Community and physician perceptions of chest pain and prevalence of acute coronary syndrome among emergency department patients in Moshi, Tanzania

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Abstract:

Despite the rapid increase in cardiovascular risk factors across sub-Saharan Africa such as hypertension, little is known about the prevalence of acute coronary syndrome (ACS) in the region. Very few studies have described ACS in the continent, and it remains unclear whether or not the disease is rare or simply underrecognized. Possible explanations for under-detection of ACS include patient factors such as healthcare seeking behavior and physician factors such as failure to consider the diagnosis of ACS. In Tanzania, no data are available regarding the prevalence of ACS, and it is unknown to what degree patient and physician knowledge, attitude, and practices may be contributing to under-diagnosis of ACS in the country. This project will aim to explore patient and physician perceptions of chest pain and ACS, to describe the current patterns of care for patients with ACS-related symptoms in northern Tanzania, and to determine the prevalence of ACS in the emergency department in Moshi.

Abbreviations:

ACS Acute Coronary Syndrome

ED Emergency Department

ECG Electrocardiogram

HIC High Income Countries

ICER Incremental Cost Effective Ratio

KAP Knowledge, Attitude, and Practice

KCMC Kilimanjaro Christian Medical Center

LMIC Low and Middle Income Countries

WHO World Health Organization

Introduction:

Acute coronary syndrome (ACS), colloquially known as the "heart attack," is a leading cause of morbidity and mortality from poorly controlled hypertension [1]. In sub-Saharan Africa, ACS has long been considered of less importance due to the relatively high burden of communicable diseases [2]. In recent years, however, countries across sub-Saharan Africa have faced a sharp increase in ACS risk factors, such as longer life span, reduced exercise, poor diet, hypertension and diabetes [3]. Given the well-documented rise of these risk factors in the region, several authors have highlighted the increased need for accurate data regarding the burden of disease of ACS in sub-Saharan Africa [4]. This study will determine the prevalence of ACS in the emergency department setting in northern Tanzania and assess patient and physician beliefs and practices which may be contributing to a low rate of ACS diagnosis.

Literature Review:

Despite the need for data regarding ACS prevalence, very little is known about the burden of ACS across the African continent. Our team's recent systematic review found there are very few studies on the incidence of ACS in sub-Saharan Africa; studies were mostly performed in small, narrowly-defined patient populations and were generally of low quality [5]. None of these studies were performed in Tanzania. Based on the sparse data available, however, researchers have pointed out that the incidence of ACS in the region seems to be much lower than what would be expected given the local prevalence of ACS risk factors [6]. It remains unclear whether or not ACS in sub-Saharan Africa is actually a rare phenomenon, or just an under-reported one.

There are many possible explanations for the apparent relative scarcity of ACS in sub-Saharan Africa. One such explanation is related to care-seeking behavior. Since most data regarding ACS incidence comes from hospital-based studies, if large numbers of patients do not present to a hospital for symptoms such as chest pain, then the local incidence of ACS may be significantly under-reported. In developed countries, there is already ample evidence that care-seeking behavior for patients with ACS symptoms is significantly affected by socioeconomic factors, health literacy, and cultural factors [7]. It is unknown to what extent, if any, similar factors are affecting patient healthcare seeking behavior, and in turn, under-reporting of ACS in Tanzania.

Physician beliefs and practices may also be contributing to under-diagnosis of ACS. If physicians do not consider the diagnosis of ACS or do not pursue diagnostic workups (such as ECGs) for patients with symptoms suggestive of ACS, their behavior may be reinforcing a misperception that ACS is a relatively uncommon and unimportant disease in the region. Studies performed elsewhere in sub-Saharan Africa have shown that physician beliefs and practices contribute to misdiagnosis and inappropriate treatment for infectious syndromes [8]. The degree to which physician practices may be similarly contributing to under-appreciation of ACS in Tanzania is unknown.

Statement of the Problem:

Little is known about the prevalence of ACS in sub-Saharan Africa or the ways in which patient and physician practices may be affecting detection of this disease.

Rationale:

This project will gather information in order to determine the prevalence of ACS in emergency department in Moshi, Tanzania. Patient and physician perceptions and practices which may be contributing to ACS under-diagnosis will also be explored.

Broad Objective:

To determine the prevalence of ACS among adults in the emergency department.

Specific Objectives:

Specific Objective 1: To explore the knowledge, attitudes, and practices (KAP) of community members and physicians regarding ACS and ACS-related symptoms in northern Tanzania.

