

Quality evaluation in delivering care of Acute Myocardial Infarction in Sancti-Spiritus, Cuba.

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Abstract

Aim: This study assesses the quality of care for patients admitted with diagnosis of acute myocardial infarction (AMI) in a secondary general hospital located in Sancti-Spiritus, Cuba, in a low/middle income scenario (LMIS), using the 2017 European Society of Cardiology (ESC) Quality of Care Working Group's guideline.

Methods: Observational retrospective of admitted AMI in Sancti-Spiritus Camilo Cienfuegos General Hospital. An implemented electronic registry was used for data collection. Each patient was considered for eligibility for each of the eight domains of quality. A set of quality measures was derived from ESC guidelines. Organizational information was assessed by administrative review and interview.

Results: Between 2017 and 2019, 660 patients with AMI were admitted to Camilo Cienfuegos General Hospital, most of them (72%), presented with features of ST-elevation myocardial infarction (STEMI). Thrombolytic were administered to 268 (72.4%) patients, 43 (16%) of them in less than 30 minutes of diagnosis. Dual Antiplatelet Therapy was administered to 98.1% of patients on admission. However, only 163 (34.8%) were enrolled in secondary prevention programs. No information regarding Patient Experience, nor 30-day adjusted mortality, was collected. Secondary prevention was accomplished, around 90%.

Conclusion: Determination of quality metrics brought certain improvement on perception of the quality of care in this setting. Despite absence of coronary intervention, there is a chance to modify some performance measures, which are not directly related with this doubtful situation.

Key Messages

- What is already known about this subject? Guidelines of attention of Acute Myocardial Infarction recently included updated set of performance measures. As this document comes from a very different setting, it is not clear, for low/middle income scenarios (LMIS), how achievable are this quality markers. These gaps on proper medical attention could generate an increase in mortality and morbidity associated with poor quality of care for cardiovascular disease in Latin America, which has not been assessed either.

- What does this study add? This evaluation, with its inherited limitations, tries to measure quality of care in a low/middle income scenarios, in a non-interventional center, with free of charge, universal access to state funded-health care system, using a set of performance measures suggested in recognized international guidelines. This work creates the basics to include performance evaluation in cardiovascular diseases care, a daily practice in LMIS centers, despite been fulfilled or not, a common feature of resource-limited units.

- How might this impact on clinical practice? By identifying gaps in medical attention in said settings, protocols can be updated and revised to correct these disparities. Quality interventions should be

assessed again, to create new evidence. Described results are a start-line to verify, and compare new assessment of quality metrics.

Introduction

Cardiac conditions are a major burden for health systems, worldwide¹⁻². And, low and middle-income settings (LMISs), especially in Latin America, are not strange to this reality³. One of the most common cardiac conditions, that require intensive care, is Acute Myocardial Infarction (AMI). Assessing the quality of care provided to patient with this condition may influence their outcome⁴. Therefore it is imperative to achieve a high-quality cardiovascular disease care.

It may be economically challenging for these countries, in every level of attention⁵. In Cuba, patients have free of charge universal access to state-funded health care, with no private practices⁶. And the case of AMI is not different than the rest of the world.

In this country with 110000 km² with 11millions inhabitants, are three well established regional networks, leaded by a tertiary center, where coronary interventions (on hours) and cardiac surgery take place. Yet, AMI attention is mostly provided in general hospitals (leaders of the district network). These centers are responsible for short, middle and long-term assistance of most cases; they also stratify patients to be transferred to a tertiary center for interventionist procedures.

Also, no national clinical guideline or quality metrics consensus has been achieved or published, so far. Despite data regarding number of patients and treatment been collected by statistics system, official publication is still lacking⁷. Therefore is still a challenge for healthcare providers to compare results from different institutions.

To identify gaps in proper medical attention may lead to a better care. In “Camilo Cienfuegos” General Hospital, Sancti-Spiritus, Cuba, a digital system with continuous evaluation of care was established⁸, with several improvements after updating its protocols. Current research in this particular topic includes evaluation of performance measures, and creation of set of specific quality markers for our settings.

AIM

This paper evaluates the quality of care for patients admitted with AMI in a secondary General Hospital in Sancti-Spiritus, Cuba.

