- *Basic Research*

Effect of palmar warming versus transient ulnar compression on the success rate of arterial puncture in critically ill patients

Intessar Mohamed Ahmad

Assistant Professor of critical care & emergency nursing,critical care & emergency nursing department,Faculty of nursing, Damanhur University.

Abstract:

Background: Difficulty of ABG punctures results in increased workloads and lost time in congested emergency rooms. Palmar warming of radial artery and transient ulnar artery compression are methods generally used to grease radial perforation and drop number of failures at the first attempt of arterial perforation. **The aim of the study:** was to evaluate the effect of palmar warming versus transient ulnar compression on success rate of arterial puncture in critically ill patients.

Materials and Method: Research Design: A quasi experimental design was implemented in this study. **Setting:** This study was performed at the general ICU of Damanhur Medical Institute. **Sample:** A convenience sample of 25 critical care nurses and 150 patients were enrolled in this study.

Instrument: Two instruments were used to accomplish this study. Tool I: Nurses' characteristics and competence for performing arterial punctures tool. Tool II: Patients' characteristics and success rate of arterial punctures tool.

Method: studied patients were divided into two groups: palm warming (group I) and transient ulnar compression group (group II). Patients who were assigned to the palm warming experimental group were inherited an air- activated heat pack to bridle in their hand for palmar warming before arterial puncture for 5-10 minutes. Patients who were assigned to the ulnar compression experimental group were subjected to manual pressure by the nurse's finger at the level of the wrist joint in Guyon's canal as long as the arterial sample was drawn, and the compression did not stop until the completion of the arterial sample.

Results: It was found that the mean of arterial puncture trials in palm warming trials was lower than the mean of ulnar compression group with significant difference. The mean number of arterial puncture trials in the palm warming group for the patients whose systolic blood pressure ranged from 110–≥120 was significantly higher than the mean number of arterial puncture trials for the patients whose systolic blood pressure was less than 90. On the other hand, there was a significant negative correlation between the mean number of arterial puncture trials in palm warming groups and both of systolic, diastolic and, mean blood pressure measurement.

Conclusion: Using palmar warming is more effective for a successful arterial puncture. There is a need for further study to combine palmar warming and ulnar compression, especially for patients with blood pressure less than 50 mmhg.

Key words: palmar warming, transient ulnar compression, success rate, arterial puncture, critically ill patients.

1. Introduction:

Nurses are taking an important position in detection of acid-base imbalance of critically ill patients in intensive care units. The nurse is working in medication administration, Oxygen treatment and mechanical ventilation if indicated [(1)]. Arterial blood gases are ordered frequently by emergency medicine, intensivist, anesthesiology and pulmonology doctors as an important step of respiratory assessment in acutely ill cases. Physicians in the fields of emergency medicine, intensive care, anesthesiology, and pulmonology frequently order arterial blood gases as a crucial component of respiratory assessment in critically ill patients.

There are numerous physiological diseases that are estimated by interpretation of an ABG similar as acute respiratory distress syndrome (ARDS), extreme sepsis, hypovolemic, circulatory failure, diabetic ketoacidosis, renal tubular acidosis, acute respiratory failure, acute heart failure, cardiac arrest and bronchial disclinations [(2)].

Blood samples for ABG analysis are drawn by nurses in various nations, including Egypt and Spain [(3-5)]. These occur in the following order of frequency: hematoma, infection, puncture site bleeding, bacteremia, permanent ischemic injury, arterial spasm and occlusion, and pseudoaneurysm. Additionally, the hand puncture injury's ischemic injury is the most severe side effect. While the most frequent side effect is pain. A difficult, intrusive technique with dangers, arterial puncture is always described [(6, 7)].

Difficulty of ABG punctures results in increased workloads and lost time in congested emergency rooms. Currently, 10% of first-time attempts are reported to fail [(8)], and multiple punctures are frequently the result of the procedure. Additionally, repeated radial punctures can significantly affect radial artery patency over the long term [(9)]. Direct heating of radial artery, palmar warming of radial artery and transient ulnar artery compression are methods generally used previous to transradial coronary catheterization to grease radial perforation and drop number of failures at the first attempt of arterial perforation [(10)].

