Dubai Medical Journal
Volume 7, Issue no. 3, DOI 10.18502/dmj.v7i3.17730
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Research Article

Assessment of the Effect of Telephonic Follow-up on Readmissions and Mortality Rate of the Patients with Acute Coronary Syndrome and Acute Heart Failure in Rashid Hospital

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Abstract

Background: Acute coronary syndrome (ACS) and acute heart failure (AHF) are severe medical conditions that are closely associated with higher rates of readmissions and mortality in hospitals. These conditions pose an exponential challenge to the healthcare system and increase patient burden.

Objectives: This study aims to identify the effect of telephonic follow-up on readmission and mortality rates in Rashid Hospital due to ACS and AHF.

Methods: In 2022, we conducted a prospective study. We divided 805 patients admitted with ACS and AHF in Rashid Hospital into two groups and compared the readmission and mortality rates of patients who were followed up with those who were not. The data collection tool included a demographic questionnaire, which was then analyzed by statistical tests and SPSS software.

Results: There were patients in the follow-up call group versus patients in the non-follow-up call group. The patients with follow-up calls had a higher survival rate (98.3%) compared with the ones who had not been called (93.4%) ($p = 0.003$). Readmission rates for follow-up patients were (7.7%) versus (5.9%) for those without follow-up calls ($p = 0.429$). The study analyzed and investigated the individuals on various other factors; however, no statistically significant difference was observed between the two groups.

Conclusion: The study provides insight into the various factors associated with patients' outcomes. Even though the association of readmission rate to follow-up was unremarkable, the mortality rate of patients with follow-up was significantly lower.

Keywords: acute coronary syndrome (ACS), acute heart failure (AHF), tele-follow up for re-admission, tele-follow up for mortality rate, follow up

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Received: March 31, 2024
Accepted: September 30, 2024
Published: December 8, 2024

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How to cite this article: Prabakaran MS, Jamil N, Thomas RM, Mohanan M, Jose A, and Chandrabose AJ. Assessment of the Effect of Telephonic Follow-up on Readmissions and Mortality Rate of the Patients with Acute Coronary Syndrome and Acute Heart Failure in Rashid Hospital. *Dubai Medical Journal*. 2024;7(3):137–148. DOI 10.18502/dmj.v7i3.17730

1. Introduction

Acute coronary syndrome (ACS) and acute heart failure (AHF) are serious conditions that can significantly impact a person's health and quality of life. These conditions often lead to hospitalizations and, unfortunately, frequent readmissions. This can be a major burden for both patients and the healthcare system.

A study [1] found that ACS is responsible for one-third of all deaths in people over the age of 35. Heart failure, on the other hand, is a progressive condition where the heart struggles to pump blood effectively [2]. AHF occurs when symptoms of heart failure suddenly worsen [3]. After a heart attack or heart failure episode, patients may be at risk of readmission due to various factors. These include ongoing heart problems like heart attacks or irregular heart rhythms, as well as lifestyle factors such as not following treatment plans, drinking alcohol, and experiencing stress [4]. Additionally, challenges within the healthcare system, such as limited access to care or language barriers, can also contribute to readmissions [5]. To address this issue, healthcare providers are exploring different strategies to reduce readmission rates. One approach is to improve communication and follow-up care with patients after they leave the hospital. Studies have shown that telephonic follow-ups can effectively prevent readmissions [6].

Other interventions include standardized patient education programs and nurse-directed interventions. These programs can help patients better understand their condition, manage their symptoms, and adhere to their treatment plans [7]. However, it is important to note that implementing these strategies can be challenging. Factors such as administrative errors, high patient volumes, and nursing shortages can hinder efforts to contact patients and provide adequate follow-up care [8, 9]. This literature review underscores the significance of timely interventions to reduce readmission rates in ACS and AHF patients. Strategies such as discharge calls and standardized patient care have been highlighted. However, the results regarding the effectiveness of these interventions are mixed. For instance, while follow-up calls were associated with a high patient engagement rate (93.4%), the comparison of readmission (Table **1**) rates were between patients who received follow-up calls (7.7%) and those who did not (5.9%) reveal any statistically significant difference ($p = 0.429$). This suggests that while these interventions may improve patient engagement and, possibly, reduce mortality rates, their direct impact on readmission rates remains inconclusive.