Specific Objective 2: To determine the prevalence of ACS-related symptoms in an emergency department in northern Tanzania and describe current patterns of care for such patients.

Specific Objective 3: To determine the prevalence of acute myocardial infarction in an ED population in northern Tanzania.

Methods:

Setting: Moshi is located in the Kilimanjaro region of Northern Tanzania. It has a population of 184, 292 people and includes both Moshi Rural and Moshi Urban. It is home to Kilimanjaro Christian Medical Center (KCMC) which is a referral hospital for northwestern Tanzania and a regional training center. Duke and KCMC have developed a research infrastructure with proven success in NIH funded grants. Many successful research projects have been conducted through the Casualty department with the help of an experienced team of Tanzanian research nurses and data entry technicians.

Study Design: The prevalence of ACS will be ascertained with a cross-sectional survey of a representative sample of all casualty department patients presenting with chest pain or shortness of breath. The prevalence of acute myocardial infarction will be determined by obtaining electrocardiograms (ECGs) and point-of-care troponins on all patients presenting with symptoms suggestive of ACS. Quantitative data concerning ACS knowledge and barriers will be obtained by patient knowledge, attitude, and practice (KAP) surveys. Qualitative information regarding barriers to care, healthcare seeking behaviors, and management of ACS will be obtained using patient focus groups and in-depth interviews with ED providers.

Study Population: All participants will be >17 years of age and be able to speak Swahili (patients or families) or English (healthcare practitioners). We will exclude patients with an inability to respond to the survey due to the severity of their illness or injury. We plan to enroll 500 patients in the observational study of patients with ACS-related symptoms and 500 patients in the ACS prevalence study.

Inclusion/ Exclusion Criteria:

Patients will be included in the prospective observational study of ACS-related symptoms and prevalence of myocardial infarction study if they have a primary or secondary chief complaint of chest pain or shortness of breath. All patients must be >17 years of age, be seeking care at KCMC in the casualty department, be clinically sober at the time of enrollment, be able to communicate in Swahili or English and consent to participate. Patients will be excluded from enrollment if they are medically unstable or have a deteriorating condition, are too critically ill to participate, are <18 years of age.

Sample Size Calculation:

Reported prevalence of myocardial ischemia among various African sub-populations (not general ED populations presenting with chest pain) range from 0.2%[9] to 10.4%[10]. Assuming the prevalence of ischemic ECGs among ED patients with chest pain will be at the high end of this range (10%), then 210 patients will need to be enrolled in order to report this prevalence with a precision of +/- 5%.

The proportion of ED patients with chest pain in Tanzania is unknown, but in developed settings is typically around 10%.[11, 12] Assuming a similar proportion of patients will be eligible for inclusion in our study, and given current patient volumes at KCMC (25 adults/dayshift), enrollment will need to be conducted for 5 months to achieve the desired sample size.

Instruments/Procedures:

KAP (Specific Objective 1): A focused knowledge, attitude, and practice survey (KAP) survey will be developed, adapting questions from existing cardiovascular KAP surveys used elsewhere [13-16]. The survey will piloted on a small sample (N<20) of persons (who will be excluded from the final study) in order to report upon the internal consistency or reliability of the survey in Kiswahili and to assess the content validity of the survey in Kiswahili. It will be necessary to audio record the pilot interview sessions in order to allow for complete translation into English. Participants will not be identified by name on the tapes, and all recordings will be discarded after translation. This pilot will occur before the start of the study recruitment. After acceptability is assured the survey will then be given to all patients enrolled in the study.

Focus Group Methodology (Specific Objective 1): Focus groups will be held in Swahili with patients to better assess their understanding of chest pain and acute coronary syndrome, adherence with treatment, and any cultural barriers or culturally relevant solutions for a successful intervention and follow-up plan. Community members from randomly selected communities in Moshi Urban or Moshi Rural will participate in the focus groups. All patients who agree will be included until 3-4 focus groups are complete with a minimum of 10 participants each. Patients will be offered transportation money if they elect to return for focus groups. The focus groups will occur in a small quiet room near to the Casualty Department or in the local community.

In-depth Interview Methodology (Specific Objective 1): Approximately twenty in-depth interviews with a semi-structured format will be conducted in English or Swahili with casualty department physicians to assess their current practice surrounding the management of ACS in the emergency department. Implied consent language will be utilized. These conversations will be recorded and transcribed.

