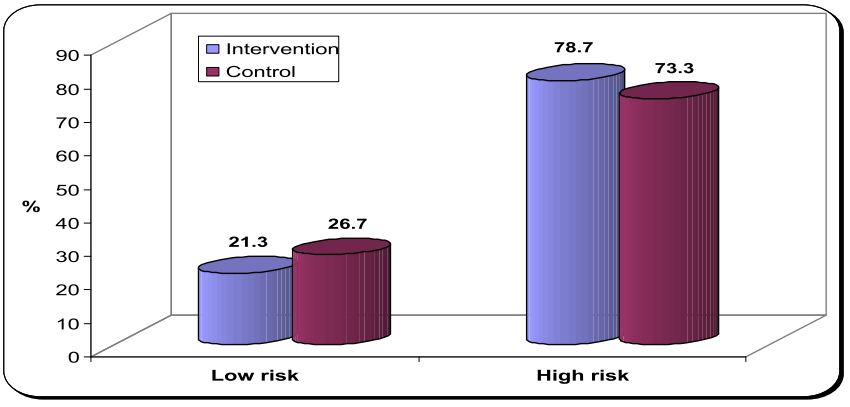

Figure 1: Percent Distribution of the Intervention and Control Groups Related to the VASCOR Risk Score Category

Local vascular complications of intervention and control groups. A statistically significant difference was found between both groups regarding haematoma (0.014) and pain at catheter local vascular complications of intervention and control groups. A statistically significant difference was found between both groups regarding haematoma (0.014), pain at the catheter insertion site (0.001), and bleeding (0.016), respectively. As regards ecchymosis, oozing in the insertion site, and retroperitoneal haematoma between the intervention and control groups, no statistically significant difference was found (*P* value > 0.05) in Table 4.

Table 4: Percent Distribution of Intervention and Control Groups Related To Local Vascular Complications (n=150)

Local Vascular Complications	Intervention group (*n*= 75)		Control group (*n*= 75)		*P*-value
	No	%	No	%	
Hematoma					
4 hours	3	4.0%	12	16.0%	0.014*
First day	0	0.0%	3	4.0%	0.245
Discharge day	0	0.0%	0	0.0%	--
Ecchymosis					
4 hours	4	5.3%	6	8.0%	0.513
First day	0	0.0%	0	0.0%	--
Discharge day	0	0.0%	0	0.0%	--
Pain at Insertion Site					
4 hours	7	9.3%	35	46.7%	0.001*
First day	3	4.0%	10	13.3%	0.042*
Discharge day	0	0.0%	1	1.3%	1.000
Bleeding					
4 hours	2	2.7%	10	13.3%	0.016*
First day	0	0.0%	0	0.0%	--
Discharge day	0	0.0%	0	0.0%	--
Oozing in the Insertion Site					
4 hours	3	4.0%	9	12.0%	0.071
First day	0	0.0%	0	0.0%	--
Discharge day	0	0.0%	0	0.0%	--
Retroperitoneal Haematoma					
4 hours	0	0.0%	2	2.7%	0.497
First day	0	0.0%	0	0.0%	--
Discharge day	0	0.0%	0	0.0%	--

*Chi square test *A Statistically significant p ≤ 0.05*

In relation to the occurrence of local vascular complications (haematoma, ecchymosis, and pain at the insertion site, bleeding and oozing at the site) and access site (femoral and radial), it was found that the majority of complications occurred in the femoral access rather than the radial access, and there was no statistically significant difference between the intervention and control groups (Table 5).

Table 5: Relationship Between Local Vascular Complications and Access Site of Intervention and Control Group (n=150)

Local vascular complications	Intervention Group				*P*-value	Control Group				P-value
	Site					Site				
	Femoral *n*= 61		Radial *n*= 14			Femoral *n*= 58		Radial *n*= 17		
	No.	%	No.	%		No.	%	No.	%	
Haematoma										
4 hours	3	4.9	0	0.0	1.000	8	13.8	4	23.5	0.451
First day	0	0.0	0	0.0	--	2	3.4	1	5.9	0.543
Discharge day	0	0.0	0	0.0	--	0	0.0	0	0.0	--
Ecchymosis										
4 hours	3	4.9	1	7.1	0.571	5	8.6	1	5.9	1.000
First day	0	0.0	0	0.0	--	0	0.0	0	0.0	--
Discharge day	0	0.0	0	0.0	--	0	0.0	0	0.0	--
Pain at Insertion Site										
4 hours	4	6.6	3	21.4	0.116	26	44.8	9	52.9	0.555
First day	3	4.9	0	0.0	1.000	7	12.1	3	17.6	0.686
Discharge day	0	0.0	0	0.0	--	0	0.0	1	5.9	0.227
Bleeding										
4 hours	2	3.3	0	0.0	1.000	7	12.1	3	17.6	0.686
First day	0	0.0	0	0.0	--	0	0.0	0	0.0	--
Discharge day	0	0.0	0	0.0	--	0	0.0	0	0.0	--
Oozing in the Insertion Site										
4 hours	3	4.9	0	0.0	1.000	8	13.8	1	5.9	0.674
First day	0	0.0	0	0.0	--	0	0.0	0	0.0	--
Discharge day	0	0.0	0	0.0	--	0	0.0	0	0.0	--