Methods

Study Design and Selection of quality indicators (QIs): Observational and retrospective study of quality of care evaluation using the European Society of Cardiology (ESC) 2017 Quality of Care Working Group’s consensus on quality document⁹(Table 1). It was selected this time, as the framework for evaluation. This document provides a series of metrics distributed in eight domains: regarding to organization of

network, reperfusion therapy, risk assessment, in-house anti-thrombotic treatment, discharge medication, patient-reported outcomes, outcomes measures, and composite QI.

Data collection and population: This study uses an implemented electronic AMI registry, co-designed by cardiologists of Camilo Cienfuegos General Hospital and software's engineer of DESOFT¹⁰. The main objective was to create a tool that allows systematic evaluation of the care received by patients with AMI. Data pertaining to patient characteristics, history, diagnosis, management and in-hospital outcomes, including lab results, for all AMI admitted in Camilo Cienfuegos General Hospital Coronary Intensive Care Unit (Sancti-Spiritus (CUBA), at any point during their hospital course, with available information of QI based on ESC 2017 Quality of Care Working Group's markers, were included, despite thrombolytic approach, or in-hospital outcome. To avoid missing data, some parameters are necessary to fill, in order to include patients in the database; system issues a warning if one of these is missing.

Analysis: Data collected from REgistro de Síndromes Coronarios agUdos [Registry of Acute Coronary Syndrome (RESCUE)]¹⁰ study were transferred into Statistical

Table 1. ESC indicators to assess the quality of the care for patients with STEMI

1. Centre organization and system level structures of AMI care.
2. Reperfusion strategy.
 - 2.1 Proportion of patients with STEMI arriving in the first 12 hours who receiving reperfusion therapy.
 - 2.2 For patients treated with fibrinolysis: <30 min from diagnosis to the needle.
3. In-hospital risk assessment.
 - 3.1 Proportion of patients having LVEF assessed before discharge.
 - 3.2 Proportion of patients with NSTEMI who have ischemic risk assessment using GRACE risk score.
 - 3.3. Proportion of patients admitted with STEMI or NSTEMI bleeding risk assessment using CRUSADE.
4. In-hospital antithrombotic drugs.
 - 4.1. Number of patients eligible for in-hospital antithrombotic therapies who received ≥ 1 therapies.
 - 4.2. Dual antiplatelet therapy.
5. Secondary prevention discharge treatment.
 - 5.1 Proportion of patients with AMI discharged on statins, unless contraindicated.
 - 5.2 Proportion of patients with LVEF equal or less to 40% or clinical evidence of heart failure, with betablocker prescribed at discharge.
 - 5.3 Proportion of patients with LVEF equal or less to 40% or clinical evidence of heart failure, with ACE inhibitor prescribed at discharge.
 - 5.4 Proportion of patients with smoking cessation advice at discharge.
 - 5.5 Proportion of patients enrolled in secondary prevention programs.
6. Patient experience collected in a systematic way.
7. Outcome measures.
 - 7.1 In-hospital mortality rate.
 - 7.2 30-day adjusted readmission rate.
8. Composite quality indicator.
 - 8.1 Proportion of patients with LVEF equal or less to 40% or clinical evidence of heart failure, with DAPT and statins prescribed at discharge.
 - 8.2 Proportion of patients with LVEF equal or less to 40% or clinical evidence of heart failure, with betablocker, ACE-I, DAPT, and statins prescribed at discharge.

Package for Social Sciences (SPSS, version 24, IBM, Armonk, New York), which was used for data cleaning, management, and analysis. Categorical variables are presented as number and percentage, and continuous variables as mean and standard deviation.

Structural data and internal protocols (Domain 1) will be further discussed. Compliance was reported as a percentage of the eligible population, and for Domain 5 (secondary prevention discharge treatment), compliance with prescribed treatment will be addressed only on patients who were discharged alive, as previously reported.

The study was conducted in full conformance with principles of Declaration of Helsinki, and approved by institutional board review. Neither patients, nor the public were involved in the design of this study.

Setting: This evaluation comes from patients between 2017 and 2019 of the at Camilo Cienfuegos General Hospital, Sancti-Spiritus; a Cuban medical center lacking on-site percutaneous coronary intervention (PCI), which also lacks the capacity to transfer its patients to a PCI-capable center.

Results

Demographics, risk factors and clinical presentation. Between 2017 and 2019, 660 patients with AMI presented to Coronary Intensive Care Unit of Camilo Cienfuegos general Hospital of Sancti-Spiritus (CUBA). The majority of patients, 475 (72%) admitted through the registry, presented with features of STEMI. Mean age was 66.6 years (\pm 12.1) and 443 (67.1%) were male. On admission 87 (13.2%) patients had a Killip classification of heart failure of 1. Clinical presentation and the prevalence of comorbidities and other risk factors for AMI are described in Table 2.