Table 1: Readmission rate outcomes after intervention according to the study groups.

	Follow-up group (296)		Non-follow-up group (572)		p-value
	Yes, N (%)	No, N (%)	Yes, N (%)	No, N (%)	
Readmission	18(7.7%)	215(92.3%)	34(5.9%)	538(94.1%)	0.351[a]
Expired	4(1.7%)	229(98.3%)	38(6.6%)	534(93.4%)	0.003[b]

[a]Pearson Chi-square test
[b]Fisher's exact test
Statistical significance was tested using an independent t-test; $p \leq 0.05$ is considered statistically significant

Therefore, additional variables and factors should be considered to completely understand and address the complexities of readmission. In conclusion, reducing readmission rates for patients with heart attacks and heart failure is a complex issue that requires a multifaceted approach. By improving communication, providing education, and offering targeted interventions, healthcare systems can help patients stay healthier and reduce the overall burden of these conditions.

2. Materials and Methods

The study was a prospective case-control study with a follow-up call group and a non-follow-up call group. The study population included all ACS and AHF patients admitted and discharged from Rashid Hospital Cardiology Complex in the United Arab Emirates from January to December 2022. The inclusion criteria between January and June exclusion criteria were patients who died during the first hospitalization, patients who did not respond even once to the follow-up call, and patients who were readmitted within less than 24 hr of hospital stay. The data collection and demographic information were obtained from electronic medical records. After obtaining permission from the cardiology complex's nursing supervisor, the cardiology department unit managers were contacted to acquire approval for involving link nurses and team members in documenting patient details, and information following the follow-up calls. The follow-up group included patients who met the study's criteria from July to December 2022, while the non-follow-up group comprised those who qualified between January and June 2022. Data collection in this study was done using a structured questionnaire and follow-up interviews, as the primary tools. This included questions on demographic characteristics, medical history, lifestyle changes, and outcomes such as readmission and mortality rates. Follow-up questions assessed patient adherence to recommended changes in lifestyle, such as smoking cessation and dietary modifications.

2.1. Sample Size and Sampling Technique

In total, 868 patients participated in the study, divided into the follow-up group comprising 296 patients and the non-follow-up group consisting of 572 patients. The sampling technique used was the non-probability sampling method, specifically convenience sampling. Patients were selected based on their availability and willingness to participate in the study. A flowchart detailing the selection process of participants included the following steps:

1) Initial patient pool: Total number of patients presented with cardiac diseases in Rashid Hospital.

2) Screening: Patients who were enrolled in the ACS and AHF clinical pathways.

3) Informed consent: The pathway consent for patients enrolled in the ACS and AHF clinical pathways, included explicit permission for their participation in research purposes. This consent process was essential to ensure that patients were fully informed about the nature of the research, its aims, and

how their data would be utilized. De-identified patient data were used in accordance with the general consent provided upon hospital admission, which included permission for using such data for research and educational purposes.

4) Final sample: Patients were divided into the follow-up group (296) and the non-follow-up group (572) based on their willingness to engage in the follow-up interventions. This method ensured a diverse representation of the patient population while allowing for a focused examination of the outcomes related to follow-up care. The data collection process for this study involved several stages to ensure comprehensive and accurate information gathering. A structured telephonic interview was conducted with the participants who fell within the study criteria. The interviews were conducted by experienced nurses from the cardiology department who had received training in conducting telephone-based interviews. The interviews were conducted on two specific days: 7th and 30th day, from the day of discharge using a separate data collection tool. These tools were designed to capture the specific information relevant to each patient group, including details related to readmission, medication usage, and other factors influencing readmission. Before initiating data collection, approval was sought from the nursing supervisor of the cardiology complex. Collaboration was also established with the unit managers from the cardiology department to obtain permission to involve link nurses and team members in recording patient details after telephonic interviews.

