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Is the care performance of critical care unit nurses in angina management consistent with evidence-based guidelines? An observational study

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Abstract: **Objective**: Pain management is an integral part of nursing practice. In this respect, angina management can be a serious clinical problem for nurses. The evaluation of pain management based on guidelines is one of the essential components in quality assurance and improvement processes. One of the most necessary steps in this process to improve pain management is to analyze the existing situation. This study aimed to determine the compliance of critical care unit (CCU) nurses' care performance in angina management with evidence-based guidelines (EBGs).
Methods: In this observational cross-sectional study, 69 nurses working in the CCU departments of public hospitals in Bushehr province participated using the full number method, and their performance was observed 207 times. The data collection tool in this study included a demographic profile form and a 29-item checklist of nurses' performance in angina management. The performance of each nurse was evaluated three times in three different shifts. Descriptive and analytical independent t-tests and Spearman and Pearson correlation were used to analyze the data. SPSS 19 software was used to perform statistical tests. The significance level was considered to be <0.05 in all cases.
Results: The findings showed that 85.5% of the participants were female and 14.5% were male, with an average age of 33.87 ± 7.14 years. The average score for performing care functions according to the evidence-based pain management guidelines was 71.42 ± 19.31. The highest (73.60 ± 19.45) and lowest (63.51 ± 28.27) average scores were related to the investigation and evaluation area, respectively. The results showed a significant negative correlation between age and care performance ($p < 0.03$; $r = -0.265$).
Conclusions: The results of this study showed that the average performance score of nurses in angina management based on the guidelines was higher than average. Considering that some items had little compliance, the health system planners are recommended to put the annual training methods to obtain and use the latest guidelines for pain management, especially angina, in the education program of nurses.

Keywords: angina • care performance • CCU • nursing practice • pain management guideline

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1. Introduction

The incidence of cardiovascular diseases (CVDs) is increasing rapidly worldwide. Ischemic heart disease (IHD) is the most common type of CVD,[1] which is responsible for nearly half of CVD-related deaths. Although Iran is an Eastern country, it has adopted a Western lifestyle in many respects. Such changes, along with enhanced health services, have improved life expectancy, raised the prevalence of IHD, and increased the burden of this disease in Iran. Moreover, similar to other parts of the world, CVD is the leading cause of death.[2]

The main symptom of IHD is angina, which reflects the imbalance between oxygen supply and demand in the heart muscle.[3] This condition is reported by more than 94% of patients with new cardiac ischemia.[4] Angina can be an urgent and life-threatening condition that leaves the patient in an emergency and unstable condition.[5] Increased heart rate, high blood pressure, resistance to blood flow in the peripheral circulation, and vascular thrombosis are some of the consequences of poor pain management.[6] For some patients, it might be a life-threatening condition that requires immediate intervention to prevent further damage and possibly death.[7]

Pain management is a responsibility of every healthcare provider. However, nurses play a key role in pain management.[8] The management of pain is an integral part of the practice of nursing.[3,8] This is because they spend more time with patients than other medical personnel[5] and tend to be the first care providers who are present when the patient experiences pain.[9] This characteristic distinguishes nurses as the first pain managers for patients.

If pain management is not done, it is considered professional malpractice or a violation of basic human rights[8] However, angina management can be a serious clinical problem for nurses. The results of the study by Baeez et al.[10] showed that nurses working in the CCU department have moderate knowledge of pain management.

One of the ways to improve pain management is to use guidelines.[11] Angina management is supported by structured assessments and evidence-based guidelines (EBGs)[7] because clinical guidelines are tools containing evidence-based recommendations for implementation at the clinical, organizational, educational, and health system levels. Patient care can be significantly improved if it is based on research findings.[11]

Evidence-based pain management improves pain management, reduces the length of the patient's stay in the hospital, increases patient satisfaction, and reduces the use of resources.[12] However, studies show that pain management in different fields is not carried out in a standard way.[13,14] The challenges associated with implementing pain assessment standards are particularly pronounced in low-income countries, resulting in ongoing difficulties for nurses in adhering to these standardized principles.[14] Nezamzadeh et al.'s[11] study revealed that there are guidelines for the management of angina, but the implementation quality is low.

