



Original Article



Assessment of Nurses' Knowledge Regarding Early Recognition and Management of Patients with Acute Coronary Syndrome at Tertiary Hospitals in Karachi

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ABSTRACT

Cardiovascular diseases are the leading cause of mortality worldwide, with Acute Coronary Syndrome (ACS) representing a significant proportion of these cases. Nurses play a critical role in the early recognition and management of ACS; however, knowledge gaps may compromise patient outcomes and timely interventions. **Objectives:** To assess practicing nurses' knowledge in recognizing and managing patients with Acute Coronary Syndrome (ACS) at tertiary care centers in Karachi. **Methods:** A descriptive cross-sectional study was conducted with 240 registered nurses recruited from CCU, ICU, HDU, and Emergency Departments of three tertiary care hospitals using purposive sampling. Data were collected using a structured 20-item questionnaire. Normality was assessed using the Kolmogorov-Smirnov test (age: KS=0.087, $p=0.068$; knowledge scores: KS=0.092, $p=0.052$), and associations were examined using chi-square tests, with significance set at $p<0.050$. **Results:** Among 240 participants, 132 (55%) demonstrated excellent knowledge, 60 (25%) good knowledge, 24 (10%) average knowledge, and 24 (10%) poor knowledge. Significant associations were found between knowledge level and age ($p=0.003$), gender ($p=0.045$), and qualification ($p=0.043$), while experience showed no significant association ($p=0.660$). However, the borderline significance of gender ($p=0.045$) and qualification ($p=0.043$) associations should be interpreted cautiously, as p -values close to the 0.050 threshold indicate that relatively small changes in sample composition or data distribution could potentially affect statistical significance. **Conclusions:** While 80% of nurses demonstrated satisfactory ACS knowledge, notable deficiencies in ECG interpretation and pharmacological management require targeted educational interventions. Regular continuing education, simulation-based training, and competency assessment programs are recommended to enhance nursing competencies in ACS care at tertiary care settings.

INTRODUCTION

Cardiovascular diseases (CVDs) are the most common cause of morbidity and mortality worldwide, which is an immense challenge to the general population in terms of their health. The World Health Organization (WHO, 2023) describes ischemic heart disease as the cause of almost 16 percent of all deaths in the entire globe, with Acute Coronary Syndrome (ACS) constituting a significant portion of such cases [1]. The subsequent complications, mortality, and patient outcomes can be prevented by early

diagnosis and timely curative measures related to ACS [2]. Recognition of clinical manifestations of typical ACS, such as chest pain, shortness of breath, diaphoresis, or vital signs changes, and managing these changes according to evidence-based guidelines could have a great impact on patient survival and prognosis [3]. The tertiary hospitals have to deal with critically ill patients with ACS who require special treatment. Prompt recognition and management have a direct impact on patient outcomes; this makes



nurses' work even more crucial in such an environment [4]. Acute coronary syndrome (ACS) includes unstable angina, NSTEMI, and STEMI. In ACS, there is a sudden reduction in the blood supply to the heart, which may manifest as extremely uncomfortable chest pain and is usually a classic symptom of myocardial infarction [5]. ACS management necessitates an extensive range of pharmacotherapy and coronary angiography. ACS is a major global health problem that must be assessed promptly, risk-stratified, and managed to avoid complications, such as arrhythmias, heart failure, and irreversible myocardial damage [6]. Early diagnosis of ACS permits individualized management aimed at preventing myocardial infarction while preserving heart function. This timely intervention will go a long way in minimizing myocardial damage because decreased damage leads to improved patient recovery [7]. Katus *et al.* emphasize that early diagnosis of Acute Coronary Syndrome is critical because it enables physicians to rule in or rule out myocardial infarction soon after patient presentation, typically in the emergency department [8]. Nurses have a significant responsibility in identifying and managing patients with ACS. They have to perform early and accurate assessments to determine the patient's status and initiate proper management as per the guidelines and the physician's orders. Nurses monitor patients' pulses, blood pressures, and ECGs and assess symptoms to differentiate between STEMI, unstable angina, and NSTEMI [9]. Research in line with Orem's Self-Care Deficit Nursing Theory and Benner's "From Novice to Expert" model, they underline that upgraded nursing knowledge and skill can lead to better patient assessment and management [10]. Benner's "Novice to Expert" model directly informed our variable selection by positing that clinical reasoning improves with educational advancement and experiential learning, justifying our comparison of knowledge across qualification levels (BSN vs. Post-RN BSN) and years of practice. Concurrently, Orem's Self-Care Deficit Theory frames the nursing imperative, as nurses must possess robust ACS knowledge to accurately detect patients' inability to maintain cardiac perfusion and initiate timely compensatory interventions. Together, these frameworks establish the theoretical premise that deficits in nurses' symptom recognition and ECG interpretation the core domains of our survey directly compromise their capacity to assess self-care deficits and deliver guideline-directed care, validating the need for this comprehensive knowledge assessment. While prior local work has isolated specific deficits, such as poor ECG interpretation and limited angiographic care knowledge, no multi-center study has comprehensively evaluated Pakistani nurses' competency across all core ACS domains. Given Karachi's rising ACS burden and the absence of standardized training frameworks, this fragmented evidence cannot guide systematic policy reforms. Therefore, this study addresses

