OPEN ACCESS
Saudi Journal of Medicine
Abbreviated Key Title: Saudi J Med ISSN 2518-3389 (Print) | ISSN 2518-3397 (Online)
Scholars Middle East Publishers, Dubai, United Arab Emirates Journal homepage: https://saudijournals.com

Original Research Article

In-Hospital Outcome and Angiographic Profile of Elderly Patients with Non-ST Segment Elevation Myocardial Infraction

Masum MS[1*], Malik F[2], Mahmud MS[3], Zaman M[4]
[1]Junior Consultant, Department of Cardiology, 250 Beded Bangamata Sheikh Fazilatunnusa Mujib General Hospitals, Bangladesh
[2]Professor and Chief of Interventional Cardiology, Department of Cardiology NHF &RI,
[3]Assistant Professor & Chief Consultant Cardiologist, Dr Sirajul Islam Medical College Hospital, Dhaka, Bangladesh
[4]Professor, Department of Cardiology, Shahid M. Munsur Ali Medical College, Bangladesh

DOI: 10.36348/sjm.2022.v07i01.011 | **Received:** 10.12.2021 | **Accepted:** 18.01.2022 | **Published:** 24.01.2022
***Corresponding Author:** Dr. Md. Sazzad Masum **Email:** smasum93@gmail.com
Junior Consultant, Department of Cardiology, 250 Beded Bangamata Sheikh Fazilatunnusa Mujib General Hospitals, Bangladesh

Abstract

Background: Non-ST Segment elevation myocardial infarction is heterogeneous in its presentation. Like ST-segment elevation myocardial infarction, non-ST-segment elevation myocardial infarction is life-threatening of a major cause of emergency medical care and hospitalization. Patients with non-ST segment elevation myocardial infarction are at risk for adverse cardiac events, so the initial treatment is very important. Increasing age is a strong predictor of adverse events in non-ST segment elevation myocardial infarction patients. ***Objective:*** To determine the in-hospital outcome and severity of coronary artery disease of older patients with Non-ST Segment elevation myocardial infarction. ***Methods:*** This was a descriptive cross-sectional study. The study was carried out in the cardiology department, National Heart Foundation Hospital, and Research Institute from June 2011 to May 2012. Patients of Non-ST Segment elevation myocardial infarction admitted at National Heart Foundation & Research Institute who fulfill the inclusion criteria were the study population. Patients were recruited by nonrandom sampling. One hundred and thirty-four patients were recruited in this study. Data were prospectively collected in a pre-designed data collection form and analyzed using SPSS - 16 software. ***Results:*** In this study, patients had a greater prevalence of hypertension diabetes mellitus. Chest pain and shortness of breath were common presentations observed in study patients during admission. They had a lower left ventricular ejection fraction than their younger counterparts. The older group was associated with an increased risk of triple vessel disease. In-hospital complications were significantly higher in older patients. Duration of hospital stay was longer in older patients. ***Conclusion****:* Older patients with Non-ST Segment myocardial infarction strongly predict adverse in-hospital outcomes and severe coronary artery disease profiles. Older patients should alert physicians to an increased risk of morbidity and mortality, which may, in turn, support more judicious treatment, including appropriate utilization of cardiovascular diagnostic tests and therapeutics used in current cardiovascular care to optimize outcomes in these high-risk patients.

Keywords: Non-ST Segment, Myocardial Infarction, Old Age.

INTRODUCTION

Coronary heart disease (CHD) is a worldwide health epidemic. Worldwide, 30 percent of all deaths can be attributed to cardiovascular disease, of which CHD causes more than half. The forecasts for the future estimate a growing number due to lifestyle changes in developing countries. Globally of those dying from cardiovascular diseases, 80 percent are in developing countries [1]. Between 1900 and 2020, CHD mortality is expected to increase by 12.0 percent in women and 13.7 % in men in developing countries. It isestimated that the annual number of deaths caused by CHD in developing countries will rise to 11.1 million in 2020 [2].

