# The Effect of Different Positions on Clinical Outcomes of Post Coronary Catheterization patients: Comparative Trial

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## Abstract

**Background**: Coronary catheterization or Percutaneous Coronary Intervention (PCI) is considered a non-surgical intervention procedure for CHD. Bed rest for a time is essential in critically ill patients, and therapeutic positioning is a way to avoid further complications and enhancing patient outcomes **Aim**: assess the effect of different positions on post coronary catheterization clinical outcomes. **Methods**: a quasi-experimental design was used. 100 adult patients undergoing diagnostic cardiac catheterization, a randomized block sampling was followed by researcher divided the sample into relatively 4 homogeneous subgroups, 25 patients for each group. One tool was utilized for data collection. It composed of three parts; Part I: sociodemographic characteristics, part two concerning assessment of clinical outcomes as hematoma, foot sensation, and nausea. Part three: pain assessment. The patients were positioned after cardiac catheterization in each group as (Restricted bed rest position group for 16-18 hours in supine position as routine hospital management; lateral position group after first hour the head of the bed raised 30- degree; changing position group every hour and after 7th hour, removal of the sandbag, patients were get out of bed and assume sitting position; and early ambulation group, patients were moved out of bed after 4 hours). Comparing between groups was done based on the clinical outcomes and pain at the 1st, 6th and 12th hours post procedure. **Results**: majority of patients were aged (54.37±5.14), male, smokers, varied between overweight and obesity. Significance differences were noticed between the four regarding respiration, urinary retention, postural hypotension, nausea. In addition to presence and intensity of pain for the benefit of group 4 (early ambulation group). Conclusion and recommendations: early ambulation has positively impact on clinical outcomes of post coronary catheterization patients. Accordingly, nurses should encourage early ambulation as an essential part of nursing care.

**Keywords:** clinical outcomes, comparative trail, positions, coronary catheterization

## Introduction

Cardiovascular diseases (CVDs) are defined as a cluster of disorders of the heart and blood vessels and include coronary heart disease, cerebrovascular disease, rheumatic heart disease and other conditions. according to the American Heart Association states, CHD rests the major reason of death in the United States with a 13% mortality rate in 2017; and people die each year from CVDs are estimated to be 31% of all deaths worldwide (**WHO 2019- AHA 2020**). Egypt, like many other countries, faces a disease burden as the prevalence of coronary heart disease of 8.3% (**WHO EMRO., 2020**).

Coronary catheterization or Percutaneous Coronary Intervention (PCI) is defined as a non-surgical interference for CHD diagnostic examinations that offer a realiable data about the existence and complexity of CHD through using a catheter to dilate or open narrowed coronary arteries resulting from atherosclerosis or thrombosis by a balloon or stents. Therefore, it can be used for diagnostic or therapeutic purposes (**Manueke, Trisyani, Nurlaeci 2019**).

The transfemoral catherization is the frequently used approach. Though, vascular complications reported that occur in 0.43–5.8% of patients; include the following; arrhythmia, vascular problems (such as bleeding, hematoma, and thrombus formation), myocardial ischemia, coronary artery perforation, cerebrovascular accident including transient ischemic stroke, allergy to contrast agent, and acute renal failure (**Kardan et al., 2020**). So, following transfemoral catherization strict bed rest with immobilization of the catheterized leg have been reflected to be crucial to lessen the threat of their development of complications. (**Rezaei-Adaryanietal.2009**)

Post transfemoral PCI, bed rest for 24 hours in the supine position is required to patients (**Abd et al., 2018**). On the other hand, long bed rest with no movement in the supine position may lead to a undesirable influence and resulting in discomfort for most patients, since it will be a source of back pain, fatigue, discomfort, difficulty in eating, urination and other vascular complaints (**Chair et al, 2012& Sheth et al 2014**) .

Critically ill patients requiring prolonged bed rest, and therapeutic positioning is significant to prevent further complications and improving patient outcomes (**Mahvar et al 2012 & Ibdah etal 2020**). Change in posture has an announced consequence on endocrine, cardiovascular and renal systems. Recumbent position is tolerated by cardiac patients better than another, but they failed to show the underlying mechanisms. In previous studies, it was noticed that patients with increased sympathetic nervous activity and chronic heart failure choose to assume lateral positions when recumbent, where the plasma concentration of NE decreases compared with that of the supine position. While anther authors confirmed that cardiac output (CO) rises in horizontal lateral positions in critically ill patients (**Pump et al 2002).**

The effect of position change post cardiac catheterization on vital signs, back pain, as well as vascular complications have reported in many nursing studies (**Abdollahi et al., 2015, Pool et al 2015, Younessi-Heravi, Yaghubi, & Joharinia, 2015, Haghshenas et al., 2013).** Bed rest for a long time in a supine position has become tradition, nevertheless it possible has negative effects **(Wentworth et al., 2018).** Nursing care studies post cardiac catheterization which investigates the consequence of the most reliable positional change on all vital signs, patients` comfort, complications and pain display a numerical inadequacy. Therefore, this study intends to be experimental investigation of the effect of different position change on clinical outcome post cardiac catheterization (PCI) includes vital signs, renal output, patient comfort and pain assessment, GIT manifestations, ambulation and incidence of vascular complications.

**What is already known**

Transfemoral Cardiac Catheterization procedure possesses many hazards for patients. Limited mobility and bed rest post catheterization are followed since many years that accompanied with low back pain, fatigue and other problems.

**What this study adds**

Early ambulation should be encountered as a main post catheterization strategy as it shows a significant impact on pain occurrence, intensity, presence of postural hypotension and urinary retention.

## Aim of study:

The current study aimed to evaluate the effect of different positions on clinical outcomes of post coronary catheterization patients.

**Research question:**

How have different positions affect the clinical outcomes of post coronary catheterization patients?

**1.Research hypothesis:**

- Patients who **assume restricted bed rest position** will experience better clinical outcomes than those who do not receive such intervention.
- Patients who assume Lateral position will experience better clinical outcomes than those who do not receive such intervention.
- Patients who assume Changing position will experience better clinical outcomes than those who do not receive such intervention.

• Patients who perform early ambulation will experience better clinical outcomes than those who do not receive such intervention.