There are many factors in ICUs, increasing the rate of failure at the first arterial puncture attempt including: haemodynamic instability with non- palpable radial or ulnar artery is one of these factors [(11)]. Hence, the purpose of this study was to evaluate effect of palmar warming versus transient ulnar compression on success rate of arterial puncture among critically ill patients.

2. Aim of the study:

- The aim of the study was to evaluate the effect of palmar warming versus transient ulnar compression on success rate of arterial puncture in critically ill patients

3. The study hypotheses:

1- Using palmar warming will have a higher success rate for arterial puncture than transient ulnar compression in critically ill patients.

2- Using transient ulnar compression will have a higher success rate for arterial puncture than palmar warming in critically ill patients.
3- Null hypotheses: There is no difference between the effects of palmar warming and transient ulnar compression on the success rate of arterial puncture in critically ill patients.

4. MATERIALS AND METHOD

4.1 Research design

The research design of this study was a quazi experimental design.

4.2 Setting:

-This study was conducted at the general ICU of Damanhur Medical Institute which contains 15 beds.

4.3 Subjects: A convenience sample of 25 critical care nurses and 150 patients were involved in this study based on the Epi-Info program according to the following parameters: confidence coefficient 95%, expected frequency 50%, margin of error 5%, the decisive sample size was 150. Nurses were concluded according to the following additional attributes: nurses who had clinical experience of not less than a year in an intensive care unit and had a success rate of arterial puncture of 70% or more; their success rate was determined as the researcher observed nurses while they were drawing samples for 10 patients before starting the research. Nurses who succeeded in drawing samples for 7 patients out of 10 by the first trial could successfully draw an arterial sample from the first trial by 70%. Patients were concluded according to the following additional attributes; age > 18 years old, hemodynamically unstable, newly admitted patient, and in need of the first arterial puncture investigation to assess blood gases and determine the necessity of mechanical ventilation. Furthermore, they were excluded according to the additional exclusion attributes, which included previous attempts at arterial puncture for investigation and the presence of any risk factors for arterial puncture failure such as fibrosis.

4.5 Tools:

- Two tools were developed by the researcher and used to accomplish this study after reviewing of related literature [1, 4]:

Tool I: Nurses' characteristics and competence for performing arterial punctures.

It comported of two partitions; Partition I: This part was used to identify the characteristics of nurses, including name, age, sex, educational level, and experience.

Partition II: This partition was an observational checklist used by the researcher to identify the nurses' competence for performing arterial punctures.

The observational checklist included the 10 items for the steps for arterial puncture, including the following 5 subtitles: site selection for arterial puncture, performing Allen's test, proper positioning of the patient's hand, proper alignment of the needle and artery, and compression time, which was needed until stoppage of bleeding. These items were rated as having been done correctly and completely, done incorrectly, or not done. Each statement was scored on a 5-point Likert scale ranging from" not done" (0 point) to "done correctly and completely" (2 points).

Tool II: Patients' characteristics and success rate of arterial punctures:
This tool was used to determine the success rate of arterial punctures for the studied patients, and it consisted of two parts:
Part I: included the characteristics and clinical data of the patients. They were age, sex, medical diagnosis, past medical history, date of ICU admission, date of starting mechanical ventilation, and vital signs, including pulse, body temperature, systolic and diastolic blood pressure.
Part II: this part was used to determine the number of trials for arterial puncture for the first time for each patient. A successful trial is one that is drawn from the first attempt with enough blood and arterial blood results (not a venous or mixed sample).