*Chi square test *A Statistically significant p ≤ 0.05*

The accuracy of the VASCOR score distribution in predicting vascular complications for the studied group, the sensitivity and specificity, positive and negative predictive values, and area under the curve (ROC curve) for scores ≤ 4 were 75.47%, 34.02%, 38.5%, 71.7%, and 0.551%, respectively (Table 6).

Table 6: Distribution of the Intervention and Control Groups Related To Vascular Complications Risk (VASCOR) Score Sensitivity and Specificity (n=150)

Cut-off	Sensitivity	Specificity	+PV	-PV	AUC
≤ 4	75.47	34.02	38.5	71.7	0.551

+PV: positive predictive value, -PV: negative predictive value, AUC: area under the curve

The accuracy of the VASCOR risk score distribution in predicting vascular complications for the studied group, the sensitivity and specificity, positive and negative predictive values, and area under the curve (ROC curve) for scores ≤ 4 were 75.47%, 34.02%, 38.5%, 71.7%, and 0.551%, respectively (Figure 2).

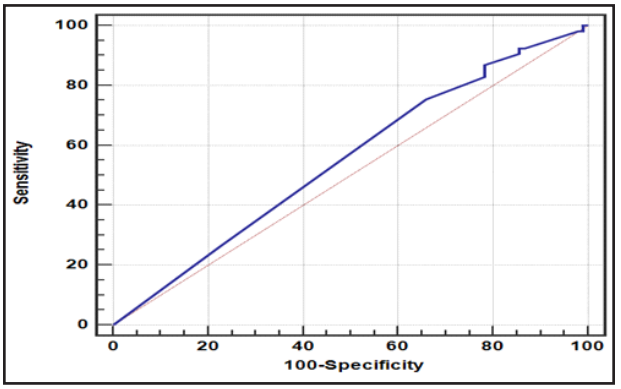

Figure 2: ROC Curve Showing Sensitivity and Specificity of the VASCOR Risk Score

Regarding the discharge criteria of intervention and control groups, it was found that 86.7% and 64.0% of patients were discharged to home, 8.0% and 24.0% were transferred to the department, and 5.3% and 12.0% died, respectively, and a statistically significant difference between intervention and control groups was found (*P* value 0.005) (Figure 3).

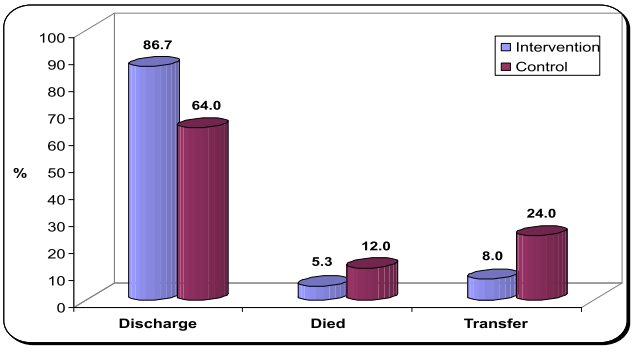

Figure 3: Percent Distribution of Intervention and Control Groups Related to Discharge Criteria

According to the length of stay, was significantly (*P* value 0.001) shorter in the intervention group (Table 7).

Table 7: Median Distribution of Length of Stay at CCU (n=150)

Patient's outcomes	Intervention Group (*n*= 75)		Control Group (*n*=75)		*P*-value
	No.	%	No.	%	
Length of Stay: (days)					
Median (Range)	2.0 (2.0-4.0)		2.0 (2.0-6.0)		0.001*
Mean ± SD	2.19 ± 0.48		2.8 ± 1.25		0.001*

*Mean t-test *A Statistically significant p ≤ 0.05*

DISCUSSION

Diagnostic cardiac catheterisation is a crucial diagnostic procedure for evaluating coronary artery disease and guiding treatment decisions. Although generally safe and well-tolerated, some patients may experience post-procedural complications, pain and discomfort (Ibrahem *et al.*, 2024). The findings indicated significant improvements in patient outcomes, which can be attributed to the implementation of specific nursing interventions, particularly the application of cold compresses at the puncture site. The results of the current study regarding the demographic characteristics of the study populations show that the majority of the study populations were males. Consistent with the findings of the present study, several studies (Pamuk and Özkaraman, 2024; Al-Bayati and Al-Kassar, 2023; and Patil, Hesarur and Mahanta, 2025), mentioned in their studies that more than a large proportion of study populations were male.