**Operational definition:**

Clinical outcomes in this study were defined operationally as a measurable changes in health and functioning (vital signs, urinary output, postural hypotension, GI manifestations as nausea and vomiting, presence of hematoma or bleeding, thigh swelling, neurovascular parameters as distal pulse, edema, leg temperature, capillary refill, foot sensation and motion and pain) that result from assuming certain position for post transfemoral adult cardiac catheterization patients.

**Materials and Method:**

**Research design:**

A quasi- experimental research design.

**Research setting:**

This study was carried out at the cardiac catheterization unit at Alexandria Main University hospital. The unit consists of 3 rooms with capacity of 10 beds

**Subjects:**

A purposive sample of 100 adult patients from both genders experiencing diagnostic Transfemoral Cardiac Catheterization were involved in this study from the above-mentioned setting, sampling was calculated based on the Roasoft calculation program with the assumption of a 50% response rate and 95% confidence interval (CI), with an error margin of 5%. Therefore (**Sample Size Calculator by Roasoft, Inc, 2014**); a randomized block sampling was followed by researcher divide the sample into relatively homogeneous 4 subgroups, 25 patients for each group. An appointment was done with the patient to clarify the study verbally and in writing pretransfemoral cardiac catherization. Patients were then asked to give written informed consent. Each consenting patient was randomly allocated to one of four groups. A computer-generated randomized table was used for randomization (**Random Number Generator 2018) (Stat 2018).**

**Inclusion criteria**: Adult Patients undergone transfemoral cardiac catheterization that active clotting time less than 150 seconds.

**Exclusion criteria**: Previous surgery involving the femoral arteries, bleeding disorder, unstable arrhythmia, renal insufficiency or impaired renal function and patient suffer from chronic lower back pain.

**Tools of the study:**

One tool was used for data collection. It was developed by the researcher with the purpose of assess the patient post transfemoral cardiac catheterization after reviewing the current national and international related literature. It was consisted of three parts.

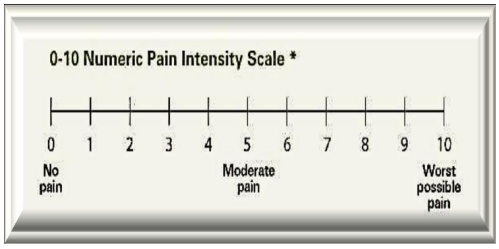
Part I: sociodemographic characteristics: this part included items related to patient's age, sex, level of education, occupation, smoking, previous coronary intervention, and body mass index.

| K/M2 | BMI |
|---|---|
| Underweight | <19 |
| Normal | 19- 24 |
| Overweight | 24-30 |
| Obesity | >30 |

Part II: clinical outcome: this part contained data concerned with vital signs, urinary output, postural hypotension, GI manifestations as nausea and vomiting, presence of hematoma or bleeding, thigh swelling and neurovascular parameters as distal pulse, edema, leg temperature, capillary refill, foot sensation and motion.

Part III: pain assessment as presence of pain, site, duration, intensity, quality, aggravating and alleviating factor.

Numerical Rating Scale (NRS) was used for pain assessment, to evaluate the pain intensity. It described as a straight line that contains "10 point scale". Through the left end of the line "0" expressive no pain , 1-3 mild pain, 4-6 moderate pain, 7-9 severe pain and the right end of the line "10" signify the worst degree of pain.



**Procedures:**

The study was directed as follows:

Ethical Research Committee review board of Faculty of Nursing, MTI University has approved the protocol on the 12 research ethics committee report; official permission for conducting the study was attained from the directors of the above mentioned setting.

Content validity for the study tool was assured by a jury of five expert professors from Medical-Surgical nursing from faculty of nursing, Cairo University, Alexandria University, and MTI University. In addition to professor of cardiology from faculty of medicine, Alexandria University reviewed the content of the tools for comprehensiveness, accuracy, clarity, relevance and applicability and necessary modifications were done.

Cronbach_Alpha Coefficient Statistical test was used to assess tool reliability and revealed that the reliability of the tool was 0.828

**Pilot study:** A Pilot study was carried out with ten percent (10 patients) of the sample under study to test the applicability, clarity and feasibility of the tools. The modifications were done; and develop the final form. Patients in the pilot study were omitted from the study group.

Phase I: the investigator interviewed with patients before the procedure to clarify the goal of the study and obtain their approval to contribute in the study, then the basic assessment was done; sociodemographic and clinical data was collected from four groups using part I of the tool.

Phase II: implementation phase: Each group received intervention immediately post cardiac catheterization:

Group I: **Restricted bed rest position group**; patients maintain bed rest in a supine position for 16-18 hour; with the legs extended straight after removal of the catheter, in which the head of the bed was elevated to 15 degree, a compressive dressing is applied on the surgical site before a sand bag is put on it for several hours to stop the bleeding while the patient is in a still position and removed after 8 hours . **(Abdollahi et al., 2015).**

Group II: **Lateral position group;** patients maintain bed rest in a supine position for first hour then the head of the bed was elevated 30- degree during lateral position. To support the thorax, a wedge cushion was used **(Laat et al 2007& Hewitt, Bucknall, Faraone 2018).**

Group III: **Changing position group**; patients positioned in to supine position which the head of the bed was elevated to 15-degree for one hour after removal of the catheter; in the 2nd hour maintain low fowler's position, in which the head of the bed was elevated to 30- degree. Then 3rd hour 30-degree bed-elevated lateral position for one hour; 4th hour patient maintained 30-degree bed elevation supine position for one hour; on the 5th hour 30-degree bed-elevated lateral position for one hour. and finally, 6th hour, standard fowler's position was given in which the head of the bed was elevated 45–60° These position changes were applied between the 1st and 6th hours, support pillow was changed every half hour to the right or the left side of the body to reduce pressure on the local tissues and muscles that were in contact with the bed. In the 7th hour, removal of the sandbag, patients were moved out of bed and placed in a sitting position in a chair near the bed for 10–15 min in order to prevent postural hypotension; in the 15 min patients walked and were helped to fulfil personal care needs. **(Boğa, Öztekin 2018).**

Group IV: **early ambulation group;** patients follow the change position was performed according to the approach of the third group, sand bags were put on the location for three hours and at the end of the fourth hour, if there were no complications; the patient would be helped to leave the bed gently **(Salahshour 2017) ( Mousa 2018).**

Phase III: Evaluation; each patient assessed by the investigator for three times via clinical outcomes tool and pain assessment tool. Assess vital signs, renal output, GIT manifestations, vascular complication and back pain by patient assessment at the 1st, 6th, and 12th hours post procedure.

