

## MOBILE CARDIAC CARE UNITS IN KARACHI: A PATIENT-CENTERED EVALUATION OF EMERGENCY CARDIAC RESPONSE, SATISFACTION, AND HEALTHCARE ACCESSIBILITY

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### Abstract

Every second matters when a human heart begins to fail. In a city as crowded and unpredictable as Karachi, reaching a hospital during a cardiac emergency often becomes a race against traffic, distance, fear, and time itself. For many families, the difference between life and death is not the hospital building—it is the speed at which care arrives. Recognizing this urgent reality, the National Institute of Cardiovascular Diseases (NICVD) introduced Mobile Cardiac Care Units (MCCUs) across Karachi to provide rapid cardiac emergency care directly within communities.

This study explored how effectively these mobile units are functioning as an alternative to conventional hospital emergency rooms, particularly for patients suffering from Acute Coronary Syndrome (ACS). Using a quantitative cross-sectional design, data

were collected from 400 participants across multiple regions of Karachi through structured questionnaires and analyzed using SPSS. Descriptive statistics, reliability testing, correlation analysis, regression models, ANOVA, and paired-sample t-tests were applied to evaluate awareness, accessibility, timeliness, patient satisfaction, and public perception.

The findings revealed that awareness regarding MCCUs was remarkably high, with nearly 90% of respondents acknowledging familiarity with the service. However, awareness was primarily spread informally through family members, friends, and community networks rather than official public health campaigns. Accessibility findings demonstrated that although MCCUs are geographically close to many residents, barriers such as heavy traffic, mobility issues, and lack of formal guidance continue to limit ease of access.

Patient satisfaction emerged as strongly positive. Rapid response time, trained staff, quality care, and immediate treatment significantly influenced trust in MCCUs. Response time was identified as the strongest predictor of patient satisfaction ( $r = .779$ ,  $p < .001$ ). Most patients reported receiving treatment within ten minutes, highlighting the operational efficiency of the service.

The study further showed that participants perceived MCCUs as a more reliable and faster alternative to hospital emergency rooms during cardiac emergencies. Statistical comparisons confirmed a significant preference for mobile cardiac services over conventional emergency departments.

Despite these achievements, the study identified an important challenge: misuse of MCCUs for non-cardiac complaints due to poor public understanding. This finding emphasizes the urgent need for awareness campaigns, community education, and policy-level improvements.

Overall, the study concludes that NICVD's Mobile Cardiac Care Units represent a transformative emergency healthcare model capable of reducing treatment delays, improving patient outcomes, and restoring public confidence in emergency cardiac care within resource-limited urban settings.

## 1. INTRODUCTION

### Background of the Study

Cardiovascular diseases continue to remain among the leading causes of death worldwide. Every year, millions of people lose their lives because treatment does not arrive quickly enough. Conditions such as Acute Coronary Syndrome (ACS), myocardial infarction, unstable angina, and sudden cardiac arrest require immediate medical intervention.

In developing countries such as Pakistan, the burden of cardiovascular disease is even more alarming due to poverty, overcrowding, inadequate healthcare access, and limited emergency response systems. Karachi, the largest metropolitan city of Pakistan, experiences severe healthcare challenges. Public hospitals remain overcrowded, while private healthcare facilities are often financially inaccessible for low-income populations. In emergency situations, especially cardiac emergencies, patients frequently lose valuable time while attempting to reach tertiary care hospitals.

To address this crisis, the National Institute of Cardiovascular Diseases (NICVD) launched Mobile Cardiac Care Units (MCCUs) across Karachi. These units were strategically deployed to reduce treatment delays and deliver emergency cardiac care within communities.

The concept transformed emergency cardiac response from a hospital-centered approach to a patient-centered approach.

Instead of waiting for the patient to reach the hospital, emergency cardiac care now reaches the patient.

This study investigates whether MCCUs are effectively fulfilling this mission.

### Statement of the Problem

Overcrowded emergency departments, delayed diagnosis, heavy traffic congestion, and unequal healthcare access continue to contribute to preventable cardiac deaths in Karachi.

