

Provider-perceived barriers to diagnosis and treatment of acute coronary syndrome in Tanzania: a qualitative study

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Background: The incidence of acute coronary syndrome (ACS) is growing across sub-Saharan Africa and many healthcare systems are ill-equipped for this growing burden. Evidence suggests that healthcare providers may be underdiagnosing and undertreating ACS, leading to poor health outcomes. The goal of this study was to examine provider perspectives on barriers to ACS care in Tanzania in order to identify opportunities for interventions to improve care.

Methods: Semistructured in-depth interviews were conducted with physicians and clinical officers from emergency departments and outpatient departments in northern Tanzania. Thematic analysis was conducted using an iterative cycle of coding and consensus building.

Results: The 11 participants included six physicians and five clinical officers from health centers, community hospitals and one referral hospital. Providers identified barriers related to providers, systems and patients. Provider-related barriers included inadequate training regarding ACS and poor application of textbook-based knowledge. System-related barriers included lack of diagnostic equipment, unavailability of treatments, referral system delays, lack of data regarding disease burden, absence of locally relevant guidelines and cost of care. Patient-related barriers included inadequate ACS knowledge, inappropriate healthcare-seeking behavior and non-adherence.

Conclusions: This study identified actionable barriers to ACS care in northern Tanzania. Multifaceted interventions are urgently needed to improve care.

Keywords: acute coronary syndrome, barriers to care, health education, health systems, sub-Saharan Africa, Tanzania

Introduction

Acute coronary syndrome (ACS), colloquially known as the ‘heart attack’, is the leading cause of death globally.¹ Although ACS has historically been considered to be rare in sub-Saharan Africa (SSA), the burden of disease is expected to grow as the region proceeds through the epidemiologic transition.² As cardiovascular risk factors like hypertension become increasingly prevalent across SSA,^{3,4} cardiovascular-related death will likely continue to rise. In Tanzania, for example, the Global Burden of Disease study estimated that ACS was already the fourth leading cause of mortality in 2016, with a 47% increase over the prior decade.⁵

Despite such projections, there has been little study of ACS in SSA and diagnosed cases of ACS remain rare.^{6–8} The perplexing

scarcity of reported ACS cases in SSA has been the subject of much speculation,^{9–12} with some suggesting that physician practices may be contributing to rampant underdiagnosis.⁹ In Tanzania, there is evidence that physicians may be contributing to ACS underdetection. In an observational study of patients presenting to the emergency department with chest pain or shortness of breath, providers rarely pursued diagnostic workups for ACS even for patients with multiple risk factors (J. Hertz et al., manuscript submitted). This led to few patients being diagnosed with ACS and even fewer receiving appropriate treatment for ACS.

As ACS is a life-threatening emergency with a high mortality rate when not treated appropriately,¹³ understanding barriers to accurate diagnosis and proper care of ACS in SSA is an urgent public health priority. In a qualitative study at a referral hospital

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in Kenya where cardiac catheterization is available, barriers to ACS care included insufficient diagnostic equipment and lack of medications.¹⁴ Beyond this study, however, barriers to ACS care in SSA remain largely unexplored, particularly in settings where cardiac catheterization is unavailable. Understanding physician perspectives on barriers to care is an essential first step to developing effective interventions to improve ACS outcomes across SSA. To address this knowledge gap, we conducted a qualitative study among healthcare providers in northern Tanzania.

Materials and methods

Setting

This study was conducted in the Kilimanjaro region of northern Tanzania in 2018. The local prevalence of hypertension and diabetes among adults in Kilimanjaro is estimated to be 22 and 6%, respectively.^{15,16} Despite the prevalence of these risk factors, a retrospective review of medical records at a local referral hospital in 2018 found that only 0.3% of adult admissions were for ACS (J. Hertz et al., manuscript submitted). At the time of the study, cardiac catheterization was not available at any facility in Kilimanjaro.

Sampling

The study included 11 providers, who were eligible if they were medical doctors (MDs) or clinical officers (COs) working in either an outpatient department or an emergency department in Kilimanjaro. Based on existing data about where adults in northern Tanzania would present for acute chest pain and shortness of breath,¹⁷ we aimed to recruit providers who were most likely to encounter patients with ACS. Thus, providers were recruited from health centers, community hospitals and a referral hospital across the Kilimanjaro region. A purposive sampling technique was used to include a broad range of ages, medical training and work environments. Participants were recruited until thematic saturation was reached.