Retrospective Chart Review (Specific Objective 2): Patient logs from the Emergency Department for a six-month period prior to study initiation date will be reviewed. From these logs, data will be collected including patient age, sex, and diagnosis. No identifying information such as name or date of birth will be collected. This data will allow for an analysis of current patterns of ACS-related diagnoses in the ED.

Prospective observational study of patients with ACS-related symptoms (Specific Objective 2): A triage system in the KCMC ED is about to be implemented to improve quality of care. The triage nurse, as part of routine care, will begin obtaining all five vital signs (blood pressure, heart rate, temperature, respiratory rate, and oxygen saturation). Patient complaints will be entered into a triage registry, along with patient age, sex, and vital signs. This registry data will be collected for our research purposes. No identifying information will be entered into this registry or our data collection. This triage registry will act as a quality improvement initiative to evaluate the triage process in the ED. As this registry will become part of routine care as a quality improvement project for the ED, patients will not undergo informed consent to have their vital signs and chief complaints in the triage registry. The de-identified data from this registry will be used to determine the prevalence of ACS-related chief complaints such as chest pain and shortness of breath among emergency department patients. This registry will be screened and patients presenting with a primary or secondary complaint of chest pain or shortness of breath will be enrolled for this prospective observational study. The ACS Patient survey (attached below) will be administered to all participants. Patients will be followed through their emergency department stay; their diagnostic workup, treatment, diagnosis, and disposition will be observed and recorded.

ACS prevalence study (Specific Objective 3): Following the observational study, all adult patients presenting to the KCMC Emergency Department with a primary or secondary complaint of chest pain or shortness of breath will be prospectively enrolled in the prevalence study. At time of enrollment, these patients will undergo testing with ECG and point-of-care troponin level, and a second point-of-care troponin level will be obtained two hours later. The results of

these studies will be shared with the clinical team. The ECGs will be reviewed by two separate physicians, trained in either emergency medicine or cardiology to determine whether or not the ECG meets STEMI criteria. If there is a disagreement, a third physician will serve as the tiebreaker.

Survey Data Collection: Data will be collected on tablets and stored in a secure database by a trained data entry technician. Surveys for all components of this study will be verbally administered to patients and families due to variable literacy rates. They will be administered by healthcare providers in the standard medical language of English or Swahili. Results of urine dipstick will be recorded for the presence or absence of proteinuria. Results of troponins will be recorded and digital images of ECGs will be uploaded. Phone number of the patient and will be recorded in the log and de identified. No PHI will be entered into Redcap or any study database. The log will remain in a secure, locked cabinet the research office.

Focus Group Data Collection: Participants will take part in an informed consent process approved by the Duke and Tanzanian ethics committees before joining the focus group that is included in the survey consent form. Focus groups will be formed once 5-10 eligible interested participants are identified. Focus groups, led by trained research nurses or other trained research personnel, will be audiotaped and transcribed for formal qualitative analysis utilizing thematic analyses. Transcriptions will occur within four days of the focus group and research nurse notes will be included in these transcriptions about the content. We expect to host approximately 3-4 focus groups.

Data Analysis: Survey results will be analyzed through analytical techniques. Continuous variables will be reported as mean and standard deviation (SD) or median and inter-quartile range (IQR). Pertinent outcome variables are expected to be dichotomous. (e.g., tobacco use, gender, alternative medicine use).

Focus Group/In-Depth Interview Data Analysis: After transcription, each of the focus groups and in-depth interviews will be translated and the final transcript will be discussed by the research nurses present in the focus group for content validation. Then a thematic analysis will be undertaken for each of the main questions from the focus groups/in depth interviews. All data will be analyzed with NVivo 10.0. Latent Semantic Analysis and Sentiment Analysis will be used to investigate latent concepts or positive/negative tones behind the qualitative answers. All transcripts, audiotapes and other study documents will be kept for 6 years following conclusion of the data the conclusion of the study.

Study Timeline: The first steps of the project included IRB submission and planning which is currently ongoing. IRB approval has already been obtained from both NIMR (National Institute of Medical Research) in Tanzania and the KCMC IRB. Data collection will occur from July 2018 – June 2019, followed by data analysis and manuscript publication.

Investigators:

Dr. Blandina Mmbaga is a co-investigator and the onsite research director at KCMC she will ensure that the study is carried out with fidelity. As a native swahili-speaker,medical provider,

and clinical researcher, she will provide critical cultural and clinical expertise. She will additionally be relied on throughout the project to assist with any cultural and language issues that may arise at later stages of the project.

