



Emotional and financial implications of repeated percutaneous coronary intervention following initial failure in the management of st-elevation myocardial infarction:a kenyan context

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Abstract

Cardiovascular diseases remain the leading cause of mortality worldwide, with ST-Elevation Myocardial Infarction (STEMI) requiring urgent intervention to restore coronary blood flow and prevent irreversible myocardial damage. Percutaneous Coronary Intervention (PCI) is the preferred method of myocardial revascularization and the standard treatment for STEMI. Procedural failure may occur, necessitating repeat interventions that can result significant emotional and financial burdens on patients and their families. While existing literature has largely focused on clinical outcomes such as procedural success and survival, limited attention has been given to the psychosocial and economic consequences of repeated PCI procedures, particularly in low-resource settings such as Kenya. This study explored the emotional and financial trauma experienced by a patient and his family following repeated PCI procedures after an initial failed intervention. A descriptive sample case study design was employed involving a 73-year-old male patient diagnosed with STEMI at a Kenyan referral hospital. Following failure of the initial PCI, the patient underwent two additional PCI procedures. Data were collected from clinical records, laboratory findings, procedural reports, and narrative accounts from the patient and family members. Thematic analysis was used to identify key themes related to emotional experiences, caregiver burden, and financial implications associated with the repeated interventions.

The findings revealed considerable emotional distress affecting both the patient and his family. Following an intra-procedural cardiac arrest during the first PCI attempt, the patient experienced fear, anxiety, helplessness, and emotional instability. Family members reported persistent worry, sleep disturbances, emotional exhaustion, and uncertainty regarding the patient's survival and recovery. These experiences highlight the profound psychosocial impact of repeated cardiac interventions beyond the immediate clinical outcome.

The total hospital bill amounted to KES 882,701, leaving an out-of-pocket deficit of approximately KES 300,000 despite partial insurance coverage. To meet these costs, the family organized multiple fundraising efforts (harambees), depleted personal savings, and experienced income loss due to caregiving responsibilities. The resulting financial strain affected household stability and overall family well-being. Psychological distress associated with repeated invasive procedures was compounded by substantial economic hardship, creating a cyclical burden that negatively influenced patient recovery and family welfare.

Key Words: Percutaneous Coronary Intervention (PCI), ST-Elevation Myocardial Infarction (STEMI), Emotional Trauma, Financial Toxicity, Caregiver Burden

Introduction

Despite significant advancements in medical technology and specialized healthcare services, some patients experience repeated failed medical procedures that do not achieve the intended therapeutic outcomes. The World Health Organization (WHO) estimates that approximately one out of ten patients' experiences harm during healthcare delivery, with more than three million deaths occurring annually due to unsafe care, over half of which are preventable¹. These adverse outcomes frequently necessitate additional interventions, increasing both emotional suffering and economic hardship.

Cardiovascular diseases (CVDs) remain the leading cause of mortality globally, accounting for approximately 17.9 million deaths annually, of which more than three-quarters occurring in low- and middle-income countries (LMICs)². Acute Myocardial Infarction (AMI), especially ST-Elevation Myocardial Infarction (STEMI), represents one of the most severe cardiovascular emergencies requiring immediate reperfusion therapy. Primary Percutaneous Coronary Intervention (PCI) is considered the gold standard treatment for STEMI because it restores coronary blood flow, limits myocardial damage, preserves cardiac function, and improves survival outcomes³. PCI may occasionally fail or result in incomplete revascularization, particularly among patients with complex coronary artery disease, chronic total occlusions, multiple vessel involvement, or advanced age. Such failures often necessitate repeat interventions, exposing patients to increased risks of complications, prolonged hospitalization, and poorer clinical outcomes⁴.

International studies have documented high levels of anxiety, depression, fear, uncertainty, frustration, and loss of trust in healthcare systems among patients undergoing repeated surgeries, cancer treatments, fertility procedures, organ transplants, and cardiovascular interventions⁵. Patients recovering from myocardial infarction frequently experience emotional instability, fear of recurrence, and post-traumatic stress symptoms, while family members often face caregiver burden, emotional exhaustion, and psychological distress as they support prolonged treatment processes⁶.

Direct medical costs such as consultations, diagnostic tests, hospital admissions, medications, and procedural expenses, patients incur indirect costs including transportation, accommodation, lost income, and reduced productivity. The WHO reports that this generates substantial economic losses globally, amounting to trillions of dollars annually¹. The concept of "financial toxicity" has increasingly been used to describe the economic hardship experienced by patients and families⁷.