Procedures

Participants were approached for recruitment via in-person conversation. Individual in-depth interviews were conducted in a private location of the participant's choosing and lasted approximately 1 h. Interviews followed a semistructured guide exploring barriers to ACS diagnosis and care. The guide was developed by an interdisciplinary committee consisting of emergency physicians, cardiologists, internists and COs from Tanzania and the USA. The interview guide was independently forward- and back-translated from English to Swahili to ensure content fidelity and was piloted prior to use. All interviews were conducted by an emergency physician from the USA (JTH) who is fluent in both English and Swahili. Participants were given the option of speaking in English or Swahili, and all participants chose to speak in a mix of both languages.

All interviews were audiorecorded in their entirety, and the recordings were transcribed and translated into English by the researcher who conducted the interviews. To ensure accurate translation, a native Swahili speaker who is fluent in English subsequently reviewed all audiorecordings and transcripts.

Any disagreements regarding optimal translation were resolved by consensus.

Data analysis

Thematic analysis was conducted in an inductive manner, applying the principles of practice theory.¹⁸ After reviewing several transcripts, a codebook of themes was developed by an interdisciplinary committee of physicians and COs from the USA and Tanzania. The codebook was iteratively refined throughout the interview and coding process. The final codebook consisted of 25 subthemes grouped into nine dominant themes across three domains: provider-related, system-related and patient-related barriers. All transcripts were independently coded in NVivo 12 (QSR International, Melbourne, Australia) by two researchers: a Tanzanian CO (GLK) and an emergency physician from the USA (JTH). The two coders met regularly to refine the codebook and resolve coding discrepancies by consensus. Representative quotes were reviewed throughout the analysis procedure to capture the breadth and depth of provider perspectives on each theme.

Ethics

This study had ethical approval from the Duke Health Institutional Review Board, the Kilimanjaro Christian Medical Centre Research Ethics Committee and the Tanzania National Institutes for Medical Research Ethics Coordinating Committee. All participants provided verbal informed consent prior to enrollment.

Results

The characteristics of participants are summarized in Table 1. Participants represented a diverse range of medical training,

Table 1. Characteristics of in-depth interview participants, Kilimanjaro region, 2018 (n=11)

Characteristic	n
Gender	
Female	4
Male	7
Medical degree	
Medical doctor	6
Clinical officer	5
Years of practice	
1–5 y	3
6–10 y	5
>10 y	3
Practice setting	
Health center	3
Community hospital	3
Referral hospital	5

years of practice and practice settings. The data revealed a range of barriers to ACS care across the levels of the provider, system and patient. Table 2 summarizes the barriers across the three domains.

Provider-related barriers

Inadequate provider training

When participants were asked to identify barriers to ACS care, inadequate provider training was typically the first response offered. The providers felt their medical education emphasized communicable diseases over non-communicable diseases, leading to limited knowledge of ACS. Respondents felt that most Tanzanian providers had insufficient knowledge of ACS presentation, diagnosis and management, and nearly all viewed themselves as lacking education in these areas. Participants expressed a desire for more training in ACS care and suggested

that continuing medical education be used to increase competence.

For my education, it wasn't enough to say that I can treat ACS completely. I mean, it wasn't really sufficient, it wasn't enough. I need more education, I need more knowledge. So I feel uncomfortable, I can't say that I can manage the disease from A to Z. (Participant 6, CO, health center.)

Participants emphasized widespread inability to interpret electrocardiograms (ECGs) as a significant barrier to ACS diagnosis. Both medical doctors and clinical officers did not feel comfortable interpreting ECGs, and all participants cited a need for improved ECG training.

ECGs are difficult for me. Yeah, I need support. I didn't get any training to read ECGs. Even to put the ECG leads, those electrodes or whatever, on the body, I wasn't taught. (Participant 4, MD, community hospital.)

Table 2. Dominant themes regarding barriers to diagnosis and care of acute coronary syndrome among providers (n=11)

Domain	Barrier	n	
Provider-related barriers	Inadequate provider training	11	
	- Inadequate ACS knowledge		
	- Inability to interpret ECGs		
	- Insufficient experience treating ACS		
System-related barriers	Poor application of knowledge	11	
	- Failure to consider diagnosis of ACS		
	- Misdiagnosis of ACS cases		
	Ill-equipped facilities		
	- Lack of diagnostic equipment		
Patient-related barriers	- Lack of necessary treatment	11	
	- Lack of specialists		
	Cost of care		
	Lack of data and guidelines		
	- Lack of disease burden data		
	- Lack of locally relevant guidelines		
	Referral system challenges		10
- Referral system delays			
Patient-related barriers	- Transportation difficulties	9	
	Inadequate patient knowledge		
	- Lack of ACS knowledge		
	- Community misperceptions		
	Patient healthcare-seeking behavior		8
	- Delayed healthcare-seeking		
	- Use of traditional and faith healers		
	Non-adherence		7
- Medication non-adherence			
- Follow-up non-adherence			
- Testing non-adherence			
	- Non-adherence to lifestyle changes		

ACS: acute coronary syndrome; ECG: electrocardiogram.