Based on all of the above, healthcare professionals and patients agree that the lack of a strategy for pain management is a serious health problem. The researchers believe that this is a critical issue that needs to be studied further to reduce patient suffering, improve the quality of healthcare, and increase patient safety.[6] Evaluating the implementation of EBGs is an essential component of quality assurance and improvement processes,[9] yet the actual implementation of pain management in clinical practice is inconsistent, despite the availability of recommendations and guidelines.[13] Evaluating pain management based on EBGs can help identify gaps in nurses' pain management process and design and implement interventions to fill these gaps. Assessing nurses' adherence to guidelines is the first step in identifying these gaps. On the contrary, previous studies mainly focused on one aspect of pain management and did not consider the guidelines,[5,11] and the aim of this study was to evaluate the adherence of CCU nurses to EBGs in the management of angina pectoris.

2. Methods

A cross-sectional observational study was conducted in 2021. The research population comprised CCU nurses in public hospitals across Bushehr Province (6 hospitals). A total of 69 eligible nurses were recruited by the census method. The inclusion criteria included informed consent to participate and a minimum of 6 months of tenure in the CCU department. Nurses who withdrew from the study or who entered the CCU department temporarily for one or a few shifts were excluded. To increase the accuracy of the observations, the performance of each nurse was observed three times during different shifts. A total of 207 observations were made from 69 participating nurses.

2.1. Data collection tool

The data collection tool included the nurses' demographic profile form (including age, gender, work history in the current department, average working hours per month, and shift status) and a researcher made checklist to measure nurses' evidence-based performance in managing angina pectoris. This checklist entailed three domains: assessment, implementation, and reevaluation.

The design and psychometric assessment of the nurses' performance checklist was carried out in 4 stages, according to Waltz and Bausell).[15] In the first stage, the researchers reviewed the most relevant sources and guidelines regarding angina management. Afterward, the theoretical and practical implications of angina management nursing performance were defined so as to develop the tool items. In the next stage, those goals that could be used in an operational and targeted manner to measure angina management performance were determined. Subsequently, relevant and suitable items for measuring each objective and practical reference in line with the measurement goals were provisionally developed. On the whole, 56 items were developed for the checklist, and the obtained items and their response options were examined by the five members of the research team, three of whom were experienced nurses in the field of angina management and two of whom were familiar with instrument development principles. The research team finalized the items, and 46 items entered the psychometric assessment process in three areas: assessment, implementation, and reevaluation.

Both qualitative and quantitative methods were used to ensure the content validity of the checklist. In the qualitative section, the checklist was given to 10 experienced nurses in angina management and faculties who were engaged in angina management teaching. The checklist was subsequently revised according to their opinions. At this stage, one item was found inapplicable for performance assessment, and 15 items were removed from the tool as they overlapped with other items. The instrument with 30 items entered the quantitative content validity process. Content validity index (CVI) was measured as a measure to evaluate content validity quantitatively. Face validity was assessed in both qualitatively and quantitatively. In terms of qualitative assessment, a face-to-face interview was conducted with 10 experienced people in angina management (observers were in this group). They were requested to express their understanding of the items. The items were modified according to the recommendations made by this group. Face validity was evaluated quantitatively using the item impact score. For this purpose, nurses familiar with angina management evaluated the importance of the items on a five-point Likert scale from very important to not important at all. The minimum item impact score was 1.6, and the maximum was 5.

To determine the CVI of the checklist, 10 experts in the field of angina management were asked to rate the checklist items in terms of their relevance to performance measurement. In this regard, one item had a low score, which was removed according to the research team's opinion. The minimum and maximum CVI values for the items were 0.83 and 1, respectively. The average CVI scores were 0.97 for the overall final items and 0.97, 0.99, and 0.93 for the assessment, implementation, and reevaluation domains, respectively. At this stage, the checklist included 29 analytical items.