These challenges are particularly more in Africa, where healthcare systems often face resource limitations, shortages of specialized healthcare personnel, inadequate infrastructure, delayed diagnosis, and constrained healthcare financing mechanisms. In Kenya, healthcare financing remains heavily dependent on out-of-pocket expenditure, exposing households to catastrophic health spending when treatment becomes prolonged or unsuccessful⁸. The growing burden of non-communicable diseases, including cardiovascular diseases, has further increased demand for specialized procedures and advanced treatment modalities across the region.

The cost of PCI in Kenya is estimated to range between KES 400,000 and KES 1,000,000, often exceeding the financial capacity of many households despite partial support from the Social Health Insurance Fund (SHIF) and private insurance providers⁹. When initial PCI procedures fail and repeat interventions become necessary, families frequently deplete savings, incur debt, sell assets, or seek community support to meet healthcare expenses. The emotional and financial consequences of repeated failed procedures are especially relevant in referral hospitals managing complex medical

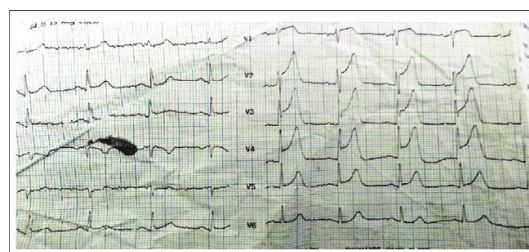
and surgical cases. Patients may experience stress, anxiety, depression, hopelessness, treatment fatigue, and reduced confidence in healthcare providers, while family members struggle to balance caregiving responsibilities with financial obligations. Despite increasing emphasis on patient-centered care, limited research in Kenya has examined the combined emotional and financial trauma experienced by patients and families following repeated unsuccessful medical procedures.

This study focuses on the experience of a 73-year-old STEMI patient who underwent two PCI procedures following failure of the initial intervention, which was complicated by an intra-procedural cardiac arrest. The patient and family experienced significant emotional distress, while the total hospital bill of KES 882,701 left an out-of-pocket deficit of approximately KES 300,000 despite partial insurance coverage. case denote how repeated medical procedures can extend beyond clinical outcomes to create significant psychological and financial challenges for patients and their families. By examining this experience within the broader context of Kenya's healthcare system, the study seeks to contribute to understanding the emotional and financial implications of repeated failed medical procedures and to inform strategies aimed at strengthening psychosocial support, improving patient-centered care, enhancing healthcare financing mechanisms, and improving overall treatment outcome.

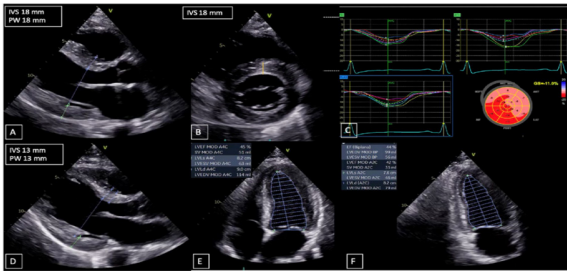
Materials and Methods

73-year-old retired civil servant with a known history of hypertension and poor adherence to antihypertensive medication, was covered under the Social Health Authority (SHA) insurance scheme. His cardiovascular risk factors included advanced age, uncontrolled hypertension, alcohol consumption, and lifestyle-related factors. On 22nd November 2024, Patient was referred from Nakuru Provincial General Hospital (PGH) to a tertiary cardiac center for specialized management. He presented with a one-day history of severe left-sided chest pain radiating to the left shoulder. The pain was associated with dyspnea, epigastric pain, vomiting, restlessness, and general discomfort. Before referral, he had received loading doses of Aspirin 300 mg and Clopidogrel 300 mg as part of initial management for suspected acute coronary syndrome. Patient appeared acutely ill but was not pale, jaundiced, or dehydrated. Blood Pressure: 140/95 mmHg, Pulse Rate: 54 beats/minute, Temperature: 36.5°C, Oxygen Saturation (SpO₂): 94%, Respiratory Rate: 16 breaths/minute. Peripheral pulses were palpable and symmetrical with no radial-radial delay. There was no jugular venous distension. Chest expansion was normal with no visible abnormalities, thrills, or heaves. First and second heart sounds (S1 and S2) were audible without murmurs. Lung fields were clear on auscultation, and there was no evidence of sacral edema.