Cardiovascular diseases are the leading causes of morbidity and mortality in industrialized countries, and they are also emerging as a prominent public health problem in developing countries. The incidence of ischemic heart disease is also increasing in developing countries, including Bangladesh, with the improvement of socioeconomic status, urbanization, dietary habits, and lifestyle changes. The incidence of myocardial infarction seems to be higher in Bangladesh than in developed countries among smokers. Epidemiologic research has identified risk factors that increase the likelihood of coronary heart disease events. When risk factors coexist, they multiply the risk of CHD several fold [3].

Acute coronary syndromes are a major health problem& represent a large number of hospitalizations annually [4]. ACS is a major source of mortality and morbidity both during and after hospitalization [5]. Patients with acute coronary syndrome include those whose clinical presentations cover the following range of diagnoses: ST-elevation myocardial infarction (STEMI), myocardial infarction without ST elevation (NSTEMI) & unstable angina. Non-ST-segment elevation myocardial infarction and unstable angina are more Heterogeneous in their presentation. Non-ST-segment elevation myocardial infarction is distinguished from unstable angina by the presence of elevated serum levels of cardiac biomarkers [6].

Non-ST-segment elevation myocardial infarction is characterized by an imbalance between myocardial oxygen supply and demand. Angiographic, intravascular ultrasound, and angioscopic studies indicate that non-ST-segment elevation myocardial infarction usually results from coronary artery narrowing caused by a nonocclusive thrombus that has developed on a disrupted atherosclerotic plaque with a subsequent cascade of pathologic processes that decrease coronary blood flow [7] Approximately 1.5 million hospitalizations in the United States due to non-ST-segment elevation myocardial infarction each year 8. The number of patients with non-ST-segment elevation myocardial infarction increased in a linear fashion with increasing age [9]. Age had an adverse prognostic significance, with a 1.7-fold increased risk for every 10 years [10]. Older patients tend to have the more severe coronary disease than their younger counterparts, and a worse outcome [11].

Prevalence of multivessel disease, including left main, increased with age and the proportion of patients with >2 vessels with significant stenosis increased in older age Group [12]. Increasing age is a strong predictor of adverse events in patients with.

Coronary heart disease: including patients undergoing coronary revascularization [13] Elderly patients are a high-risk group for PCI, progressing to higher mortality rates when compared to younger individuals [14].

Though Indian clinicians commonly report that CAD is highly prevalent in urban. In practice, there are little population-based data on the prevalence of CAD. In India, Pakistan, Bangladesh, or Sri Lanka, there is a paucity of population-based data on. Coronary mortality from South Asia. However, high death rates from CAD have been reported in South Asian immigrants to many countries. The earliest report of high CAD rates in Indians compared with other ethnic groups came from Singapore in 1967 [15].

Smaller coronary artery luminal diameter potentially reflects neointimal thickening, which has been recognized as an important early step in developing atheromatous plaque. Hence, the likely presence of neointimal thickening as reflected by small coronary artery luminal diameter may represent a more severe atherosclerotic vascular disease, corresponding to the increased CAD morbidity and mortality observed in South Asians relative to other ethnic groups [16].

MATERIALS AND METHODS

This is a descriptive cross-sectional study. The study was carried out in the cardiology department, National Heart Foundation Hospital and Research Institute, Mirpur, Dhaka, Bangladesh, from June 2011 to May 2012. Patients of non-ST-segment elevation myocardial infarction admitted at National Heart Foundation & Research Institute who fulfill the inclusion criteria were the study population. It was a nonrandom sampling. A total number of 134 patients of both sexes were included in this study. Ethical consideration was taken from the ethical consideration committee of the National Heart Foundation Hospital and Research Institute.

STATISTICAL ANALYSES

After processing all available data, statistical analysis of their significance was done. As applicable, the obtained data were expressed in frequency, percentage, mean, and Standard deviation. Logistic regression was done. The whole Analyses were done with the help of computer-based SPSS (Statistical Programme for Social Science) version 16.0. a p-value of <0.05 was considered significant.