Evaluation of quality of care according domains (Table 3)

- *Domain 1: Centre organization and system level structures of AMI care.* An internal protocol exists which asserts that every patient with STEMI and no contraindications to receive thrombolytic therapy, which symptoms started within 12 h should receive it. In this center (as in Cuba), thrombolysis with Recombinant Streptokinase (Heberkinase, CIGB, Cuba) is standard therapy in patients with STEMI. Its administration after 12 hour was not suggested, despite clinical characteristic of patients, due to increasing adverse effects without any clinical benefit. Patients can be assisted wherever they decide.

There are 23 clinics, and 4 general hospitals (among them, Camilo Cienfuegos General Hospital, is the leader of the Cardiology network), it serves a population of 466000 inhabitants around 6744 km². Management of AMI can be done everywhere, however, diagnosis of NSTEMI, can be done only in the General Hospital, given that cardiac biomarkers are not available in any other medical facility.

Table 2. Baseline characteristics of studied population

Parameters	N: 660 patients	(Cont)	N: 660 patients
Age in years (Median and IQR)	66.5 (17)	TIMI score at admission (Median and IQR)	3(3)
STEMI patients (%)	475 (72%)	GRACE score at at the time of admission (Median and IQR)	110 (39)
Female gender (%)	217 (32.9)	Cardiogenic shock (%)	42 (7.7)
Diabetes Mellitus type 2 (%)	190 (28.8)	Killip class ≥ 2	142 (21.1)
Hypertension (%)	569 (86.2)	Anterior Myocardial Infarction	346 (52.4)
Known CAD (%)	243 (36.8)	Total ischemic time (min) (Median and IQR)	180(360)
Prior Myocardial Infarction	101 (15.3)	Aspirin within 12h after symptoms onset (% from patients assisted in first 12 hours after symptoms started)	610/614 (99.3)
Prior Stroke	21 (6.2)	ADPI within 12h after symptoms onset (% from patients assisted in first 12 hours after symptoms started)	608/614 (99)
Peripheral artery diseases	26 (3.9)	Statins at the time of admission (%)	659 (99.8)
Dyslipidemia	40 (6.1)	Betablockers at the time of admission (%)	520 (78.8)
Atrial Fibrillation	12 (1.8)	ACE inhibitors at the time of admission (%)	608 (92.1)
Congestive heart failure (%)	15 (2.2)	Diuretics at the time of admission (%)	122 (18.5)
Current smoking (%)	336 (50.9)	Streptokinase administration	276/475 (58.1)
Left Ventricle Ejection Fraction (in %) (Median and IQR)	48(11)	Aspirin at the time of discharge (% from discharged alive)	594 (97.4)
eGFR (MDRD, ml/min) (Median and IQR)	65.9(36.7)	ADPI at the time of discharge (%from discharged alive)	585 (95.9)
Glycaemia (mmol/L) (Median and IQR)	6.2(2.9)	Statins at the time of discharge (%from discharged alive)	597 (97.9)
Cholesterol (mmol/L) (Median and IQR)	5.0(1.5)	Betablockers at the time of discharge (% from discharged alive)	535 (87.7)
Total CK (UI/L) (Median and IQR)	823(542)	ACE inhibitors at the time of discharge (% from discharged alive)	593 (97.2)
CK-MB (UI/L) (Median and IQR)	143 (71)	Diuretics at the time of discharge (% from discharged alive)	302 (49.5)
Systolic Blood Pressure at the time of admission (mmHg) (Median and IQR)	130(10)	In-hospital stay (days) (Median and IQR)	7.0(1.0)
Triglycerides (mmol/L) (Median and IQR)	1.2(0.76)	In- Hospital Mortality (%)	50 (7.6)

IQR: Interquartile range.. STEMI: ST Elevation Myocardial Infarction. CAD: Coronary Artery Disease. GFR: Glomerular Filtrate Rate. CK: Creatin Kinase. CK-MB: Creatin Kinase- MB. ADPI:ade. ACE: Angiotensin Converter Enzyme. ADPI:Adenosine diphosphate (ADP) receptor inhibitors

Though direct emergency phone number exists for patient with chest pain, emergency system can be activated by attending physicians or by patients themselves. According to symptoms, an electrocardiogram can be done, which is widely available in the district. Though not widely used there are several attempts to perform a trans-telephonic evaluation of electrocardiograms, to supervise treatment. If STEMI is diagnosed, patient's transfer to proper setting on time is attempted. However, as it usually takes more time than recommended (given low number of available properly equipped vehicles), most patients, arrived by personal means. (Air transfer is not available in Cuba). Since 2014, time of initial medical contact is routinely recorded for this network, and periodical audits for quality assessment are often performed.

