Identifying educational needs and knowledge gaps in healthcare professionals for effective management of acute myocardial infarction

Fady Yousef, Zainah Mohamed *, Gurbinder Kaur Jit Singh, Nor Haty Hassan

Department of Nursing, Faculty of Medicine, Universiti Kebangsaan Malaysia, Kuala Lumpur, Malaysia

ARTICLE INFO

ABSTRACT

This study aims to examine the educational needs and knowledge gaps of healthcare professionals in treating Acute Myocardial Infarction (AMI), a leading cause of death worldwide due to its impact on the heart muscles and blood vessels. Although healthcare workers generally understand how to manage AMI, there are crucial areas where their knowledge could be improved. The research involved 65 healthcare professionals from Jordan University Hospital, collecting data through surveys with structured questions and analyzing it with descriptive statistics. The findings indicate that while nurses are proficient in recognizing symptoms and managing care for AMI patients, including medication administration and patient education, they require more resources and training. Specifically, they need better training in oxygen therapy, emergency procedures, and advising patients on lifestyle changes. The study highlights the need for targeted, patient-focused education to address these gaps and improve AMI management in hospitals.

1. Introduction

Cardiovascular diseases are still the leading causes of death across the globe, accounting for more than 31% of the total global deaths. It is also the leading cause of death among all communicable diseases, especially among people below the age of 70. Most of these deaths occur in developing countries, and the proportion is predicted to increase every year since 2012 (Choi et al., 2022). The same projections show that by the end of 2050, there will be about 2.2 million deaths because of cardiovascular diseases every year. The World Health Organization aims to achieve a 25% decrease in mortality caused by non-communicable diseases, among which cardiovascular diseases are included (Zhang et al., 2022).

According to Shah et al. (2019), even though Acute Myocardial Infarction (AMI) is currently the largest cause of death globally, its incidence in developing countries accounts for a considerable portion. However, morbidity and mortality rates have significantly reduced among developed nations even though they are not evenly distributed across the world. Chang et al. (2021) argued that one of the major reasons AMI is prevalent in developing countries is because of the limited access to healthcare services. Most of these countries have poor infrastructures and a shortage of medical facilities, leading to a lot of healthcare inequalities. Furthermore, there are inadequate medical resources and low awareness and education among nurses and patients because of limited resources and technology (Zhang et al., 2022). For these reasons, AMI is mostly prevalent among developing countries, leading to increased death rates.

While AMI continues to affect developing countries, there are several treatment programs that have progressed over the years, especially because of improvements in healthcare technology (Zhang et al., 2022). Therefore, the fatality rate has significantly reduced despite the significant increase in the number of patients administered. Nevertheless, among the people recovering from AMI, the morbidity and mortality rates are 1.5 to 15 times higher than in the general population, depending on gender. According to Jiang et al. (2020), women are 16% more likely to experience signs and symptoms of AMI compared to 16% of men (Choi et al., 2022). On average, women typically experience heart attacks later in life when compared to men. This phenomenon is, in part, attributed to the diminishing protective influence of estrogen following menopause, which increases the

vulnerability of postmenopausal women to heart-related conditions (Curry et al., 2018).

While AMI continues to be a major healthcare concern, Van de Werf et al. (2003) argued that nurses have improved their current knowledge in managing it because of the improvement in technology in healthcare. It is important for healthcare professionals to have fundamental knowledge and awareness of managing AMI (Jing et al., 2020). With the improvement in healthcare technologies, most of the nurses are currently aware of pain management that can influence the final treatment outcome of AMI. Furthermore, the majority of these nurses can recognize and assess the prevailing signs and symptoms of AMI, such as severe chest pains, nausea, diaphoresis, and chest discomfort (Vallabhajosyula et al., 2020). For example, nurses can currently use various technologies such as portable electrocardiogram (ECG) devices, Magnetic Resonance Imaging, Chest X-ray, and Echo to diagnose patients and determine the signs and symptoms of AMI in patients. However, Vanzella et al. (2022) argued that while these technologies in the treatment and management of AMI continue to emerge, the majority of these nurses cannot access these resources. In other countries, especially developing countries, most nurses cannot effectively use these technologies, suggesting the prevalence of AMI (Curry et al., 2018).

