The Academic
International Journal of Multidisciplinary Research

An Online Peer Reviewed / Refereed Journal
Volume 3 | Issue 6 | June 2025
ISSN: 2583-973X (Online)
Website: www.theacademic.in

Effectiveness of Hemodynamic monitoring guidelines on nurses Knowledge and Practice in Critical Care Units of a Tertiary Care Hospital.

Ms. Doli Biswas

PhD Scholar, Mansarovar Global University, Madhya Pradesh India, doli.biswas1973@gmail.com

Prof. Dr. Asha Sreenivasan

Professor, Department of Nursing, ashasreeni1984@gmail.com

DOI : https://doi.org/10.5281/zenodo.17035520

ARTICLE DETAILS

Research Paper

Accepted: 25-06-2025

Published: 10-07-2025

Keywords:

Critical Care Nurses; Hemodynamic Monitoring; Hemodynamic Monitoring Guidelines,

ABSTRACT

Hemodynamic monitoring is the most important dimension of patient monitoring in acute care settings. Its effectiveness is related with improved patient outcomes following hemodynamic guidelines (Pinsky et al., 2022). Managing hemodynamically unstable patients requires an integrated and responsive approach (Abu Farah & Khleif, 2024). In critical care units, as a specialized team member, nurses are playing a pivotal role (Howthan, 2024). The study aimed to assess the existing knowledge and Practice on hemodynamic monitoring among critical care nurses & to introduce and evaluate the effectiveness of hemodynamic monitoring guidelines in terms of improvement in post-test knowledge and Practice scores. A quasi experimental research approach with experimental & control group pre-test and post-test research design was adopted for this study. Total 61 Nurses (31 for experimental and 30 for control group) were participated following convenience sampling technique from critical care units of a Multispeciality Hospital. Three tools were used for the collection of data. 1. A Self-administer questionnaire to collect demographic characteristics of Critical Care nurses followed by 2. knowledge

questionnaire to assess Nurses' knowledge regarding hemodynamic monitoring prepared on Central venous pressure, Arterial Pressure, Pulmonary arterial pressure monitoring and Oxygen saturation measurement. 3. Practice Observation Check-lists to assess practice on hemodynamic monitoring on these parameters. The study results of experimental and control group revealed that the majority of samples participated in this study were female, 25(81%) and 23(74%). Their age group between (26-30) years, 15(48%) and 13(42%) respectively. Most of them General Nursing & Midwifery 25(81%) and 23(74%), more than 3 years of clinical experiences, 16(52%) and 17(55%) in experimental and control group. The data also reported that the majority of samples in experimental group and control group, 26(84%) and 29(94%) had no previous experience or attended any training regarding hemodynamic monitoring. The study results reported, before introduction of hemodynamic monitoring guidelines the knowledge score was poor in (15)48.39%, Average (10)38.26%, very good (4)12.9% and excellent (2)6.45% only. But after introduction it improved to excellent (20)64.52%, very good (8)25.81% and in the same the pre-test practice scores, very good and excellent were only (5)16.13% and (1)3.23% but after intervention post-test, it improved to (10)32.26% and (15)48.39% respectively. The post-test Mean and SD of knowledge score was 36.52 and SD 5.07 improved from the pre-test Mean 25.55 and SD 9.10 and the post-test Mean 60.07 and SD 10.01 of practice score was improved from the pre-test Mean 37.97 and SD 4.59 with a significant t-value of 11.08 and 12.12 at $p < 0.001$ This enhancement of knowledge and practice establish the effectiveness of hemodynamic monitoring guideline among critical care nurses. Whereas in control group both the pre-test and post-test knowledge scores among critical care nurses have only 2(6.66%) and 3(12%) excellent, 2(6.66%) and 2(6.66%) very good, 9(30%) and 7(23.33%) average, 17(56.66%) and 18(60%) poor. In case of pre-test and post-

test practice scores, they had only 1(3.33%) and 3(10%) excellent practice, 4(13.33 %) and 4(13.33%) very good practice, 5(17%) and 5(16.66%) average practice, 20(67%) and 18(60 %) poor practice score. From the above values, it was clearly identified that the post-test knowledge and practice scores in experimental group were significantly improved after introducing the hemodynamic monitoring guideline among critical care nurses.