- *Domain 2: Reperfusion strategy:* As stated, almost no patient was transferred to interventional setting (although patients with mechanical complications that require surgical treatment may be transferred). For NSTEMI, due to lack of effective procedure of reperfusion, only conservative treatment is provided.

Globally, median time for first medical contact was 120 min (Interquartile range: 120 min), and delay system for those who received thrombolytic was 60 min (Interquartile range: 60 min). As several patients with STEMI arrived more than 12 hours after symptoms initiation (17.7%), they usually, don't receive thrombolytic (available thrombolytic has no indication after this time).

. Those patients with indication, who arrived within the correct time frame, only 72.4% received thrombolytic therapy, and in barely 30 patients, electrical signs of reperfusion were observed (50% decrease in initial level of ST segment deviation, and no Q wave). This may condition other QI which will be discussed, such as rate of complications, and in-hospital mortality.

- *Domain 3: In-hospital risk assessment.* One of the advantages of the designed electronic AMI registry is that, parameters to calculate risk stratification tools, such as TIMI, GRACE, and CRUSADE are of mandatory inclusion. Therefore, the system itself determines the score and issues a warning message if one of these parameters is missing.

Besides, in hand-written reception of patients, is mandatory to determine them. Mean GRACE score was 112 (IQ: 18.5), CRUSADE score was 37.2 (IQ: 10), and TIMI score was 1.7 (IQ: 1.1), which means that most patients admitted in this center had a low or intermediate risk of death of major complications, which does not truly reflect the reality of those parameters.

- *Domain 4: In-hospital antithrombotic drugs.* Tough antiplatelets drugs as aspirin and heparins, are available, the only P2Y12 inhibitor offered in Cuba is Clopidogrel. Antiplatelet treatment is administered in most patients with AMI, reaching a very good 97% of dual antiplatelet treatment administration. This fraction increases until an excellent 99.7%, when patient which can't receive it due to several causes, were excluded.

Domain 5: Secondary prevention discharge treatment. Pharmacologic secondary prevention is widely administered. However, there is gap in the integration to secondary prevention programs. In our district,

formally cardiac rehab (in a proper gym) is on offered in the gym of this hospital. This is why, strict inclusion criteria, need in order to offer this, to those who can benefit the most. However, suggestions and encouragement to initiate doctor recommended physical activity is carefully given to every patient and their relatives, before they are fully discharge.

Domain 6: Patient experience collected in a systematic way.. Despite being a QI, patients and relatives experience is not routinely gathered. However, the Cardiology service often receives tokens of appreciation from most patients and relatives, some of them in social media, radio, and TV reportages. Yet, from January 2021 on, this parameter will be recorded in the digital system. In Public Relations Bureau, there are only 5 complaints, all of them related to our crowded wait list for several exams that take place out of this center.