Respondents also cited a general lack of experience managing ACS, which created an additional barrier to care. Because participants had little experience caring for ACS patients, they were not comfortable managing such cases. Many respondents reported only caring for a handful of ACS patients in their entire careers and four participants reported that they had never diagnosed or treated such a patient. This provider emphasized the way in which such lack of experience limits one's ability to diagnose ACS:

But if you've never seen a case before, it's hard to suspect the diagnosis. I mean, you see what your brain knows. If your brain doesn't know the diagnosis, you can't see it. (Participant 9, MD, referral hospital.)

Poor application of provider knowledge

Beyond insufficient training, respondents felt that providers often failed to properly apply their medical knowledge to the clinical setting. Participants worried that even when doctors had textbook-based knowledge of ACS, they did not routinely consider the diagnosis of ACS when caring for patients. This failure to consider ACS was identified by all but one participant as an important driver of ACS underdetection in Tanzania. This provider spoke about the pervasiveness of this failure to consider ACS:

The patients with those symptoms like chest pain, some doctors interpret it as pneumonia, other doctors think that the chest pain is due to fatigue or whatever. But only a few doctors think to examine the heart. (Participant 10, MD, community hospital.)

Participants felt that this failure to consider the diagnosis resulted in frequent misdiagnosis of ACS. Participants believed that patients with ACS in Tanzania are often given inaccurate diagnoses, such as peptic ulcer disease or pneumonia. They

worried that such misdiagnoses resulted in poor patient outcomes and reinforced misperceptions that ACS is rare.

For many others, they are misdiagnosed. For those symptoms, the doctor says ‘This is something else.’ So he won’t do any testing, he’ll just say it’s something else and he’ll give him other medicines. *(Participant 7, CO, community hospital.)*

Systems-related barriers

Ill-equipped facilities

Providers emphasized a lack of diagnostic equipment as a major barrier to ACS diagnosis in Tanzania. They reported that many facilities, even some referral hospitals, do not have ECG machines or troponin assays, which substantially limits clinicians’ ability to diagnose ACS. Even in facilities where testing is available, participants cited frequent equipment failures and long delays in result times as common obstacles to prompt ACS diagnosis.

You might suspect ACS is the diagnosis but you don’t have an ECG machine to at least confirm or you don’t even have that troponin test. So you’ll just say, this is just acid reflux and you’ll treat the patient for that. *(Participant 8, MD, referral hospital.)*

Participants also cited the unavailability of treatments necessary for ACS management as an important barrier to care. They reported that many facilities did not have access to some mainstays of ACS treatment, such as clopidogrel, heparin and oxygen. Many respondents also noted the lack of a local center capable of performing cardiac catheterizations, the gold standard intervention for most ACS cases. They reported that the nearest cardiac catheterization center was a 10-h drive from Kilimanjaro, making emergent catheterization impossible and creating substantial financial and logistical obstacles for patients seeking this treatment.

It’s difficult when we discover that someone has ACS, because you know the drug that the patient should be given, but unfortunately we usually don’t have the medicine that they need. *(Participant 1, CO, health center.)*

A dearth of specialists was also frequently cited as a barrier to ACS care. None of the respondents reported having a cardiologist at their facility, including those working at a referral hospital. Respondents expressed a desire for a wider distribution of cardiologists to facilitate ACS care and offer expertise to providers across the country.

I’d also like to say that we need more cardiologists in Tanzania, especially in our hospital. We don’t have a cardiologist. If we had even just one, he could help us a lot to diagnose heart diseases. *(Participant 11, MD, referral hospital.)*

Cost of care

Providers reported that the cost of ACS care was sometimes prohibitive for some patients. Respondents felt that ECGs, cardiac biomarker testing, ACS medications and cardiac catheterization

are too expensive for many Tanzanians. Participants emphasized the importance of health insurance and some shared stories of uninsured patients declining ACS testing or treatment because of the cost.