4.6 Methods:

- An official letter from the Dean of the Faculty of Nursing at Damanhour University was transferred to the hospital authorities in Damanhour Medical Institute and blessing to conduct this study was attained after furnishing an interpretation of the purpose of the study.
- Damanhour University Research Ethics Committee approved this study on March 17, 2022 No.54. Written informed consent was obtained from a family member of each patient.
- The two tools of the study were created by the author after looking at the relevant literature [8-11]. These tools were presented to a panel of 7 critical care experts to assess the clarity and accuracy of the content, and any necessary changes were made accordingly.
- A pilot study was done on 23 patients (10 % of the research subjects) to examine their lucidity and they were barred from the study. A pilot study revealed that further variations were not demanded.
- Reliability of nurses' competence for performing arterial punctures tool was tested using Cronbach's Alpha test and result was 0.90%.
- Twenty five nurses were involved in this study with, total of 150 trials of arterial puncture on 150 consecutive patients who were admitted to the general ICU (Damanhur Medical Institute, Damanhur, Egypt) between October 2022 and February 2023. The researcher observed nurses when they drew arterial samples from 10 patients and calculated their success rate for the first trial. The success rate of the arterial puncture for each nurse was determined before starting the study, which should not be less than 70% for the first trial.
- Before starting the research, nurses were trained to use both transient ulnar pressure and an air- activated heat pack for palm warming.
- Then, the studied patients were divided into two groups: palm warming and ulnar compression groups randomly by using the simple random method (folded paper).
- For both groups, each nurse drew an arterial sample for three patients in each group by using an insulin syringe. As demonstrated in a previous study, puncture of the radial

artery with an insulin needle was less painful than with a regular needle [16]. It was not permitted to perform more than two trials in the same hand when there was any failure. Also, it was not permitted to try more than four trials in both hands with a five minute interval between each trial.

- Patients in the palmar warming group were inherited an air-activated heat pack to bridle in their hands for 5 to 10 minutes before to artery puncture in order to warm their palms.

- Patients who were assigned to the ulnar compression group were subjected to manual pressure by the nurse's finger at the level of the wrist joint in Guyon's canal for 1 minute before inserting the needle and as long as the arterial sample was drawn. Moreover, the compression did not stop until the completion of the arterial sample.

- Nurses were observed during the performance of each arterial puncture trial to fulfill an observational checklist to identify the nurses' competence for performing arterial punctures (Part II, Tool I).

5. Statistical Analysis:

With the use of the IBM SPSS software package version 20.0, data were input into the computer and analyzed. (IBM Corp., Armonk, New York). Numbers and percentages were used to describe qualitative data. The normality of the distribution was assessed using the Kolmogorov-Smirnov and Shapiro-Wilk tests. The range (minimum and maximum), mean, and standard deviation were used to explain numerical data. The 5% level of significance (p= 0.05) was used to determine the results' statistical significance.

The tests used were:

1 - The first test employed was the **Chi-square test**: was used to differentiate various groups for categorical variables.

2 - Monte Carlo adjustment: was used when more than 20% of the cells had an expected count lower than 5, and the chi-square must be corrected.

3- F-test (ANOVA): was used to differentiate more than two groups for quantitative variables that are normally distributed**.**

4 - The Kruskal-Wallis test: was used to examine numerical variables with aberrant distributions between more than two research groups.

5-rs: Spearman coefficient: it was used for determining how quantitative variables were correlated.

6. Results:

The nursing staff members who were involved in the current study are described in Table I. There were 25 nurses who took part in the study as a whole. According to this table, 72% of the nurses who were the subject of the study were men. In addition, between 18 and 20 was the average age of the nurses who were the subject of the study. From this table, it can be seen that the majority of them (80%) have a baccalaureate degree, which speaks to their level of education. This table shows that three-fifths of the nurses in the study (60) had experience in the ICU ranging from 1.5 to 2 years.

Table II presents the distribution of the studied nurses according to their adherence to the checklist for arterial puncture. It can be observed that more than 50% of nurses in both groups chose the right location for their arterial punctures. Moreover, the majority of them performed the rest of the steps of the arterial puncture correctly. There was no significant difference in CCNs' compliance with the steps of arterial puncture between the different groups (p=0.135).

Table III shows the characteristics of the patients who were involved in the current study. The total number of patients who participated in this study was 150. There were divided as 75 patients in each group. Concerning patients' gender, this table illustrates that more than one third of the studied patients (38.2%) were between ages of 51-60. Moreover, studied patients, were nearly equal as regards to their sex. In relation to medical diagnosis, it can be said that nearly half of them (45.3%) had neurological disorders; followed by more than one fifth of the studied patients had respiratory disorders.

Table IV reveals the mean and standard deviation differences of vital signs between the studied groups**.** It can be noted that the mean diastolic, systolic blood pressure and the mean arterial blood pressure in the group of ulnar compression were higher than the other different means in the palm warming group with no significant difference.