Introduction:

Hemodynamic monitoring is an essential part of cardiovascular assessment (Scheeren & Ramsay, 2029). Among cardiovascular assessment, arterial and venous pressure assessment is most relevant monitoring for critical care nursing (Ghiassi et al., 2022). Critical care nursing needs early recognition and evaluation. Hemodynamic parameters have become most common and relevant assessment in clinical practice (Rezkalla & Eleid, 2023). The nurses are working in the critical care unit must understand the severity of instability through continuous hemodynamic monitoring (Vincent et al., 2021). Effective hemodynamic monitoring techniques can identify the cardiovascular insufficiency (CVI) and guide the nurses for better care. No hemodynamic equipment or device will bring better outcomes, only the nurses' adequate knowledge and practice on can bring the better outcomes (Pinsky et al., 2022). Assuring stable hemodynamic conditions through ongoing monitoring is an essential quality of patient care in intensive care units (Hermes, 2024). Nurses should know and practice the basics of Hemodynamic Monitoring and understanding principle (Rajuri, 2023). Research study reported that nurses' knowledge and Practice is successfully improved after training on hemodynamic monitoring (Davis et al., 2025).

Objectives of the study:

1. To assess the existing level of knowledge and Practice of Nursing personnel working in Critical care unit on monitoring of selected Hemodynamic parameters.
2. To assess the post interventional level of knowledge and Practice of Nursing personnel working in Critical care unit on monitoring of selected Hemodynamic parameters.
3. To evaluate the effectiveness of hemodynamic monitoring guidelines on knowledge and Practice of Nursing personnel working in Critical care unit

Methodology: A quasi experimental research approach with pre-test post-test control group design was adopted for this study. Total 61 nurses (31 for experimental and 30 for control group) were participated following purposive sampling technique from critical care units. Data was collected using knowledge questionnaire and Practice by Observation Check-list. The **reliability of the questionnaire** was computed by test-retest reliability technique, using Pearson product moment correlation coefficient, which was 0.95 indicating the tool is reliable and for the Structure observation checklist**,** interrater reliability test (% agreement) and rank difference method was used. Out of 15 Items in **Central venous pressure** observation checklists, there is 100% agreement in all items, for **arterial pressure monitoring** checklist, there was a difference in rating in 1 item, hence the agreement percentages were 93%, for **Pulmonary arterial pressure monitoring**, out of 18 items is 88.7% agreement between two raters. And **Oxygen saturation monitoring** is 100%, Each item in the observation list was discussed, made clear and then re-tested after minor changes which indicated the tool is reliable. Ethical permission was obtained from the ethics committee of the organisation.

Design:

PRETEST – POST TESTCONTROL GROUP DESIGN

R1	O_1	X	O_2	Experimental group
R2	O_3	-	O_4	Control group

Here R – Respondent or the participants for the Research study

O1- Pretest knowledge and practice score of experimental groups

X – Introduction of Hemodynamic monitoring Guidelines

O2- Posttest knowledge and Practice of Experimental group

O3- Pretest Knowledge and Practice of Control Group and

O4- Posttest knowledge and Practice of Control Group

Setting of the study: A Pvt Corporate hospital setting with 312 beds Superspeciality Quaternary care Hospital, with 110 ICUs bed which comprises of Medical Intensive Care, surgical Intensive Care, Respiratory Intensive Care. All Patients were with Hemodynamic Monitors. Nurses are 24x7 Posted in three different shifts to care patient. The primary Nursing allocations follows in all areas. The SOPs (Standard operating processes) are follows same in all Critical Care Unit.

Criteria for sample selection

Inclusion Criteria

1.All types of Critical Care Unit of the Hospital (all Medical &Surgical ICUs)

2.Nurses working in Intensive (Critical) care Unit

3. Invasive hemodynamic monitoring with Central Line, Arterial Line, Pulmonary arterial pressure monitoring & non-invasive Oxygen saturation monitoring included here.