the critical gap by providing a rigorous, multi-institutional baseline assessment of practicing nurses' ACS knowledge to inform targeted, evidence-based educational interventions in tertiary settings. [12]. The Brazilian research study indicated that methodological expertise in care provision is paramount to recognizing cases of ACS, thus leading to an optimized outcome for patients [13]. There were wide gaps in nurses' knowledge of MI detection, management, and treatment; thus, recommended training programs need to be strengthened. Generally, nurses who have more experience and higher education articulate this better [14]. Tobacco use, diabetes, and high blood pressure have been identified as substantial risk factors for ACS [15]. The previous study found a high incidence of STEMI in Pakistan, with risk factors that include lifestyle, hypertension, diabetes, smoking, and a high-calorie diet. Populations of urban and rural settings were affected, but this varies because of the lifestyles of people and the differences in the availability of healthcare facilities [16]. The findings of a study conducted in Indonesia at an emergency department revealed that systematic interventions are needed to improve interprofessional teamwork and provide the best possible treatment for patients in emergencies [17]. Moreover, the research study concluded that significant inadequacies were found in their capacity to identify high-risk patients, effectively interpret diagnostic findings such as ECG readings, and apply time-sensitive therapies required for successful ACS therapy [18]. Kousar *et al.* conducted a study in Karachi, Pakistan, to assess female nurses' knowledge of pre/post-angiographic patient care. The research found that focused training programs are crucial for enhancing nursing skills, leading to improved patient outcomes and safety in pre- and post-angiographic patient care management [19]. Hernandez *et al.* conducted a study in the USA across various healthcare facilities. The study concluded that to improve clinical outcomes and patient care in critical situations like acute coronary syndrome, customized training programs are required to enhance the nursing staff's recognition skills [20].

The past study identified the critical assessment points regarding acute myocardial infarction (AMI), which highlights the importance of identifying the major symptoms of chest discomfort, such as substernal pain, heaviness, chest pain, sweating, nausea, and dyspnea. Though some international studies have assessed the knowledge of nurses in the recognition and management of Acute Coronary Syndrome (ACS) very few studies are available in Pakistan especially from tertiary care hospitals. This study aimed to assess practicing nurses' knowledge in recognizing and managing patients with Acute Coronary Syndrome (ACS) at tertiary hospitals of Karachi.

METHODS

The current study was carried out using a descriptive cross-sectional design. Ethical approval was obtained from the Institutional Review Committee (Ref. No: DUHS/DION&M/2025/18.193 dated 23 June 2025), Dow Institute of Nursing and Midwifery, Dow University of Health Sciences. The population was registered nurses who were employed in the cardiac care units, intensive care units, high dependency units, and emergency departments of the Dow University Hospital, Civil Hospital Karachi, and Abbasi Shaheed Hospital Karachi. The sample size was calculated using the Open Epi online calculator, assuming a 95% confidence level, a 5% margin of error, and a conservative estimated prevalence of 57% for adequate ACS knowledge, drawn from the Pakistani study by Ahmad et al. [11] and consistent with local findings from Yaqoob et al. [12]. Given the total eligible registered nurse population across the three tertiary care hospitals was approximately 660, a finite population correction was applied, yielding a minimum required sample of 240 participants. To account for a 10% anticipated non-response or incomplete data, the target was inflated to 264 participants. The data collection was performed by a non-probability purposive sampling technique. The duration of the data collection was conducted for approximately 3 months, from July 2025 to September 2025. The data were collected using a structured, researcher-developed questionnaire following an extensive literature review and current Acute Coronary Syndrome (ACS) clinical guidelines. The questionnaire consisted of two sections: (1) demographic information (age, gender, qualification, and years of experience) and (2) 20 multiple-choice knowledge items assessing six domains of ACS knowledge, including recognition of signs and symptoms, ECG interpretation, diagnostic evaluation, pharmacological management, emergency management, and prevention. Each correct response was assigned one point and each incorrect response zero points, yielding a total score ranging from 0 to 20, with higher scores indicating greater knowledge of ACS recognition and management, hence revealing high reliability. The inclusion criteria comprised registered nurses working in the CCU, ICU, HDU, and Emergency Departments of the selected tertiary care hospitals who had at least six months of clinical experience and provided written informed consent to participate. The exclusion criteria included student nurses, nursing administrators, nurses on extended leave during the data collection period, and questionnaires with incomplete or missing responses. These criteria were applied to ensure the inclusion of participants directly involved in the care of patients with Acute Coronary Syndrome (ACS). The knowledge questionnaire consisted of 20 items, with each correct

