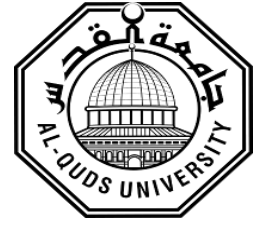


**Deanship of Graduate Studies
Al-Quds University**



**Coronary Computed Tomography Angiography Versus
Invasive Coronary Angiography at Gaza Governmental
Hospitals: Cost Effectiveness Analysis**

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Coronary Computed Tomography Angiography Versus Invasive Coronary Angiography at Gaza Governmental Hospitals: Cost Effectiveness Analysis

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Thesis Approval


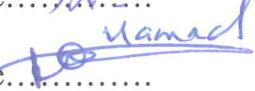
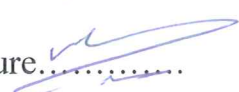
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Jerusalem- Palestine

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Dedication

To the greatest man I have in my life, the sun of my life... my lovely father

To the biggest heart with the most loving care, who sacrificed a lot for me to become what I am now, my mother

To my wife who supported me through each step of the way and for being for me the greatest source of inspiration... my beloved wife

To the light of my eyes... my kids "Naseem, Waseem &Tala"

To all those who encouraged, supported, and helped me all the way

I dedicate this research for all of them...

With love

Husam

Declaration

I certify that this thesis submitted for the degree of master is the result of my own research, except where otherwise acknowledged, and that this thesis or any of its parts has not been submitted for a higher degree to any other university or institution.

Signed:

Husam Hassan Mansour

Date: -----/-----/-----

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With my appreciation and respect

Husam Hassan Mansour

Abstract

The burden of Cardiovascular Diseases (CVDs) is remarkable in Palestine, which is considered the first leading cause of death and placing a huge pressure on healthcare economics. Several imaging approaches exist for diagnosing Coronary Artery Disease (CAD), with varying accuracy and cost. In the Gaza Strip, there is a trend in the Ministry of Health (MoH) toward the need for a sufficient evidence base to justify the cost of any procedure. We aimed to provide cost-effectiveness information to help physicians and decision-makers in selecting the most appropriate testing strategy.

This prospective study was conducted to assess the cost-effectiveness of coronary computed tomography angiography (CCTA) compared with invasive coronary angiography (ICA) in patients with suspected CAD. The overall sensitivity and specificity of CCTA technique was 97.3% and 90.48%, respectively. The positive predictive value was 94.74% and the negative predictive value was 95% of CCTA.

The overall direct costs of ICA (234.23 dollars) were found to be about 4.6 times the cost of CCTA (50.84 dollars). Cost of unnecessary and adverse health outcome of ICA is prominent in this study, about 43.6% of patients have not any benefit from ICA procedure with unjustified cost 26621 dollars for the investigated patients' cohort.

The cost of CCTA per patient increased as a linear function of increasing CAD prevalence. In contrast, the cost per patient for ICA did not increase significantly. Specifically, CCTA showed lower cost than ICA with CAD prevalence $<57\%$ but higher costs with CAD prevalence $\geq 57\%$.

Regarding cost-effectiveness per CAD correct diagnosis, it is worthy to mention that at CAD prevalence 55% both of CCTA and ICA were equally effective with a cost of 448 dollars. But, the data showed that CCTA is more cost-effective in patients with a prevalence up to 54%, ranging from 1139.1 dollars (10% prevalence) to 449.7 dollars (54% prevalence). In contrast, ICA showed better cost-effectiveness for the prevalence above 55%, ranging from 436.13 dollars (56% prevalence) to 244.23 dollars (100% prevalence).

In term of quality-adjusted life years gained (Δ QALY) with cost-effectiveness, the trend was similar in which at a CAD prevalence of 55% CCTA and ICA were equally effective (150 dollars). But, CCTA was more cost-effective up to a CAD prevalence of 54% ranging from 399.21 dollars (10% prevalence) to 128.06 dollars (54% prevalence). In contrast, ICA shows better cost-effectiveness for the prevalence above 55%, ranging from 146.55 dollars (56% prevalence) and 81.79 dollars (100% prevalence).

The study highly recommends ICA to be considered for patients with CAD whose clinical characteristics indicate a high prevalence of severe stenosis and when the benefits are deemed to exceed the risk. Patients with suspected CAD should receive a comprehensive medical history to assess the probability of CAD prior to additional testing. Furthermore, CCTA can be useful as a first-line test for risk assessment in patients with mild to intermediate probability of suspected CAD.

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List of Abbreviations

CABG	Coronary Artery Bypass Graft
CAD	Coronary Artery Disease
CBC	Complete Blood Count
CCTA	Coronary Computed Tomography Angiography
CEA	Cost Effectiveness Analysis
CVDs	Cardiovascular Diseases
ED	Emergency Department
ESR	European Society of Radiology
FFR	Fractional Flow Reserve
GS	Gaza Strip
HBV	Hepatitis B Virus
HCV	Hepatitis C Virus
ICA	Invasive Coronary Angiography
INR	International Normalized Ratio
MoH	Ministry of Health
MRI	Magnetic Resonance Imaging
MSCT	Multislice Computed Tomography
mSv	Millisievert
NICE	National Institute for Health and Care Excellence
PCBS	Palestinian Central Bureau of Statistics
PCI	Percutaneous Coronary Intervention
PNA	Palestinian National Authority
PT	Prothrombin Time
PTT	Partial Thromboplastin Time
QALYs	Quality-adjusted life-years
SPSS	Statistical Package for Social Science
sq.km	square kilometers
WB	West Bank
WHO	World Health Organization
Δ QALYs	Quality-adjusted life-years gained