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Impact of Delayed Presentation in the Treatment outcomes and it's Complications in patients with Acute Coronary Syndrome

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ABSTRACT

Acute coronary syndrome describes a range of conditions associated with sudden, reduced blood flow to the heart & includes unstable angina, Non–ST-segment elevation myocardial infarction (NSTEMI) & ST-segment elevation myocardial infarction(STEMI). India has the highest burden of ACS in the world. Myocardial infarction accountsfor more than 70% Patients experiencing STEMI have a greater short-term risk of complications, including death, compared to patients experiencing NSTEMI, whereas NSTEMI is associated with a greater long-term risk. To complete coronary occlusion, STEMI, the goal is for immediate revascularization to salvage myocardium. For NSTEMI and unstable angina (UA), treatment is to mitigate the changes of recurrent infarction and/or to reduce the size of infarction. To assess the factors associated with the impact of delayed presentation in the treatment outcomes and its complications in patients with acute coronary syndrome. This is a prospective observational study which was carried out in Narasaraopeta over a period of 6 months i.e. / /2022 to / /2023.About 120 study participants were analyzed for time of presentation to the hospital based on time of onset of symptoms, past medical history, risk factors, diagnosis, age, gender, social history. A sample size of 120 subjects was included. A total of 120 subjects were included with different types of ACS during the study period.49 (40.83%) subjects with STEMI 40 (33.34%) subjects with Unstable Angina & 31 (25.83%) subjects with NSTEMI were found**.** Patients included in this studymajorly presented delay to the hospital after symptoms occur 94 (78.34%) than who presented early to the hospital 26 (21.66%). The epidemiological results of this study revealed that people with age group between 41-70 yrs were more affected and males 79 (65.83%) were highly affected when compared to females 41 (34.16%). Treatment outcomes in ACS were observed that there is longer treatmentduration of anticoagulant therapy for delayed presentation than early presentation. It was identified that main factors for delaying were pre-hospital factors like unaware of condition. patients may feel that it is a gastric problem and delays till chest pain become worse. Within a short study period we observed that pulmonary edema, decreased EF (ejection fraction) and dyspnea were common complications were observed in delayed presented patients. So, improvement in patients QOL is achieved by creating awareness among them and educatesthem regarding the disease, medications, life style modifications and cost effective treatment.

Keywords: Acute coronary syndrome, delayed presentation, anticoagulant therapy, early presentation.

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INTRODUCTION

Acute coronary syndrome (ACS) is an acute manifestation of coronary artery disease (CAD). The spectrum of ACS includes ST-Segment Elevation Myocardial Infarction (STEMI), Non-ST Segment Elevation Myocardial Infarction (NSTEMI), andUnstable Angina (UA) [1].

Acute coronary syndrome describes a range of conditions associated with sudden, reduced blood flow to the heart. The blockage can be sudden and occur in oneinstant, or it may come and go over a period of time.

The condition occurs due to the build-up of fatty deposits in and on the walls of the coronary arteries. These arteries are responsible for delivering oxygen and nutrients to heart muscles. Heart muscles need a steady and constant supply of oxygen-rich bloodto function. A blood clot is the most common cause of a blocked coronary artery [2].

Classification:

Acute coronary syndromes include

- Unstable angina
- Non–ST-segment elevation myocardialinfarction (NSTEMI)
- ST-segment elevation myocardial infarction(STEMI)

These syndromes all involve acute coronary ischemia and are distinguished based on symptoms, ECG findings, and cardiac marker levels. It is helpful to distinguish the syndromes because prognosis and treatment vary.

Unstable Angina Pectoris:

(Acute coronary insufficiency, preinfarction angina, intermediate syndrome) In many patients who experience unstable angina, symptoms will be caused by significant coronary artery disease. Angina is considered unstable and requires furtherevaluation if patients experience:

1. Rest angina, which usually is prolonged 20 minutes occurring within a weekof presentation
2. Severe new-onset angina refers to angina of at least Canadian Cardiovascular Society Classification (CCSC) to class III severity, with onset within 2 months of initial presentation

Increasing angina refers to previously diagnosed angina that is distinctlymore frequent, longer in duration, or lower in threshold [3]

Table 1: Canadian Cardiovascular Society Classification System for AnginaPectoris [4]

Activities Triggering Chest Pain	Class
Strenuous, rapid, or prolonged exertion.	1
Not usual physical activities (eg, walking,climbing stairs).	
Walking rapidlyWalking uphill Climbing stairs rapidly	2

Walking or climbing stairs after mealsCold Wind Emotional stress	
Walking, even 1 or 2 blocks at usual pace and onlevel ground	3
Climbing stairs, even 1 flight	
Any physical activity Sometimes occurring at rest	4

ECG changes such as ST-segment depression, ST-segment elevation, or T-wave inversion may occur during unstable angina but they are transient. Of cardiac markers, CK is not elevated but cardiac troponin, particularly when measured using high- sensitivity troponin tests (hs-cTn), may be slightly increased. Unstable angina is clinically unstable and often a prelude to myocardial infarction or arrhythmias or, less commonly, to sudden death.