Table 3 Compliance for ESC domains of quality for patients with AMI

ESC domains of quality for patients with AMI	Total population	Eligible population	Availability (%)	Compliance (%) SE
1. Centre organization and system level structures of AMI care	Presented in section "Results"			
2. Reperfusion strategy				40.6%
2.1 Proportion of patients with STEMI arriving in the first 12 hours who receiving reperfusion therapy	475	390	370	268 (72.4)
2.2 For patients treated with fibrinolysis: <30 min from diagnosis to the needle	475	268	268	43 (16%)
3. In-hospital risk assessment				100%
3.1 Proportion of patients having LVEF assessed before discharge	660	660	660	660 (100)
3.2 Proportion of patients with NSTEMI who have ischemic risk assessment using GRACE risk score	185	185	185	185 (100)
3.3. Proportion of patients admitted with STEMI or NSTEMI bleeding risk assessment using CRUSADE	660	660	660	660 (100)
4. In-hospital antithrombotic drugs				98.1%
4.1. Number of patients eligible for in-hospital antithrombotic therapies who received ≥1 therapies.	660	655	645	645 (100)
4.2. Dual antiplatelet therapy	660	648	638	636 (98.1)
5. Secondary prevention and discharge treatment				
5.1 Proportion of patients with AMI discharged on statins, unless contraindicated	610	610	610	597 (97.9)
5.2 Proportion of patients with LVEF equal or less to 40% or clinical evidence of heart failure, with betablocker prescribed at discharge	610	94	92	84 (89.3)
5.3 Proportion of patients with LVEF equal or less to 40% or clinical evidence of heart failure, with ACE inhibitor prescribed at discharge	610	94	91	87 (92.5)
5.4 Proportion of patients with smoking cessation advice at discharge	610	313	313	282 (90.1)
5.5 Proportion of patients enrolled in secondary prevention programs	610	468	468	163 (34.8)
6. Patient experience collected in a systematic way	Presented in section "Results"			
7. Outcome measures				
In-hospital mortality rate	660	660	660	50 (7.6)
30-day adjusted readmission rate	610	610	610	4 (0.7)
8. Composite quality indicator				
Proportion of patients with LVEF equal or less to 40% or clinical evidence of heart failure, with DAPT and statins prescribed at discharge	610	92	92	85 (92.4)
Proportion of patients with LVEF equal or less to 40% or clinical evidence of heart failure, with betablocker, ACE-I, DAPT, and statins prescribed at discharge	610	92	89	79 (85.9)

LVEF: Left Ventricle Ejection Fraction. AMI: Acute Myocardial Infarction. DAPT: Double Antiplatelet Treatment. ACE-i: Angiotensin Converter Enzyme Inhibitor STEMI: ST Elevation Myocardial Infarction. NSTEMI: non-ST Elevation Myocardial Infarction

Domain 7: Outcome measures. After an update of protocols in summer of 2016, a proper outpatient follow up outline was created to assist patients with AMI post hospital discharge. However, the coordination necessary to include data of this consultation and those responsible for entry them in the software, has not been implemented yet, for this reason statistics regarding 30 day after discharge are lacking. Efforts to update this issue are currently running, and perhaps, in a near future, this indicator could be formally presented. In-hospital mortality is quite high: 7.6%, which is a reflex of several gaps previously described.

Domain 8: Composite quality indicator. There is still an opportunity to increase the quality of treatment of those patients complicated with heart failure. Although a near- 90%, is a good number, taking into account, that these patients didn't receive proper thrombolytic in time, will not have the chance of a coronary intervention in a near future, and their chances to have a proper cardiac rehab are very low, at least they should leave the facility, with an optimized medical management. So, improvement is mandatory in order to extent the 1-year surviving rate of these patients.

Discussion

This study provides a continuous evaluation of the quality of AMI care in a patient centered outcome from in LMIS, a non-interventional center, with free of charge and universal access to state funded-health care system. Comparison will be performed with registries from LMIS, giving priority, for those reports coming from a network where most patients are treated with thrombolytic instead of primary percutaneous coronary intervention (PPCI), as possible.

In Cuba, Delgado-Acosta et al⁷ applied a survey from National Center of Epidemiology, in Cienfuegos (110 km western of this center), in one month in 2013. They described a thrombolytic rate application of 72%, (16/22), which may be considered very high. Prescription of betablockers in admission, were not as high, just 63.7%. No data about ACE-I was recorded, and system delay was considerably lower compared with previous report in 2011. Despite these gaps, more than 92% of patients perceived the attention as good or better.

On the other hand, Lóriga-García et al.'s registry of AMI, in Pinar del Rio (most western district, 441 km northwestern of this center), gives another result¹¹. Of 644 patients admitted during 2011 and 2012 with STEMI, only 55,2% received thrombolytic, 96.4% aspirin, 49.3% atenolol, and 32.9% ACE-I, lower frequency than Delgado Acosta et al for all drugs. And, 50 (7.7%) patients died during hospital admission.

In Camilo Cienfuegos General Hospital, Sancti-Spiritus, of 251 patients with STEMI, during 2014-2016, thrombolytic therapy was administered to 57%; betablockers, to 42.8%; ACE-I, to 95.2%; and statins to

94.82%. System delay was 112.7 ± 77.8 min and time from symptoms onset to needle was 354.5 ± 266.4 min in those who received thrombolytic. Mortality was very high, even for LMISs: 13.5%¹².