Additionally, nurses are currently knowledgeable in the administration of medications to patients diagnosed with AMI to manage pain. This means that these nurses currently have the fundamental knowledge and skills to administer medications to help manage pain among these patients. They also play a crucial role in continuously monitoring vital signs, oxygen saturation, and cardiac rhythms to detect any changes promptly, which are also important in pain management (Zhang et al., 2022). Other senior nurses in various hospitals play crucial roles in offering patient education in areas concerning lifestyle modifications, such as smoking cessation, dietary changes, exercise, and stress reduction, to reduce the risk of future cardiac events. Other nurses are highly skilled in providing psychological support to these patients and their families, which is one of the key goals of care coordination and ensuring continuity of care (Jing et al., 2020). However, Ibanez et al. (2018) argued that to offer psychological support and continuity of care, these nurses highly depend on effective communication and collaboration, which is still a challenge in some hospitals.

While the current knowledge of the nurses in managing AMI seems essential and fundamental among the nurses, there are still some gaps that need proper education. For example, not all these nurses have adequate knowledge of how to use most of these technologies to manage pain and facilitate recovery among patients diagnosed with AMI. For instance, nurses in local hospitals in both developed and developing countries might not have adequate knowledge to use technologies such as ECG, Cardiac Biomarkers, Echocardiography, Coronary Angiography, or CT Angiography (Jing et al., 2020). Given the morbidity and mortality rates of AMI, this aspect shows how there is a high need for training and additional resources for these nurses. This means that these nurses need education and training on how to use these new technologies to recognize the signs and symptoms and to help in pain management. In some cases, the nurses need education and training on how to educate the patients and families about pain management and risk reduction strategies (Vallabhajosyula et al., 2020). Moreover, these nurses need to be educated on emerging trends and guidelines, emergency response and protocols, cultural sensitivity, and treatment modalities.

In short, it is important to assess the current knowledge and educational needs of these healthcare professionals in managing AMI. In that case, the objective of this study is to assess the education and knowledge of healthcare professionals in managing AMI. The results of this study are expected to serve as a reference to areas that hospitals and nurses need to improve on to effectively manage AMI and reduce its morbidity and mortality rates.

2. Methods

A quantitative descriptive approach using survey design was used to assess the current knowledge and educational needs of these healthcare professionals in managing AMI. The researcher obtained information from the research participants to describe the current knowledge and educational needs of these healthcare professionals in managing AMI (Siedlecki, 2020). In this study, the researcher used structured questionnaires with close-ended questions. A total of 65 questionnaires were distributed to the healthcare professionals. The researcher used close-ended questions, and the respondents were asked to answer the questionnaires based on set instructions or the Likert Scale. A total of 30 questions were used in the questionnaires, excluding demographic information such as sex, age, marital status, education level, and duration of employment. The scale had a Cronbach's alpha value of 0.813 (81.3%), which means that the questionnaires had an accepted level of reliability and the responses could yield a high level of external validity.

This study was conducted with 65 healthcare professionals at a teaching hospital in Jordan. The participants included 30 males and 35 females, comprising doctors, nurses, and pharmacists. The researcher used purposive sampling to select participants because it ensured that the respondents could provide useful and relevant information (Andrade, 2021). The healthcare professionals were informed about the study and invited to participate during regular staff meetings. The first author explained the study and provided questionnaires along with a statement containing study details. Each

questionnaire came with a pre-labeled sealed envelope. Participants were asked to return the completed questionnaires in sealed envelopes via internal mail to a locked box in the cardiac administration office. They were given up to 36 hours to complete and return the questionnaires. All questionnaires were completed and returned on time. Data was analyzed using Statistical Package for the Social Sciences version 26.0 for Windows (SPSS Inc., Chicago, IL, USA). Descriptive analyses were performed on the demographic data and the educational and knowledge needs of healthcare professionals in managing AMI.

3. Results

There were more female participants (53.84%) than male participants in the study. Most of the participants held a Bachelor's Degree (60%), followed by those with a Master's Degree (40%). Additionally, most participants had worked for up to 3 years, while others had worked for up to 11 years, mainly in emergency and other departments. Furthermore, most participants were married, although some chose not to disclose their marital status. Table 1 shows the demographic characteristics of the respondents. The researcher conducted a survey to determine the current level of knowledge among healthcare professionals in managing AMI within hospital settings. Table 2 shows that most nurses are knowledgeable and skilled in managing AMI. For example, 63.1% of participants know that an ECG is a valuable tool for diagnosing and locating AMI (M = 3.356, SD = 0.645). Additionally, 41.54% of participants can accurately interpret ECGs to identify ST-segment elevation myocardial infarction (STEMI).