**Ethical considerations**:

The researcher approached the patients who matched the inclusion criteria and explained the aim of the study, benefits and possible risks of participation. Patients' free decision to voluntarily

participate in the study or withdrawal at any time was also emphasized. After their agreement, written informed consent was gained. Confidentiality of the obtained data was assured, and patients' anonymity was valued. Privacy also maintained during the implementation of the study.

**Data analysis**

Data was analyzed using IBM SPSS software package version 20.0. (Armonk, NY: IBM Corp). Frequency and percentage were used to present qualitative variables. Quantitative data presented a mean and standard deviation. At the 0.05 level was considered the significance of the obtained results. The used tests were: Paired t-test: For normally distributed quantitative variables, to compare between the control group and the intervention group. in the analysis of contingency tables, Fisher exact test and Chi were used.

**Statistical analysis:**

Statistical Program for Social Science (SPSS) version 26.0 was used for data analysis

The following tests were done:

to determine whether there are any statistically significant differences between the means of three or more independent (unrelated) groups, the one-way analysis of variance (ANOVA) is used. While ANOVA is a powerful and useful parametric approach to analyzing approximately normally distributed data with more than two groups (referred to as 'treatments'), it does not deliver any deeper perceptions into configurations or comparisons between specific groups.

Tukey's test compares the means of all treatments to the mean of every other treatment. After a multivariate test, it is habitually preferred to identify more about the specific groups to find out if they are significantly different or similar. This step after analysis is referred to as 'post-hoc analysis' and is a key step in hypothesis testing (comparing between the four groups based on their position).

Probability (P-value)

– P-value <0.05 was reflected significant.

– P-value <0.001 was reflected as highly significant.

– P-value >0.05 was reflected not significant

## Results

Table (1) shows that approximately half of patients (48%) in group 1 and majority of patients (68.0%, 76.0%, 88.0%) in the next groups 2,3, and 4 are aged from 3 respectively with a mean age of 54.37±5.14. Regarding sex, it was noticed that the majority of patients in the entire groups were males (80.0%, 64.0%, 76.0%, 60.0%) respectively. Concerning level of education, approximately half of patients (48.0%)_in group 1 have basic education while in group 2 and 3 were secondary education (48.0%, 48.0%). In group 4, three fifth of patients (60.0%) were also secondary educated. Regarding occupation, regarding occupation, majority of patient in the four groups were varied between manual (40%, 44%, 60%, 56%) and professional work (48%, 32%, 32%, 32%). The majority of patients were smokers (60%, 56%, 72%, 56%) with no previous coronary intervention (84%,76%,88%,84%) represented with a mean weight of (80.31±8.01) reflected in a form of overweight for the patient in all groups (84%, 64%, 60%, 68%).

Table (2) demonstrate that significant differences were noticed between the study groups in certain clinical parameters such as respiration rate and urinary retention in the 6th hour (p=o.ooo, 0.002), postural hypotension and nausea at the 6th and 12th hour (p=0.001, 0.000). in addition to foot sensation at the 12th hour (0.001). all differences were found for the benefit of group 4.

Table (3) shows significance of differences between the study groups regarding pain per hour: Less presence of pain and intensity in the group 4 with statistical significant differences between the entire groups at the 6th (0.000) and 12$^{th}$ hour (0.000).

Table (4) clarifies that; there was a highly positive statistically significant correlation between vital signs and 4th position. The strongest correlation was patient respiration after 12 hours of transfemoral cardiac catheterization (r= 0.000*). In relation to postural hypotension there was highly incidence in 1st position compared with three positions, there was a highly improvement in

4th position on 1st hour, 6th hour, 12th hour. Concerning nausea and vomiting, there was highly significant correlation between incidence of nausea and the 1st position (r= 0.000), while there was no significant correlation between four position and incidence of vomiting. Conversely, the weakest correlation was between 4 positions and incidence of hematoma (0.57); Incidence of pain regrading (site, duration radiation, quality and aggravating factors, alleviating factors and pain intensity) in 1st, 6th, 12th hours.

**Table I: Frequency Distribution of Patients Biosociodemographic Characteristics:**

| **Items** | Gr.1 | | Gr.2 | | Gr.3 | | Gr.4 | |
|---|---|---|---|---|---|---|---|---|
| | **No.** | **%** | **No.** | **%** | **No.** | **%** | **No.** | **%** |
| **Age** | | | | | | | | |
| 30-9 | **1** | **4.0%** | **0** | **0.0%** | **1** | **4.0%** | **1** | **4.0%** |
| 40-9 | **5** | **20.0%** | **2** | **8.0%** | **3** | **12.0%** | **2** | **8.0%** |
| 50-9 | **12** | **48.0%** | **17** | **68.0%** | **19** | **76.0%** | **22** | **88.0%** |
| 60-70 | **7** | **28.0%** | **6** | **24.0%** | **2** | **8.0%** | **0** | **0.0%** |
| **Mean ± SD** | | | | **54.37±5.14** | | | | |
| | | | | Sex | | | | |
| Male | **20** | **80.0%** | **16** | **64.0%** | **19** | **76.0%** | **15** | **60.0%** |
| Female | **5** | **20.0%** | **9** | **36.0%** | **6** | **24.0%** | **10** | **40.0%** |
| **Level of education** | | | | | | | | |
| Illiterate | **0** | **0.0%** | **0** | **0.0%** | **0** | **0.0%** | **0** | **0.0%** |
| Read and write | **0** | **0.0%** | **0** | **0.0%** | **0** | **0.0%** | **0** | **0.0%** |
| Basic education | **12** | **48.0%** | **6** | **24.0%** | **7** | **28.0%** | **4** | **16.0%** |
| Secondary education | **8** | **32.0%** | **12** | **48.0%** | **12** | **48.0%** | **15** | **60.0%** |
| University | **5** | **20.0%** | **7** | **28.0%** | **6** | **24.0%** | **6** | **24.0%** |
| **Occupation:** | | | | | | | | |
| Not working | **3** | **12.0%** | **6** | **24.0%** | **2** | **8.0%** | **3** | **12.0%** |
| Manual | **10** | **40.0%** | **11** | **44.0%** | **15** | **60.0%** | **14** | **56.0%** |
| Professional | **12** | **48.0%** | **8** | **32.0%** | **8** | **32.0%** | **8** | **32.0%** |
| **Items** | Gr.1 | | Gr.2 | | Gr.3 | | Gr.4 | |
| | **No.** | **%** | **No.** | **%** | **No.** | **%** | **No.** | **%** |
| **Smoking:** | | | | | | | | |
| Smoker | **15** | **60.0%** | **14** | **56.0%** | **18** | **72.0%** | **14** | **56.0%** |
| Non smoker | **6** | **24.0%** | **9** | **36.0%** | **5** | **20.0%** | **8** | **32.0%** |
| Quitter | **4** | **16.0%** | **2** | **8.0%** | **2** | **8.0%** | **3** | **12.0%** |
| **Previous coronary intervention:** | | | | | | | | |
| Yes | **4** | **16.0%** | **6** | **24.0%** | **3** | **12.0%** | **4** | **16.0%** |
| No | **21** | **84.0%** | **19** | **76.0%** | **22** | **88.0%** | **21** | **84.0%** |
| **Weight:** | | | | | | | | |
| **Mean ± SD** | | | | **80.31±8.01** | | | | |
| **Height:** | | | | | | | | |
| **Mean ± SD** | | | | **167.77±4.89** | | | | |
| **Body mass index:** | | | | | | | | |
| **Average weight** | **1** | **4.0%** | **1** | **4.0%** | **2** | **8.0%** | **0** | **0.0%** |
| **Overweight** | **21** | **84.0%** | **16** | **64.0%** | **15** | **60.0%** | **17** | **68.0%** |
| **Obese** | **3** | **12.0%** | **8** | **32.0%** | **8** | **32.0%** | **8** | **32.0%** |