NSTEMI [17]

NSTEMI is defined by electrocardiographic ST-segment depression or prominent T wave inversion and/or positive biomarkers of necrosis (e.g.troponin) in the absence of ST-segment elevation and an appropriate clinical setting (chest discomfort or angina equivalent).

OLDER AGE [18]

Of course, the aging process is a biological reality that has its own dynamic, largely beyond human control. However, it is also subject to the constructions by which each society makes sense of old age. In the developed world, chronological time plays a paramount role; the age of 60, roughly equivalent to retirement ages in most developed countries, is said to be the beginning of old age. In many parts of the developing world, the chronological time has little or no importance in the meaning of old age. Other socially constructed meanings of age are more significant, such as the roles assigned to older people. In some cases, the loss of roles accompanying physical decline is significant in defining old age. Thus, in contrast to the chronological milestones which mark life stages in the developed world, old age in many developing countries

is seen to begin at the point when the active contribution is no longer possible."

The severity of Coronary Stenosis [19]

- 0-Normal coronary artery
- 1-Irregularities of the vessel
- 2-Narrowing of less than 50%
- 3-Stenosis between 50% and 75%
- 4-Stenosis between 75% and 95%
- 5-Total occlusion.

RESULTS

Table-1: Socio-demographic study of the study patients (n=134).

Age	Number (N)	Percentage (%)
≤40	09	6.70
41-50	33	24.60
51-60	38	28.40
61-70	42	31.30
≥70	12	9.00
MEAN	57.71	
SD	11.82	
Sex		
Male	114	85.00
Female	20	15.00
Risk Factors		
Smoking Habit		
Yes	74	55.00
No	60	45.00
Hypertension		
Yes	95	70.89
No	39	29.10
Diabetes Mellitus		
Yes	71	53.00
No	63	47.00
Dyslipidemia		
Yes	31	23.00
No	103	77.00
Family History of Ihd		
Yes	26	19.00
No	108	81.00

Table 1: shows socio-demographic study of the study patients and found that most of the patients belonged to 61-70 years which was 31.3%. The mean age of the patients was 57.81. Among the study population 85% was male and 15% was female. Regarding risk factors hypertension, smoking and diabetes mellitus were the common risk factors.

Table-2: Clinical presentation of study patients (n=134)

Clinical Presentation	Number (N)	Percentage (%)
Chest Pain		
Yes	130	97.00
No	4	3.00
Shortness of Breath		
Yes	34	25.00
No	100	75.00
Syncope		
Yes	1	0.75
No	133	99.25
Vomiting And Sweating		
Yes	114	85.00
No	20	15.00

Table2: shows the most common clinical presentation was chest pain (97%) followed by vomiting and sweating (85%) then shortness of breath (25%) in the study population.

Table-3: Distribution of the study patients (n=134) by severity of coronary artery lesion

Percentage of Lesion	Number (N)	Percentage (%)
LM		
Normal	110	82.10
<50%	8	6.00
50%-75%	5	3.70
75%-99%	11	8.20
100	0	0.00
LAD		
Normal	18	13.40
<50%	6	4.50
50%-75%	13	9.70
75%-99%	83	61.90
100	14	10.40
LCX		
Normal	50	37.30
<50%	10	7.50
50%-75%	5	3.70
75%-99%	55	41.00
100	14	10.40
RCA		
Normal	58	43.30
<50%	5	3.70
50%-75%	9	6.70
75%-99%	40	29.90
100	22	16.40

LM: Left Main, LAD: Left Anterior Descending, LCX: Left Circumflex, RCA: Right Coronary Artery.

Table 3: shows the distribution of the study patients by severity of coronary artery lesion, the most common lesion in all arteries was 75-99%, which was 8.2% in LM, 61.9% in LAD, 41% in LCX 29.9% in RCA.

Table-4: Distribution of patients according to in-hospital outcome (n=134).

Outcome	Number (N)	Percentage (%)
Heart Failure	29	21.60
Cardiogenic Shock	15	11.20
Arrythmia	9	6.70
Mitral Regurgitation	56	41.80
Death	1	0.70

Table 4. Shows the distribution of patients according to the in-hospital outcome. The common adverse events were mitral regurgitation (41.8%), heart failure (21.6%), and cardiogenic shock (11.2%).