Table 1: Demographic characteristics of participants (n = 65)

Demographic characteristics	Description	n	%
Gender	Female	35	53.84
	Male	30	46.16
Level of education	Bachelors	39	60.00
	Masters	26	40.00
Working experience (Years)	0-3	23	35.38
	4-7	10	15.39
	8-11	16	24.62
	12-15	7	10.77
	Above 15	9	10.75
Department	Surgery	11	16.92
	Emergency	21	30.31
	ICU	16	24.62
	Other departments	17	26.15
Marital status	Married	27	41.54
	Not married	20	30.77
	Preferred not to say	18	27.69

Furthermore, 53.9% are aware that some AMI patients may present to the emergency room with severe epigastric pain, which can be misdiagnosed as heartburn or another gastric disorder (M = 3.31, SD = 0.555). Regarding treatment knowledge, 50.77% are familiar with using thrombolytic therapy and antiplatelet agents for AMI. Additionally, 54.31% know that all AMI patients with ST-segment

elevation on the ECG should be given aspirin, beta blockers, and heparin unless they are receiving fibrinolytic agents (M = 3.36, SD = 0.543).

The study also found that 60.54% of participants understand that myocardial infarction patients should receive long-term therapy with aspirin, beta blockers, statins, and ACE inhibitors (M = 3.22, SD = 0.487). Moreover, 47.21% of participants know that if a patient develops sinus bradycardia after AMI, doctors should increase the heart rate only if the patient is hemodynamically stable by administering Atropine (M = 3.39, SD = 0.513).

The researcher also conducted a survey to identify areas where healthcare professionals might need more knowledge or skills in managing AMI. According to Table 2, most participants (49.76%) know that if a patient diagnosed with AMI develops recurrent symptoms, heart failure, or malignant arrhythmias during conservative treatment, they should immediately undergo angiography for further evaluation (M = 3.31, SD = 0.476). Additionally, most participants (50.33%) understand that primary percutaneous coronary intervention (PCI) should be performed when fibrinolytic therapy is contraindicated and in patients with cardiogenic shock or delayed presentations (M = 3.29, SD = 0.435). On average, participants demonstrated a good understanding of pharmacological interventions and their timing in AMI care. Furthermore, most participants (51.25%) are aware that diagnosing AMI requires at least two of the following three criteria: a history of typical chest discomfort, ECG changes consistent with AMI, and a rise and fall in serum cardiac markers (M = 3.55, SD = 0.605). These findings indicate that the majority of participants have a solid foundational knowledge of AMI intervention strategies.

4. Discussion

4.1. Current level of knowledge in managing AMI

Knowledge and awareness about acute diseases like AMI are crucial in reducing mortality and morbidity rates. Nurses' knowledge about these diseases can positively impact treatment outcomes. This study shows that, despite differences in skills and expertise levels, most nurses are knowledgeable about managing AMI.

One area in which most nurses have fundamental knowledge is recognizing AMI signs and symptoms. For instance, 51.25% of participants know that diagnosing AMI requires at least two of these three criteria: a history of typical chest discomfort, ECG changes consistent with AMI, and a rise and fall in serum cardiac markers (M = 3.55, SD = 0.605). Furthermore, Table 2 indicates that most of the 65 participants are confident in recognizing AMI signs and symptoms. For example, 63.4% acknowledge that proper medical history-taking, followed by diagnostic and laboratory tests, is essential in diagnosing and treating AMI (M = 3.22, SD = 0.519).