The team leaders of the respective departments were informed about the data collection tool. They were responsible for submitting data on discharged patients weekly to the research team. This collaborative approach ensured timely and accurate data collection. The assigned team members carried out follow-up interviews with patients on the designated dates, 7th and 30th day from the day of their discharge date (July 2022 to December 2022). Information about readmission, clinical progress, medication adherence, and other pertinent factors was collected during these follow-up interactions. Follow-up calls were not conducted for patients discharged from January 2022 to June 2022. The data collected from non-follow-up and various follow-up stages were compared to determine readmission and mortality rates and factors affecting readmission and mortality. This study was approved by the Dubai Scientific Research Ethics Committee (DSREC), Dubai Health Authority; the patients/participants provided their written informed consent.

2.2. Data Analysis

The data obtained from the questionnaires was entered and analyzed using the SPSS software (Statistical Package for the Social Sciences). Descriptive statistics were calculated to summarize the main characteristics of the data. Measures such as means, medians, and standard deviations for numerical variables and frequency distributions were computed for categorical variables. The Chi-square test was used to examine the association between categorical variables. Graphs like bar charts and pie charts

were generated to present the findings visually. A P-value less than 0.05 indicates statistically significant results.

3. Results

The study delved into a comprehensive analysis and investigation of various factors and their association with patient outcomes. The data analysis revealed important findings regarding the impact of follow-up calls on patient outcomes. The follow-up group consisted of 296 patients, while the non-follow-up group included 572 patients. In terms of readmissions, 18 patients (7.7%) in the follow-up group were readmitted compared to 34 patients (5.9%) in the non-follow-up group. Regarding mortality, 4 patients (1.7%) in the follow-up group expired, whereas 38 patients (6.6%) in the non-follow-up group expired. Specifically, it was observed that patients who received follow-up calls exhibited a notably lower mortality rate (1.7%) in contrast to those who did not receive such calls (6.6%) ($p = 0.003$). Furthermore, an assessment of readmission rates among patients who underwent follow-up (7.7%) and those without follow-up (5.9%), led to the determination that there is no statistically significant association between these two groups ($p = 0.429$).

4. Discussion

ACS and AHF are conditions associated with considerable morbidity and mortality, which substantially impact affected individuals' quality of life [10, 11]. Hospital readmissions for patients with ACS have gained increasing recognition as a significant healthcare concern. This study sought to investigate the impact of telephonic follow-up on the rate of readmissions in patients following the clinical pathway for ACS and AHF. The study design involved a prospective approach, categorizing patients into two groups: the intervention group, which received follow-up calls on the 7th and 30th days post-discharge, and the control group, which did not receive such follow up.

In this discussion section, we aim to highlight the key findings of our study, particularly focusing on the biosocial-demographic data (Table **2**) and its implications for patient outcomes. The biosocial-demographic characteristics of our study population suggest that factors such as age, gender, and co-morbidities may influence health behaviors and outcomes. For instance, the age difference might indicate varying levels of health challenges and the need for tailored follow-up interventions. Considering the implications of our findings, it is evident that integrating structured follow-up programs into standard care could significantly benefit diverse patient populations. Personalized follow-up schedules that account for biosocial-demographic factors might enhance patient engagement and outcomes. Future research should aim to further explore the relationship between biosocial-demographic data and health outcomes

in the context of follow-up care. Investigating the specific support mechanisms that resonate with different demographic groups could provide valuable insights for healthcare providers.

Table 2: Demographic characteristics of research samples.