Table-5: Distribution of study patients according to heart failure

Heart Failure			*P*-Value
Age	Yes	No	$.01^{S}$
	29	105	
Mean±SD	63.65±7.45	56.20±12.31	

Table 5 shows the distribution of study patients according to heart failure. In this study, 29 patients developed heart failure where MEAN±SD was 63.65±7.45, which was statistically significant.

Table-6: Distribution of study patients according to cardiogenic shock

Cardiogenic Shock			*P*-Value
Age	Yes	No	$.540^{NS}$
	15	119	
Mean±SD	57.53±11.92	57.84±11.86	

NS=Nonsignificant, *P* value obtained from unpaired t-test.

Table 6 shows the distribution of study patients according to cardiogenic shock. In this study, 15 patients developed cardiogenic shock, which was not statistically significant.

Table-7: Distribution of study patients according to arrhythmia

Arrhythmia			*P*-Value
Age	Yes	No	.078
	9	125	
Mean±SD	50.00±21.79	57.84±11.79	

P value obtained from unpaired t test.

Table 7 shows the distribution of study patients according to arrhythmias. In this study, 9 patients developed arrhythmia. In this study, we found that there was a tendency to develop arrhythmia.

Table-8: Distribution of study patients according to mitral regurgitation

Mitral Regurgitation			*P*-Value
Age	Yes	No	$.05^{S}$
	56	78	
Mean±SD	61.19±9.97	55.38±12.49	

S= significant, *P*-value obtained from unpaired t-test.

Table 8 shows the distribution of study patients according to mitral regurgitation. In this study 56 patients developed mitral regurgitation, which was statistically significant?

Table-9: Distribution of study patients according to a number of vessel involvements

Number of Vessel Involvement	Age	*P*-Value
1(n=51)	54.0±10.9	$.001^{S}$
2(n=42)	56.4±13.5	
3(n-41)	63.9±8.2	

S=Significant, *P*-value reached from one-way ANOVA. 1=SVD, 2=DVD, 3=TVD

Table 9 shows the distribution of study patients according to the number of vessel involvement. In this study, SVD was common in the 54.0±10.9 age group, DVD was common in 56.4±13.5, and TVD was common in 63.9±48.2, which was statistically significant.

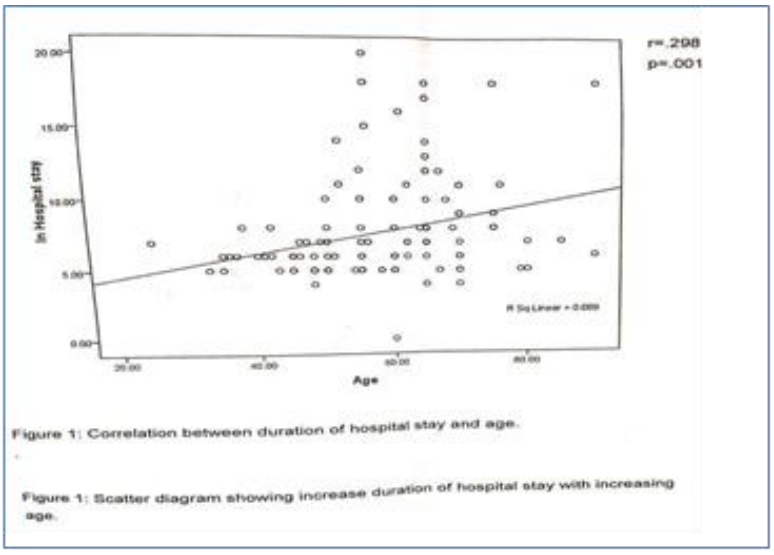

Figure 1: Correlation between duration of hospital stay and age.

Figure 1: Scatter diagram showing increase duration of hospital stay with increasing age.