Table V demonstrates the distribution of the studied groups according to the number of arterial puncture trials. It can be noted that the mean of arterial puncture trials in palm warming trials was lower than ulnar compression group with a significant difference while, H=89.584 and p=<0.001.

Figure 1 displays the comparison between the studied groups according to the mean of arterial puncture trials. It can be noted that the number of arterial puncture trials in the range of 1-2 in palm warming was higher than the number of trials in the same range in the ulnar compression group. Also, it was lower than the number of trials in the other group in the range of 3-4. Moreover, there was a significant difference between them with χ^2=78.881 and p=<0.001*

Table VI shows the relationship between the number of arterial puncture trials and blood pressure measurement**.** It can be noted that the mean number of arterial puncture trials in the palm warming group for the patients whose systolic blood pressure ranged from 110–≥120 was significantly higher than the mean number of arterial puncture trials for the patients whose systolic blood pressure was less than 90. P= 0.003. On the other hand, table VII presents the correlation between the number of arterial puncture trials and blood pressure measurements. There was a significant negative correlation between the mean number of arterial puncture trials in palm warming groups and both of systolic, diastolic and, mean blood pressure measurement. P= 0.003, 0.008, and 0.002 respectively.

Table 1: Distribution of the studied nurses according to their characteristics

Nurse characteristics (n = 25)	**No.**	**%**
Age		
18-20	11	44
>21-25	3	12
>25-30	10	40
>30	1	4
Sex		
Male	18	72
Female	7	28
Education		
Bachelor	20	80
secondary nursing technical school	4	16
Technical Nursing Institute	1	4
Experience (per year)		
1-1.5	10	40
>1.5-2	15	60

Table II: Distribution of the studied nurses according to their adherence to the checklist for arterial puncture:

Steps of arterial puncture checklist	Studied groups											
	Palm warming						Ulnar compression					
	Not done		Done incorrectly		Done correctly		Not done		Done incorrectly		Done correctly	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Site Selection Check at least two viable sites	7	28	5	20	13	52	6	24	7	28	12	48
Proper positioning of the hand	4	16	8	32	13	52	3	12	8	36	14	56
Hold hand if necessary	2	8	2	28	21	84	1	4	2	8	22	88
Perform Allen's test	0	0	7	28	18	72	0	0	5	20	20	80
Proper Positioning Hyperextend the patient's wrist for radial artery access	1	4	3	12	21	84	4	16	3	12	18	72
Support patient's hand over a comfortable surface.	1	4	3	12	21	84	1	4	3	12	21	84
Proper alignment of the needle The needle should **be aligned** with the artery against the flow of blood	1	4	5	20	19	76	0	0	5	20	20	80
Apply compression	0	0	2	8	23	92	0	0	2	8	23	92
	Total Score (0-20)											
Mean ± SD.	17.04 ± 3.55						17.04 ± 3.55					
	% Score											
Mean ± SD.	85.20 ± 17.76						85.20 ± 17.76					
Fr. (p)	**4.0 (0.135)**											

Table III: Distribution of the studied groups according to patients' characteristics

Patients' characteristics	Studied groups							
	Palm warming (n = 75)		Ulnar compression (n = 75)		Total		χ^2	p
	No.	%	No.	%	NO.	%		
Age								
8–30	8	10.7	11	14.7	27	12	6.94	0.54
31–40	0	0	1	1.3	2	0.9		
41–50	19	25.3	8	10.7	42	18.7		
51–60	28	37.3	29	38.7	86	38.2		
>60	20	26.7	26	34.7	68	30.2		
Sex								
Male	38	50.7	38	50.7	112	49.8	142	0.93
Female	37	49.3	37	49.3	113	50.2		
Medical diagnosis #								
Neurological disorders	29	38.7	36	48	102	45.3	14.23	^{MC}p= 0.24
Endocrinal disorders	4	5.3	8	9.3	18	8		
Respiratory disorders	21	28	20	26.7	52	23.1		
Renal disorders	12	16	7	9.3	35	15.6		
Cardiac disorders	5	6.7	3	4	12	5.33		
others	4	5.3	1	1.3	6	2.7		

