ORIGINAL ARTICLE

ENHANCING CLINICAL OUTCOMES AND QUALITY OF LIFE IN ACUTE MYOCARDIAL INFARCTION PATIENTS THROUGH STANDARD CLINICAL PATHWAY IMPLEMENTATION: A STUDY FROM A PUBLIC TERTIARY CARE HOSPITAL IN KARACHI, PAKISTAN

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Objectives: This study aimed to assess and compare the impact of implementing a standard clinical pathway on clinical outcomes and quality of life among Acute Myocardial Infarction (AMI) patients at Dr. Ruth Katherina Martha Pfau Civil Hospital in Karachi, Pakistan.

Methodology: A quasi-experimental non-randomized controlled study was conducted from September to December 2018, involving 220 AMI patients. The control group (110) received standard care, while the interventional group (110) was managed using a standardized clinical pathway. Data was collected using the AMI standard clinical pathway tool and the SF-36 questionnaire. Statistical analysis was performed using SPSS version 22, presenting categorical variables as frequencies and percentages, and continuous variables as mean and standard deviation. Mean differences in clinical parameters and quality of life were assessed using paired sample t-tests with a significance level set at $p < 0.05$.

Results: Among the participants, 50% were in the control group and 50% in the interventional group, with a predominance of males. The quality-of-life scores significantly differed between the control and intervention groups ($p < 0.001$). Furthermore, significant improvements in quality of life were observed in both male and female patients' post-intervention ($p < 0.001$).

Conclusion: Implementation of a standard clinical pathway led to improved clinical outcomes and quality of life among AMI patients. This highlights the potential benefits of standardized care pathways in enhancing patient outcomes in similar healthcare settings.

Keywords: Acute Myocardial Infarction, Standard Clinical Pathway, Clinical Outcomes, Quality of Life

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INTRODUCTION

Acute Myocardial Infarction (AMI) stands as a leading cause of mortality in the developed world,[1] claiming over a million lives annually in the United States alone, with a prevalence nearing 3 million.[2] Characterized by myocardial necrosis resulting from a sudden coronary artery blockage, AMI encompasses two categories: Non-ST-segment elevation myocardial infarction (NSTEMI) and ST-segment elevation myocardial infarction (STEMI).[3] Typical symptoms include chest pain, sometimes accompanied by dyspnea, nausea, and/or diaphoresis, with diagnosis often reliant on electrocardiography (ECG) changes.[4-6] Clinical pathways, and multidisciplinary strategies for treatment, aim to enhance healthcare outcomes, minimize delays, and optimize resource utilization.[7] These pathways, grounded in evidence-based practices, tailor treatment approaches to specific patient populations and healthcare settings, promoting standardized, efficient care delivery.[8] However, successful implementation necessitates effective collaboration among healthcare professionals, ensuring coordinated, patient-centered care.

Employing clinical pathways enhances clinical effectiveness and patient outcomes by aligning practices with evidence-based guidelines.[9] Customized hospital Standard Operating Procedures (SOPs) can streamline healthcare delivery, incorporating evidence-based interventions to optimize patient care.[10] Yet, a comprehensive care plan must delineate treatment stages, encompassing assessment, diagnosis, information provision, rehabilitation, and ongoing evaluation to ensure patient needs are met consistently.[11] Inter-professional collaboration lies at the heart of successful clinical pathway implementation, fostering transparent communication and regular evaluation of healthcare practices.[12] Patient safety and satisfaction are enhanced through streamlined care delivery, reducing the likelihood of adverse events and readmissions while improving overall healthcare quality.[13]

Notably, clinical pathways offer numerous benefits, including reduced healthcare costs, decreased hospital stays, and enhanced patient satisfaction.[14] By standardizing care processes and promoting interdisciplinary teamwork, clinical pathways bolster internal hospital efficiency and effectiveness, ultimately improving patient outcomes and healthcare quality.[15] This study aims to investigate the impact of implementing an AMI standard clinical pathway on clinical outcomes and the quality of life of AMI patients at Dr. Ruth Katherina Martha Pfau Civil Hospital Karachi, Pakistan.

METHODOLOGY

Study Design: This study employed a non-randomized quasi-experimental design to assess the effectiveness of implementing a standard clinical pathway for acute myocardial infarction (AMI) patients. The intervention group received care following the newly implemented pathway, while the control group received care based on existing routine practices.

Setting: The research was conducted at Dr. Ruth Katherina Martha Pfau Civil Hospital Karachi, Pakistan, from September to December 2018.