response scored as 1 and each incorrect response scored as 0, resulting in a total possible score of 0–20. A modified Bloom's cut-off scoring system, widely applied in clinical nursing competency research, was utilized to categorize total knowledge scores (range 0–20): Poor (<12; <60%), Average (12–15; 60–74%), Good (16–17; 75–84%), and Excellent (18–20; ≥85%). This threshold-based classification ensures that a 50% score is not conflated with acceptable clinical mastery, particularly given the high-stakes nature of ACS recognition and pharmacological management. These benchmarks are consistent with established educational standards requiring ≥75% for satisfactory clinical competence and were reviewed by the expert panel during content validation to ensure their clinical appropriateness. The questionnaire was developed following an extensive review of published literature and current ACS clinical guidelines. To establish content and face validity, the instrument was reviewed by a panel of experts comprising nursing faculty members and cardiology specialists, who evaluated the relevance, clarity, and comprehensiveness of each item. Based on their recommendations, minor revisions were made before conducting a pilot study on 40 nurses, which demonstrated good internal consistency with a Cronbach's alpha of 0.856, supporting the reliability of the final questionnaire. The questionnaire was given to the respondents with prior explicit consent and assurance of anonymity and confidentiality. Incomplete questionnaires (n=12) were excluded from the analysis. All included questionnaires (n=240) had complete responses for all variables of interest, and no additional missing data remained in the final dataset. Thus, no missing data were present in the final analysis.

Statistical analysis was performed using SPSS version 27.0. Before inferential analysis, the normality of continuous variables was assessed using the Kolmogorov-Smirnov test. For participants' age, the test statistic was 0.087 ($p=0.068$), indicating that the age data did not significantly deviate from a normal distribution. For total knowledge scores, the test statistic was 0.092 ($p=0.052$), suggesting approximately normal distribution. Both p -values exceeded the 0.050 threshold ($p>0.050$); therefore, parametric tests were considered appropriate for subsequent analyses. Accordingly, the independent t -test was considered for comparisons of continuous variables; however, since the primary analysis involved categorical variables, chi-square tests were used to examine associations between demographic characteristics and knowledge levels. Measures of association (Cramer's V), together with 95% confidence intervals, were calculated to improve the interpretation of statistically significant findings and provide information regarding the magnitude

and precision of the observed associations. Cramer's V values were interpreted as: 0.10-0.29 indicating weak association, 0.30-0.49 moderate association, and ≥ 0.500 strong association. Assumptions for chi-square tests were verified before analysis. All expected cell frequencies were ≥ 5 , validating the use of chi-square analysis. No cells had expected frequencies below 5, and therefore the chi-square test assumptions were met. No missing data were present in the final dataset as all included questionnaires had complete responses. Incomplete questionnaires ($n=12$) were excluded before analysis. Statistical significance was set at $p < 0.050$.

RESULTS

Out of 240 participants, the age distribution was 80 (33.3%) in the 25-28 years, 78 (32.5%) in the 29-31 years, and 82 (34.2%) in the 32-35 years. Gender distribution included 97 (40.4%) males and 143 (59.6%) females. Regarding qualifications, 137 (57.0%) held Post RN BSN and 103 (43.0%) held BSN degrees, while experience varied: 70 (29.2%) had 1-3 years, 90 (37.5%) had 4-6 years, and 80 (33.3%) had 7-10 years (Table 1).