The method of comparison groups was used to check the validity of the construct, and for the instrument's reliability, internal consistency and stability parameters were employed. Kuder–Richardson coefficient was used for internal consistency, and the agreement between evaluators was used to check stability. To assess the aforementioned characteristics, two nurse observers used the checklist to assess the care performance of nurses and final-semester nursing students on a simulated patient with angina pectoris (it should be noted that nurses were selected from non-university hospitals and were not in the research target group). The instrument's construct validity was assessed by comparing the average performance scores of nurses and nursing students (the mean score of the two evaluators was considered as the score of each individual). The mean score of performance and its areas was significantly higher in nurses than in nursing students (with the significance level being <0.05 in all cases), which shows that this checklist can distinguish experienced people from novice people.

The Kuder–Richardson coefficient was used based on the scores of the first rater to ensure internal consistency. Additionally, the stability of the checklist was assessed by examining the intra-cluster correlation between the scores of the two raters. The Kuder–Richardson coefficients were 0.805 for the performance section and 0.715, 0.798, and 0.800 for the assessment, implementation, and reevaluation domains, respectively. The intra-cluster correlation between the scores of the two evaluators was 0.952 for the performance section and 0.885, 0.818, and 0.940 for the assessment, implementation, and reevaluation domains, respectively, with the results indicating the appropriate reliability of the tool.

The final draft of the checklist included 29 items. Items 1 to 17 concerned the pain assessment stage, items 18 to 24 pertained to intervention for control, and items 25 to 29 were related to pain reevaluation. The responses to the items were of *done* and *not done* type, where a score of 1 was given if the item was performed and a score of zero was given if the respective item was not performed. The range of scores that can be obtained for the checklist ranges from 0 to 29, with a higher score indicating a better performance. To compare the scores of the domains, the scores were converted into percentages by a linear transformation, that is, the scores of each domain and the total are between 0 and 100.

2.2. Data collection procedure

Researchers initiated field research after acquiring the ethics code and necessary permits. First, a meeting was held with the nurses, and the research objectives and procedures were fully explained to them. They were assured of the confidentiality of the information, and it was stated that their performance would be observed, but they were unaware of the exact time and the parameters that would be observed. They subsequently signed written informed consent forms. The performance of each nurse was recorded once in each shift over three different shifts. Thus, the data for each nurse included three observations in three different shifts: morning, evening, and night. The observer completed the checklist after the nurses finished their work without their presence. Since the presence of the researcher could affect the performance of the nurses, the observer was selected from the nurses of the ward. In addition to normalizing and reducing the effect of their presence, they could observe the actual performance of nurses as much as possible. To familiarize themselves with the observation procedure, the observers participated in a 2-h orientation class, and the necessary training was provided.

2.3. Data analysis

Frequency, percentage, mean, and standard deviation were reported to describe the data. The data were analyzed by the independent *t*-test and Spearman and Pearson correlation tests. SPSS 19 software was employed to perform statistical tests. The significance level was considered <0.05 in all cases.

2.4. Ethical considerations

This study was approved by the Research Council of Bushehr University of Medical Sciences and was approved and registered in the Ethics Committee affiliated with the Research Vice-Chancellery of Bushehr University of Medical Sciences with the ethics code IR.BPUMS.REC.1400.184.

3. Results

The mean age of nurses was 33.87 ± 7.14 years. Of the 69 nurses participating in the study, 59 (85.5%) were women. Moreover, 84.1% of the nurses were trained in angina management (Table 1). In total, 187 patients participated. The mean age was 55.16 ± 10.67 years. Patients were predominantly male (53.5%) and married (86%). Table 2 shows the characteristics of the study

Variable	Number/ average*	Percent/standard deviation**
Age (year)	33.87*	7.14**
Gender		
Female	10	14.5
Male	59	85.5
Education		
Bachelor's	60	87.0
Master's	14	13.0
Employment status		
Permanent	44	64.7
Contractual	12	17.6
Conscripted	12	17.6
Shift status		
Fixed	14	20.3
Rotational	55	79.9
Education on angina pectoris management		
Yes	58	84.1
No	11	15.9

Note: *average; ** *standard deviation*; the percentages are based on the number analyzed.

Table 1. Demographic and job-related characteristics of nurses.

Variable	Number/ average*	Percent/standard deviation**
Age (year)	55.16*	10.67**
Gender (187)		
Male	100	53.5
Female	87	46.5
Marital status (186)		
Single	15	8.1
Married	160	86.0
Widow	11	5.9
Educational level (186)		
Elementary	32	17.2
Middle School	68	36.6
Diploma	45	24.2
Associate Degree	9	4.8
Bachelor's Degree and Higher	11	17.2
History of hospitalization (183)		
Yes	84	45.9
No	99	54.1

Note: *average; **standard deviation;* the percentages are based on the number analyzed.