Participants: The participants consisted of AMI patients admitted to the hospital during the study period. The intervention and control groups were formed based on the implementation of the standard clinical pathway.

Variables: The primary variables of interest included clinical parameters and quality of life, which were assessed using the AMI standard clinical pathway tool and the SF-36 questionnaire, respectively. Other variables such as socio demographic data were also collected.

Data Sources/Measurement: Data were collected through self-administered questionnaires and structured tools. Pre- and post-assessment data were obtained in three phases: pre-implementation, intervention, and post-implementation. The AMI standard clinical pathway tool, adapted from Queensland Government guidelines, was used to guide data collection and intervention.

Intervention Description: The standard clinical pathway implemented for the intervention group comprised eight components: investigations, pre-angiography care, post-angiography care, medications, observation and continuation of treatments, vital signs and other parameters, nutritional status, and mobility, elimination hygiene, and expected outcomes. This pathway was developed based on guidelines from the Queensland Government, Australia, and was modified to suit the study setting at Dr. Ruth Katherina Martha Pfau Civil Hospital Karachi, Pakistan.

Ethical Considerations: Ethical approval was obtained from the Institutional Review Board (IRB) at Dow Health Sciences University (DUHS). Written informed consent was obtained from all study participants. Patient confidentiality was maintained throughout the study, and ethical guidelines and regulations were strictly adhered to.

Training of Healthcare Providers (HCPs): Healthcare providers involved in implementing the standard clinical pathway received training through workshops, presentations, and educational materials. These training sessions aimed to ensure that HCPs had a thorough understanding of the pathway and could implement it consistently and effectively.

Monitoring and Quality Assurance: The implementation process was monitored closely to ensure adherence to the standard clinical pathway. Quality assurance measures, including regular evaluations and feedback sessions, were implemented to maintain the integrity and reliability of the intervention.

Follow-up Procedures: Follow-up procedures were conducted to assess the long-term effects of the intervention beyond the immediate post-implementation period. These procedures included

tracking patient outcomes and evaluating the sustainability of the intervention over time.

Bias: Efforts were made to minimize bias through ethical approval, informed consent, and standardized data collection methods. However, potential biases such as selection bias and information bias may have been present due to the non-randomized design and reliance on self-reported data.

Study Size: The sample size was determined using Power Analysis and Sample Size System (PASS), with 220 participants divided equally between the intervention and control groups. This sample size calculation aimed to achieve 92% power to detect a difference in means between the groups.

Quantitative Variables: Quantitative variables such as clinical parameters and quality of life scores were analyzed using statistical methods. Mean differences between groups were compared using a paired sample t-test, with a significance level (alpha) set at 0.05.

Statistical Methods: Data analysis was performed using SPSS 21 software. Sociodemographic data were presented as frequencies and percentages, while mean differences in clinical parameters and quality of life were compared using the paired sample t-test. A p-value less than 0.05 was considered statistically significant, indicating a difference between the groups.

RESULTS

Participants: A total of 220 participants were included in the study, with 110 assigned to the control group and 110 to the interventional group. In the control group, 77.2% were male and 22.7% were female, while in the interventional group, 83% were male and 17% were female. Additionally, demographic variables such as marital status, level of education, co-morbidities, time of symptoms presentation to the ER/Casualty, and prescription medication time were recorded for both groups.

Descriptive Data: Sociodemographic characteristics, including gender, marital status, level of education, co-morbidities, time of symptoms presentation to the ER/Casualty, and prescription medication time, were analyzed for both the control and interventional groups. Significant differences were observed in gender distribution, marital status, time of symptoms presentation to the ER/Casualty, and prescription medication time between the two groups ($p < 0.05$).