This observation can be attributed to several factors associated with gender differences in coronary artery disease prevalence. Men are generally more susceptible to coronary artery disease compared to women due to various reasons, including hormonal differences and lifestyle factors such as smoking, stress, and activity level, which can increase the workload on the heart and contribute to coronary artery disease development and subsequent cardiac catheterisation.

The studied populations' mean ages were 57.87 and 55.63 years, with standard deviations of ± 7.64 and 8.79 years, and this is in accordance with Cheema *et al.* (2024), who found that the mean age of studied populations was 52.80 and 53.04 with standard deviations of ± 8.49 and ± 7.43; and Iqbal (2023) found that the mean age of studied populations was 53.0 with standard deviations of ± 9.6, and this is in agreement with Hamdi *et al*. (2023), reported that the mean age was 52.58 with standard deviations of ± 6.9. The researcher's point of view is that the age of the studied populations is a very important variable to be detected, as the literature suggests that increasing age brings more cardiovascular disease risks to individuals due to degenerative changes in the human vasculature.

The present study demonstrates that less than half of the studied population was hypertensive, and this is in accordance with Cheema *et al*. (2024), who found that less than half of the studied population was hypertensive, and Hamdi *et al*. (2023), who found that more than half of the studied patients had hypertension. The present study demonstrates that less than a quarter of the studied population was diabetic, and this is in the same line with Cheema *et al.* (2024), who demonstrated that less than a quarter of the studied population was diabetic, and Hamdi *et al*. (2023), who found in their study that more than one-third of the study population was diabetic.

From the researcher's point of view, people with diabetes are more likely to get high blood pressure, high cholesterol, and obesity, all of which are major risk factors for cardiovascular diseases. Additionally, diabetes may cause damage to the nerves and blood vessels that control the heart and blood vessels, which can lead to complications such as peripheral artery disease, heart attack, and stroke.

As regards local vascular complications in the form of haematoma, the current study revealed that there was a statistically significant difference between the study and control groups (*P* value 0.014). This result is in accordance with Asy'ary *et al*. (2024), Al-Bayati and Al-Kassar (2023), Kurt and Kaşkçı (2019), and Patil, Hesarur and Mahanta (2025), who found in their studies that the application of a cold pack reduced haematoma formation in the experimental group, and it is consistent with Galli da Silveira *et al.* (2024), who demonstrated in their study that the main complication was haematoma.

Although the control group exhibited a higher ecchymosis occurrence than the intervention group, the difference is not statistically significant (*P* value 0.513). This outcome is consistent with Al-Bayati and Al-Kassar (2023), who found that ecchymosis could be reduced by using direct cold bag compression after the femoral artery sheath removal, and in accordance with Pamuk and Özkaraman (2024), who observed that the ecchymosis diameters in the femoral catheter region of the patients who used the cold sand pack group were smaller than those of the patients, used the normal sand pack group during the 24-hour follow-up of the patients' ecchymosis diameters.

The current study results demonstrate that a statistically significant difference between intervention and

control groups was noticed (*P* value 0.001) regarding puncture site pain at 4 hours and on the first day after sheath removal, and this result corresponds to Sokhanvar *et al.*, (2023); Korkmaz and Karagözoğlu (2022) and Kurt and Kaşıkçı (2019) who found in their studies that pain after catheter withdrawal decreased with the use of cold compresses. The study demonstrates that most of the complications occurred in the femoral access rather than the radial access group, and this is in accordance with Cheema et al. (2024), Chiarito *et al*. (2021) and Koifman *et al*. (2017), who found that radial access is safer than femoral access and has lower rates of vascular complications.