Table 2. Sociodemographic details of patients.

Variable	The range of attainable scores	Mean	Standard deviation	Average out of 100	Standard deviation from 100
Assessment	0–17	12.51	3.31	73.60	19.45
Implementation	0–7	5.02	1.45	71.78	20.67
Reevaluation	0–5	3.18	1.41	63.51	28.27
Total score	0–29	20.71	5.60	71.42	19.31

Table 3. Care performance (and its domains) based on angina management guidelines.

Item	Performed	
	Frequency	Percent
Checking the intensity of pain	103	50.2
Checking the time of pain onset	188	91.7
Examining the pain site	199	97.1
Assessing the spread of pain to other organs	167	81.5
Checking the duration of pain	143	69.8
Checking pain continuity or interruption	103	50.2
Examining pain aggravating factors	153	74.6
Reviewing pain relief symptoms	169	82.4
Examining pain-related symptoms	183	89.3
Examining pain improvement with position change	131	63.9
Examining pain quality (burning, pressing, sharp, etc.)	118	57.6
Examining cardiac biomarkers such as troponin	191	93.2
Checking the status of the oxygen supply	186	90.7
Checking vital signs	195	95.1
Examining the patient's ECG in terms of ischemic changes	190	92.7
Auscultating the patient's lungs (to see if there is shortness of breath)	48	23.4
Examining the patient's anxiety level (restlessness, frowning, etc.)	98	47.8
Placing the patient in a comfortable position (preferably Fowler's position)	155	75.6
Absolute rest (CBR) for the patient	202	98.5
NPO until pain control and symptom stabilization	177	86.3
Pain relief as prescribed by the physician	197	96.1
Teaching the patient how to use the nurse call button	48	23.4
Assessing the reduction or resolution of the patient's pain	168	82.0
Education about angina pectoris and its care to the patient	97	47.3
Education about pain notification to the nurse	154	75.1
Leg pain monitoring every 2 h	145	70.7
Checking the duration of pain every 2 h	82	40.0
Checking the patient's vital signs every minute until it stabilizes	168	82.0
Examining the patient's non-verbal reactions	88	42.9

Note: EBGs, evidence-based guidelines.

Table 4. Distribution of the frequency of performing a care function based on EBGs in the management of angina.

patients. The average care performance score was 71.42 ± 19.31 (out of 100). The highest average score was related to the assessment domain (73.60 ± 19.45), and the lowest was related to the reevaluation domain (63.51 ± 28.27) (Table 3). Lung auscultation and the use of the nurse call button both had the lowest frequency of performance, with 23.4%. The highest frequency was related to examining the pain site (97.1%) and examining vital signs (95.1%) (Table 4). Among the demographic variables, there was a significant negative correlation ($p < 0.03$, $r = -0.265$) between age and care performance (Table 5).

Variable	Average	Standard deviation	Statistics	The significance level
Gender			$t = -0.127$	0.899
Female	20.60	7.20		
Male	20.82	4.79		
Education			$Z = -1.686*$	0.092
Bachelor's	21.27	4.64		
Master's or higher	17.63	7.27		
Employment status			$X^2 = 0.230**$	0.631
Permanent	20.19	5.40		
Contractual	20.58	2.48		
Conscripted	22.53	5.72		
Shift status			$Z = -0.037*$	0.970
Fixed	20.02	6.62		
Rotational	20.99	4.75		
Education about angina management			$T = 1.179$	0.243
Yes	21.11	5.46		
No	19.12	2.57		
Age	33.87	7.14	$r = -0.265***$	0.031

Note: Tests performed: independent *t*, Mann-Whitney, Kruskal-Wallis, and Pearson;

*Man-Whitney test performed;

**Kruskal-Wallis test performed;

***Pearson correlation test was performed.

Table 5. The average score of care performance at different levels of nurses' demographic and occupational variables.