**Table II: Significance of Differences Between the Study Groups Regarding Clinical Outcomes Per Hour:**

| Clinical parameters | | 1st hour | | | | 6th hour | | | | 12th hour | | | | Test of significance | P value |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Gr.1 | Gr.2 | Gr.3 | Gr.4 | Gr.1 | Gr.2 | Gr.3 | Gr.4 | Gr.1 | Gr.2 | Gr.3 | Gr.4 | | |
| Vital signs/ hour | Temp | 36.78 ±0.22 | 36.75 ±0.26 | 36.72 ±0.28 | 36.70 ±0.25 | 36.96 ±0.16 | 37.06 ±0.18 | 36.98 ±0.20 | 37.00 ±0.06 | 49.08 ±60.09 | 37.08 ±0.19 | 37.03 ±0.15 | 37.00 ±0.02 | 1st=0.535<br>6th=1.848<br>12th=1.004 | 1st=0.659<br>6th=0.144<br>12th=0.395 |
| | Pulse | 73.72 ±2.42 | 73.80 ±1.94 | 73.48 ±2.35 | 73.76 ±2.59 | 73.16 ±2.43 | 73.92 ±2.63 | 74.80 ±2.42 | 74.12 ±2.15 | 72.36 ±14.01 | 74.16 ±2.67 | 72.08 ±13.89 | 74.40 ±3.61 | 1st=0.095<br>6th=1.960<br>12th=0.351 | 1st=0.963<br>6th=0.125<br>12th=0.788 |
| | Respiration | 14.04 ±2.42 | 13.28 ±1.67 | 13.36 ±1.25 | 13.88 ±1.33 | 14.64 ±1.85 | 15.92 ±1.55 | 15.60 ±2.60 | 15.00 ±2.25 | 15.64 ±1.47 | 15.08 ±1.58 | 15.12 ±1.69 | 13.16 ±1.03 | 1st=1.181<br>6th=1.888<br>12th=13.875 | 1st=0.321<br>6th=0.137<br>12th=0.000** |
| | Blood pressure | 116.20 ±6.96 | 119.40 ±9.39 | 118.00 ±8.16 | 117.00 ±9.57 | 115.60 ±6.51 | 114.40 ±8.21 | 114.80 ±9.18 | 117.20 ±8.91 | 110.80 ±9.09 | 112.40 ±8.79 | 114.00 ±7.07 | 118.00 ±5.00 | 1st=0.645<br>6th=0.598<br>12th=0.561 | 1st=0.588<br>6th=0.618<br>12th=0.642 |
| Urinary retention | | 1.00 ±0.00 | 1.00 ±0.00 | 1.00 ±0.00 | 1.00 ±0.00 | 1.32 ±0.48 | 1.12 ±0.33 | 1.04 ±0.20 | 1.00 ±0.00 | 1.20 ±0.41 | 1.12 ±0.33 | 1.04 ±0.20 | 1.00 ±0.00 | 1st=NA<br>6th= 5.381<br>12th= 2.484 | 1st=NA<br>6th= 0.002*<br>12th= 0.065 |
| Postural hypotension | | 1.09 ±0.29 | 1.00 ±0.00 | 1.00 ±0.00 | 1.00 ±0.00 | 1.52 ±0.51 | 1.32 ±0.48 | 1.08 ±0.28 | 1.12 ±0.33 | 1.48 ±0.51 | 1.24 ±0.44 | 1.00 ±0.00 | 1.04 ±0.20 | 1st=NA<br>6th= 6.099<br>12th= 9.878 | 1st= NA<br>6th= 0.001*<br>12th =0.000** |
| Nausea | | 1.40 ±0.50 | 1.40 ±0.50 | 1.24 ±0.44 | 1.16 ±0.37 | 1.52 ±0.51 | 1.32 ±0.48 | 1.04 ±0.20 | 1.04 ±0.20 | 1.56 ±0.51 | 1.32 ±0.48 | 1.04 ±0.20 | 1.00 ±0.00 | 1st=1.735<br>6th=9.671<br>12th=13.121 | 1st= 0.165<br>6th=0.000**<br>12th =0.000** |
| Vomiting | | 1.00 ±0.00 | 1.12 ±0.33 | 1.08 ±0.28 | 1.08 ±0.28 | 1.04 ±0.20 | 1.08 ±0.28 | 1.04 ±0.20 | 1.00 ±0.00 | 1.24 ±0.44 | 1.12 ±0.33 | 1.04 ±0.20 | 1.00 ±0.00 | 1st=0.962<br>6th=0.681<br>12th=3.294 | 1st= 0.414<br>6th=0.566<br>12th=0.024 |
| Hematoma/ hr: | | 1.00 ±0.00 | 1.00 ±0.00 | 1.00 ±0.00 | 1.00 ±0.00 | 1.00 ±0.00 | 1.00 ±0.00 | 1.00 ±0.00 | 1.00 ±0.00 | 1.04 ±0.20 | 1.08 ±0.28 | 1.08 ±0.28 | 1.00 ±0.00 | 1st=NA<br>6th= NA<br>12th=0.759 | 1st= NA<br>6th= NA<br>12th=0.520 |