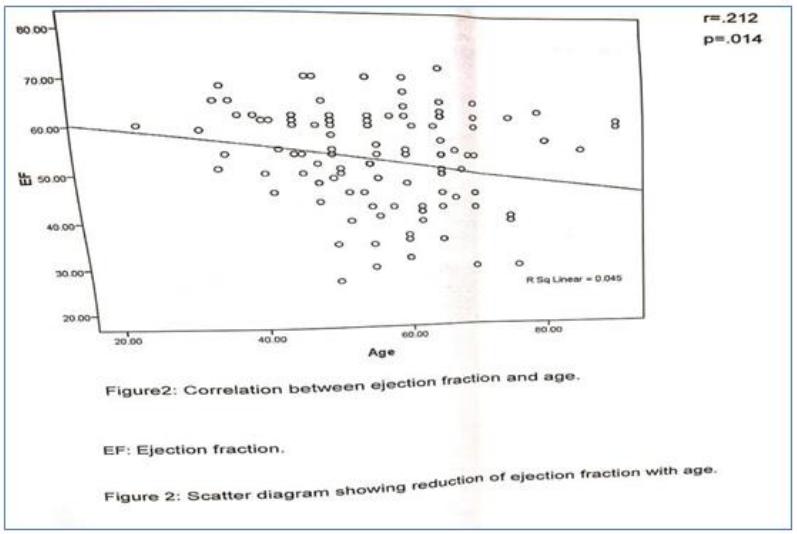

Figure2: Correlation between ejection fraction and age.

EF: Ejection fraction.

Figure 2: Scatter diagram showing reduction of ejection fraction with age.

Table-10: Shows the distribution of the study patients by in-hospital complications

Complication	≤40 Years		40-59 Years		≥60 Years	
	n	%	n	%	n	&
Present	2	22.20	17	24.30	43	78.20
Absent	7	77.80	53	75.70	12	21.80

Table 10: Shows distribution of the study patients by in-hospital complications. Regarding in-hospital complications, 22.2% of patients had in-hospital adverse events in the ≤40 year age group, 24.3% patients in 41-60 year age group, and 78.2% patients in ≥60 year age group during their hospital stay. Older patients had more adverse in-hospital events than others.

A step-wise logistic regression model was done with in-hospital complications dependent on old age, hypertension, diabetes mellitus and smoking as independent variables. However, only age remains in the final model in stepwise logistic regression.

Table-11: Result of logistic regression analysis

Variable	B	SIG	Exp (B)	95.0% C.I. For EXP (B)	
				Lower	Upper
Age	.096	.001^{S}	1.101	1.055	1.150
Hypertension	-.542	.238^{NS}	.582	.237	1.431
Diabetes	.560	.178^{NS}	1.751	.774	3.961
Smoking	-.313	.444^{NS}	.732	.329	1.629
Constant	-5.53	.001	.004		

Table 11: shows result of logistic regression analysis. Old age patients had higher risk of developing in-hospital complications.

DISCUSSION

This study was conducted to determine the hospital outcome and severity of coronary artery disease of older patients with non-ST segment elevation myocardial infarction. This was a descriptive cross-sectional study. Considering inclusion and exclusion criteria, this study included patients with non-ST segment elevation myocardial infarction admitted in NHFHSRI. Nonrandom sampling was done, and total 134 patients were recruited in this study. Socio-demographic study of the study patients found that most of the patients belonged to 61-70 years which was 31.3%. The mean age of the patients was 57.81. Among the study population, 85% were male, and 15% were female. Regarding risk factors, hypertension (70.89%), smoking (55%), and diabetes mellitus (53%) were the common risk factors. In Bangladesh, various studies showed the female patients formed a small percentage [20] found 16 percent female patients in his study. In this study male: female ratio was 5.7:1. These findings were also close to the study done by Malik *et al.* [21], where the ratio was 7.9:1. The smaller percentage of female Patients in our country may be due to the protective effect of estrogen, less incidence of smoking in females, and social negligence towards the female for seeking medical help. Hypertension was the commonest risk factor in the study done by Salim [22] Malik *et al.* [23] found smoking was the leading risk factor in about 81.8% of patients.