4. Discussion

This study aimed to determine what nurses actually do when managing angina and whether their practice is consistent with EBGs. The results revealed that the nurses' care performance was above average. Among the domains of care performance, the assessment domain exhibited the highest mean score, and the reevaluation domain had the lowest score. Also, the results indicated that the care performance score decreases with age.

Since no studies were found on the available websites regarding angina management by nurses based on established guidelines, the results are compared with relatively similar studies. The results are consistent only with those of the study by Aliha et al.,[16] but they are not consistent with the studies that have reported the pain management performance of nurses as good[17] or poor.[18] The difference in performance can be caused by the origin of the patients' pain or the method and tools used to evaluate the performance of nurses. Most of the studies that reported good performance of nurses in pain management measured the performance through a self-report questionnaire. Test takers may have biases when completing self-reported instruments because people tend to use positive points when self-reporting and answering survey questions.[19] In other words, some people may not accurately report their performance when participating in a survey, and instead of being honest, they may provide a more socially acceptable answer. The list was collected by observation in this study, which could explain the difference in the above findings. However, El Sayed Mahedy et al.[18] measured nurses' performance through observation and reported poor performance in pain management. This difference may be attributed to the number of observations of nurses' performance. El Sayed Mahedy et al.'s study observed the performance of each nurse only once in the morning or evening shift. This study evaluated the nurse's performance three times over three different shifts. Multiple observations can yield more accurate data and increase the validity of the data.[20]

It should be noted that the nurses' performance in some items, such as examining the intensity and kind of pain, assessing pain every 2 h, auscultating the lungs, and teaching the patient, was moderate and poor. Despite the fact that in this study, all the nurses had at least a bachelor's degree; the majority were trained in angina management; and no correlation was found between training and performance. The first step for effective pain management by nurses is knowledge, and studies have shown that nurses who have less knowledge have a weaker performance in pain management.[21] Therefore, this finding can be interpreted to suggest that their training was not provided in a

practical manner that would respond to the real work environment. The results of Ma et al.[22] revealed that the factors affecting the transfer of education in the nursing profession are complex, and factors such as correct beliefs and values about education, careful selection of employees for education, relevance of educational content, educational guidelines that facilitate learning and transfer, support from peers, supervisors, and the organization, and organizational culture can affect the transfer of knowledge. Therefore, in order to maximize the quality of responsive education, nursing managers and education planners must consider the factors affecting the transfer of education before implementing educational programs. The factors that influence the relationship between learning to manage pain and performance are recommended for future research.

The results of this study showed that among the three performance areas of pain management, the assessment domain had the highest average score, while the reevaluation domain had the lowest average score, which is similar to some previous studies.[18,23] Nonetheless, it is not consistent with other ones.[17,24] The reasons for the difference can be the research environment, the difference in the origin of pain, or the research tool. The highest mean score of nurses for pain management in the study by Han et al.[17] in Busan, South Korea, was related to the pain management reevaluation. The research environment can be one of the reasons for the different results. This study was conducted in a developed country. However, in developing countries with limited resources, such as Iran, some care may be ignored, performed incompletely, or simply abandoned.[25] This is because nurses in developing countries face many challenges at their workplace, including a shortage of personnel, high workload, and job stress. They may have multiple jobs, low salaries, inappropriate tasks, insufficient resources, poor management, and a shortage of equipment or defective equipment,[23,25] which can affect their performance. Alnajar et al.[24] found a suboptimal pain assessment in their study. In addition to the difference in the research environment, which was the ICU department, the difference in patients and pain measurement tools is an important reason for nurses' suboptimal performance in pain assessment. In fact, in Alnajar et al.'s study, two different tools were used to assess pain intensity in conscious and unconscious patients. The environment of this study was the CCU department, and the patients were conscious. As such, the items that constituted the assessment domain were performed by the majority of nurses, such as pain quality, pain duration, pain distribution, ameliorating and aggravating factors, control of vital signs, or the assessment of the patient's ECG. The investigation of these items is necessary to distinguish between typical cardiac and non-cardiac pain, as well as to investigate coronary spasms or reoccurrences and new injuries to the myocardium. Therefore, the assessment domain has obtained the highest average. Pain is known as the fifth vital sign and is as important as other vital signs. Therefore, in order to effectively manage pain, the nurse must accurately examine the pain using appropriate techniques and tools.[14,24] In this study, although the assessment domain had the highest average, only 23% of the nurses had performed auscultation of the patient's lungs (in case of shortness of breath), perhaps because they had checked the oxygen supply status. Considering that the first step to detect the onset of heart failure is auscultation of the lungs, it is suggested that pain management retraining courses be held for nurses working in the CCU by introducing and emphasizing the importance of all aspects of pain assessment.