| Clinical parameters | 1st hour | | | | 6th hour | | | | 12th hour | | | | Test of significance | P value |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Gr.1 | Gr.2 | Gr.3 | Gr.4 | Gr.1 | Gr.2 | Gr.3 | Gr.4 | Gr.1 | Gr.2 | Gr.3 | Gr.4 | | |
| | Mean ± SD | Mean ± SD | Mean ± SD | Mean ± SD | Mean ± SD | Mean ± SD | Mean ± SD | Mean ± SD | Mean ± SD | Mean ± SD | Mean ± SD | Mean ± SD | | |
| Bleeding: | 1.00 ±0.00 | 1.00 ±0.00 | 1.00 ±0.00 | 1.00 ±0.00 | 1.08 ±0.28 | 1.08 ±0.28 | 1.04 ±0.20 | 1.00 ±0.00 | 1.12 ±0.33 | 1.04 ±0.20 | 1.00 ±0.00 | 1.00 ±0.00 | 1st=NA<br>6th= 0.759<br>12th= 2.133 | 1st= NA<br>6th= 0.520<br>12th= 0.101 |
| Thigh swelling: | 1.00 ±0.00 | 1.00 ±0.00 | 1.00 ±0.00 | 1.00 ±0.00 | 1.12 ±0.33 | 1.04 ±0.20 | 1.00 ±0.00 | 1.00 ±0.00 | 1.20 ±0.41 | 1.08 ±0.28 | 1.00 ±0.00 | 1.00 ±0.00 | 1st= NA<br>6th= 2.133<br>12th= 3.671 | 1st= NA<br>6th= 0.101<br>12th= 0.015 |
| Distal pulse: | 1.00 ±0.00 | 1.00 ±0.00 | 1.00 ±0.00 | 1.00 ±0.00 | 1.00 ±0.00 | 1.00 ±0.00 | 1.00 ±0.00 | 1.00 ±0.00 | 1.08 ±0.28 | 1.04 ±0.20 | 1.00 ±0.00 | 1.00 ±0.00 | 1st= NA<br>6th= NA<br>12th= 1.257 | 1st= NA<br>6th= NA<br>12th= 0.294 |
| Capillary refill: | 1.00 ±0.00 | 1.00 ±0.00 | 1.00 ±0.00 | 1.00 ±0.00 | 1.00 ±0.00 | 1.00 ±0.00 | 1.00 ±0.00 | 1.00 ±0.00 | 1.04 ±0.20 | 1.00 ±0.00 | 1.00 ±0.00 | 1.00 ±0.00 | 1st= NA<br>6th= NA<br>12th= 1.000 | 1st= NA<br>6th= NA<br>12th= 0.396 |
| Peripheral edema: | 1.00 ±0.00 | 1.00 ±0.00 | 1.00 ±0.00 | 1.00 ±0.00 | 1.00 ±0.00 | 1.00 ±0.00 | 1.00 ±0.00 | 1.00 ±0.00 | 1.04 ±0.20 | 1.00 ±0.00 | 1.00 ±0.00 | 1.00 ±0.00 | 1st= NA<br>6th= NA<br>12th= 1.000 | 1st= NA<br>6th= NA<br>12th= 0.396 |
| Foot color | 1.00 ±0.00 | 1.00 ±0.00 | 1.00 ±0.00 | 1.00 ±0.00 | 1.08 ±0.28 | 1.08 ±0.28 | 1.00 ±0.00 | 1.00 ±0.00 | 1.12 ±0.33 | 1.00 ±0.00 | 1.00 ±0.00 | 1.00 ±0.00 | 1st= NA<br>6th= 1.391<br>12th= 1.862 | 1st= NA<br>6th= 0.250<br>12th= 0.141 |
| Foot temperature | 1.08 ±0.28 | 1.00 ±0.00 | 1.04 ±0.20 | 1.04 ±0.20 | 1.08 ±0.28 | 1.08 ±0.28 | 1.00 ±0.00 | 1.00 ±0.00 | 1.08 ±0.28 | 1.00 ±0.00 | 1.00 ±0.00 | 1.00 ±0.00 | 1st= 0.681<br>6th= 1.391<br>12th= 2.087 | 1st= 0.566<br>6th= 0.250<br>12th= 0.107 |
| Foot sensation: | 1.12 ±0.33 | 1.08 ±0.28 | 1.12 ±0.33 | 1.08 ±0.28 | 1.16 ±0.37 | 1.08 ±0.28 | 1.04 ±0.20 | 1.00 ±0.00 | 1.28 ±0.46 | 1.08 ±0.28 | 1.00 ±0.00 | 1.00 ±0.00 | 1st= 0.143<br>6th= 1.818<br>12th= 6.093 | 1st= 0.934<br>6th= 0.149<br>12th= 0.001* |
| Toes motion | 1.12 ±0.33 | 1.08 ±0.28 | 1.12 ±0.33 | 1.04 ±0.20 | 1.08 ±0.28 | 1.00 ±0.00 | 1.00 ±0.00 | 1.00 ±0.00 | 1.02 ±0.14 | 1.04 ±0.20 | 1.04 ±0.20 | 1.00 ±0.00 | 1st= 0.436<br>6th= 2.087<br>12th= 0.667 | 1st= 0.728<br>6th= 0.107<br>12th= 0.575 |