Table 2: Knowledge regarding the management of AMI (n = 65)

Items	M	SD
1. The ECG is a valuable clinical tool for diagnosing and locating AMI	3.56	0.645
2. If a patient develops high-risk features during conservative treatment, invasive procedures like cardiac catheterization are recommended to reduce recurrent ischemic chest pain, admissions, and myocardial infarctions	3.51	0.635
3. The diagnosis of AMI requires at least two of the following three elements: a history of typical chest discomfort, ECG changes consistent with AMI, and a rise and fall in serum cardiac markers	3.55	0.605
4. When taking a medical history for an AMI patient, the pain is often described as heaviness in the chest, usually substernal, and sometimes radiating to the arm, shoulder, jaw, or upper back, or it may be stable in the center of the chest	3.44	0.602
5. The most common cause of AMI is atherosclerotic coronary artery disease with plaque rupture and thrombosis, while congenital anomalies and substance abuse are other possible causes	3.31	0.601
6. Some AMI patients may present to the emergency room with severe epigastric pain, leading to misdiagnosis as heartburn or another gastric disorder	3.41	0.555
7. A prior left bundle branch block can complicate AMI diagnosis, but significant ST-segment deviations not explained by conduction abnormalities suggest AMI	3.57	0.553
8. Serum cardiac markers used in AMI diagnosis include CK, CK-MB, cardiac-specific troponins, and myoglobin	2.72	0.544
9. All AMI patients with ST-segment elevation on the ECG should receive aspirin, beta-blockers, and heparin unless they are receiving fibrinolytic agents	3.36	0.543
10. Key factors in diagnosing AMI are acute ECG changes (ST-segment elevation) along with ischemic chest pain and elevated cardiac biomarkers	3.43	0.543
11. The Thrombolysis in Myocardial Infarction (TIMI) risk score is a simple bedside tool for assessing AMI risk based on history, physical exam, and ECG findings, helping doctors predict in-hospital mortality	3.63	0.533
12. A 12-lead ECG should be done within 10 minutes of arrival at the emergency room to confirm acute ST-elevation myocardial infarction	3.51	0.533
13. Elderly AMI patients might not have chest discomfort but may show symptoms like left ventricular failure, general weakness, or syncope	3.28	0.527
14. If AMI treatment starts after 12 hours, patients should receive medical therapy and may be considered for reperfusion therapy or ACE inhibitors individually	2.99	0.523
15. AMI indicates complete occlusion of coronary vessels with resultant thrombus, explaining the ST-segment elevation on the ECG	2.98	0.521
16. Proper medical history-taking, followed by diagnostic and laboratory tests, is crucial for diagnosing and treating AMI	3.22	0.519
17. If a patient develops sinus bradycardia after AMI, doctors should accelerate the heart rate with atropine only if the patient is hemodynamically stable	3.39	0.513
18. After invasive procedures like PCI or CABG, cardiologists must prescribe antiplatelet medications (ASA, Clopidogrel, Ticagrelor), statins, ACE/ARB, and CCB/Beta blockers if not contraindicated	3.42	0.512
19. Elevation of cardiac markers "troponin I/troponin T" without acute ECG changes or symptoms of myocardial ischemia and a negative angiography indicates myocardial injury	3.17	0.509
20. If a patient develops atrial fibrillation or atrial flutter after AMI, doctors should control the ventricular rate and restore sinus rhythm with diltiazem, verapamil, digitalis, diuretics, or cardioversion	3.56	0.498
21. Patients with inferior AMI may present with epigastric or right upper quadrant pain, mimicking acute cholecystitis, and vice versa	3.19	0.489
22. Cardiac-specific troponins, especially highly sensitive assays, are useful for diagnosing most AMIs, while CK and CK-MB are helpful for diagnosing recurrent AMIs due to persistent troponin elevation	3.53	0.488
23. All myocardial infarction patients should receive long-term therapy with aspirin, beta-blockers, statins, and ACE inhibitors	3.22	0.487
24. If a diagnosed AMI patient develops recurrent symptoms, heart failure, or malignant arrhythmias during conservative treatment, they should undergo immediate angiography	3.31	0.476
25. If a patient develops ventricular premature beats after AMI, doctors should correct electrolyte imbalances and reduce sympathetic tone with potassium and magnesium replacement and/or beta-blockers	2.89	0.476
26. An important part of taking a medical history is asking about risk factors such as age, sex, ethnicity, family history of coronary artery disease, and modifiable risk factors like diabetes, hypertension, smoking, dyslipidemia, obesity, and physical activity	3.39	0.451
27. Primary percutaneous coronary intervention (PCI) should be performed when fibrinolytic therapy is absolutely contraindicated and in patients with cardiogenic shock or delayed presentations	3.29	0.435
28. An ECG is necessary for patients complaining of chest pain to determine if the cause is non-cardiac, such as musculoskeletal, pulmonary, or gastrointestinal issues	3.67	0.435
29. For AMI patients, thrombolytic agents (tPA) should be administered within a specific time frame, regardless of medical history, to save the patient's life	3.54	0.434
30. Before discharging AMI patients, they should be informed about cardiac rehabilitation programs and given diet and exercise prescriptions	3.12	0.432