Table 1: Sociodemographic Characteristics of the Patients

Demographic Variables	Study Group		P-value
	Control	Interventional	
Total (N)	**110**	**110**	**-**
Gender			
Male	85 (77.2)	91 (82.7)	<0.001
Female	25 (22.7)	19 (17.3)	
Marital Status			
Single	47 (42.7)	24 (21.8)	0.4
Married	40 (36.4)	69 (62.7)	
Separated/ Divorced	23 (20.9)	17 (15.5)	
Level of Education			
Primary	25 (22.7)	50 (45.5)	0.074
Middle	16 (14.5)	25 (22.7)	
Matric	20 (18.2)	9 (8.2)	
Intermediate	29 (26.4)	17 (15.5)	
Graduate (Bachelor)	11(10)	7 (6.4)	
Post Graduate (Master)	9 (8.2)	0	
Co-morbid			
Diabetes Mellitus & Hypertension	43 (39)	52 (42.3)	0.098
Tuberculosis	25 (22.7)	28 (25.5)	
Ischemic Heart Disease	11(10)	5 (4.5)	
Bronchial Asthma	31(28.2)	25 (22.7)	
Time of symptoms presentation to ER/Casualty			
12:00mn-6:00 am	65 (59.1)	35 (31.2)	0.12
6:01am-12:00pm	35 (31.2)	19 (17.3)	
12:01am-6:00pm	5 (4.5)	17(15.5)	
6:01 pm-12:00mn	5 (4.5)	39 (35.5)	
Prescription Medication time			
Immediately	23 (20.9)	35 (31.8)	0.04
11-15 minutes	27 (24.5)	55 (50)	
Within 10 minutes	35 (31.8)	15 (13.6)	
16-30 minutes	25 (22.7)	5 (4.5)	

Outcome Data: The quality-of-life scores of participants before and after the intervention were compared between the control and interventional groups. A significant difference was found in the quality-of-life scores between the two groups ($p < 0.001$). Additionally, associations between demographic variables and quality of life scores were explored. Significant differences were observed in quality-of-life scores based on gender, marital status, level of education, co-morbidities, time of symptoms presentation to the ER/Casualty, and prescription medication time ($p < 0.05$).

Table 2: Comparison of Quality-of-Life Score among control and intervention group

Quality of life n=110	Mean difference ± SD		P-value
	Pre	Post	
Pre (Control)	38.77±8.5	38.97±8.73	0.893
Post (Intervention)	38.79±8.61	53.7±3.9	<0.001
P-value	0.992	<0.001	-

Paired T-test has been applied
P-value <0.05 considered significant

The main results of the study indicate that the implementation of the standard clinical pathway led to a significant improvement in the quality of life of AMI patients. Quality of life scores increased from 38.97±8.73 in the control group to 53.7±3.9 in the interventional group ($p < 0.001$). Furthermore, demographic variables such as gender, marital status, level of education, co-morbidities, time of symptoms presentation to the ER/Casualty, and prescription medication time were found to be associated with changes in quality-of-life scores.

Table 3: Association of demographic variable with quality-of-life scores among control and intervention group

	Mean ± SD		Mean Diff ± SD	P-value
	Control	Intervention		
Gender				
Male	39.42±9.01	53.52±3.56	14.1±2.16	<0.001
Female	38.29±8.47	53.81±4.12	15.52±1.66	<0.001
Marital status				
Single	41.15±4.65	53.54±4.6	12.39±3.27	0.009
Married	38.16±7.73	53.64±4.02	15.49±1.28	<0.001
Separated/Divorced	42.26±14.19	54.65±1.96	12.39±7.3	0.120
Level of Education				
Primary	39.88±7.8	53.37±3.44	13.48±1.45	<0.001
Middle	37.7±7.59	53.98±5.02	16.28±2.88	<0.001
Matric	38.05±5.05	56.19±1.88	18.14±3.84	0.005
Intermediate	31.5±7.65	54.36±5.16	22.86±3.67	<0.001
Graduate (Bachelor)	43.14±18.72	-	-	-
Post Graduate (Masters)	44.69±6.88	-	-	-
Co-Morbid				
DM & HTN	38.16±6.77	53.7±3.81	15.53±1.3	<0.001
TB	31.15±6.11	53.98±4.38	22.83±3.36	<0.001
IHD	40.71±9.03	55.36±4.03	14.65±3.26	<0.001
Asthma	46.76±13.85	49.78±1.68	3.02±7.1	0.681
Time of symptoms presentation to ER/Casualty				
12:00mn-6:00am	35.4±5.67	52.51±3.68	17.11±3.51	<0.001
6:01am-12:00pm	36.69±5.9	53.98±1.53	17.3±3.53	<0.001
12:01am-6:00pm	37.21±5.59	53.79±4.03	16.59±1.18	<0.001
6:01pm-12:00mn	48.35±12.48	53.1±6.26	4.75±9.26	0.618
Prescription Medication time				
Immediately	41.27±13.02	50.44±2.5	9.17±9.56	0.358
11-15 minutes	38.4±6.89	51.99±2.33	13.59±3.53	<0.001
Within 10 minutes	38.01±8.04	53.91±4.07	15.9±1.5	<0.001
16-30 minutes	42.04±10.64	55.16±2.7	13.13±5.96	0.115