Initial Clinical Impression: The patient was diagnosed with: Acute Coronary Syndrome (ACS) in a background of uncontrolled hypertension.



Electrocardiogram (ECG): An ECG performed on 20th November 2024 demonstrated significant ST-segment elevation in leads V1–V5, consistent with an anterior wall ST-Elevation Myocardial Infarction (STEMI).



Echocardiography

An echocardiogram performed on the same date showed: Left Ventricular Ejection Fraction (LVEF): 41% and a Concentric Left Ventricular Hypertrophy.

Findings suggested impaired left ventricular systolic function secondary to ischemic heart disease and longstanding hypertension.

Laboratory Investigations (22nd November 2024)

TABLE for Lab results done on 22/11/2024

Lab test	Lab test	Result	Normal values	Interpretation
FBC	Wbc	8.66	4-10	Normal
	Neut	5.29	2.0-7.0	Normal
	PLT	141	150-450	Normal
	HB	12.1	12-17	Normal
TFTS	Tsh	1.20099	0.4-4.0	Normal
	T3	3.01	3.5-6.5	Normal
	T4	13.35	9-24	Normal
Lipid profile	Total cholesterol	3.83	<5.2mmol/l	Normal
	Triglycerides	1.63	<1.7	Normal
	Hdl	1.40	>1.0	Normal
	Ldl	2.13	<3.0	Normal
Urinalysis	Bil	Negative		Normal
	Protein	Positive		Normal
	Blood	Negative		Normal
	Leucocyte	Negative		Normal
	Ketone	Absent		Normal
	PH	9.0	4.5-8.0	High

Baseline laboratory findings were largely within normal ranges:

Full Blood Count: White Blood Cell Count: $8.66 \times 10^9/L$, Hemoglobin: 12.1 g/dL, Platelet Count: $141 \times 10^9/L$

Thyroid Function Tests: TSH: Normal, T3: Slightly reduced, T4: Normal

Lipid Profile: The lipid profile was within recommended limits, with normal total cholesterol, LDL, HDL, and triglyceride levels.

Urinalysis: Urinalysis demonstrated proteinuria and an alkaline urine pH of 9.0, while other parameters were normal.

Initial Medical Management

Following admission, the patient was commenced on guideline-directed medical therapy for acute coronary syndrome and heart failure prevention, including:

- Empagliflozin 10 mg once daily
 - Bisoprolol 5 mg once daily
 - Ticagrelor 90 mg twice daily
 - Enalapril 5 mg once daily
 - Atorvastatin 80 mg once daily
 - Aspirin 75 mg once daily
 - Low Molecular Weight Heparin (LMWH) 40 mg twice daily
- Additional investigations including cardiac biomarkers, liver function tests, electrolyte assessment, and coronary angiography were planned.

First Coronary Angiography and PCI Attempt (25th November 2024)

On 25th November 2024, the patient underwent coronary angiography (CAG) and attempted Percutaneous Coronary Intervention (PCI) via the radial artery.

Coronary Angiography Findings: The angiogram revealed severe multivessel coronary artery disease:

- Left Main Coronary Artery: Normal
- Left Anterior Descending (LAD) Artery: Mid-segment complete occlusion
- Left Circumflex (LCX) Artery: Distal 90% stenosis
- Right Coronary Artery (RCA): Diffuse significant disease

PCI Procedure:

- Multiple attempts were made to cross the LAD lesion; however, the guidewire failed to penetrate the occlusion.
- Balloon angioplasty was successfully performed on the LCX lesion.
- Significant RCA lesions were dilated.
- Due to technical difficulties and inability to cross the LAD occlusion, complete revascularization was abandoned.

Intra-Procedural Complication: During the procedure, the patient suffered a brief cardiac arrest while on the catheterization table. Cardiopulmonary resuscitation (CPR) was immediately initiated and continued for approximately one minute, after which Return of Spontaneous Circulation (ROSC) was achieved. The patient stabilized rapidly and remained conscious and alert following resuscitation.

The procedure was subsequently completed, and the patient was transferred to the High Dependency Unit (HDU) for close monitoring.