According to Shah et al. (2019), the use of healthcare technologies and evidence-based practices, such as ECG, has helped nurses recognize AMI signs and symptoms. Most nurses understand how these signs and symptoms vary among patients and affect different body parts, especially the chest. Similarly, this research found that 56.71% of nurses at Jordan University Hospital know that cardiac-specific troponin, particularly highly sensitive troponin assays, is useful for diagnosing most AMIs, while CK and CK-MB help diagnose recurrent myocardial infarctions due to persistent troponin elevation (M = 3.53, SD = 0.488). This shows that many healthcare professionals are increasingly aware of how to manage AMI symptoms and vital signs in patients. While the emergence of technology in healthcare has equipped these nurses with skills to manage AMI and acknowledge the signs and symptoms, this study has established that using the current technologies is still a challenge among healthcare professionals. For example, in the survey, only 43.19% of healthcare professionals are aware that ECG is a valuable clinical tool for the diagnosis and localization of AMI (M = 3.56, SD = 645). This finding is in line with what Chang et al. (2021) found, which shows that awareness of the use of current technologies in managing AMI in hospitals is still low. Despite the low level of awareness of the use of these technologies, Ibanez et al. (2018) established that most healthcare professionals rely on various

approaches, such as evidence-based practices, to gain knowledge. Similarly, this study found that 54.31% of the research participants are aware that all AMI patients (ST-segment elevation) on the ECG must be given aspirin, beta-blockers, and heparin (unless receiving fibrinolytic agents) (M = 3.36, SD = 0.543). Ibanez et al. (2018) established that such administration of medication could mostly be learned from evidence-based practices, which the majority of nurses currently rely on.

Additionally, the technological advancements in the field of healthcare have enabled many healthcare professionals to gain skills in the application of various therapies. For example, Ibanez et al. (2018) found that the use of oxygen therapy in managing AMI has become prevalent in many hospitals today. Similarly, this study found that 49.91% of the healthcare nurses surveyed at Jordan University are aware that if AMI treatment started after 12 hours, patients should receive medical therapy and, on an individual basis, may be considered for reperfusion therapy or angiotensin-converting enzyme inhibitors (M = 2.99, SD = 0.523). Because of that, Jiang et al. (2020) believed that many healthcare professionals can effectively manage pain by effectively managing the vital signs and recognizing the changes in the clinical conditions of their patients. For example, the use of current technologies and reliance on evidence-based nursing practices have enabled these healthcare professionals to know how to continuously monitor the vital signs, cardiac rhythms, and oxygen saturation and detect changes in AMI patients' bodies. Similarly, this research found that 51.25% of the research participants are aware that the criteria for the diagnosis of AMI require at least two of the following three elements: history of typical chest discomfort, electrocardiographic (ECG) changes consistent with AMI, and rise and fall in serum cardiac markers (M = 355, SD = 0.605).

Moreover, education is one of the key areas in which healthcare professionals have advanced their skills and expertise in managing acute healthcare conditions such as AMI. According to Henry et al. (2021), many nurses can currently collaborate with their colleagues and interdisciplinary teams to provide coordinated and optimal patient-centered care. Through such collaboration, Shah et al. (2019) argued that healthcare professionals can currently provide comprehensive education to patients about their condition, medications, follow-up care, and signs of complications, which is essential for their recovery and self-management. Similarly, the findings of this study have shown that 51.09% of the healthcare professionals surveyed at Jordan University Hospitals are aware that prior to discharging AMI patients, they should know of the cardiac rehabilitation program and should follow diet and exercise prescriptions (M = 3.22, SD = 0.487). This revelation shows that healthcare professionals are currently skilled to the extent that they can offer patient education on AMI, including how they can manage pain and the importance of

follow-up in the recovery journey. The fact that these healthcare professionals can provide comprehensive patient education also shows that they can offer adequate psychological support to patients and their families as an essential part of care.