Dr. Julian Hertz is a co-investigator. He will assist with project planning, implementation, data analysis, and manuscript preparation.

Dr. Catherine Staton is a co-investigator. She will also assist with study design, study oversight, data analysis, and manuscript preparation.

Dr. John Bartlett is a co-investigator. He will also assist with study design, study oversight, data analysis, and manuscript preparation.

Ethical Considerations:

Capacity Development:

This project was based on the local needs, available resources and standard practices in the KCMC Emergency Department. We have sought out collaborators both at Duke as well as at KCMC and have adapted our project to their suggestions and experiences. We will employ and train, Tumsifu Tarimo, a Masters student in sociology at the Open University of Tanzania, who has considerable experience performing focus groups with the Duke-KCMC research collaboration. He will oversee both the focus groups and the administration of the KAP survey. We will continue to recruit junior facility at KCMC to assist with all research concerns and plan to collaborate with Dr. Kijaro Kilonzo, nephrologist and chair of the internal medicine department at KCMC for future publications and research project.

Subject Recruitment and Compensation:

All patients at KCMC Casualty Department who meet inclusion criteria will be offered enrollment in the study. The only cost to participants is the time spent performing the survey. The participants will not be compensated for their time for this study. Participants will not be compensated for their time spent completing the survey. They will be compensated for travel and food if they return for focus groups.

Consent Process:

For patients we will be utilizing a written informed consent. Participants will be provided with a description of the study objectives and procedures, along with information on data safety. Agreement to participate in the survey will serve as consent to participate in the study. The in-depth interviews will have an implied consent language. The participants will be enrolled by study nurses.

Dissemination and Publications:

Dissemination of results will occur for both the academic literature in the form of international presentations and research manuscripts as well as the clinical environment at KCMC. We will offer to KCMC leadership to discuss our results during the weekly Clinical Case Conference in order to educate KCMC Clinicians. Similarly, presentations in the Casualty Department will take place for KCMC Casualty Department staff and all healthcare providers. We also hope to share these results with emergency department providers and health policy officials in order to understand the burden of disease suffered by our patients in hopes of planning for the needs of healthcare professionals for these patients.

Budget:

Item	Cost in US Dollars
RN time x 12 months	9,600
RN data/internet time x 8 months	500
Printing .13 x sheet	3328
Automatic BP cuff x 2	100
Alcohol pads (1/per subject)	donated
POC troponin machines	donated
EKG paper	donated
ECG machines	donated
Patient focus group transportation/food/time x 100 subjects	300
MD indepth interview food x 3	100
KCMC overhead 10% total budget	3213
Total	**15,321**

Budget Justification:

PERSONNEL

Research nurse: One full time research nurse will be required for all the aims of this study. They will be employed according to the research project requirements and will be active on other projects thus supplementing their salary during periods when less participant contact is needed. The research nurses will be responsible for recruiting patients for the surveys, follow-up groups and performing blood pressure measurements, ECGs, and troponins. They will also be responsible for informed consent of participants, conducting all interviews, maintaining participant files, and communicating progress to Dr. Hertz. Nurses will be paid $800 per month, which is standard for Duke/KCMC Collaboration research nurses. One nurse will be full-time for 12 months ($9,600).

SUPPLIES:

Laboratory equipment: One alcohol pad will be required for each patient and these supplies will be donated.

Two automatic blood pressure cuffs will be needed. ($100) ECG machines, POC troponin machines, and cartridges will be donated.

Paper and printing costs: ($3,328) We request funds in order to cover paper and printing costs for the project. Informed consent, surveys and any regulatory paperwork will need printing estimating 16 pages/participant x 1600 participants at 25,600 pages at 0.13 cents for paper and printing costs. Total funds requested $3,328.

Patient focus group transportation and food: Ten focus group will be held x 10 patients each. Each participant will be reimbursed (5,000 TSH)= ($3USD) for transportation plus food.($300)

In-depth interview: Interviewee will be paid for their time and provided with a meal. ($100)

KCMC overhead According to our funders, the US National Institute of Health guidelines, we are requesting 10% of the total KCMC budget be paid to the Good Samaritan Foundation account at KCMC hospital for the privilege of being housed at KCMC and other administrative costs.

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Curriculum Vitae

CRERC FORM 13

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CRERC FORM 13

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