During admission, the most common clinical presentation was chest pain (97%) followed by

vomiting and sweating (85%) then shortness of breath (25%) in the study population. These findings were also very much close to the study done by Malik *et al*. [24] where chest pain (92.6%), nausea and vomiting (56.9%), and Breathlessness (62%). There was a decrement in left ventricular ejection fraction with increased age with non-st segment elevation myocardial infarction regarding ejection fraction.

Regarding Coronary artery involvement, SVD was found in the 54.0-10.9 age group, DVD was common in 56.4±13.5, and TVD was common in 63.9±48.2, which was statistically significant. Wennberg *et al*. [25] found the prevalence of multivessel disease, including left main, increased with age, and the proportion of patients with >2 vessels with significant stenosis is increased from 32.4% of those were non older age group to 57.9% in the older age group.

Regarding the severity of lesion of the study patients, the most common lesion in all arteries was 75-99%, 8.2% in LM, 61.9% in LAD, 41% in LCX, and 29.9% in RCA. The common adverse events were mitral regurgitation (41.8%), heart failure (21.6%) and cardiogenic shock (11.2%) in this study, Avenzum *et al*. found in their study, the incidence of heart failure increased with age (68.4% vs. 22.6%), cardiogenic shock more common in the oldest compared with a non-older group (9.8% vs. 1.6%). rates of death (18.4% vs 1.3%).

Older patients had more adverse in-hospital events than others. One patient (.7%) died from in-hospital complications. He was suffering from triple vessel coronary artery disease and waiting for CABG. In this study, we found that increased duration of hospital stays with increasing age. The length of in-hospital stay was 6 days which was higher in older patients. In this study showed that 22.2% of patients had in-hospital adverse events in <40 year age group, 24.3% patients in 41-60 year age group, and 78.2% patient in >60 year age group during their hospital stay.

Analysis showed that only non-ST-elevation myocardial infarction in old age independently predicts adverse in-hospital complications and severe coronary artery disease profile.

CONCLUSION

Old age was associated with an increased risk of triple vessel disease; in contrast, the prevalence of single-vessel disease was higher in younger patients. In-hospital complications were significantly higher in older patients. Patients with non-ST-elevation myocardial infractions with old age had a longer hospital stay.

REFERENCE

1. Kim, M.C., Kini, A.S., Fuster, V. (2008). Definitions of Acute Coronary Syndromes. In: V. Fuster, R. A., O'Rourke, R.A. Walsh, P., Poole-Wilson, eds. *Hurst's the Heart* New York: McGraw-Hill, 1311-19.
2. Vasan, R.S. Benjamin, E.J., Sullivan, L.M., D'Agostino, R.B. (2008). The Burden of Increasing Worldwide Cardiovascular Disease. In: V. Fuster, R.A., O'Rourke, RA, Walsh, P., Poole-Wilson, eds. *Hurs't The heart.* New York: McGraw – Hill, 17-46.
3. Kabiruzzaman, M, All M.A., Islam, M. N. (2011). Risk factors profile of patients with first myocardial infarction admitted in a tertiary care cardiac hospital in Bangladesh. *Journal of National Heart Foundation of Bangladesh*, *1*(1), 2-7
4. Fox, K. A., Goodman, S. G., Klein, W., Brieger, D., Steg, P. G., Dabbous, O., & Avezum, A. (2002). Management of acute coronary syndromes. Variations in practice and outcome. Findings from the Global Registry of Acute Coronary Events (GRACE). *European heart journal*, *23*(15), 1177-1189.
5. Palmer, S., Sculpher, M., Philips, Z., Robinson, M., Ginnelly, L., Bakhai, A., & Gray, D. (2005). Manage ment of non-ST-elevation acute coronary syndromes: how cost-effective are glycoprotein IIb/IIIA antagonists in the UK National Health Service?. *International journal of cardiology*, *100*(2), 229-240.
6. Anderson, J. L., Adams, C. D., Antman, E. M., Bridges, C. R., Califf, R. M., Casey, D. E., ... & Riegel, B. (2007). ACC/AHA 2007 guidelines for the management of patients with unstable angina/non–ST-elevation myocardial infarction: a report of the American College of Cardiology/American Heart Association Task Force on Practice Guidelines (Writing Committee to Revise the 2002 Guidelines for the Management of Patients With Unstable Angina/Non–ST-Elevation Myocardial Infarction) developed in collaboration with the American College of Emergency Physicians, the Society for Cardiovascular Angiography and Interventions, and.... *Journal of the American College of Cardiology*, *50*(7), e1-e157.
7. Anderson, J. L., Adams, C. D., Antman, E. M., Bridges, C. R., Califf, R. M., Casey, D. E., ... & Riegel, B. (2007). ACC/AHA 2007 guidelines for the management of patients with unstable angina/non–ST-elevation myocardial infarction: a report of the American College of Cardiology/American Heart Association Task Force on Practice Guidelines (Writing Committee to Revise the 2002 Guidelines for the Management of Patients With Unstable Angina/Non–ST-Elevation Myocardial Infarction) developed in collaboration with the American College of Emergency Physicians, the Society for