Table 1: Demographic Characteristics of the Participants

Variables	Category	n (%)
Age (Years)	25-28	80 (33.3%)
	29-31	78 (32.5%)
	32-35	82 (34.2%)
Gender	Male	97 (40.4%)
	Female	143 (59.6%)
Professional Qualification	Post RN BSN	137 (57.0%)
	BSN	103 (43.0%)
Experience (Years)	1-3 Years	70 (29.2%)
	4-6 Years	90 (37.5%)
	7-10 Years	80 (33.3%)

Knowledge distribution among 240 nurses showed 132 (55%) excellent, 60 (25%) good, 24 (10%) average, and 24 (10%) poor. BSN-prepared nurses outperformed Post RN BSN (excellent: 61.2% vs 50.4%; good: 25.2% vs 24.8%). Excellent knowledge was similar across experience groups (55.7%, 55.6%, 53.8%), while significant associations were found with gender, age, and qualification ($p < 0.050$) (Table 2).

Table 2: Distribution of ACS Recognition and Management Knowledge Levels Across Demographic Groups ($n=240$)

Variables	Category	Excellent, n (%)	Good, n (%)	Average, n (%)	Poor, n (%)	Total, n	χ^2	p-value	Cramer's V	95% CI
Gender	Male	54 (55.7%)	30 (30.9%)	4 (4.1%)	9 (9.3%)	97	8.01	0.045*	0.183	0.02-0.34
	Female	78 (54.5%)	30 (21.0%)	20 (14.0%)	15 (10.5%)	143				
	Total	132 (55.0%)	60 (25.0%)	24 (10.0%)	24 (10.0%)	240				
Age (Years)	25-28	60 (75.0%)	10 (12.5%)	5 (6.2%)	5 (6.2%)	80	23.14	0.003*	0.311	0.18-0.43
	29-31	40 (51.3%)	20 (25.6%)	10 (12.8%)	8 (10.3%)	78				
	32-35	32 (39.0%)	30 (36.6%)	9 (11.0%)	11 (13.4%)	82				
	Total	132 (55.0%)	60 (25.0%)	24 (10.0%)	24 (10.0%)	240				
Qualification	Post RN BSN	69 (50.4%)	34 (24.8%)	14 (10.2%)	20 (14.6%)	137	8.02	0.043*	0.183	0.02-0.34
	BSN	63 (61.2%)	26 (25.2%)	10 (9.7%)	4 (3.9%)	103				
	Total	132 (55.0%)	60 (25.0%)	24 (10.0%)	24 (10.0%)	240				
Experience (Years)	1-3	39 (55.7%)	18 (25.7%)	7 (10.0%)	6 (8.6%)	70	2.41	0.660	0.100	-0.03-0.22
	4-6	50 (55.6%)	23 (25.6%)	9 (10.0%)	8 (8.9%)	90				
	7-10	43 (53.8%)	19 (23.8%)	8 (10.0%)	10 (12.5%)	80				
	Total	132 (55.0%)	60 (25.0%)	24 (10.0%)	24 (10.0%)	240				

ACS: Acute Coronary Syndrome, χ^2 : Chi-Square. *A p-value of < 0.050 is considered significant

Across the three hospitals, knowledge distribution remained consistent: Dow University (55.7% excellent, 25.7% good, 10.0% average, 8.6% poor), Civil Hospital Karachi (55.0%, 25.0%, 10.0%, 10.0%), and Abbasi Shaheed Hospital (54.0%, 24.0%, 10.0%, 12.0%). Excellent knowledge ranged from 54.0% to 55.7% across sites. The analysis showed no statistically significant difference ($p > 0.050$) (Table 3).

Table 3: Hospital-Wise ACS Recognition and Management Knowledge Levels among Participants

Hospital	Excellent, n (%)	Good, n (%)	Average, n (%)	Poor, n (%)	Total, (n)
Dow University Hospital	39 (55.7%)	18 (25.7%)	7 (10.0%)	6 (8.6%)	70
Civil Hospital Karachi	66 (55.0%)	30 (25.0%)	12 (10.0%)	12 (10.0%)	120
Abbasi Shaheed Hospital	27 (54.0%)	12 (24.0%)	5 (10.0%)	6 (12.0%)	50
Total	132 (55.0%)	60 (25.0%)	24 (10.0%)	24 (10.0%)	240

Participants performed well in fundamental knowledge (80%), management (70%), pharmacology (65%), and

prevention (80%), but showed poor performance in ECG interpretation (40% correct; 60% incorrect). This highlights a substantial gap between theoretical knowledge and practical diagnostic competence in ACS care (Figure 1).