Finally, there are the results of the RegistroCubano de InfartoAgudo de Miocardio, which includes the data included in this study. In order to perform an accurate analysis, common patients to both studies were excluded from this comparison. Then, excluding data from Camilo Cienfuegos General Hospital, there were 638 patients remaining, of them 550 with STEMI, with a thrombolytic rate of 54.7% (301/550); Aspirin, Clopidogrel, Betablockers, ACE-I, and statin administration rate at admission of 97.2%, 99.1%, 58%, 79.2%, and 97.2% respectively. Mortality was 9.6%, system-to-needle time was 49.9 ± 47.1 min; and 85.7% of patients which received thrombolytic had a system delay time shorter than 60 min¹³.

Since the introduction of Estreptoquinase, no major change has been introduced to reperfusion STEMI in last 20 years, since coronary intervention is only available in 5 hospitals) in Cuba¹⁴⁻¹⁶. Beyond economic burden, there are external political situations that may impact on it. However, with same resources, several improvements stand out, when comparing with older reports from same centers.

Rest of pharmacological treatment is highly fulfilled at top level centers in high income settings, except perhaps, for betablockers. However, results in Cuban studies, are for overall population.

In Trinidad and Tobago, in a similar setting¹⁷, 70.5% of overall population with STEMI (70% of women and 69.2% of men), received thrombolytic within an hour after first medical contact. Just 30.3% of patients received betablockers within first day of admission, but this, increased up to 76.5% at the time of discharge. Rest of drugs, such as, aspirin, Clopidogrel, ACE-I, and statins were administered at discharge to 79.8%, 79%, 70.6%, and 75.3%, respectively.

In the Caribbean, in Barbados, results like the ones found in this report, were only achievable in male, in a specific group of age. Women were undertreated, as well as elderly, at their admission, as well with their discharge treatment¹⁸.

Data of the RENASCA, from 177 hospitals in Mexico during March 1, 2014 to December 2017, shows that 71.39% of patients, after implantation of "Infarction Code", received reperfusion of any kind, 40.1% with fibrinolytic therapy and 31.3% with Primary PCI. Commonly used drugs couldn't reach 90% of administration, and most of them were reduced during in-hospital stay¹⁹.

The ACCESS registry showed that treatment in Latin America is quite suboptimal, although high rate of reperfusion by any means were reported. Even though barriers to adopt guideline-recommended treatment are common, quality improvement initiatives may work everywhere, despite the place where they were designed²⁰.

Finally, in Africa, results are even more heterogeneous. However, three patterns may be described. First, in northern African countries, attention seems to be dependent on patient's time for first medical contact, as technologies and human resources appear to be available²¹⁻²³. Second, in sub-Saharan countries

attention appears to be really poor, based on absence of reperfusion treatment for most of patients, despite their delay time to seek for attention: few patients received thrombolytic, and a huge variation of system delay was observed, Betablockers and ACE-I administration didn't reach a quarter of available population²⁴⁻²⁶. And finally, in southern more-wealthy countries, attention seems to be as good as they can afford²⁷.

Translating into practice

The absence of official document or consensus about describing quality of attention of AMI in Cuba, make reports heterogeneous, and hard to compare with each other. However, some QI are universal despite conditions of network. Efforts from physicians to increase value of care should be directed, precisely, to those universal ones: rate of reperfusion, in-hospital and discharge treatment, and patient experience.

In Cuba, basis of networks is known by policy makers. And, as economic conditions are unlikely to change, it seems that the cheapest and short-term most effective way to increase quality of attention is by monitoring its markers. Generate specific guidelines according to the real possibilities in the local setting where they are going to be applied is a right step but, even when some resources may be unavailable, there is no reason for excluding them. One must consider when and where those technologies can be introduced.

First, this is an opportunity to continue improving local protocols, and second this will contribute to do proper comparisons with higher standards. Physicians from LMICs shouldn't consider quality metrics from high income countries as unachievable. If do so, continuous battle to improve care will be lost before it's started.

Limitations of the study

This study was made in a single center of Middle-Region in Cuba, an underdeveloped country with free of charge universal access to state funded-health care, which is not common in this kind of settings. Also, lack of coronary intervention, made its results hard to generalize for stings where this is present. Finally, this registry can't be considered as representative for the national population until specific analysis has been made. However, this methodology may be considered as start point for futures evaluation of quality metrics, or descriptions of them.

Conclusion

Determination of the quality metrics brought some improvement for the perception of the actual quality of care. Difficulties to achieve high quality attention for these patients were common to those found in LMICs. Despite absence of coronary intervention, there is a chance to modify some performance measures, which are not directly related with this doubtful situation.