4. Only registered staff nurses employed in Critical care areas included

Exclusion criteria

1. Nurses from other areas of the hospital excluded like wards
2. Here non-invasive BP monitoring excluded
3. Nurses from ward if posted for helping excluded
4. Nurses undergoing induction programme were excluded

Results

Table:1.1 and 1.2 Sample characteristics of experimental and control group

N=31

Demographic Profile of Experimental group			
1	**Age**	**No of Critical care Nurses**	**%**
	21-25	8	26
	26-30	15	48
	31-35	6	19
	36-40	1	3
2	**Sex**		
	Female	25	81
	Male	6	19
3	**Stream in Higher Secondary examination**		

N=30

Demographic Profile of Control Group			
1	**Age**	**No of Critical care Nurses**	**%**
	21-25	7	23
	26-30	13	42
	31-35	8	23
	36-40	2	6
2	**Sex**		
	Female	23	74
	Male	7	26
3	**Stream in Higher Secondary examination**		

	Science	15	48		Science	13	39
	Arts	16	52		Arts	17	55
4	**Professional qualification**			4	**Professional qualification**		
	GNM	25	81%		GNM	23	74%
	B.Sc Nursing	6	19%		B.Sc. Nursing	7	26%
5	**Critical care Specialization**			5	**Critical care Specialization**		
	Yes	2	6%		Yes	3	13%
	No	29	94%		No	27	87%
6	**Years of experience**			6	**Years of experience**		
	<3 years	11	35%		<3 years	10	32%
	3-6yers	16	52%		3-6yers	17	55%
	6 -9 years	4	13%		6 -9 years	3	13%
7	**Preceptorship Experience**			7	Preceptorship **Experience**		
	Yes	16	52%		Yes	11	39%
	no	15	48%		**no**	19	61%
8	Preceptee **experience**			8	Preceptee **experience**		
	Yes	15	48%		Yes	13	45%
	No	16	52%		**No**	17	55%
9	Previous experience of HDM workshop / training			9	Previous experience of HDM workshop / training		
	Yes	5	16%		Yes	1	6%

	no	26	84%		no	29	94%

Table-1.1 & 1.2 revealed about samples characteristics and shows that the majority of samples were female, and their frequencies are 25(81%) in experimental and 23(74%) in control group. According to age, most of them were between (26-30) years of age group, in experimental group 15(48%) and 13(42%) in control group. Table value also revealed that most of the samples were GNM, 25(81%) in experimental and 23(74%) in control group. The maximum number of participants have more than 3 years of clinical experiences and it was 16(52%) in experimental and 17(55%) in control group. The data also reported that the majority of sample has no previous experience or attended any training on hemodynamic monitoring and the pre-test frequencies were in 26(84%) experimental group and 29(94%) in control group. So, researcher arranged one training for them after assessment.

Table-2.1 &2.2 Pre-test Knowledge and Practice Score in experimental group N=31

Pre-test Knowledge score in experimental group			
Category	Pre-test Knowledge score	Frequency	Percentages %
Excellent	36-40	2	6.45
Very good	31-35	4	12.90
Average	26-30	10	32.26
Poor	<26	15	48.39

Pre-test Practice score in experimental Group			
Category	Pre-test Knowledge score	Frequency	Percentages %
Excellent	56-60	1	3.23
Very good	51-55	5	16.13
Average	46-50	6	19.35
Poor	<45	19	61.29

Table-2.1 & 2.2 highlights the pre-test knowledge and practice scores among critical care nurses. In experimental and Control group, excellent 2(6.45%), 1(3.23%), very good 4(12.9%) and 5(16.13%), average 10(32.26%) and 6(19.35%), poor 15(48.39%) and 19(61.29%).

Table-3.1 and 3.2: Post-test Knowledge and Practice Scores in experimental group **N=31**

Post -test Practice score of experimental Gr			
Category	Pre-test Knowledge score	Frequency	Percentages %
Excellent	56-60	15	48.39
Very good	51-55	10	32.26
Average	46-50	4	12.90
Poor	<45	2	6.45

Post-test Knowledge score of experimental Gr			
Category	Pre-test Knowledge score	Frequency	Percentages %
Excellent	36-40	20	64.52
Very good	31-35	8	25.81
Average	26-30	2	6.45
Poor	<26	1	3.23

The above table-3.1 and 3.2 reported that post-test knowledge and practice scores were excellent 20(64.52%) and 15(48.39%), very good 8(25.81%) and 10(32.26%), average 2(6.45%) and 4(12.90%), poor 1(3.23%) and 2(6.45%)