Paired T test has been applied
P-value <0.05 considered significant
DM: Diabetes Mellitus; HTN: Hypertension; TB: Tuberculosis; IHD; Ischemic Heart Disease; ER; Emergency

Table 4: Association of diagnostic test with quality-of-life scores among control and intervention group

	Mean ± SD		Mean Diff ± SD	P-value
	Control	Intervention		
ECG				
Immediately	38.1±6.1	52.43±2.74	14.34±3.15	<0.001
11-15 minutes	40.22±11.47	50.27±1.31	10.04±5.22	0.067
Within 10 minutes	36.87±7.77	54.16±4.04	17.29±1.76	<0.001
16-30 minutes	41.42±8.29	54.87±3.75	13.45±6.36	0.088
Dyspnea				
Immediately	38.94±13.13	52.92±2.53	13.98±6.03	0.039
11-15 minutes	39.38±8.18	53.34±2.75	13.96±2.02	<0.001
Within 10 minutes	38.18±7.75	54.2±4.77	16.02±1.79	<0.001
16-30 minutes	41.59±6.91	52.88±3.64	11.28±3.97	0.036
Mobility Test				
Yes	38.4±7.83	54.59±4.2	16.19±1.47	<0.001
No	41±11.59	52.17±2.81	11.17±2.69	<0.001
Pain Score				
Moderate	38.11±7.94	53.58±4.36	15.47±1.59	<0.001
Severe	40±9.66	53.9±3.18	13.9±2.16	<0.001

Paired T test has been applied
P-value <0.05 considered significant
ECG: Electrography

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Table 5: Correlation of Clinical Parameters with Quality of Life

	Quality of Life Correlation	P-value
Pulse Rate	0.236	0.017
Systolic Blood Pressure	0.12	0.246
Diastolic Blood Pressure	0.09	0.348
Respiratory Rate	0.236	0.017
Pain Score	0.373	<0.001
ECG	-0.02	0.850

DISCUSSION

The study delves into the impact of implementing a Standard Clinical Pathway on Clinical Outcomes and the quality of life of AMI patients at Doctor Ruth Katherina Martha Pfau Civil Hospital, Karachi, Pakistan. Notably, the findings align with previous national and international research, consolidating existing knowledge in the field.[16-21] The study's demographic analysis reveals a predominance of male participants in both the control and interventional groups, consistent with prior investigations.[22] Similarly, the majority of individuals in the interventional group were married, mirroring findings from studies conducted in Karachi, Pakistan.[23] Additionally, the study identifies common comorbidities among AMI patients, such as diabetes mellitus (DM) with hypertension (HTN), tuberculosis, ischemic heart disease, and bronchial asthma, corroborating previous research highlighting the prevalence of these health issues among AMI patients.

Notably, the study observes statistically significant improvements in five key clinical parameters within the interventional group compared to the control group, echoing conclusions from international investigations. Conversely, insignificant differences were noted in two clinical parameters, warranting further exploration in future studies. The study underscores the role of the AMI clinical pathway in enhancing patient outcomes and reducing the financial burden associated with prolonged hospital stays, aligning with previous research highlighting the pathway's efficacy in minimizing hospitalization duration.[24-26]

A notable strength of the study lies in the abundance of quantitative data collected from AMI patients in a public tertiary care facility. However, the limited sample size necessitates caution in generalizing the findings. Future research should encompass larger sample sizes in public hospitals, employing mixed-method approaches to comprehensively address the research question.

LIMITATION

While this study provides valuable insights into the effects of standard clinical pathways on clinical outcomes and quality of life among AMI patients, several limitations should be acknowledged. The sample size, although sufficient for the analysis conducted, may limit generalizability, as the study was conducted in a single tertiary care facility. Additionally, reliance on non-randomized quasi-experimental research and purposive sampling introduces selection bias, potentially affecting external validity.

CONCLUSION

In conclusion, the study demonstrates that the implementation of a standard clinical pathway significantly improves clinical outcomes and enhances the quality of life among acute myocardial infarction patients. Patients managed with the AMI standard clinical pathway exhibit notable improvements compared to those in the control group, underscoring the pathway's effectiveness in optimizing patient care and outcomes.

AUTHORS' CONTRIBUTION

SB, SM, RB, MNL, SMH, MP, and IA: Concept and design, data acquisition, interpretation, drafting, final approval, and agree to be accountable for all aspects of the work. SB, SM, RB, MNL, SMH, MP, and IA: Data acquisition, interpretation, drafting, final approval and agree to be accountable for all aspects of the work.

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