Abbreviations

- LMISs: Low and middle-income scenario
- AMI: Acute Myocardial Infarction
- QIs: quality indicators
- STEMI: ST-elevation myocardial infarction
- NSTEMI: non-ST-elevation myocardial infarction
- GRACE: Global Registry of Acute Coronary Events
- TIMI: Thrombolysis In Myocardial Infarction
- ACE-I: Angiotensin Converter Enzyme Inhibitors

Declarations

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Author Contribution:

MARR: Concept/design, Statistics, Data analysis/interpretation, Approval of article, Responsible for the overall content as a guarantor.

GCS: Drafting article, Critical revision of article, Approval of article.

JAPM: Drafting article, Critical revision of article, Approval of article.

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References

1. Jia S, Liu Y, Yuan J. Evidence in Guidelines for Treatment of Coronary Artery Disease. *Adv Exp Med Biol.* 2020; 1177:37-73. doi: 10.1007/978-981-15-2517-9_2.
2. Shao C, Wang J, Tian J, Tang YD. Coronary Artery Disease: From Mechanism to Clinical Practice. *Adv Exp Med Biol.* 2020; 1177:1-36. doi: 10.1007/978-981-15-2517-9_1.
3. Pagan E, Chatenoud L, Rodriguez T et al.: Comparison of Trends in Mortality from Coronary Heart and Cerebrovascular Diseases in North and South America: 1980 to 2013. *Am J Cardiol.* 2017 Mar 15;119(6):862-871. doi: 10.1016/j.amjcard.2016.11.040.
4. Caixeta A, Franken M, Katz M, et al.: Benchmarking as a quality of care improvement tool for patients with ST-elevation myocardial infarction: an NCDR ACTION Registry experience in Latin America. *Int J Qual Health Care.* 2020 Apr 21;32(1): A1-A8. doi: 10.1093/intqhc/mzz115.
5. Tran DT, Welsh RC, Ohinmaa A, et al.: Resource Use and Burden of Hospitalization, Outpatient, Physician, and Drug Costs in Short- and Long-term Care After Acute Myocardial Infarction. *Can J Cardiol.* 2018 Oct;34(10):1298-1306. doi: 10.1016/j.cjca.2018.05.022.
6. Domínguez-Alonso E1, Zacea E. El Sistema de Salud en Cuba. *Salud Publica Mex.* 2011;53Suppl 2:s168-76.
7. Hilda María Delgado-Acosta HM, González-Orihuela PY, Monteagudo-Díaz S, et al.: Calidad de la atención médica a pacientes con infarto agudo del miocardio. *Cienfuegos 2013. Rev. Finlay [online].* 2016 Jun;6, (1):3-11. Available: http://scielo.sld.cu/scielo.php?script=sci_abstract&pid=S2221-24342016000100002
8. Rodriguez-Ramos MA. Increasing Quality of Secondary Prevention of Acute Myocardial Infarction by Using E-Health. *High Blood Press Cardiovasc Prev.* 2019 Feb;26(1):81-82. <https://doi.org/10.1007/s40292-018-0294-8>.
9. Ibanez B, James S, Agewall S, et al.: 2017 ESC Guidelines for the management of acute myocardial infarction in patients presenting with ST-segment elevation: The Task Force for the management of acute myocardial infarction in patients presenting with ST-segment elevation of the European Society of Cardiology (ESC). *Eur Heart J.* 2018 Jan;39(2):119-177. doi: 10.1093/eurheartj/ehx393
10. Rodriguez-Ramos MA.: Registro Nacional de Infarto Agudo de Miocardio: No es una utopía. *Rev Cub Cardiol Cir Cardiovasc* 2017; 23(3)Available: http://www.revcardiologia.sld.cu/index.php/revcardiologia/article/view/699/html_96.
11. Lóriga-García O, Pastrana-Román I, Quintero-Pérez W. Características clínico epidemiológicas de pacientes con infarto miocárdico agudo. *Características clínico Epidemiológicas de pacientes con infarto miocárdico agudo. Rev. Ciencias Médicas.* 2013; 17(6):37-50.
12. Rodríguez-Ramos MA: Muerte súbita cardiovascular intrahospitalaria e infarto agudo de miocardio con elevación de ST: Resultados de RESCUE. *CorSalud* 2017 Oct-Dic;9(4):255-262.
13. Santos-Medina M, Rodríguez-Ramos M, Prohías-Martínez J, et al.: REgistroCUbano de Infarto de Miocardio Agudo (RECUIMA), los primeros 1000 casos. *Rev Cub Cardiol Cir Cardiovasc* 2019;