Post-Procedure Management:

- Dual antiplatelet therapy (Aspirin and Ticagrelor)
- Statin therapy
- Ongoing anticoagulation
- Heart failure management
- Continuous hemodynamic monitoring

Laboratory Findings Following PCI

Laboratory tests done on 25/11/24

Lab Test	Lab Test	Result	Normal Values	Interpretation
U/E/C	Na	136	135-145	Normal
	K	4.3	3.5-5.0	Normal
	Cl	105	98-106	Normal
	Urea	6.1	2.5-7.1	Normal
	Creatinine	67	62-115	Normal
Fbc	Wbc	6.12	4-10	Normal
	Neut	3.77	2.0-7.0	Normal
	Lymph	1.41	1.1-3.5	Normal
	Eos	0.02	0.03-1.1	Low
	Basophil	0.04	0.03-1.1	Normal
CRP		62.3	<5mg/dl	High
Procalcitonin		0.16	<0.05ng/ml	High

Investigations performed after the procedure showed:

- Normal renal function
- Normal electrolyte levels
- Elevated C-Reactive Protein (62.3 mg/dL)
- Elevated Procalcitonin (0.16 ng/mL)

These findings suggested significant systemic inflammation following the acute cardiac event and intervention.

Intensive Care Monitoring 26th November 2024:

Stable hemodynamic status, Blood Pressure: 117/74 mmHg, Heart Rate: 88 beats/minute, Clear chest, no edema, Intact neurological status with normal Glasgow Coma Scale

The diagnosis at this stage was:

- Ischemic Heart Disease (IHD)
- Reduced Ejection Fraction (31%)
- Hypertension
- Status Post Cardiac Arrest with ROSC
- Following stabilization, transfer to the general ward was recommended.

Clinical Deterioration and Decision for Repeat PCI

Three days after the initial PCI attempt and six days after admission, the patient continued to report: Difficulty breathing, Wet cough, Generalized body weakness, Lethargy.

Although vital signs remained relatively stable, persistent symptoms and incomplete revascularization of the LAD lesion prompted cardiology review. A decision was made to perform a **Second PCI** targeting the LAD artery on 29th November 2024.

Second PCI Procedure (29th November 2024)

The patient was readmitted to the catheterization laboratory for a repeat attempt at LAD revascularization.

Access was obtained through the right femoral artery. The patient was preloaded with:

1. Aspirin 300 mg 2. Clopidogrel 300 mg 3. Heparin 5,000 IU 4. Nitroglycerin 300 mcg Unlike the first attempt, the guidewire successfully crossed the LAD lesion. Balloon angioplasty was performed, and TIMI grade III blood flow was successfully restored. Approximately 150 mL of contrast was used during the procedure. The patient remained stable throughout and after the intervention.

Post-Procedure Management The patient was admitted to CT -ICU for observation and commenced on optimized heart failure and secondary prevention therapy, including:

- Aspirin 75 mg daily
- Clopidogrel 75 mg daily

- Atorvastatin 80 mg daily
- Empagliflozin 10 mg daily
- Aldactone 12.5 mg daily
- Sacubitril/Valsartan (Uperio) 50 mg twice daily
- Furosemide 40 mg daily
- Bisoprolol 5 mg daily
- Rivaroxaban 10 mg daily
- Intravenous fluids and repeat renal function testing were also planned.

Recovery and Discharge

On 30th November 2024, two days after successful LAD stenting, the patient remained clinically stable. The final diagnosis included:

- Ischemic Heart Disease with reduced Ejection Fraction (31%)
- Hypertension
- Status Post Cardiac Arrest with successful ROSC
- Status Post Successful PCI with LAD Stenting

The patient was discharged home on optimized heart failure and secondary prevention medications with instructions for close outpatient follow-up. A cardiology clinic review was scheduled one week after discharge to assess recovery, medication adherence, symptom control, and long-term cardiovascular outcomes.

Despite partial revascularization of the LCX and RCA, persistent symptoms necessitated a second PCI. The repeat intervention successfully restored coronary blood flow to the LAD, resulting in clinical stabilization and eventual discharge.

Knowing that his family was struggling to raise funds through multiple harambees and personal contributions caused him considerable guilt and distress. He worried about the impact of his illness on his family's financial stability and future well-being. The patient relied heavily on spiritual faith and family support as coping mechanisms. He found comfort in prayer, which helped him manage his fears and maintain hope during the treatment process. The constant presence, encouragement, and reassurance provided by family members gave him emotional strength and motivation to proceed with the second procedure despite his fears. Faith, resilience, and family support played a critical role in helping him cope with the difficult journey toward recovery.