**Table III: Significance of Differences Between the Study Groups Regarding Pain per Hour:**

| | 1st hour | | | | 6th hour | | | | 12th hour | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Gr.1 Mean ± SD | Gr.2 Mean ± SD | Gr.3 Mean ± SD | Gr.4 Mean ± SD | Gr.1 Mean ± SD | Gr.2 Mean ± SD | Gr.3 Mean ± SD | Gr.4 Mean ± SD | Gr.1 Mean ± SD | Gr.2 Mean ± SD | Gr.3 Mean ± SD | Gr.4 Mean ± SD | F Test | P value |
| **Presence of pain** | 1.20 ±0.41 | 1.24 ±0.44 | 1.20 ±0.41 | 1.12 ±0.33 | 1.68 ±0.48 | 1.28 ±0.46 | 1.12 ±0.33 | 1.00 ±0.00 | 2.00 ±0.00 | 1.32 ±0.48 | 1.08 ±0.28 | 1.08 ±0.28 | 1st=0.400<br>6th=16.073<br>12th=49.789 | 1st=0.753<br>6th=0.000**<br>12th=0.000** |
| **Site** | 2.00 ±0.00 | 1.83 ±0.41 | 2.00 ±0.00 | 2.00 ±0.00 | 1.95 ±0.23 | 3.00 ±0.00 | 2.86 ±0.38 | 0.00 | 2.96 ±0.19 | 2.92 ±0.40 | 2.78 ±0.67 | 1st= 6th= 12th= | 1st=0.684<br>6th=1.481<br>12th =1.176b | 1st=0.575<br>6th=0.247<br>12th=0.333 |
| **Duration** | 2.00 ±0.00 | 2.00 ±0.00 | 2.00 ±0.00 | 2.00 ±0.00 | 1.53 ±0.51 | 1.86 ±0.38 | 2.00 ±0.00 | 0.00 | 1.67 ±0.48 | 1.16 ±0.37 | 1.89 ±0.33 | 2.00 ±0.00 | 1st=NA<br>6th=2.139<br>12th =14.665 | 1st= NA<br>6th=0.140<br>12th =0.000** |
| **Radiation** | 1.00 ±0.00 | 1.00 ±0.00 | 1.00 ±0.00 | 1.00 ±0.00 | 1.00 ±0.00 | 1.00 ±0.00 | 1.00 ±0.00 | 1.00 ±0.00 | 1.00 ±0.00 | 1.00 ±0.00 | 1.00 ±0.00 | 1.00 ±0.00 | 1st= NA<br>6th= 4.571<br>12th= 21.511 | 1st= NA<br>6th= 0.005*<br>12th= 0.000** |
| **Quality** | 0.20 ±0.41 | 0.28 ±0.54 | 0.20 ±0.41 | 0.12 ±0.33 | 1.65 ±0.49 | 1.43 ±0.53 | 2.00 ±0.00 | 0.00 | 1.64 ±0.57 | 2.11 ±0.33 | 2.00 ±0.00 | 2.00 ±0.00 | 1st= 0.579<br>6th= 1.500<br>12th= 2.307 | 1st= 0.630<br>6th= 0.243<br>12th= 0.094 |
| **Aggravating factors** | 1.00 ±0.00 | 1.00 ±0.00 | 1.00 ±0.00 | 1.00 ±0.00 | 1.00 ±0.00 | 1.00 ±0.00 | 1.00 ±0.00 | 1.00 ±0.00 | 1.00 ±0.00 | 1.00 ±0.00 | 1.00 ±0.00 | 1.00 ±0.00 | 1st= NA<br>6th= NA<br>12th= NA | 1st= NA<br>6th= NA<br>12th= NA |
| **Alleviating factors** | 1.00 ±0.00 | 1.00 ±0.00 | 1.00 ±0.00 | 1.00 ±0.00 | 1.00 ±0.00 | 1.00 ±0.00 | 1.00 ±0.00 | 1.00 ±0.00 | 1.00 ±0.00 | 1.00 ±0.00 | 1.00 ±0.00 | 1.00 ±0.00 | 1st= NA<br>6th= NA<br>12th= NA | 1st= NA<br>6th= NA<br>12th= NA |
| **Pain intensity** | 1.20 ±0.41 | 1.14 ± 0.38 | 1.00 ±0.00 | 1.00 ±0.00 | 2.00 ±0.00 | 1.00 ±0.00 | 1.00 ±0.00 | 0.00 | 2.76 ±0.44 | 2.00 ±0.50 | 1.00 ±0.00 | 1.00 ±0.00 | 1st= 0.460<br>6th= NA<br>12th= 25.635 | 1st= 0.714<br>6th= NA<br>12th =0.000** |