Cardiovascular Angiography and Interventions, and.... *Journal of the American College of Cardiology*, *50*(7), e1-e157.

8. Anderson, J. L., Adams, C. D., Antman, E. M., Bridges, C. R., Califf, R. M., Casey, D. E., ... & Riegel, B. (2007). ACC/AHA 2007 guidelines for the management of patients with unstable angina/non–ST-elevation myocardial infarction: a report of the American College of Cardiology/American Heart Association Task Force on Practice Guidelines (Writing Committee to Revise the 2002 Guidelines for the Management of Patients With Unstable Angina/Non–ST-Elevation Myocardial Infarction) developed in collaboration with the American College of Emergency Physicians, the Society for Cardiovascular Angiography and Interventions, and.... *Journal of the American College of Cardiology*, *50*(7), e1-e157.
9. Avezum, A., Makdisse, M., Spencer, F., Gore, J. M., Fox, K. A., Montalescot, G., & Grace Investigators. (2005). Impact of age on management and outcome of acute coronary syndrome: observations from the Global Registry of Acute Coronary Events (GRACE). *American heart journal*, *149*(1), 67-73.
10. Granger, C. B., Goldberg, R. J., Dabbous, O., Pieper, K. S., Eagle, K. A., Cannon, C. P., ... & Global Registry of Acute Coronary Events Investigators. (2003). Predictors of hospital mortality in the global registry of acute coronary events. *Archives of internal medicine*, *163*(19), 2345-2353.
11. Collinson, J., Flather, M.D., Fox, K.A.A. (2000). Clinical outcomes, risk stratification and practice patterns of unstable angina and acute myocardial infarction without ST elevation: prospective registry of acute ischemic syndromes in the UK (PRAIS-UK). *European Heart Journal*, 21, 1450–7.
12. Wennberg, D. E., Malenka, D. J., Sengupta, A., Lucas, F. L., Vaitkus, P. T., Quinton, H., & Northern New England Cardiovascular Disease Study Group. (1999). Percutaneous transluminal coronary angioplasty in the elderly: epidemiology, clinical risk factors, and in-hospital outcomes. *American heart journal*, *137*(4), 639-645.
13. Granger, C. B., Goldberg, R. J., Dabbous, O., Pieper, K. S., Eagle, K. A., Cannon, C. P., ... & Global Registry of Acute Coronary Events Investigators. (2003). Predictors of hospital mortality in the global registry of acute coronary events. *Archives of internal medicine*, *163*(19), 2345-2353.
14. Wennberg, D. E., Malenka, D. J., Sengupta, A., Lucas, F. L., Vaitkus, P. T., Quinton, H., ... & Northern New England Cardiovascular Disease Study Group. (1999). Percutaneous transluminal coronary angioplasty in the elderly: epidemiology, clinical risk factors, and in-hospital outcomes. *American heart journal*, *137*(4), 639-645.
15. Islam, M. N., Ali, M. A., & Ali, M. (2004). Spectrum of cardiovascular disease: the current scenario in Bangladesh. *Bangladesh Heart Journal*, *19*(1), 1-7.
16. Huang, H. C., Kao, H. L., Wu, X. M., Wang, S. S., Hsu, R. B., Ho, Y. L., & Chen, M. F. (2010). Long-term prognosis in ethnic Chinese patients with unprotected left main coronary artery disease. *Clinical research in cardiology*, *99*(7), 437-443.
17. Anderson, J. L., Adams, C. D., Antman, E. M., Bridges, C. R., Califf, R. M., Casey, D. E., ... & Riegel, B. (2007). ACC/AHA 2007 guidelines for the management of patients with unstable angina/non–ST-elevation myocardial infarction: a report of the American College of Cardiology/American Heart Association Task Force on Practice Guidelines (Writing Committee to Revise the 2002 Guidelines for the Management of Patients With Unstable Angina/Non–ST-Elevation Myocardial Infarction) developed in collaboration with the American College of Emergency Physicians, the Society for Cardiovascular Angiography and Interventions, and.... *Journal of the American College of Cardiology*, *50*(7), e1-e157.
18. Randel, J., German, T., & Ewing, D. (2017). The ageing and development report: poverty, independence and the world's older people.
19. Bitar, S. Kern, J. M. (2003). Angiographic data. In: 4, Kern, J. M. The cardiac catheterization hand book. Elsevier, 217-325.
20. Hanna, E. B., Chen, A. Y., Roe, M. T., Wiviott, S. D., Fox, C. S., & Saucedo, J. F. (2011). Characteristics and in-hospital outcomes of patients with non–ST-segment elevation myocardial infarction and chronic kidney disease undergoing percutaneous coronary intervention. *JACC: cardiovascular interventions*, *4*(9), 1002-1008.
21. Malik, A., Islam, M. N., Zafar, A., Khan, A. K., & Ramizuddin, M. (1987). Clinical patterns of ischemic heart diseases and its association with some known risk factors. *Bangladesh Heart Journal*, *2*, 1.
22. Danchin, N., Coste, P., Ferrières, J., Steg, P. G., Cottin, Y., Blanchard, D., ... & Simon, T. (2008). Comparison of thrombolysis followed by broad use of percutaneous coronary intervention with primary percutaneous coronary intervention for ST-segment–elevation acute myocardial infarction: data from the French Registry on Acute ST-Elevation Myocardial Infarction (FAST-MI). *Circulation*, *118*(3), 268-276.
23. Malik, A., Islam, M. N., Zafar, A., Khan, A. K., & Ramizuddin, M. (1987). Clinical patterns of