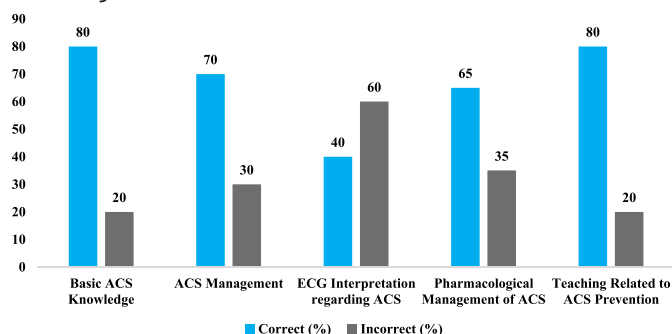


Figure 1: Comparisons of Participants' Knowledge Levels Across ACS Domains

DISCUSSION

The results of this study showed that most of the nurses (80%) had good to excellent knowledge about ACS at the tertiary care centers in Karachi, with a significant association of age, gender, and qualification. Like Ahmad, [11] in Ethiopia, younger nurses and highly educated nurses had better knowledge ($p=0.021$ and $p<0.001$), indicating that education and cognitive factors had a universal effect on acquiring knowledge about ACS. The uniformity of the results obtained in different healthcare settings, despite different resource levels and infrastructures, suggests a fundamental role of nursing education curricula and age-related cognitive processing on knowledge retention and clinical reasoning skills. Although gender and qualification were borderline significant, it is important to note that the number of changes in the sample size or distribution of the data may impact the statistical significance, and larger multicenter studies with multivariate analysis accounting for potential confounding factors should be conducted [11, 22]. The answers to questions about the delivery of oxygen, continuous cardiac monitoring, and the time limits for emergency treatment were especially strong, with most nurses correctly identifying the time limits from door to balloon (PCI) and door to needle (thrombolytic therapy) (90 minutes and 30 minutes, respectively), indicating appropriate education about the standards of emergency treatment and reperfusion objectives [23]. The lowest performance was seen in ECG interpretation, with 60% failing to correctly identify typical ECG changes associated with ACS: ST-segment elevation (STEMI), ST-segment depression (NSTEMI), and T-wave inversion (unstable angina). It is especially worrisome because the interpretation of the ECG is critical to the rapid diagnosis and proper triage of ACS. The poor performance may be due to a lack of interest in ECG education in the curriculum

of the nurses in Pakistan and limited exposure to ECG interpretation by the students in their clinical practice. In contrast, in some international studies, there is a specific ECG course as part of the nursing curriculum and continuing education (CE), whereas in Pakistan, there is a possibility of inadequate structured training for nurses in this important diagnostic skill. The discovery implies that there is a need to improve the content of ECG interpretation in the nursing education programs by adopting simulation, case-based reasoning, frequency testing of competency, and skill in Pakistan [24]. Out of the 65% correct, 35% failed to recognize the correct medications available for the ACS, and there was an alarming gap that needs to be addressed with immediate teaching interventions. Nurses' knowledge of health promotion strategies for cardiovascular disease prevention, such as providing smoking cessation and dietary and exercise recommendations, was highest at 80%, which was consistent with literature highlighting nurses' important role in patient counseling and cardiovascular disease prevention [25].

This study has several limitations that must be acknowledged. The cross-sectional design restricts causal inference; the non-probability purposive sampling technique and inclusion of only three tertiary care hospitals limit generalizability; and self-administered questionnaires may introduce response bias. Borderline p -values for gender and qualification associations require confirmation with larger samples, while the absence of multivariate analysis means potential confounding factors were not controlled. Future multicenter longitudinal studies with probability sampling, validated assessment instruments, and multivariate statistical techniques are recommended to provide more robust and generalizable evidence regarding nurses' ACS knowledge.

CONCLUSIONS

The present study demonstrated that the majority of nurses possessed good to excellent knowledge regarding the early recognition and management of Acute Coronary Syndrome (ACS). Significant associations were observed between nurses' knowledge levels and age, gender, and professional qualification, whereas years of clinical experience showed no statistically significant association. Despite the overall satisfactory knowledge, notable deficiencies were identified in ECG interpretation and pharmacological management, highlighting important areas for improvement. These findings underscore the need for regular evidence-based continuing education, simulation-based training, and competency assessment programs to strengthen nurses' clinical skills and promote timely recognition and effective management of ACS in tertiary care settings.

Authors' Contribution

Conceptualization: FAS, MY

Methodology: FAS, MY

Formal analysis: FAS, DAK

Writing and Drafting: FAS, SR, SS

Review and Editing: FAS, MY, SR, SS, DAK

All authors approved the final manuscript and take responsibility for the integrity of the work

Conflicts of Interest

All the authors declare no conflict of interest.

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