F: **F for One way ANOVA test** H: H for **Kruskal Wallis test** # patient may have more than one diagnosis. p: p The value of the differentiation between the 2 groups*: Statistically significant with $p \leq 0.05$

Table IV: Mean differences of vital signs between the studied groups

Vital signs	Palm warming group (n = 75)		Ulnar compression group (n = 75)		χ^2	p
	Mean	± SD	Mean	± SD		
Peripheral pulse	75.3	± 12.6	77.7	± 12.5	H=2.34	0.31
Systolic blood pressure	96.4	± 10.98	101.33	± 14.36	H=5.12	0.08
Diastolic blood pressure	64	± 7.2	67.1	± 8.5	H= 8.81	0.12
Mean arterial blood	74.80	± 8.13	78.49	± 9.88	H=7.716*	0.21
Body temperature	36.87	± 0.31	37	± 0.31	F=3.86*	0.09

± **SD**: standard deviation. H: H for **Kruskal Wallis test**

Table V: Distribution of the studied groups according to the number of arterial puncture trials

Number of arterial puncture trials	Palm warming group (n = 75)		Ulnar compression group (n = 75)		Test of Sig p
	No.	%	No.	%	
1	27	36	6	8	χ^2= 105.287* P= <0.001*
2	31	41.3	27	36	
3	16	21.3	36	48	
4	1	1.3	6	8	
1–2	58	77.3	33	44	χ^2=78.881* MCp=<0.001*
3–4	17	22.7	42	56	
Min.-Max.	1-3		1-4		H=89.584* =<0.001*
Mean ± SD.	1.88 ± 0.79		2.57 ± 0.79		

χ^2: **Chi square test** H: H for **Kruskal Wallis test**

p: p value for differentiation between the studied groups *: Statistically significant at p ≤ 0.05