Variable		Follow-up group (Percent)	Non-follow-up group (Percent)	p-value
Age	< 40	27(11.3%)	58(10.1%)	0.828[a]
	40-60	119(50.9%)	299(52.2%)	
	> 60	87(37.2%)	215(37.62%)	
Gender	Male	195(83.7%)	458(80.1%)	0.275[b]
	Female	38(16.3%)	114(19.9%)	
Nationality	Indian	75(32%)	172(30%)	0.171[a]
	Pakistan	48(20%)	99(17%)	
	Bangladesh	9(3.8%)	48(8%)	
	UAE	30(12.8%)	89(15%)	
	Philippines	14(6%)	25(4.4%)	
	Jordan	57(24.4%)	139(24%)	

[a]Pearson Chi-square test
[b]Fisher's exact test

In the analysis of the demographic data, a broad range of age groups were admitted, among which the highest representation was for the age group of 40-60 years. It was found that patients aged between 40 and 70 years accounted for 74% of the total patient population, and 81% consisted of the male population. This distribution aligns with the known susceptibility of middle-aged and older individuals to cardiovascular conditions such as ACS and AHF. Similarly, the nationality distribution highlights the representation of patients from various countries, with a significant proportion from Indian, Pakistani, and Jordanian backgrounds. This diversity reflects the multicultural nature of the study settings and adds depth to the analysis. The distribution of patients based on past medical history provides insights into the prevalence of specific conditions among the study participants. Conditions such as hypertension, diabetes, ischemic heart disease, and dyslipidemia are shared among the patients, which is consistent with their association with cardiovascular health.

The study's emphasis on modifying behavior and adherence to health practices was evident in the 7-day follow-up results (Table **3**). During this period, 51.6% of patients successfully quit smoking, showcasing the efficacy of education and prompt post-discharge follow-up in promoting smoking cessation. Additionally, 75.9% of patients effectively reduced their consumption of oily foods, highlighting the potential influence of education and counseling on dietary preferences. Physical activity remains a cornerstone of cardiovascular health [12, 13], as emphasized by the study's outcomes. Within the 7-day follow-up, 62.6% of patients adhered to regular exercise, indicating a positive response to physical activity interventions. Vital health parameter monitoring is critical in cardiovascular management [14, 15]. Data reveals that

a considerable portion of patients (56.2%) tracked their blood pressure during the initial 7-day follow-up, indicating heightened awareness of its importance. Consistent medication adherence is pivotal for effective treatment [16, 17]. The findings underscore successful interventions in enhancing adherence, with 77.6% of patients reporting compliance with prescribed medications.

Table 3: Disease information of research samples.

Past medical history	Follow-up group (Percent)	Non-follow-up group (Percent)	p-value (Fisher's exact)
Hypertension	116(49.7%)	289(50.52%)	0.877
Diabetic	122(52.4%)	283(49.5%)	0.485
Dyslipidemia	92(39.5%)	183(31.9%)	0.49
Ischemic heart disease	60(25.8%)	109(19%)	0.036
Smoking history	91(39%)	204(35.7%)	0.083

Regular medical check-ups are essential for progress tracking. The study highlights a significant proportion of patients (71.2%) attending regular check-ups during the initial 7-day follow-up, demonstrating a proactive health approach. Furthermore, (Table **4**) 70.6% of AHF patients actively monitored their water intake during this time, indicating heightened hydration awareness. However, a slight shift in trends was observed during the 30-day follow-up. While smoking cessation rates dropped to 39.5%, other behaviors like reducing oily food intake (56.6%) and regular exercise (51.0%) remained consistent. The data also reflects decreased blood pressure monitoring (51.5%) and body weight (53.2%) compared to the week following discharge. Discussing these findings could highlight the continuous importance of sustaining positive behavioral changes in ACS and AHF patients. The 30-day follow-up findings might explore reasons for specific behavior declines and suggest strategies for maintaining patient motivation and commitment to healthier practices beyond the immediate post-discharge phase. While the study's outcomes indicated that telephonic follow-up did not significantly reduce readmission rates, an important observation emerged.

Table 4: Research follow-up questions.