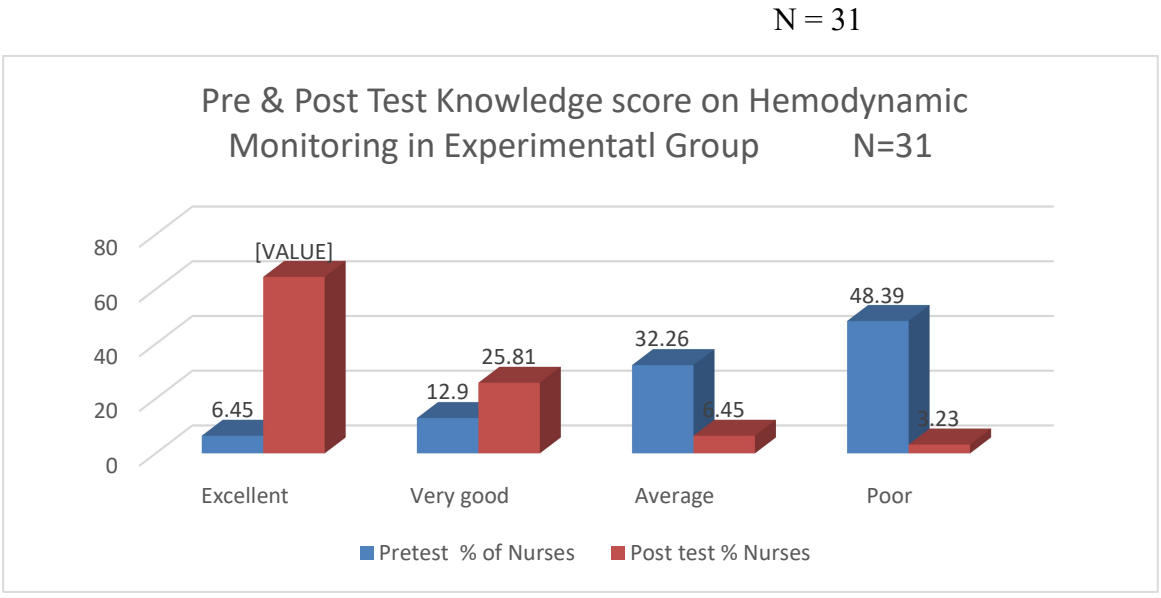

Fig 1: Pre-& post-test knowledge score on Hemodynamic Monitoring

Figure-1 highlighted in the bar diagram that the Pre-test and Post-test Knowledge scores was significantly improved after introduction of hemodynamic monitoring guideline among critical care

nurses. Before introduction the very good and excellent knowledge score was only 12.9% and 6.45% but after introduction it improved to 25.81% and 64.52% and it shows effectiveness. of intervention.