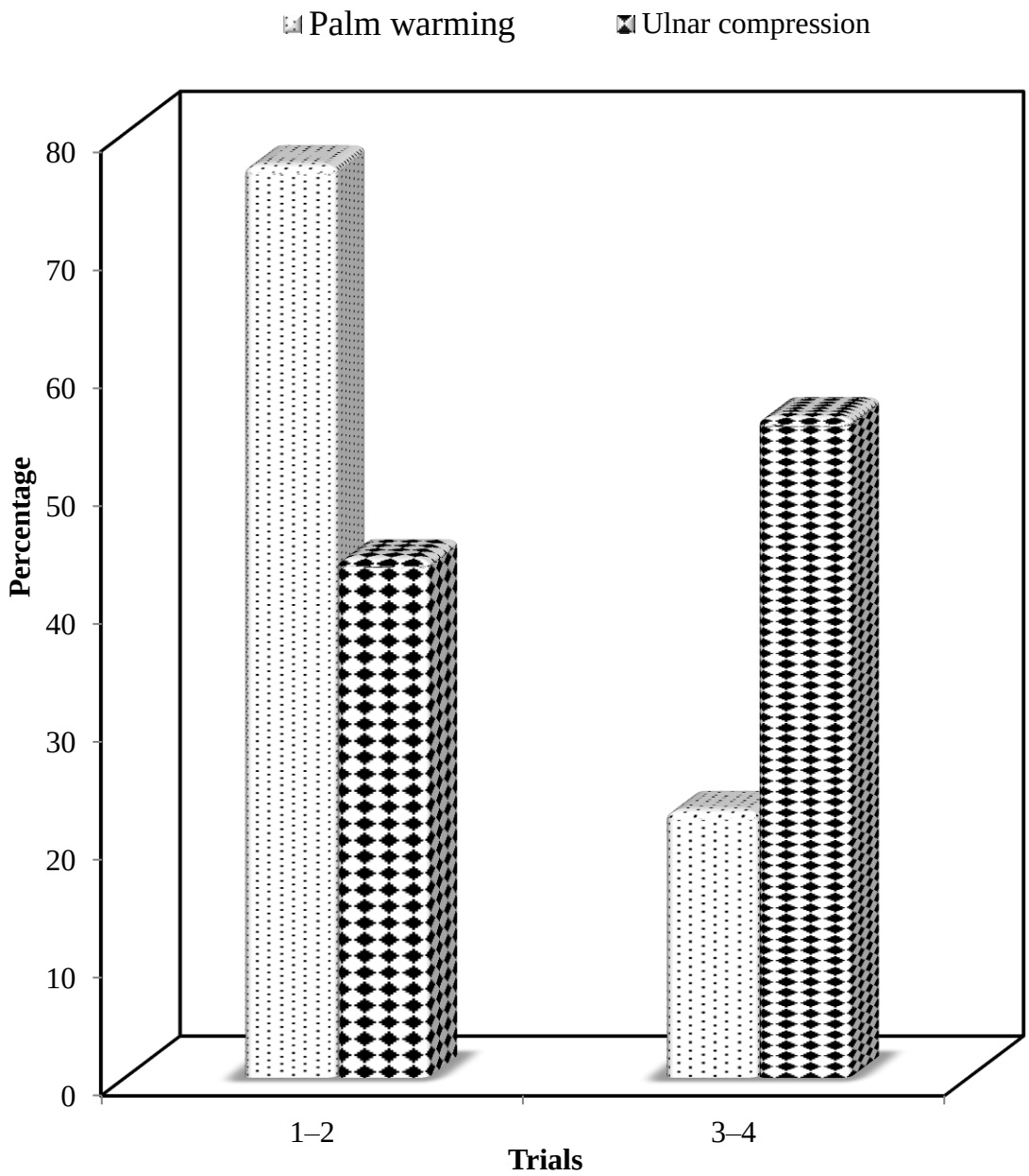

Figure 1: Comparison between the studied groups according to mean of arterial puncture trials

Table VI: Relationship between the number of arterial puncture trials and Vital signs:

Blood pressure	Number of trials in studied groups	
	Palm warming (n = 75)	**Ulnar compression (n = 75)**
Systolic blood pressure		
Less than 90	2.67 ± 0.52	3.0 ± 0.0
90–<100	2.11 ± 0.80	2.75 ± 0.85
100–<110	1.53 ± 0.63	2.52 ± 0.77
110–≥120	1.83 ± 0.83	2.42 ± 0.78
H(p)	**14.166* (0.003*)**	**2.550 (0.466)**
Diastolic blood pressure		
Less than 50	3.0 ± 0.0	3.0
50–<60	2.0	–
60–<80	1.86 ± 0.79	2.57 ± 0.77
80 – ≥90	1.67 ± 0.58	2.56 ± 1.01
H(p)	**4.215 (0.239)**	**0.544 (0.762)**
Mean arterial blood pressure		
40-<60	3.0 ± 0.0	3.0
60-<80	1.85 ± 0.77	2.67 ± 0.77
80-<100	1.83 ± 0.83	2.27 ± 0.83
100-<120	–	3.0 ± 0.0
H(p)	**4.030 (0.133)**	**5.211 (0.157)**

H: H for **Kruskal Wallis test** p: p value for comparison between the studied categories
*: Statistically significant at $p \leq 0.05$

Table VII: correlation between the number of arterial puncture trials and blood pressure measurements

Vital signs	Number of trials in studied groups			
	Palm warming (n = 75)		**Ulnar compression (n = 75)**	
	r_s	**p**	**r_s**	**p**
Peripheral pulse	-0.150	0.199	0.029	0.806
Systolic blood pressure	-0.337*	0.003*	-0.140	0.233
Diastolic blood pressure	-0.302*	0.008*	-0.128	0.273
Mean arterial blood	–0.347*	0.002*	-0.158	0.174
Body temperature	-0.111	0.342	-0.020	0.862

r_s: Spearman coefficient *: Statistically significant at $p \leq 0.05$

7. Discussion:

The results of the current study revealed that more than half of the nurses in each group selected the correct site for the arterial puncture and the majority of them performed the rest of the steps of the arterial puncture correctly. Between the two groups, there was no discernible difference in CCNs or compliance with the arterial puncture steps. This may be related to the fact that the researcher observed nurses when they drew arterial samples from 10 patients before starting the research and nurses who had a success rate of more than 75% for the first trial were involved in this study. Moreover, three- fifths of the studied nurses had experience in the ICU for longer than 1.5-2 years. On the other hand, the majority of them (80%) was highly educated and held a baccalaureate degree, which means that arterial puncture was involved in their educational program for graduation. In addition, nurses' participation in previous educational programs affected their proficiency in drawing arterial sample [(4)].