- 25(3)Available: <http://www.revcardiologia.sld.cu/index.php/revcardiologia/article/view/895/pdf>.
14. Gutiérrez-Loyola A, Druyet-Castillo D, Oramas-Domínguez et al.: Infarto de Miocardio Agudo en Cuba. Situación actual. *Rev Cub Med Int Emerg* 2010;9(1) 1638-1648
 15. Lázaro Abilio Hernández-Rodríguez LA, Valladares-Carvajal FJ, Coll-Muñoz Y.: Terapia trombolítica en pacientes con infarto agudo de miocardio en Cienfuegos. *Rev Finlay* 2014;4(1): 29-39
 16. Rodríguez-Londres J, Quirós-Luis JJ, Castañeda-Rodríguez G, et al.: Comportamiento de la letalidad hospitalaria en pacientes con infarto agudo de miocardio con el uso de terapias de reperfusión en 12 años de trabajo en la Unidad de Coronario Intensivo del Instituto de Cardiología de La Habana, Cuba. *Rev MexCardiol* 2014; 25 (1): 7-14.
 17. Bahall M, Seemungal T, Khan K, et al.: Medical care of acute myocardial infarction patients in a resource limiting country, Trinidad: a cross-sectional retrospective study. *BMC Health Serv Res.* 2019 Jul 18;19(1):501. doi: 10.1186/s12913-019-4344-2.
 18. Sobers N, Rose AMC, Samuels TA, et al.: Are there gender differences in acute management and secondary prevention of acute coronary syndromes in Barbados? A cohort study. *BMJ Open.* 2019 Jan 28;9(1):e025977. doi: 10.1136/bmjopen-2018-025977.
 19. Borrayo-Sánchez G, Rosas-Peralta M, Ramírez-Arias E, et al.: STEMI and NSTEMI: Real-worldStudy in Mexico (RENASCA). *Arch Med Res.* 2018 Nov;49(8):609-619. doi: 10.1016/j.arcmed.2019.01.005.
 20. Martínez-Sánchez C, Jerjes-Sánchez C, Carlos-Nicolau J, et al.: Acute coronary syndromes in Latin America: lessons from the ACCESS registry. *Rev Med InstMexSeguro Soc.* 2016;54(6):726-37.
 21. Moustaghfir A, Haddak M, Mechmeche R. Management of acute coronary syndromes in Maghreb countries: The ACCESS (ACute Coronary Events - a multinational Survey of current management Strategies) registry. *Arch Cardiovasc Dis.* 2012 Nov;105(11):566-77. doi: 10.1016/j.acvd.2012.07.002.
 22. Hattab FE, Radi FZ, Hara L, et al.: Infarctus du myocardefinférieur: première sériemarocaine, à propos de 103 cas. *Pan Afr Med J.* 2019 May 31;33:74. doi: 10.11604/pamj.2019.33.74.16047.
 23. Addad F, Mahdhaoui A, Gouider J, et al.: Management of patients with acute ST-elevation myocardial infarction: Results of the FAST-MI Tunisia Registry. *PLoS One.* 2019 Feb 22;14(2):e0207979. doi: 10.1371/journal.pone.0207979. eCollection 2019.
 24. Kaboré EG, Yameogo NV, Seghda A, et al.: Evolution profiles of acute coronary syndromes and GRACE, TIMI and SRI risk scores in BurkinaFaso. A monocentric study of 111 patients *Ann de CardiolAngéiolog* 68 (2019) 107–114
 25. Yao H, Ekou A, Hadéou A, et al. Medium and long-term follow-up after ST-segment elevation myocardial infarction in a sub-Saharan Africa population: a prospective cohort study. *BMC CardiovascDisord.* 2019 Mar 20;19(1):65. doi: 10.1186/s12872-019-1043-1.
 26. Bahiru E, Temu T, Gitura B, et al. Presentation, management and outcomes of coronary syndromes: a registry study from Kenyatta National Hospital in Nairobi, Kenya. *Cardiovasc J Afr.* 2018;29(4):225–230. doi: 10.5830/CVJA-2018-017.

27. Delpont R. Appropriate strategies for South Africa for the management of acute myocardial infarction in patients presenting with STsegment elevation. *Cardiovasc J Afr.* Jan/Feb 2018;29(1):4-5