Non–ST-segment elevation MI:

(NSTEMI, sub endocardial MI) is myocardial necrosis (evidenced by cardiac markers in blood; troponin I or troponin T and CK will be elevated) without acute ST-segment elevation. ECG changes such as ST-segment depression, T-wave inversion, or both may be present.

ST-segment elevation MI

(STEMI, transmural MI) is myocardial necrosis with ECG changes showing ST-segment elevation that is not quickly reversed by nitroglycerin orshowing new left bundle branch block. Troponin I or troponin T and creatine kinase (CK) are elevated [3]

Epidemiology:

The epidemiology for acute coronary syndrome is as follows

- Cardiovascular diseases (CVDs) have now become the leading cause of mortality in India.
- A quarter of all mortality is attributable to CVD.
- Ischemic heart disease and stroke are the predominant causes and are responsible for >80% of CVD deaths.
- The Global Burden of Disease study estimate of age-standardized CVD death rate of 272 per 100 000 population in India is higher than the global average of 235 per 100000 population.
- Despite wide heterogeneity in the prevalence of cardiovascular risk factors across different regions, CVD has emerged as the leading cause of death in all parts of India, including poorer states and rural areas [5]
- Indian patients with ACS have a higher rate of STEMI (61%) than do patients in high income countries (15-25%).
- India has the highest burden of ACS in the world.
- The 3 most common risk factors for ACS were smoking (40%), high blood pressure (38%) and diabetes (30%) [6]

- Myocardial infarction accounts for more than 70% of these hospitalizations, themajority are the first occurrence of a coronary event.
- Patients experiencing STEMI have a greater short-term (eg, 30 days) risk of complications, including death, compared to patients experiencing NSTEMI, whereas NSTEMI is associated with a greater long-term (eg, 2 years) risk.
- In addition to death, patients experiencing ACS are also at risk for developing HF, cardiogenic shock, and ventricular arrhythmias, each of which contribute to the mortality associated with this disease state [7]

Etiology & Risk Factors

The most common cause of acute coronary syndromes is

1. An acute thrombus in an atherosclerotic coronary arteryRarer causes of acute coronary syndromes are
2. Coronary artery embolism
3. Coronary spasm
4. Spontaneous coronary artery dissection
5. Coronary arterial embolism can occur in
    - Mitral stenosis
    - Aortic stenosis
    - Infective endocarditis
    - Marantic endocarditis, or atrial fibrillation.
6. Cocaine use and other causes of coronary spasm can sometimes result in myocardial infarction. Spasm-induced MI may occur in normal or atherosclerotic coronary arteries [3]
    - Aging
    - Having overweight/obesity.
    - Lack of physical activity.
    - Smoking.
    - Unhealthy diet.
    - Diabetes.
    - Family history of chest pain, heart disease or stroke.
    - High blood cholesterol.
    - High blood pressure (hypertension).
    - High blood pressure, preeclampsia or diabetes during pregnancy [8]

Pathophysiology[9]

The majority of ACS results from occlusion of a coronary artery secondary to thrombus formation overlying a lipid-rich atheromatous plaque that has undergone fissuring or rupture. Plaques that are more susceptible to rupture are characterized by a thin fibrous cap, large fatty core, high content of inflammatory cells such as macrophages and lymphocytes, limited amounts of smooth muscle, and eccentric shape. Triggers such as surges in sympathetic activity with a sudden increase in blood pressure, pulse rate, myocardial contractility, and coronary blood flow can lead to erosion, fissuring, or rupture of the fragile fibrous cap surrounding the atheromatous plaque. Once ruptured, the thrombogenic components of the plaque consisting of collagen and tissue factor are exposed. This promotes activation of the platelet cascade, ultimately leading to the formation of a clot or thrombus as well as ischemia in the corresponding myocardial area. The extent of intracoronary thrombosis and distal embolization determines the type of ACS. In patients with UA, the coronary lesion demonstrates severe stenosis or narrowing but with little thrombosis.