The results of this study revealed that the lowest performance domain is related to reevaluation. Nonetheless, it was higher than average. This finding is consistent with the study of Ngasu and Restiana.[26] However, it is inconsistent with the study of Han et al.,[17] where the highest average was related to the pain assessment domain, and the study of Bucknall et al.,[27] where only 4.4% of patients were reevaluated after the prescription of painkillers. Perhaps the reason for the inconsistency with the results of Bucknall et al. is related to the origin of pain and nurses. In this study, pain is caused by damage to a vital organ, namely the heart. The significance of heart pain and the potentially severe consequences of improper management necessitate nurses to reevaluate the pain. On the contrary, more skilled nurses are often recruited in the CCU department, and as the results of this study showed, new and less experienced nurses are employed to a lesser degree. The experience and skills of nurses can play an important role in their performance.

The reason for the difference in the results of nurses' performance in Han et al.'s study can be related to the data collection method. When the nurse's performance is measured through observation, it may be affected by internal variables (nurse's knowledge or experience) or external variables (background effects such as stress, time pressure, or workload). The effect of some of these variables on nurses' performance has been reported in other studies.[27,28] As a result, nurses may not be able to demonstrate their real performance. Since evaluation of pain is critical in determining the effectiveness of interventions and incorrect evaluation of pain can lead to high morbidity and mortality,[29] future research is recommended to investigate nurses' performance in angina management and barriers to management from the nurses' perspective.

Based on the results, with the increase in age, the guideline-based performance of nurses in pain management decreases. Sepahvand et al.[30] found that younger nurses exhibited better evidence-based performance. Considering the mean age of the samples in this study, it appears that younger nurses may exhibit better performance. This could be attributed to their recent graduation and relatively close proximity to the university environment. They have updated knowledge and more energy to implement guideline- and evidence-based practice.

This study had limitations. This study is cross-sectional and quantitative, with the limitations associated with quantitative studies. This study was conducted only in the CCU department of the public hospitals of Bushehr Province. Therefore, generalizing the results of this study to the performance of other departments and private hospitals should be done cautiously. The newness of the tool is another limitation of this study, so there is a need for a similar study to be repeated with this new tool. To compare the results between the two areas, it is suggested that a similar study should be carried out in private hospitals so that proper planning can be done based on the comparison of results. This study did not take into account the number of hospitalized patients, the number of shifts, and the workload of nurses, which could have an impact on the results. It is important to consider these factors in future research to ensure a more comprehensive analysis. In future studies, researchers should investigate nurses' performance while considering these factors.

5. Conclusions

The results of this study showed that the performance of nurses based on the guidelines for angina management was above average. Moreover, with increasing age, the performance of nurses decreased. Given that certain aspects of pain management, such as the assessment of pain intensity and quality, were found to be subpar and inadequate, it is imperative for health system planners to ensure that annual training is provided on acquiring and utilizing the latest guidelines for pain management, particularly in the case of angina. Incorporating the various factors that impact the transfer of education, these factors should be considered when designing the continuous education program for CCU nurses. Given the importance of the issue and the need for appropriate planning to improve nurses' performance in the use of guidelines in the management of angina, the development of evidence-based care programs, and the reduction of cardiac events, it is essential that both qualitative and quantitative studies are undertaken. Due to the fact that this study was conducted only on hospitals affiliated with the University of Medical Sciences, it is suggested that a similar study should be conducted in private hospitals as well so that proper planning can be done by comparing the findings.

Data availability

The data underlying this article will be shared on reasonable request to the corresponding author.

Ethical approval

This study was approved by the ethics committee of Bushehr University of Medical Sciences (IRB approval number: IR.BPUMS.REC.1400.184).

Conflicts of interest

All contributing authors declare no conflicts of interest.

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