One of the reasons that contributes to the greater safety of the radial access site is the comfort it provides to the patient due to the possibility of early mobilisation out of bed, whereas the femoral access site requires at least 3 hours of bed rest. The current study shows that in the (VASCOR) score category of the studied populations, most of the patients were at high risk (76%), and there was no statistically significant difference between the intervention and control groups (*P* value > 0.05). This result conflicts with Romero *et al*. (2019), who demonstrated in their study that a large proportion of patients were low risk (47.7 %). Notably, vascular complications were accurately predicted by a VASCOR score at the cutoff of 4 points, with a sensitivity of 75.47% and a specificity of 34.02%. The positive findings of this study support those of other retrospective evaluation studies conducted by Romero *et al*. (2019), who found that the heart score had a 73% sensitivity and a 55.8% specificity in predicting vascular problems. (Paganin *et al*. (2017) mentioned that a VASCOR score cutoff of ⩾3 had a sensitivity and specificity of 66 % and 57 %, respectively.

Positive predictive value (PPV) indicates the proportion of patients identified as high-risk by the (VASCOR) score who actually experience a vascular complication. A PPV of 38.5% suggests that the VASCOR score is moderately reliable in predicting vascular complications when it does flag a patient as high risk. This high PPV is crucial for ensuring that resources and immediate care are appropriately directed to those who need them; a negative predictive value (71.7%) means that patients classified as low risk are truly free from risk. This relatively high NPV suggests that many patients not identified as high risk might still experience avascular complications (high false negative rate), which can have serious implications for patient outcomes. On the same site, Romero *et al*. (2019) observed that the VASCOR score had a low positive predictive value, and 83% of those classified as high risk were free from vascular complications.

The findings showed that the VASCOR score had a higher sensitivity, making it a better prediction tool for identifying patients at high risk of vascular problems. A local cold compress can cause vasoconstriction, decreased blood flow, and increased coagulation, which, in turn, result in decreased haemorrhage that can ultimately reduce the haematoma and ecchymosis. Decreased vascular complications in the intervention group ensure greater safety when using cold compresses, and this is in line with Sugiharto *et al*. (2025), who noticed in his systematic review findings that cold compress therapy may help reduce pain and avoid haematomas. Cold compress treatment is one method that medical professionals, particularly nurses, can use in the nursing care plan for patients following cardiac catheterisation.

As regards outcomes, the study shows that a large proportion of the study populations were discharged to home, less than a quarter of the study populations died, and less than a quarter of the study populations were transferred to departments, and a statistically significant difference between study populations was noticed regarding discharge criteria. The length of stay was significantly (*P* value 0.001) shorter in the intervention group.

The intervention group not only showed fewer complications but also exhibited improved overall results, including reduced hospital stays and mortality rates. These outcomes are significant as they highlight the effectiveness of structured nursing guidelines in enhancing the quality of care provided to patients undergoing PPCI.

Implication

It is important to use the predictive VASCOR score and nursing guidelines in the identification of high-risk patients for vascular complications in the CCU. This may be useful in reducing hospitalisations, length of stay, and cost.

Limitation

This was a single institutional study, and the major limitation of this study was the sample size. The study sample was limited to STEMI patients handled with PPCI with special inclusion criteria, and there was a dropout: death in the middle of the study. Transfer to the department was not suitable for the researcher.

CONCLUSION

The studied populations were at high risk (78.7% and 73.3%) for developing vascular complications respectively and this demonstrates that predicting a possibility of vascular complications in STEMI patients post-PPCI by VASCOR risk score, which was easy to use and well performed, helps minimise vascular complications and helps attending critical care nurses plan the best post-procedural monitoring and lower in-hospital mortality. Nursing guidelines had a positive effect on improving STEMI patients' outcomes. The study findings also revealed that the difference between studied populations was statistically significant for haematoma (p=0.014), insertion site pain (p=0.001) and bleeding (p=0.016) after application of cold compress regarding discharge criteria and length of stay at CCU. Regarding the predictive accuracy of the VASCOR risk score and the efficacy of nursing guidelines, future research could focus on validating these findings across larger and more diverse populations. Long-term studies are also recommended to assess sustained improvements in vascular outcomes and mortality. Additionally, integrating risk scoring and guideline-based interventions into routine critical care nursing practice may further enhance patient safety and reduce complications post-PCI.

Recommendation

The study recommended the implementation of the VASCOR risk score and nursing guidelines in the cardiac care unit for predicting vascular complications in STEMI patients' post-PPCI within 2 days. For high-risk patients, nurses should apply nursing guidelines. Apply this research to a large sample size acquired from different geographical areas to better understand the accuracy of the VASCOR score in the prediction of suspected vascular complications in patients.

Conflict of Interest

The authors declare that they have no competing interests.

ACKNOWLEDGMENT

The researcher sincerely appreciates all patients who participated in this study at the coronary care unit and all nursing staff members.

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