Follow-up questions	Responded on 7 days	Responded on 30 days	SD
Stopped smoking	47(20%)	36(15%)	5.5
Reduced oily foods/fatty foods	177(75.9%)	132(56.6%)	22.5
Exercising regularly	146(62.6%)	119(51%)	13.5
Monitoring your blood pressure regularly	131(56%)	120(51%)	5.5
Monitoring your body weight	144(61%)	124(53%)	10
Taking medication regularly	181(77%)	131(56%)	25
Attending regular check-ups	166(71%)	124(53%)	21
Water intake 1.5-2 l/ day or as advised	41(17%)	49(21%)	4

The mortality rate exhibited a noteworthy decrease among the group that received follow-up calls compared to the group that did not receive such follow up. This suggests that the telephonic follow-up model positively impacts patient outcomes beyond the scope of reducing readmissions. In this research

study, we focused on understanding how many patients experienced readmissions and mortality rates after being discharged. To make our findings more meaningful, we used a method called confidence interval calculation to estimate the range within which, we believe, the true rates lie. We worked with a sample of 233 patients. Among these, we found that about 7.72% had to be readmitted to the hospital. To get a clear picture of this statistic, we calculated a 95% confidence interval. This means we are fairly certain that the true rate of readmissions for all patients in this group falls within a specific range. To perform the calculation, we followed these steps: first, we calculated the standard error, to understand the variability in our sample proportion. This involved using the observed proportion (7.72%) and the sample size (233). Next, we determined the margin of error, which tells us how much we can expect our estimate to fluctuate. For our study, we used a Z-value of 1.96, corresponding to a 95% confidence level. Finally, we combined these calculations to find the confidence interval for the readmission rate. This resulted in a range of approximately 5.18%–10.26%. This means we can be confident that the actual readmission rate for all patients in this group is likely between these two percentages. We applied this same approach to calculate confidence intervals for mortality rates.

Readmission rates: There is some overlap between the confidence intervals for the two groups, suggesting that the difference in readmission rates might not be statistically significant. However, the follow-up group seems to have a slightly higher in readmission rate.

Mortality rates: The confidence intervals for mortality rates were quite different between the two groups. The follow-up group has a significantly lower mortality rate compared to the non-follow-up group. It is essential to consider the broader context when interpreting the findings of this study. The observed reduction in mortality rates may point to the potential benefits of follow-up beyond its influence on readmission rates. The study's limitations, such as the encountered challenges and potential contributing factors, should also be acknowledged when interpreting the results. Several challenges were encountered throughout the study, and some patients were excluded from the study for various reasons. Specifically, 143 patients were excluded due to incorrect demographic information provided, 128 patients did not respond to calls or had their mobile phones turned off, 94 patients faced financial constraints impacting their treatment compliance, and 67 patients could not be contacted as they were located outside UAE. Despite these hurdles, 348 patients were successfully included in the study, with 143 in the follow-up call group and 205 in the non-follow-up call group. Flow diagram and tables were generated to present the findings visually (Figure **1**).

These results highlight the importance of follow-up care in enhancing patient outcomes. The lower readmission and mortality rates in the follow-up group suggest that regular monitoring and support may contribute to better adherence to treatment plans and lifestyle changes. We propose that a proactive engagement of patients through follow-ups can lead to timely interventions, ultimately improving health outcomes and reducing the burden on healthcare systems. Moreover, the research reflects on the potential implications of these findings for clinical practice, advocating for the integration of structured

follow-up programs in patient care protocols. This could involve personalized follow-up schedules that cater to individual patient needs, thus fostering a more supportive healthcare environment. Further research is warranted to explore the significance of telephonic follow-up and its impact on various patient outcomes. While the immediate effect on readmission rates might not be substantial, our study hints at the broader positive implications of telephonic follow-up in managing ACS and AHF patients. In conclusion, we urge our colleagues and policymakers to recognize the essential role of follow-up care in improving patient outcomes. By prioritizing ongoing support and engagement, informed by biosocial-demographic considerations, we can create a more effective healthcare system that caters to the diverse needs of our patients.