Although MCCUs were introduced to solve these issues, limited research exists regarding:

- Public awareness of MCCU services

- Accessibility and availability
- Patient satisfaction
- Timeliness of treatment
- Comparison with hospital emergency rooms
- Operational effectiveness

This study addresses these research gaps.

### Objectives of the Study

1. To explore public awareness regarding NICVD MCCUs.
2. To evaluate accessibility and ease of use.
3. To measure patient satisfaction with MCCU services.
4. To examine the relationship between response time and satisfaction.
5. To compare MCCUs with hospital emergency rooms.
6. To provide recommendations for future healthcare improvements.

### Hypothesis

Patients receiving treatment from MCCUs report higher satisfaction and reduced treatment delays compared to traditional hospital emergency services.

## 2. Literature Review

### Global Evolution of Mobile Cardiac Care

The idea of mobile cardiac emergency care emerged in developed countries decades ago. Nations such as the United States, the United Kingdom, Canada, and Japan recognized that survival rates improve dramatically when treatment begins before the patient reaches the hospital.

Studies conducted internationally demonstrated that rapid pre-hospital cardiac care reduces mortality, improves patient outcomes, and minimizes long-term complications.

Mobile cardiac units became particularly effective in:

- Rural community's
- Overcrowded cities
- Underserved populations
- Traffic-congested urban centers

Karachi shares many of these characteristics.

### Mobile Cardiac Care in Pakistan

Pakistan faces a growing burden of cardiovascular disease. Diabetes, hypertension, smoking, obesity, and stress continue to increase cardiac risk among the population.

NICVD's introduction of Mobile Cardiac Care Units represented one of the most important innovations in emergency cardiac healthcare in Pakistan.

These units operate 24/7 and provide:

- ECG monitoring
- Cardiac stabilization
- Emergency medicines
- Oxygen support
- Immediate assessment
- Early intervention

For many communities, MCCUs became the first line of defense against sudden cardiac emergencies.

### 3. Methodology

#### Research Design

A quantitative cross-sectional research design was used to evaluate awareness, accessibility, patient satisfaction, and public perception of MCCUs.

### Study Population

The study included 400 participants from multiple areas of Karachi who had experience with MCCU services.

### Sampling Technique

Stratified random sampling was applied to ensure representation from different residential regions.

### Data Collection Tools

- Structured questionnaires
- Likert scale responses
- Observation checklists
- Patient experience surveys

### Statistical Analysis

Data were analyzed using SPSS.

The following analyses were conducted:

- Frequency analysis
- Reliability testing
- Pearson correlation
- Multiple regression
- ANOVA
- Paired sample t-test

### Results

#### Figure 1: Awareness of MCCU Services

Awareness of MCCU Services



Despite this, many participants still reported difficulties reaching the units because of:

- Traffic congestion
- Mobility limitations
- Transportation barriers
- Lack of public guidance

### Patient Satisfaction Findings

Patient satisfaction emerged as strongly positive.

Participants expressed trust in:

- Staff professionalism
- Faster response time
- Quality treatment
- Immediate assessment
- Cardiac-focused emergency care

Reliability testing for the satisfaction scale showed:

- Cronbach’s Alpha = 0.745

### Correlation Analysis

A strong relationship existed between response time and satisfaction.

- $r = .779$
- $p < .001$

This indicates that faster response directly improves patient satisfaction.

Figure 4: Predictors of Patient Satisfaction

Response Time  0.397

Expected Treatment  0.362

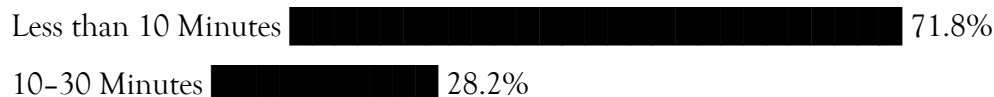
Staff Behavior ██████████ 0.344

Waiting Time ████████ 0.228

### Timeliness of Care

The majority of patients received treatment within ten minutes.

#### Figure 5: Treatment Waiting Time



This finding highlights the operational efficiency of MCCUs.