The results of the current study showed that more than one third of the studied patients (86 patients) were between the ages of 51-60. Moreover, the studied patients were nearly equal as regards their sex. In relation to medical diagnosis, nearly half of them (102 patients) had neurological disorders; followed by more than one fifth of the studied patients had respiratory disorders. It could be related to the fact that patients with respiratory disorders like chronic obstructive pulmonary disease, pulmonary edema, acute respiratory distress syndrome, or pneumonia typically have an ABG analysis ordered. Additionally, it is carried out during cardiac arrest shock resuscitation episodes and changes in respiratory therapy or status. Acute respiratory failure (ARF) can also result from a variety of neurological disorders that affect the bulbar respiratory center, spinal cord, motoneurons, peripheral nerves, neuromuscular junction, or skeletal muscles[(12- 14)].

The number of arterial puncture trials in the palm warming group was lower than in the ulnar compression group, with a significant difference. In addition, the number of arterial puncture trials in the range of 1-2 trials in palm warming was higher than in the ulnar compression group. Also, it was lower in the range between 3 – 4 trials than in the ulnar compression group, with a significant difference. These results demonstrated that palmar warming was more efficient and had a higher success rate for the first trial arterial puncture because it causes vasodilatation of radial artery. The vasodilation is via the vascular bed in the hand. This is due to the activation of the skin's cutaneous sympathetic co-oprolator system. The following studies support this claim: Ramsey et al., 2018[(15)] palmar warming induces radial arterial vasodilation, Chen et al. [(16)], 2018; palmar warming is effective at arterial vascular baseline vasodilation, Dharma H et al. [(17)], 2016; palmar warming may also reduce radial artery rate of occlusion.

In these previous studies, applying heat to the distal vesicle bed may also increase blood flow by stimulation of cutaneous receptors all over the hand and activation of the sympathetic cholangiostatic active vasodilation system. Moreover, it was recommended that radial heating with heat is preferable to other techniques to reduce the occlusion of radial artery than ulnar compression in addition, Unal (2017) [18] demonstrated that radial heating with heat reduces the number of attempts to puncture radial artery. Radial heating directly or through palmar heating is cheap, there is no extra cost, and it can be done by anyone.

In this study the mean number of arterial puncture trials in the palm warming group for the patients whose systolic blood pressure ranged from 110 – ≥120 was significantly higher than the mean number of arterial puncture trials for the patients whose systolic blood pressure was less than 90. On the other hand, there was a significant negative correlation between the mean number of arterial puncture trials in palm warming groups and both of systolic, diastolic, and mean blood pressure measurement. This result was related to decreases blood pressure and haemodynamic instability which stimulates the sympathetic nervous system and results in arterial vasoconstriction [19].

It is essential to identify the primary causes of abnormal vessel vasoconstrictor activation, which include: trauma from Lidocaine injector, the room temperature is always lower than the body temperature (approximately 22 - 24°C), exposure to cold stimulates the skin's cold receptors, resulting in cold thermal sensations, the sympathetic nervous system stimulates the body's response to cold by vasoconstriction the skin, the arms and the legs, resulting in changes in the blood pressure in the arteries and release of vasoconstrictors and some hormones. The body's physiological response to cold causes the radial artery to contract, preventing radial puncture [20 - 21].

Although, the success rate of arterial puncture by using palm warming was affected by hypotension [20], it was still higher and better than the success rate with the other method, transient ulnar compression (table VI). So, it is recommended to use palm warming during arterial puncture especially for hemadynamically unstable patients.

8. Conclusion: it can be concluded that using palmar warming is more effective for a successful arterial puncture. Moreover, the use of ulnar compression has some benefits over not using it.

9. Recommendation: Recommendations for clinical practice:

- Nursing management protocol for arterial puncture should be including the two different techniques palm warming and transient ulnar compression.

- **Recommendations for education and training:**

- The curriculum of nursing students should focus on the importance of using these two different techniques palm warming and transient ulnar compression in the arterial puncture.

- **Recommendations for administration:**

- The hospital's budget must be directed to the purchase of equipment and accessories necessary for the implementation of palm heating.
- Managers should routinely review nurses' adherence to palm warming and transient ulnar compression during arterial puncture.