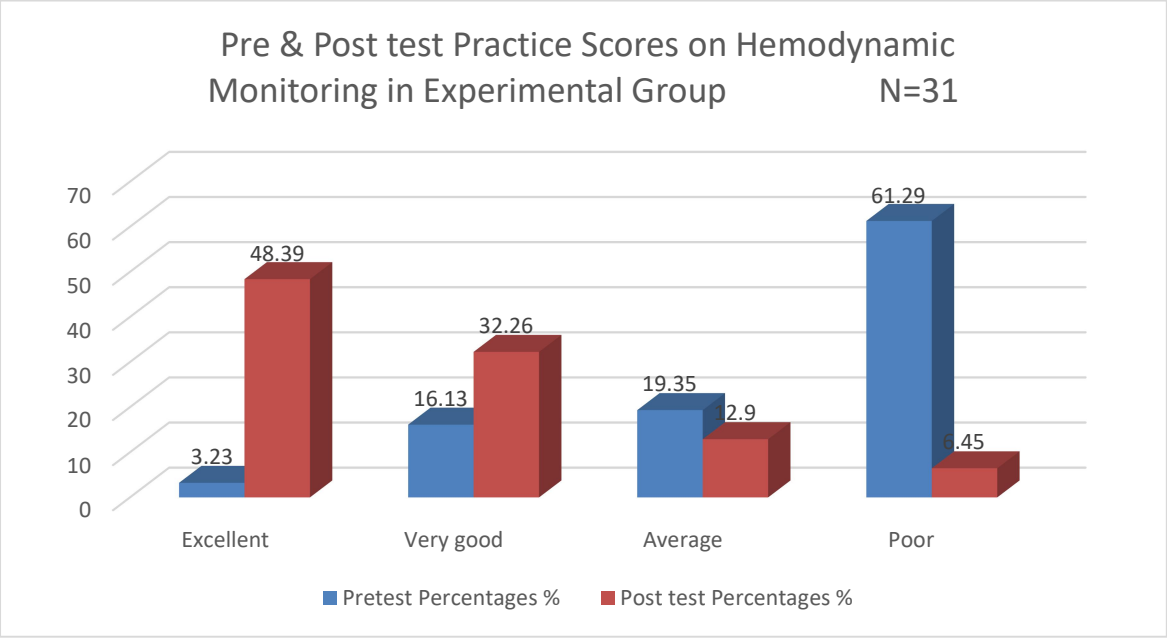

Fig:2 Pre & Post-test practice Score on Hemodynamic Monitoring

Figure-2 highlighted in the bar diagram that the Pre-test and Post-test Practice scores was significantly improved after introduction of hemodynamic monitoring guidelines among critical care nurses. Before introduction the very good and excellent practice score was only 16.13% and 3.23% but after intervention it improved to 32.26% and 48.39% among critical care nurses which shows the effectiveness of intervention.

Table-4.1 and 4.2: Pre-test Knowledge and Practice Score of Control group N=30

Pre-test Knowledge score of control group			
Category	**Pre-test Knowledge score**	**Frequency**	**Percentages %**
Excellent	**36-40**	**2**	**6.66**
Very good	**31-35**	**2**	**6.66**
Average	**26-30**	**9**	**30**
Poor	**<26**	**17**	**56.66**

Pre-test Practice score of Control Group			
Category	**Pre -test Knowledge score**	**Frequency**	**Percentages %**
Excellent	**56-60**	**1**	**3.33**
Very good	**51-55**	**5**	**16.66**
Average	**46-50**	**4**	**13.33**
Poor	**<45**	**20**	**66.66**

Table 4.1 represents that in control group, critical care nurses had excellent knowledge, 2(6.66%), very good knowledge 2(6.66%), average knowledge 9(30%) and poor knowledge 17(56.66%). The table 4.2 reported that the pre-test practice score was excellent 1(3.33%), very good 5(16.66%), average 4(13.33%) and poor 20(66.66%).

Table-5.1 and 5.2: Post-test Knowledge and Practice Score of Control Group

N=30

Posttest Knowledge score of control Group			
Category	**Pre-test Knowledge score**	**Frequency**	**Percentages %**
Excellent	**36-40**	**3**	**12**
Very good	**31-35**	**2**	**6.66**
Average	**26-30**	**7**	**23.33**
Poor	**<26**	**18**	**60**

Post -test Practice score of Control Group			
Category	**Pre-test Knowledge score**	**Frequency**	**Percentages %**
Excellent	**56-60**	**3**	**10.00**
Very good	**51-55**	**4**	**13.00**
Average	**46-50**	**5**	**16.66**
Poor	**<45**	**18**	**60.00**

Table-5.1 represents that the post test score in control group was excellent 3(12%), very good 2(6.66%), average 7(23.33%) and poor 18(60%). The table 5.2 revealed that post-test practice score was excellent 3(10%), very good 4(13%), average 5(16%), poor 18(60%).

Table-6: Mean, Median, SD and paired t test on Knowledge score of experimental group: N=31

Pre-test Knowledge Score		Post-test Knowledge Score		t-value
Mean	SD	Mean	SD	11.08
25.55	9.10	36.52	5.07	

P<0.001

Table-7: Mean, Median, SD and paired t test on practice score of experimental Group N=30

Pre-test Practice Score		Post-test Practice Score		t-value
Mean	SD	Mean	SD	12.12
37.97	10.01	60.06	4.59	

P<0.001

The table-6 & 7 reported that the pre-test, Mean 25.55, SD 9.10 of knowledge scores was improved to post-test Mean 36.52, SD 5.07 with a significant t-value of 11.08 and the pre-test &post-test

Mean, 60.07, SD 10.01 of practice score was improved to Mean 37.97, SD 4.59 of pretest with a significant t value 12.12 in 99% confidence interval at P<0.001 after introducing the hemodynamic monitoring Guidelines among critical care nurses, which establish the effectiveness of hemodynamic monitoring guideline among critical care nurses' knowledge and practice.