It’s difficult. For the patient to open a hospital chart? Cash. To do testing? Cash. To get treatment? Cash. Because we don’t do any testing until you pay for it. *(Participant 4, MD, community hospital.)*

Lack of local data and evidence-based guidelines

Another challenge mentioned by all but one participant was lack of data regarding the local burden of ACS. Respondents were uncertain whether ACS was rare in Tanzania or whether it was common but misdiagnosed. They felt that this lack of local prevalence data caused providers to fail to consider the diagnosis in clinical care. Participants described a cycle of inadequate data leading to underdiagnosis, which in turn resulted in a persistent lack of data.

So it’s possible that the disease is very common but it could also be rare. The challenge is there has been no research so we can know exactly the magnitude of the problem. *(Participant 8, MD, referral hospital.)*

Participants also wished for more locally relevant ACS guidelines to assist them with clinical care. Although the Tanzanian Ministry of Health does publish standard treatment guidelines for ACS,¹⁹ the majority of respondents were unaware of them. Providers also desired hospital-specific protocols based on locally acquired evidence to reduce ACS underdiagnosis and aid clinicians who lack experience managing the disease.

When I did orientation I wasn’t given any guidelines. I mean, it’s different than common diseases that we think are common like diarrhea or malaria that they give us guidelines for. So there are guidelines for those diseases but heart attacks? No. *(Participant 2, CO, health center.)*

Referral system challenges

Because the resources needed to manage ACS are often found only in referral centers, providers felt the referral system itself could be a barrier to efficient diagnosis and care. Participants noted that patients with ACS typically had to visit multiple facilities over several days before reaching a facility that could care for them. They cited inefficiencies and delays in the referral system as obstacles to prompt, emergency ACS care. These providers described the series of delays that patients face in attempting to access appropriate care for ACS:

The challenge the patient would face would be that delay—let’s say the disjointed referral of his care. Because, first, it will be difficult for the doctors there in his village to know what is going on with him. [...] And then maybe he’ll be sent to another hospital that’s a higher level of care. Because it’s not like he’ll be sent directly here, no. Maybe

he'll be sent to a district hospital. At the district hospital, they'll say maybe, take him to [the regional hospital]. And all that time the patient has that same pain there in his chest and sometimes they die on the way. (*Participant 9, MD, referral hospital.*)

The normal amount of time it takes to confirm a diagnosis is very long. You have to send him to another hospital for the testing, then he has to bring back the results. You do another test there. And all that time the thrombus it continues to grow, and eventually the patient dies. (*Participant 3, CO, referral hospital.*)

Patient-related barriers

Inadequate patient knowledge

Providers felt that there was a pervasive lack of ACS knowledge among patients, which had negative effects on ACS diagnosis and outcomes. Participants believed that many patients do not know ACS symptoms or causes and that some patients were more likely to attribute symptoms like chest pain to witchcraft than heart disease. Providers reported that this lack of ACS awareness led to failure to present to hospitals and non-adherence to treatment, resulting in underdetection of ACS and poor outcomes. All but one participant stated that community educational programming is essential to improving ACS care in Tanzania.

Only a few people know about heart diseases, so many people don't really know what are the causes, what are the risks. So you can be treating the patient, but she really doesn't know why she got there, why she got that problem. And, most of them, because of that, they end up getting worse in their disease. (*Participant 6, CO, health center.*)

Inappropriate healthcare-seeking

Participants felt that this inadequate patient education led to care-seeking behavior that negatively affected ACS detection and outcomes. Providers reported that many patients either do not seek care at all for ACS symptoms, seek care on a very delayed basis or seek care in inappropriate places, such as traditional healers. Participants believed that educational interventions were needed to encourage patients to report promptly to a hospital for possible ACS symptoms in order to improve clinical outcomes and to allow for higher rates of disease detection.

Some will look for treatment with local herbs, others will go to faith healings. So each person looks for treatment that they think will help. And other people come to the hospital. So you can see that there are many people with heart attacks but we only end up seeing a few. (*Participant 11, MD, referral hospital.*)

Many respondents felt that the popularity of traditional healers, faith healers and herbalists was a particularly vexing barrier to care. They reported that many patients seek the advice of these kinds of healers before coming to a hospital. Several participants

shared stories of patients stopping their medications for diabetes or hypertension and deteriorating based on the advice of a healer. Providers were pessimistic that the popularity of such healers could be easily diminished.

They go to the preachers and they tell them, 'Stop taking those medicines, throw them away, Jesus will heal you, Allah will heal you. You don't have to take these medicines.' And so they stop taking them. (*Participant 6, CO, health center.*)

Non-adherence

Closely related to low levels of patient education is the issue of non-adherence. Participants referenced patient non-adherence to medications, lifestyle changes, follow-up appointment attendance and recommended diagnostic testing. Providers felt that such non-adherence was often due to lack of awareness of the causes and risks of ACS, although they also cited cost as a barrier to adherence. Participants worried that such non-adherence resulted in worse patient outcomes.