ischemic heart diseases and its association with some known risk factors. *Bangladesh Heart Journal*, *2*, 1.

24. Malik, A., Islam, M. N., Zafar, A., Khan, A. K., & Ramizuddin, M. (1987). Clinical patterns of ischemic heart diseases and its association with some known risk factors. *Bangladesh Heart Journal*, *2*, 1.
25. Wennberg, D. E., Malenka, D. J., Sengupta, A., Lucas, F. L., Vaitkus, P. T., Quinton, H., ... & Northern New England Cardiovascular Disease Study Group. (1999). Percutaneous transluminal coronary angioplasty in the elderly: epidemiology, clinical risk factors, and in-hospital outcomes. *American heart journal*, *137*(4), 639-645.
26. Avezum, A., Makdisse, M., Spencer, F., Gore, J. M., Fox, K. A., Montalescot, G., & Grace Investigators. (2005). Impact of age on management and outcome of acute coronary syndrome: observations from the Global Registry of Acute Coronary Events (GRACE). *American heart journal*, *149*(1), 67-73.
27. Fox, K. A., Goodman, S. G., Klein, W., Brieger, D., Steg, P. G., Dabbous, O., & Avezum, A. (2002). Management of acute coronary syndromes. Variations in practice and outcome. Findings from the Global Registry of Acute Coronary Events (GRACE). *European heart journal*, *23*(15), 1177-1189.