Discussion of findings,

Critical care patients are always at high risk for significant health issues which can lead to death. So, critically sick patients require more rigorous nursing care and monitoring (Howthan, 2024). The Critical care nurses are continuously observing the patient with hemodynamic Monitor. The understanding of dynamic changes inside the circulatory system and accurate interpretation of status enables appropriate management and faster recovery. Continuous training with guidelines helps to interpret the technique of hemodynamic monitoring. Critical care nurses have to maintain adequate knowledge and practice in monitoring hemodynamic parameters, otherwise it can result in delays in the detection and management (Hashmi, 2024). One study reported that most of the nurses demonstrated a low level of knowledge on hemodynamic monitoring, with a mean score of 2.7 on a 7-points rating scale. Additionally, nurses expressed a high positive attitude toward their practice, with a mean score of 3.8 on a 5-point scale (Abu Farah & Khleif, 2024). Another descriptive cross-sectional study was conducted from April 2023 to June 2023 using convenience sampling technique among 212 pediatric intensive care nurses. Data revealed that nurses who have received hemodynamic monitoring training have higher level of knowledge and practice score than those who have not received it ($P < 0.05$). Data revealed that nurses aged ≤ 30 years showed better knowledge than those aged > 30 ($P < 0.05$) (Li et al., 2024). A quasi-experimental, study was implemented among Cardio-Thoracic unit 64 nurses at Benha University utilizing convenience sampling technique at 23 Benha University & 41 at Nasser Institute Hospitals). Data was collected using knowledge questionnaire and observational check-list. Results showed that the 62.5% of nurses had an unsatisfactory level of total knowledge and it was improved immediate after two consecutive months of post guidelines implementation, 89.1% & 81.2%, respectively (Salah Mohamed et al., 2023).

Conclusion

The study finding revealed that the nursing personnel working in intensive care unit included in the present study had inadequate knowledge and practices of hemodynamic monitoring, which had necessitated developing the guidelines. Use of the guideline helped the nurses in improving knowledge and practice score. So, it is expected that using this guideline would bring changes in their daily practices

of measuring selected hemodynamic parameters and improve the quality of Nursing practice. The research also would like to conclude that with larger sample the association with demographic characteristics at $p<0.05$ would have established in future studies.

Implications: The finding of the study have implications in nursing education, nursing administration, nursing practice and Nursing research with large no of sample.

References:

1. Abu Farah, H., & Khleif, M. (2024). Knowledge, attitude, and practice of Palestinian critical care nurses about hemodynamic instability in patients with cardiovascular diseases. BMC nursing, 23(1), 1-8.
2. Davis, C., Lindsay, K., Jacks, K., Lowery, K., Nichols, J., & Yerdon, A. (2025). Implementation of an Evidence-based Protocol to Increase the Use of Goal-directed Hemodynamic Therapy. Journal of Peri Anesthesia Nursing.
3. Ghiassi, K., Nattanmai, P., & Arora, N. (2022). Hemodynamic Monitoring. In Procedures and Protocols in the Neurocritical Care Unit (pp. 445-495). Cham: Springer International Publishing.
4. Howthan, A. M. (2024). Nursing Role for Intra-abdominal Pressure (IAP) Monitoring in Critical Care of Adult Patients: Scoping Review. J Intensive Crit Care, 10, 41.
5. Hashmi M (2024) Knowledge competency score among critical care nurses concerning intra-abdominal hypertension measurement. J Nur Mid Pak. 1-7.
6. Hermes, C. (2024). Hämodynamisches Monitoring–(K) eine Aufgabe der Pflege?!. Medizinische Klinik-Intensivmedizin und Notfallmedizin, 1-4.
7. Li, Z., Lu, F., Dai, Y., Sheng, M., Su, L., Yao, P., & Wang, H. (2024). Knowledge, attitudes, and practices (KAP) regarding intra-abdominal pressure monitoring among pediatric intensive care nurses: A cross-sectional study. International Journal of Nursing Sciences, 11(3), 381-386.
8. Pinsky, M. R., Cecconi, M., Chew, M. S., De Backer, D., Douglas, I., Edwards, M., ... & Vincent, J. L. (2022). Effective hemodynamic monitoring. Critical Care, 26(1), 294.
9. Rajuri, S. (2023). hemodynamic monitoring modalities: choosing the right tool for right patient. Int J Acad Med Pharm, 5(5), 1436-1442.
10. Rezkalla, J., & Eleid, M. F. (2023). The clinical role of invasive hemodynamic in the evaluation and treatment of structural heart disease. Expert Review of Cardiovascular Therapy, 21(7), 483-499.