Recommendations for research:

- *Further study:*

1-There is a need for further study to combine palmar warming and ulnar compression, especially for patients with blood pressure less than 50 mmhg.

2- There is a need for further study to compare effects of palmar warming in males and females.

3- There is a need for further study to examine to what extent atherosclerosis and sedation may affect the degree of vasodilation with palmar warming.

10. Limitation of the study:

- The response to palm warming may not be as strong in patients with atherosclerotic disease, and concomitant medications that may be used during mechanical ventilation (sedation) may affect vasodilation with palm warming.

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الملخص العربى

تأثير تدفئة الكف مقابل الضغط الزندي المؤقت على معدل نجاح الثقب الشريانى لمرضى الحالات الحرجة

المقدمة: الممرضات يأخذون دورًا حاسمًا في الكشف المبكر عن اختلال التوازن الحمضي القاعدي للمرضى ذوي الحالات الحرجة في وحدات العناية المركزة. يعد قياس غازات الدم الشرياني الآن من بين الاختبارات المعملية الأكثر شيوعًا في الطب. نتيجة لذلك ، غالبًا ما يتم تنفيذ الإجراءات الغازية مثل أخذ عينات الدم الشرياني في البيئات السريرية.

الهدف من الدراسة: تحديد تأثير ارتفاع درجة حرارة الكف مقابل الضغط الزندي المؤقت على معدل نجاح الثقب الشرياني في المرضى ذوي الحالات الحرجة.

المواد والطريقة: **تصميم البحث:** تم تنفيذ تصميم شبه تجريبي في هذه الدراسة.

مكان اجراء البحث: أجريت هذه الدراسة في وحدة العناية المركزة العامة بمعهد دمنهور الطبي.

العينة: تم تسجيل عينة ملائمة من 25 ممرضة رعاية حرجة و 150 مريضا في هذه الدراسة.

الأداة: تم استخدام أداتين لإنجاز هذه الدراسة. الأداة الأولى: الممرضات والخصائص والكفاءة لأداء أداة ثقب الشرايين. الأداة الثانية: خصائص المرضى ومعدل نجاح أداة ثقب الشرايين.

الطريقة: قسم المرضى الخاضعين للدراسة إلى مجموعتين: تدفئة الكف (المجموعة الأولى) ومجموعة الضغط الزندي المؤقت (المجموعة الثانية). تم اعطاء المرضى الذين تم تعيينهم في المجموعة التجريبية لتسخين الكف حزمة حرارية تنشط بالهواء لتثبيتها في أيديهم لارتفاع درجة حرارة راحة الكف قبل ثقب الشرايين لمدة 5-10 دقائق. تعرض المرضى الذين تم تخصيصهم للمجموعة التجريبية للضغط الزندي للضغط اليدوي بإصبع الممرضة على مستوى مفصل الرسغ في قناة جويون اثناء سحب عينة الشرايين ، ولم يتوقف الضغط حتى اكتمال الشريان الشرياني عينة.

النتائج: وجد أن متوسط تجارب ثقب الشرايين في تجارب تدفئة الكف كان أقل من الوسيلة الأخرى للضغط الزندي مع المجموعتين

فرق واضح. متوسط عدد تجارب الثقب الشرياني في مجموعة تدفئة الكف للمرضى الذين يتراوح ضغط الدم الانقباضي لديهم بين 110 120 كان أعلى بكثير من متوسط عدد تجارب الثقب الشرياني للمرضى الذين كان ضغط الدم الانقباضي لديهم أقل من 90. على من ناحية أخرى ، كان هناك ارتباط سلبي بين متوسط عدد تجارب الثقب الشرياني في مجموعات تدفئة الكف وكلا من قياس ضغط الدم الانقباضي والانبساطي ومتوسط ضغط الدم.

الخلاصة: استخدام تدفئة الكف أكثر فاعلية لنجاح ثقب الشرايين. هناك حاجة إلى مزيد من الدراسة للجمع بين تدفئة الكف والضغط الزندي ، خاصة بالنسبة للمرضى الذين يقل ضغط الدم عن 50 مم زئبقى.