**Table IV: Correlation Between the Four Positioning Groups and Clinical Outcomes:**

| | | | | 1st hour | | | 6th hour | | | 12th hour | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Gr.2 | Gr.3 | Gr.4 | Gr.2 | Gr.3 | Gr.4 | Gr.2 | Gr.3 | Gr.4 |
| Vital signs/ hour | Temp | Gr. 1 | M.D | 0.04 | 0.07 | 0.08 | 0.10 | 0.02 | 0.04 | 12.00 | 12.05 | 12.08 |
| | | | P VALUE | 0.98 | 0.78 | 0.65 | 0.12 | 0.97 | 0.85 | 0.49 | 0.49 | 0.49 |
| | | Gr. 2 | M.D | | 0.03 | 0.05 | | 0.08 | 0.06 | | 0.05 | 0.08 |
| | | | P VALUE | | 0.97 | 0.91 | | 0.29 | 0.49 | | 1.00 | 1.00 |
| | | Gr. 3 | M.D | | | 0.02 | | | 0.02 | | | 0.03 |
| | | | P VALUE | | | 1.00 | | | 0.98 | | | 1.00 |
| | Pulse | Gr. 1 | M.D | 0.08 | 0.24 | 0.04 | 0.76 | 1.64 | 0.96 | 1.80 | 0.28 | 2.04 |
| | | | P VALUE | 1.00 | 0.98 | 1.00 | 0.68 | 0.08 | 0.50 | 0.92 | 1.00 | 0.89 |
| | | Gr. 2 | M.D | | 0.32 | 0.04 | | 0.88 | 0.20 | | 2.08 | 0.24 |
| | | | P VALUE | | 0.96 | 1.00 | | 0.57 | 0.99 | | 0.89 | 1.00 |
| | | Gr. 3 | M.D | | | 0.28 | | | 0.68 | | | 2.32 |
| | | | P VALUE | | | 0.97 | | | 0.75 | | | 0.85 |
| | Respiration | Gr. 1 | M.D | 0.76 | 0.68 | 0.16 | 1.28 | 0.96 | 0.36 | 0.56 | 0.52 | 2.48 |
| | | | P VALUE | 0.41 | 0.51 | 0.99 | 0.14 | 0.37 | 0.93 | 0.53 | 0.59 | 0.000** |
| | | Gr. 2 | M.D | | 0.08 | 0.60 | | 0.32 | 0.92 | | 0.04 | 1.92 |
| | | | P VALUE | | 1.00 | 0.61 | | 0.95 | 0.41 | | 1.00 | 0.000** |
| | | Gr. 3 | M.D | | | 0.52 | | | 0.60 | | | 1.96 |
| | | | P VALUE | | | 0.71 | | | 0.74 | | | 0.000** |
| | Blood pressure (sys) | Gr. 1 | M.D | 3.20 | 1.80 | 0.80 | 1.20 | 0.80 | 1.60 | 1.60 | 3.20 | 7.20 |
| | | | P VALUE | 0.55 | 0.88 | 0.99 | 0.96 | 0.99 | 0.90 | 0.88 | 0.46 | 0.01 |
| | | Gr. 2 | M.D | | 1.40 | 2.40 | | 0.40 | 2.80 | | 1.60 | 5.60 |
| | | | P VALUE | | 0.94 | 0.76 | | 1.00 | 0.63 | | 0.88 | 0.05 |
| | | Gr. 3 | M.D | | | 1.00 | | | 2.40 | | | 4.00 |
| | | | P VALUE | | | 0.98 | | | 0.73 | | | 0.26 |
| Urinary retention | | Gr. 1 | M.D | | | | 0.20 | 0.28 | 0.32 | 0.08 | 0.16 | 0.20 |
| | | | P VALUE | | | | 0.10 | 0.01 | 0.000** | 0.75 | 0.19 | 0.06 |
| | | Gr. 2 | M.D | | | | | 0.08 | 0.12 | | 0.08 | 0.12 |
| | | | P VALUE | | | | | 0.79 | 0.51 | | 0.75 | 0.44 |
| | | Gr. 3 | M.D | | | | | | 0.04 | | | 0.04 |
| | | | P VALUE | | | | | | 0.97 | | | 0.96 |
| Postural hypotension | | Gr. 1 | M.D | | | | 0.20 | 0.44 | 0.44 | 0.24 | 0.44 | 0.44 |
| | | | P VALUE | | | | 0.32 | 0.000** | 0.000** | 0.08 | 0.000** | 0.000** |
| | | Gr. 2 | M.D | | | | | 0.24 | 0.20 | | 0.24 | 0.20 |
| | | | P VALUE | | | | | 0.17 | 0.32 | | 0.08 | 0.19 |
| | | Gr. 3 | M.D | | | | | | 0.24 | | | 0.04 |
| | | | P VALUE | | | | | | 0.99 | | | 0.98 |
| Nausea | | Gr. 1 | M.D | 0.00 | 0.16 | 0.24 | 0.20 | 0.48 | 0.48 | 0.24 | 0.52 | 0.56 |
| | | | P VALUE | 1.00 | 0.000** | 0.25 | 0.24 | 0.000** | 0.000** | 0.09 | 0.000** | 0.000** |
| | | Gr. 2 | M.D | | 0.16 | 0.24 | | 0.28 | 0.28 | | 0.28 | 0.32 |
| | | | P VALUE | | 0.60 | 0.25 | | 0.06 | 0.06 | | 0.04 | 0.01 |
| | | Gr. 3 | M.D | | | 0.08 | | | 0.00 | | | 0.04 |
| | | | P VALUE | | | 0.93 | | | 1.00 | | | 0.98 |
| Vomiting | | Gr. 1 | M.D | 0.12 | 0.08 | 0.08 | 0.04 | 0.00 | 0.04 | 0.12 | 0.20 | 0.24 |
| | | | P VALUE | 0.35 | 0.69 | 0.69 | 0.89 | 1.00 | 0.89 | 0.47 | 0.08 | 0.02 |
| | | Gr. 2 | M.D | | 0.04 | 0.04 | | 0.04 | 0.08 | | 0.08 | 0.12 |
| | | | P VALUE | | 0.35 | 0.95 | | 0.89 | 0.48 | | 0.77 | 0.47 |
| | | Gr. 3 | M.D | | | 0.00 | | | 0.04 | | | 0.04 |
| | | | P VALUE | | | 1.00 | | | 0.89 | | | 0.96 |
| Hematoma/ hr | | Gr. 1 | M.D | | | | | | | 0.04 | 0.04 | 0.04 |
| | | | P VALUE | | | | | | | 0.92 | 0.92 | 0.92 |
| | | Gr. 2 | M.D | | | | | | | | 0.00 | 0.08 |
| | | | P VALUE | | | | | | | | 1.00 | 0.57 |
| | | Gr. 3 | M.D | | | | | | | | | 0.08 |
| | | | P VALUE | | | | | | | | | 0.57 |

**Discussion:**

Coronary artery diseases touch the lives of millions of patients and their families, together with those who provide and plan care, and those responsible for planning and funding care especially in developing countries like Egypt. Although many patients with CAD can be successfully managed with medications, there are many situations where it is necessary to investigate and restore blood flow to the coronary artery and heart muscle by revascularization either by PCI or by CABG via coronary catheterization **(Nag and Ghosh., 2013; Petroni et al., 2016) .**

Percutaneous coronary intervention (PCI) is a significant clinical implement for evaluating and accessing the vasculature of the heart. It is an progressively significant revascularization approach in coronary heart disease management. The mandate for percutaneous coronary intervention (PCI) applies constant pressure on health care systems to encounter the increasing needs of patients **(Ford., 2008; Petroni et al., 2016).** Nurses show a critical role in supplying care in both the independent and collaborative circumstances of percutaneous coronary intervention management.

The results of the present study demonstrate that majority of patients were aged (54.37±5.14), male, smokers, varied between overweight and obesity. Significance differences were found between the four groups regarding respiration, urinary retention, postural hypotension, nausea. In addition to presence and intensity of pain for the benefit of group 4 (early ambulation group).

Regarding age, the study results were congruent with **Ibrahim et al., 2013** which emphasize that aging is an un-modifiable risk factor for CAD. The ageing population has enhanced the influence of CAD to total disease burden. These results may be due to changes in lifestyle factors in the young age including dramatic growing of obesity, sedentary lifestyles, increasing diabetes, hypertension and persistent smoking in young adults promoted by the aging physiological changes.