They normally only decide to come back when the pain worsens. We have the same problem with hypertension. We normally tell patients with hypertension to come back in one week, but patients usually say, 'I forgot to come back and I feel fine, so I'll stop taking my medication.' (*Participant 1, CO, health center.*)

Discussion

This study identified multiple actionable barriers to ACS care at the levels of patients, providers and the healthcare system in Tanzania. Participants described providers who had inadequate knowledge and frequently missed cases of ACS, a healthcare system characterized by insufficient supplies and inefficient referrals, and patients who lacked education about proper care-seeking behavior. The findings presented here suggest that a multifaceted strategy is needed to improve ACS care in Tanzania, and that such a strategy should include improved provider training, expansion of access to diagnostic equipment and treatment, research to quantify the burden of disease, improvements in referral system efficiency, development of locally relevant guidelines and patient education. In 2016, the Tanzanian Ministry of Health released a strategic action plan to combat non-communicable diseases that emphasized health system strengthening.²⁰ The results of this study highlight the importance of this mission to improving care for ACS and non-communicable diseases in general.

Prior research in Tanzania demonstrated that referral system delays led to increased mortality for patients with infectious diseases,²¹ suggesting that efforts to streamline the referral system may improve outcomes for both communicable and non-communicable diseases. Beyond health system strengthening, however, our findings identified a need for provider and patient educational interventions to improve ACS care in Tanzania. In high-income settings, both health system and educational

interventions have been shown to improve ACS outcomes,^{22–24} and implementation science research is needed to determine whether a package of evidence-based interventions can be implemented in SSA to impact ACS outcomes.

Delayed or inappropriate patient healthcare-seeking was identified as an important barrier to ACS care in our study. This finding is consistent with the results of a recent community survey conducted in northern Tanzania, which found that most adults would not present to a hospital for ACS symptoms like chest pain, were not aware that chest pain might be a symptom of cardiovascular disease and did not perceive themselves to be at risk of ACS.^{17,25} As ACS is a life-threatening emergency requiring time-sensitive treatments,²⁶ our findings highlight the urgent need for community education regarding ACS in Tanzania.

Cost of care was another significant barrier identified in our study, particularly for those without health insurance. In 2015, the Tanzanian government released the Fourth National Health Sector Strategic Plan, which included financing reforms to help the country achieve universal health coverage (UHC).²⁷ Although the country has made considerable progress towards UHC in recent years,²⁸ substantial gaps in coverage remain: less than one-third of Tanzanians have health insurance and catastrophic health expenditures are still common among the uninsured.^{28–30} Indeed, although many of the medications needed to manage ACS appear on the national essential medicines list and are partially subsidized,¹⁹ our findings suggest that the cost of ACS testing and treatment remain prohibitive for many patients. As Tanzania makes progress towards achieving the Sustainable Development Goals, additional efforts to expand health coverage and reduce costs for care of non-communicable diseases are needed.

The findings of this study must be considered in light of its limitations. First, social desirability bias may have made participants feel social pressure to appear competent and knowledgeable when speaking to a non-Tanzanian physician. This may have resulted in minimizing concerns about their own inadequacies in knowledge or quality of care. Participants did speak with candor, however, about general clinician incompetence related to ACS. Second, this study included only physicians and COs; additional interviews with patients, caregivers, nurses and administrators may identify additional important barriers to ACS care in Tanzania.

In conclusion, healthcare providers in northern Tanzania identified multiple barriers to ACS care at the patient, provider and healthcare system levels. Locally relevant interventions in all three areas are needed to improve ACS care and outcomes. As ACS shares common risk factors with a wide range of other cardiovascular diseases, the findings presented here may also have implications for control strategies for other non-communicable diseases. As the burden of cardiovascular disease across SSA continues to rise, it will be increasingly imperative to implement strategies to address barriers to ACS care.

Authors' contributions: JTH and FMS conceived the study; JTH, PM and FMS developed the interview guide; GLK and FMS recruited participants;

JTH conducted the interviews; JTH and GLK performed the coding; JTH, PM and MHW conducted the thematic analysis; JTH drafted the manuscript; GLK, PM, MHW and FMS critically revised the manuscript for intellectual content. All authors read and approved the final manuscript. JTH and FMS are guarantors of the paper.

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