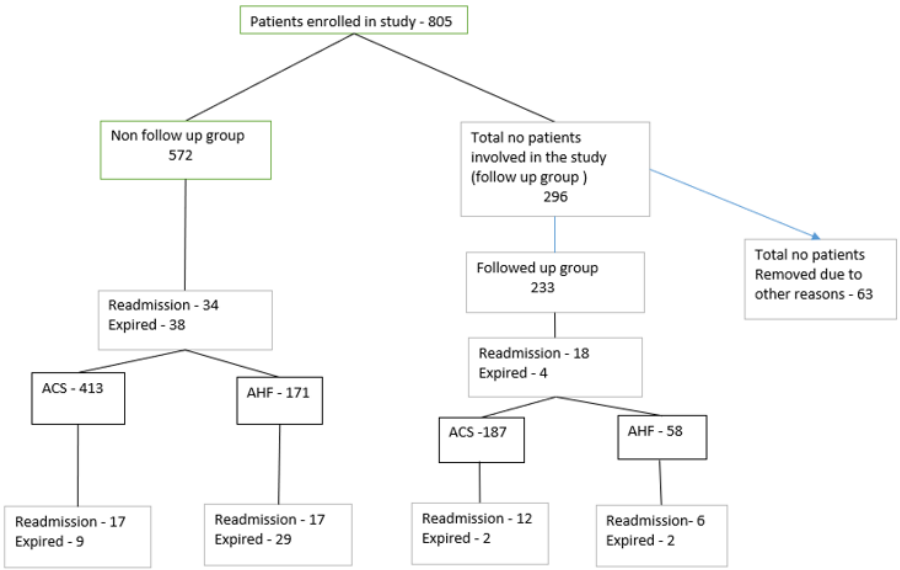

Figure 1: CONSORT flow diagram (enrolment, intervention allocation, follow-up, and data analysis).

5. Conclusion

These findings provide valuable insights into the role of follow-up calls in patient care and highlight the need for further investigation into the multifaceted factors influencing patient outcomes. While this study contributes to the existing body of knowledge, it also emphasizes the complexity of patient care and the potential influence of various factors in shaping outcomes. As the healthcare system evolves, these insights can help with clinical practice and contribute to the ongoing efforts to optimize patient care strategies. In summary, the study's results emphasized the potential benefits of follow-up calls in enhancing patient survival rates. While there was a visible difference in survival rates between patients who received follow-up calls and those who did not, it is essential to acknowledge that multiple factors may contribute to this discrepancy. The absence of a significant association between readmission rates and follow-up calls suggests that additional variables could play a role in determining readmission.

Acknowledgment

We are grateful to the Rashid Hospital MERD team for their valuable input and guidance during the study. Moreover, we sincerely thank all our cardiology complex charge nurses, team leaders, Dr. Marwan, Mr. Mustafa, and other members for their support and cooperation.

Statement of Ethics

The study was performed according to the Declaration of Helsinki and approved by the Dubai Scientific Research Ethics Committee (DSREC), Decision Number DSREC-08/2022_08 Dated 15/08/2022. In this prospective study, we used anonymized patient data in accordance with the general consent provided upon hospital admission, which included permission to use this information for research and educational purposes.

Conflict of Interest

The authors declare that there is no conflict of interest.

Funding

This study was not supported by any sponsor or funder.

Author Contributions

The study conception and design: Mary Sumitha Prabakaran and Naser Jamil; Acquisition of Data: Mary Sumitha Prabakaran, Rose Mary Thomas, Mayamol Mohanan, Anumol Jose, and Akila Jeyasingh Chandrabose; Analysis or interpretation of the data: Mary Sumitha Prabakaran and Rose Mary Thomas; Intellectual content development or critical review: Mary Sumitha Prabakaran, Rose Mary Thomas, Mayamol Mohanan, Anumol Jose and Akila Jeyasingh Chandrabose; Final version approval: Mary Sumitha Prabakaran, Rose Mary Thomas and Naser Jamil.

Data Availability Statement

The data set will not be published publicly due to privacy and security reasons. For any more questions, feel free to contact the corresponding author.

Artificial Intelligence (AI)

AI-unassisted work.

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