4.2. Educational needs in managing AMI

In most cases, the healthcare professionals are knowledgeable about managing AMI. However, the majority of these healthcare professionals seem to lack fundamental skills and expertise in managing AMI and effectively improving its treatment. According to Ibanez et al. (2018), the emergence of new technologies encourages the need to train nurses to be aware of AMI, its diagnosis, and treatment methods. Specifically, nurses in local hospitals in developing and developed nations still do not have access to some of these latest technologies in the management of AMI. Because of that, Vanzella et al. (2022) believe that they have limited access to educational resources that can improve their knowledge of managing AMI and effectively providing treatment. Similarly, this research found that out of 65 healthcare participants surveyed, 78.46% agreed that limited access to educational resources prevented them from pursuing additional education or training in AMI management. While most nurses have basic knowledge of managing AMI, they still need more awareness and understanding of various interventions and management techniques. Even though healthcare professionals have access to certain technologies, many do not fully understand how to interpret the outputs, which prevents them from providing patient-centered and coordinated care. According to Van de Werf et al. (2003), while these professionals can effectively administer medications, many are unaware of the latest trends and evidence-based best practices in AMI management. This research found that 47.69% of the 65 healthcare professionals surveyed at Jordan University Hospital did not know that AMI indicates a complete occlusion of coronary vessels, resulting in a thrombus and explaining the ST-segment elevation on the ECG (M = 2.98, SD = 0.521). However, the study also found that, on average, these healthcare professionals had a good understanding of pharmacological interventions and their timing in AMI care. Consistent with Henry et al. (2021), most nurses need better access to training and educational resources to understand these interventions fully. Training should focus on collaboration, using the latest healthcare technologies, performing emergency procedures, and understanding lifestyle modifications and therapies. These are the areas where many healthcare professionals managing AMI lack fundamental skills and knowledge. This finding highlights the urgent need for key stakeholders in healthcare to advance training and ensure that professionals not only have access to technology and

educational resources but also know how to use them effectively.

5. Conclusion and recommendations

This research assessed the educational and knowledge needs of healthcare professionals in managing AMI, a leading cause of heart disease-related deaths worldwide. While many nurses are aware of AMI's signs, symptoms, management techniques, and treatments, there are still gaps in skills and expertise. Some healthcare professionals lack the necessary knowledge and skills to manage and treat AMI effectively. The study found that most healthcare professionals can assess and recognize AMI signs and symptoms, respond quickly, monitor patient recovery, administer medications, manage pain, provide psychological support, and collaborate with interdisciplinary teams. However, due to limited resources in some hospitals, some nurses cannot access the latest technologies, provide effective patient education, deliver therapies, prevent complications, or understand emergency procedures. These gaps suggest a need for better access to educational resources and training to enhance AMI management skills. This research highlights the importance of individualized and patient-centered education for managing AMI in hospitals. It identifies areas where policymakers and healthcare practitioners can focus to improve AMI management. Hospitals must work hard to meet the needs of nurses and other healthcare professionals to ensure positive outcomes in AMI management.

However, the study's limitations include a small sample size and reliance on healthcare professionals from Jordan University Hospital, making it difficult to generalize the findings to a broader population. Additionally, the study focused only on the educational needs and knowledge of healthcare professionals, neglecting the crucial role patients play in their recovery. Future studies should focus on the learning needs of patients in managing AMI, recognizing the important roles that patients and families play in treatment and recovery. They should use larger samples to enhance the external validity of the findings and expand research settings to cover more hospitals, revealing diverse perspectives of healthcare professionals in managing AMI.

Acknowledgment

Compliance with ethical standards

Ethical considerations

Approval to conduct the study was granted by the relevant university ethics committee (JEP-2022-812) and the hospital involved (IRB-JUH 30/2023). The first researcher contacted the director of the hospital to explain the study and seek permission to enter the hospital for the purpose of gathering data. These healthcare professionals were given explanations regarding the purpose and significance of conducting the research. Healthcare professionals who agreed to participate in this study were asked to sign written informed consent. Participation was voluntary, and the questionnaire was anonymously answered with no possibility of research participants being identified.

Conflict of interest

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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