Discussion

The case anecdotes are consistent with existing evidence showing that patients recovering from myocardial infarction often experience anxiety, depression, emotional instability, and symptoms of post-traumatic stress, particularly when treatment outcomes are uncertain⁶. The emotional impact was further compounded by concerns about mortality, prolonged hospitalization, and the burden placed on family members. The repeated procedures and prolonged hospitalization disrupted normal family functioning and created caregiver burden as relatives balanced caregiving responsibilities with work and other obligations⁶.

A major finding in this case was the substantial financial burden associated with repeated PCI procedures. Despite insurance coverage through the Social Health Authority (SHA), the patient's total hospital bill reached KES 882,701, leaving an out-of-pocket deficit of approximately KES 300,000. The need for a repeat PCI, intensive care monitoring,

prolonged hospitalization, medications, and follow-up care significantly increased healthcare expenditures. Additional indirect costs, including lost income due to caregiving responsibilities and transportation expenses, further strained household finances. These experiences reflect the growing problem of financial toxicity; whereby healthcare costs create significant economic hardship for patients and families⁷. The case further illustrates the close relationship between emotional distress and financial strain. The uncertainty surrounding treatment outcomes increased anxiety and psychological stress, while escalating medical expenses intensified feelings of frustration, helplessness, and emotional exhaustion. The patient's concern about the financial burden imposed on his family further contributed to his emotional suffering.

The findings have important implications for clinical practice and health policy. There is a need to integrate routine psychological assessment and counseling into cardiac care, particularly for patients undergoing repeat interventions. Family-centered support services should also be strengthened to address caregiver burden. The substantial out-of-pocket costs observed in this case highlight the need for improved financial risk protection mechanisms, expanded insurance coverage, and enhanced support systems for patients requiring specialized cardiovascular care. This case underscores the importance of adopting a holistic approach to cardiac care that addresses not only clinical outcomes but also the psychological, social, and economic challenges associated with complex cardiovascular treatment.

Conclusion

Successful revascularization may improve clinical outcomes; the associated psychosocial and economic consequences often remain unaddressed in routine cardiac care. Integration of psychosocial assessment and counseling services, strengthening of family-centered care, provision of financial counseling, expansion of insurance coverage for repeat PCI procedures, and adoption of multidisciplinary cardiac care approaches are recommended.

In Kenya, cardiovascular disease prevalence continues to rise due to urbanization, lifestyle changes, with increasing rates of hypertension, diabetes, dyslipidemia, and smoking⁹. Although investments in specialized healthcare facilities, universal health coverage initiatives, and health financing reforms have improved access to care, specialized cardiac services remain concentrated in a limited number of facilities

The case also illustrates the severe financial implications associated with repeated specialized cardiac interventions in resource-constrained settings. The experience reflects the growing challenge of financial toxicity, where healthcare costs negatively affect the economic stability and overall well-being of patients and families.

Importantly, this case demonstrates the interconnected nature of emotional and financial trauma. The uncertainty associated with repeated procedures intensified anxiety and psychological distress, while escalating healthcare expenses amplified stress, frustration, and feelings of helplessness. These findings underscore the need to view treatment outcomes not only through the lens of clinical success but also through their broader psychosocial and economic implications.

The study highlights the importance of adopting a holistic and patient-centered approach to cardiovascular care. Healthcare providers should integrate routine psychological assessment, counseling services, and family support interventions into the management of patients undergoing complex cardiac procedures. Additionally, strengthening health financing mechanisms, expanding insurance coverage for specialized cardiovascular interventions, and enhancing financial risk protection strategies are essential to reduce catastrophic health expenditures and improve access to care.

Recommendations

A standardized psychological assessment tool should be administered within 48 hours of admission and before discharge to identify anxiety, depression, fear, and emotional distress. Cardiology units should establish structured family support programs that provide education, counseling, and emotional support to caregivers of patients undergoing complex cardiac procedures. Family counseling sessions should be conducted at least once during hospitalization and before discharge. Hospitals should establish financial counseling units to guide patients and families on available insurance benefits, payment plans, financial assistance programs, and social support resources. Financial counseling should be provided within 72 hours of admission for all patients scheduled for high-cost cardiac procedures.

The Social Health Authority (SHA) and policymakers should review and expand benefit packages for cardiovascular interventions to include comprehensive coverage for repeat PCI procedures, intensive care admissions, and post-procedural rehabilitation service.

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