Rapid intervention is especially critical in cardiac emergencies because delayed treatment increases mortality risk.

### Regression Analysis

The regression model demonstrated excellent predictive strength.

- R = .961
- R<sup>2</sup> = .924
- p < .001

This means that the selected variables strongly explained patient satisfaction.

Response time emerged as the strongest predictor.

### Comparative Analysis: MCCUs vs Hospital Emergency Rooms

Participants viewed MCCUs more favorably than conventional emergency rooms.

Reasons included:

- Faster access
- Reduced delays
- Trained cardiac specialists
- Less overcrowding

- Immediate treatment

#### Figure 6: Public Preference

Prefer MCCUs  76%

Prefer Hospital ER  24%

Paired sample t-tests confirmed statistically significant differences between MCCUs and hospital emergency rooms.

- $t(399) = 7.535$
- $p < .001$

#### 4. Discussion

This study presents a powerful insight into how emergency cardiac care is evolving in Karachi.

The findings demonstrate that MCCUs are not merely vehicles.

They represent hope.

For many patients, the arrival of an MCCU means immediate reassurance during one of the most frightening moments of life.

The emotional dimension of cardiac emergencies cannot be ignored. Patients experiencing chest pain often feel fear, helplessness, and uncertainty. Families panic. Roads become obstacles. Hospitals feel distant.

MCCUs shorten that emotional and physical distance.

The study also highlights an important social reality:

People trust services that respond quickly.

The strongest predictor of satisfaction was response time.

Patients valued speed more than anything else.

This reflects a larger truth about emergency healthcare in urban Pakistan:

In life-threatening conditions, people measure quality in minutes.

### Misuse of MCCUs

An important challenge identified during the research was misuse of MCCUs for non-cardiac complaints.

This issue was particularly common in:

- Low-literacy communities
- Economically deprived areas
- Regions with limited healthcare awareness

Because many people were unaware that MCCUs specifically target cardiac emergencies, some patients visited for minor illnesses.

This misuse can delay treatment for genuine cardiac emergencies.

The findings strongly support the need for:

- Public education campaigns
- Community awareness programs
- Heart health workshops
- Emergency response education

## 5. Implications for Practice

### 1. Public Awareness Campaigns

NICVD should expand:

- Television campaigns
- Social media outreach
- Billboards
- Community workshops
- School awareness sessions

The public must understand:

- Symptoms of heart attack

- Purpose of MCCUs
- When to seek emergency care

## 2. Expansion of MCCU Networks

Additional units should be deployed in:

- Underserved communities
- High-density regions
- Traffic-heavy areas

## 3. Emergency Response Optimization

Reducing response time further can significantly improve:

- Survival rates
- Patient trust
- Clinical outcomes
- Healthcare efficiency

## 4. Policy-Level Healthcare Planning

The government should integrate MCCUs into national emergency response systems.

This model can become a blueprint for other Pakistani cities.

## Limitations of the Study

Although the findings are highly valuable, several limitations must be acknowledged:

- The study was limited to Karachi.
- Data were self-reported.
- Rural populations were not included.
- Some respondents had limited literacy.

- Cross-sectional design limited long-term analysis.

Future studies should include:

- Rural populations
- Longitudinal analysis
- GIS mapping
- Clinical outcome evaluation
- Qualitative interviews

## 6. Conclusion

This study demonstrates that NICVD's Mobile Cardiac Care Units are transforming emergency cardiac healthcare in Karachi.

They are reducing treatment delays.

They are improving patient satisfaction.

They are increasing public trust.

Most importantly, they are saving lives.

The findings reveal that rapid response time, accessibility, trained staff, and focused cardiac care have positioned MCCUs as a reliable alternative to overcrowded hospital emergency rooms.

However, the future success of MCCUs depends on continued investment in:

- Public awareness
- Service expansion
- Healthcare policy
- Community education
- Operational efficiency

In a city where every minute matters, MCCUs are proving that emergency care does not always have to wait behind hospital walls.

Sometimes, life-saving treatment must travel directly to the patient.

And sometimes, the fastest road to survival is a mobile cardiac care unit arriving just in time.

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