11. Scheeren, T. W., & Ramsay, M. A. (2019). New developments in hemodynamic monitoring. Journal of cardiothoracic and vascular anesthesia, 33, S67-S72.
12. Salah Mohamed, A. E. R., Said Taha, A., & Fathy Mohamed, R. (2023). Effect of Educational Guidelines on Nurses' Performance regarding Caring of Patients with An Intra-Aortic Balloon Pump. Journal of Nursing Science Benha University, 4(2), 912-925.
13. Vincent, J. L., Joosten, A., & Saugel, B. (2021). Hemodynamic monitoring and support. Critical care medicine, 49(10), 1638-1650.
14. Ros Cottis;Neil Magee; David J. Higgins (2003): Hemodynamic monitoring with pulse-induced contour Cardiac output (PiCCO) in critical care; Journal of Intensive and Critical Care Nursing, 19(5) 30-307.https://doi.org
15. Josip Brezić, Biljana Kurtović;(2021). Levels of Knowledge in Nursing Students on Hemodynamic Monitoring – A Cross-Sectional Study; University, Adriano Friganovic.
16. Mudathir Mohamedahmed Eltayeb, Suad Ahmed, Mohamed Salahen, Waled Amen, Mohammed Ahmed(2020): Effect of invasive hemodynamic monitoring training program on nurses' knowledge and practice in cardiac center in Sudan Majmaah. Journal of Health Sciences 8(2):115-129
17. Tahereh A. Jeshvaghani , Malahat Nikravan Mofrad, Ziba Borzabadi Farahani, Malihe Nasiri.(June 2021). Nurses' Educational Needs Assessment for Hemodynamic Monitoring in Intensive Care Units; The Journal of Continuing Education for Health Professionals 41(3):169-175 https://doi.org.Pubmed.gov.
18. Nils.S, Raphael G, Till S, Delphine S. Courvoisie;(Apr.2014) "Haemodynamic Monitoring in the Intensive Care Unit: Results from a Web-Based Swiss Survey", BioMed Research International.Retrieve from https:// doi.org..Pubmed.gov
19. Carla C de Souza Ramos' Grace Teresinha Marcon Dal Sasso etall(sept 2008) Invasive hemodynamic monitoring at bedside: nursing evaluation and nursing care protocol42(3):512-8. Retrieve from https://doi.org.Pubmed.gov
20. Josip B, Biljana K; (2021) Levels of Knowledge in Nursing Students on Hemodynamic Monitoring – A Cross-Sectional Study. University of Applied Health Studies, Adriano Friganovic. Retrieve from https://doi.org.Pubmed.gov
21. Dietz, Beth ;Smith, Tina T. (2002) Enhancing the Accuracy of Hemodynamic Monitoring; Journal of Nursing Care Quality: 17 (1)27-34

22. Maria M. Cvach, Johns H. M, Kathleen R; (May 2015): Effect of Altering Alarm Settings: A Randomized Controlled Study Journal of Biomedical 49(3):214-22:; Retrieve from https://doi.org.Pubmed.gov
23. Zeinab M. Shaban Aysha-, Safaa E. Sayed Ahmed (**2019)**,.The Effect of Implementing Clinical Alarm Nursing Intervention Program on Nurses' Knowledge, Practice and Patient outcomes at Intensive Care Unit American Journal of Nursing Research. 7(5), 824-835
24. Hala Abdel S G, Nadia M T, Gehan El S H (2019); Nurses' Knowledge and Practice Regarding Hemodynamic Monitoring for Patients with Cardiothoracic, Vascular Surgery and Patient Outcome; Egyptian Journal of Health Care, EJHC: Vol.10 No.4