In relation to sex, majority of patients were males. This result is constant with **Abdelaal et al., 2013** meta-analysis indicates that 64% of PCI cases were men. Conversely, **Beltrame et al., 2012** who informed that CAD is the principal cause of mortality for both adult males and females alike worldwide. Although the initial manifestation of CAD is delayed in females by about ten years compared to males, there is no abrupt increase in CAD mortality rates for females directly following menopause but advanced increase over consequent years.

Majority of patients were obese and overweight, this result is harmonious with Egyptian Hypertension Society which described that increased plasma cholesterol is now an established risk factor for CAD. Regarding the all-over sociodemographic characteristics, **Abdelmoneim et al**. (**2014**) emphasize present study results and found that the majority of patient were at a mean age of (58± 11 vs 57± 12 years, male gender, smoking, and familial predisposition, hypertension, and diabetes.

The results of this study showed that vital signs (temperature, pulse, respiration and blood pressure) were within the normal range along four positions during assessment 1$^{st}$, 6$^{th}$, 12 hours post the diagnostic transfemoral cardiac catheterization patients. This may be related to that patients in the present study had pre-catheterization stable vital signs, and during the procedures there was not any complication. which considered congruent with the results of **Abbass** (**2014**), who studied the effect of gradual early ambulation on recovery and satisfaction of patients undergoing percutaneous coronary intervention and found vital signs were within the normal range along the six hours post the diagnostic cardiac catheterization among patients. Also, **Ramadan et al (2019)** in their study about association between time of ambulation and clinical outcome of patients after cardiac catheterization, there was no significant changes between change position and vital signs of patients.

As for pain, the present study shown that patients in the first group experienced more back pain post transfemoral coronary catheterization than of the 3 groups patients that

patient change their positions; It was noticed that all patients in the intervention group reported that they felt relaxed and comfortable after changing their position, that could be due to back pain is a main and general problem resulting from prolonged bed rest. **Abd et al (2018)** results were harmonious with current study who found that back pain was one of the complaints often recounted by patients who were obligatory for strict bed rest and immobilization after cardiac catheterization.

In present study it was observed that the early ambulation group (4th group) had low incidence rate and severity of pain, that may be related to changing position of patient every hour and early ambulation after 4 hours of the cardiac catherization. The present study finding was in agreement with **Dal Piva et al. 2014** who explained that the predominant discomfort after femoral puncture was lumbar pain. Their findings validate the recommendations for a clinical practice that promotes better patient care, including comfort measures, such as the use of cushions, changes in body position, supervised ambulation and the creation of a welcoming environment. Moreover, **Chair et al., 2003** concluded that in patients who had non-emergency coronary angiography, changing their position in bed reduced back pain without increasing the incidence of bleeding from the catheter insertion site. Also, **Matte et al., 2016** trial show that reducing bed rest time to 3 hours after elective cardiac catheterization is safe and does not increase complications as compared with a 5-hour rest. The mean of pain intensity in the fourth and sixth hours showed a significant difference. It also recommended that changing patients' position can be safe and they can be ambulated early after cardiac catherization.

**According SCAI expert consensus statement for best practices in the cardiac catheterization laboratory 2016**, its recommendation of best practices are in the same line with our study finding which represented in " Length of stay for diagnostic catheterization ranges from 2–6 hr, depending on the access site used and the nursing assessment of patient ambulation and wellbeing. The length of stay for PCI is dependent on access site complications, patient comorbidities, and need for further procedures, therapy, or testing. Selected patients after elective PCI can be considered for same-day discharge if the appropriate monitoring time has been completed (usually 6–8 hr) and the discharge aligns with patient preference and physician approval".

Furthermore, the present study results are consistent with **Abdollahi et al., 2015** who conduct a study to assess the effect of changing position and early ambulation on low back pain, urinary retention, bleeding and hematoma after cardiac catheterization. The present results showed that none of patients developed vascular complications.

Continue in this context, **Rezaei-Adaryani et al., 2009** conducted a study to evaluate the consequence of changing position and early ambulation on the level of comfort, satisfaction, and fatigue and on the amount of bleeding and hematoma after cardiac catheterization. The results of this study showed that the levels of comfort, satisfaction and fatigue after catheterization are related to the duration of bed rest and patients' position in bed. Changing patients' position accompanied by early ambulation after cardiac

Occurrence of urinary retention was higher in the first group, that may be related to patients` position in a supine position made them sense that they had difficulty urination. This finding is supported by evidence **Hansen et al (2011),** which displays that patients who undergo cardiac catheterization might develop urinary retention due to various causes such as lack of pre operation teaching regarding emptying of the bladder before the operation. **Ibdah, et al., (2020);** who reported patients who suffered from urinary retention was lower in the intervention group (siting position) in comparison with control group (supine position), where statistically significant differences.

Concerning vascular complications Incidence (hematoma ,bleeding, thigh swelling, distal pulse, capillary refill, peripheral edema, foot color, foot temperature, foot sensation, and toes motion), this study clarified that all patients

in four groups had no vascular complications during 1st, 6th, 12th hours of assessment post transfermoral catherization. This finding in a line with study that conducted by **Rezaei-Adaryani et al., 2009** who assess the effect of changing position and early ambulation on the level of comfort, satisfaction, and fatigue and on the amount of bleeding and hematoma after cardiac catheterization., and decreasing the level of fatigue without increasing the amount of bleeding and hematoma in changing position after cardiac catherization.

**Limitation of the study:**

Although the present study adds an important perspective to the already robust literature on this subject, as it emphasize the benefits of early ambulation. Traditions that support the bed rest position are encountered. Therefore, conducting the study on a larger sample and examining other clinical parameters would provide more generalizable findings.

## Conclusion and recommendations:

This study concluded that the majority of patients were within a mean age of (54.37±5.14), male, smokers, varied between overweight and obesity. Significance differences were found between the four groups in relation to respiration, urinary retention, postural hypotension, nausea. In addition to presence and intensity of pain for the benefit of group 4 (early ambulation group) that assume changing position according to the approach of the third group, sand bags were put on the location for three hours and at the end of the fourth hour, if there were no complications; the patient would be helped to leave the bed gently. It was recommended to further investigate the effect of early ambulation on a large sample size and different clinical parameters. Decreasing the priod of bed rest to 3 hours should be investigated further.

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## Disclosures

The authors declare no conflict of interest concerning the research, authorship, and publication.

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