In patients with NSTEMI, there exists partial thrombotic occlusion with or without distal embolization or severe stenosis. For STEMI, there exists total and persistent thrombotic occlusion. It is important to highlight that 80% of patients presenting with ACS have two or more active plaques. Most infarctions are located in a specific region of the heart and are described as such (e.g., anterior, lateral, inferior). Some patients exhibit permanent electrocardiographic (ECG) abnormalities (Q waves) after an AMI. In the past, patients with Q wave infarctions were generally believed to have more extensive necrosis and a higher in-hospital mortality rate. Patients with a non–Q-wave infarct were believed to have a greater likelihood of experiencing post infarction angina and early reinfarction. More recently, however, these distinctions have come into question. Some cardiologists now believe there is no difference in prognosis. The terminology has changed because most patients who have STEMI are treated emergently, preventing the development of Q waves. An anterior wall infarction carries a worse prognosis than an inferior or lateral wall infarction because it is more commonly associated with development of left ventricular failure and cardiogenic shock.

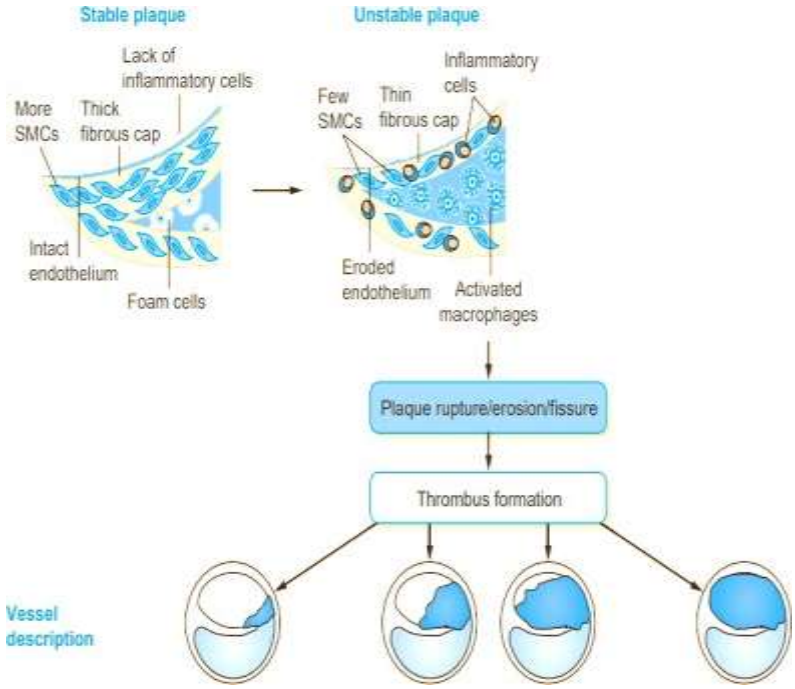

Figure 1: Thrombus formation and acute coronary syndrome. MI, myocardial infarction; SMC, smooth muscle cells

Clinical Presentations:[10]

The signs and symptoms for ACS patients are-

Signs:

- No physical findings are specific for ACS.
- Nonspecific findings include S4 or paradoxical splitting of S2 on auscultation.
- Patients with ACS may present with signs of acute decompensated HF including jugular venous distention, pulmonary edema, and an S3 on auscultation.
- Patients with ischemia-related papillary muscle dysfunction may present with a new murmur of mitral regurgitation.
- Patients may also present with arrhythmias, including tachycardia or bradycardia, as well as heart block.
- Hemodynamic abnormalities may include hypertension and hypotension orshock.

Symptoms:

- The classic symptom of ACS is abrupt-onset substernal chest pain or discomfort often described as a squeezing, heaviness, or tightness that persists for 10 minutes or longer.
- Symptoms may radiate to the arms, shoulders, back, abdomen, or jaw.
- Nausea, vomiting, diaphoresis, or shortness of breath may also be present.
- Patients likely to present with atypical symptoms include older adults aged 75 years or

greater, women, and patients with diabetes, impaired renal function, and dementia.

Complications: [3]

Depending on the extent and area of ischemia, various complications are possible in patients with ACS, particularly those with MI, which can manifest hours to weeks after the index event.

- Electrophysiologic disturbances including ventricular arrhythmias, bradyarrhythmias, and heart block are possible and may occur either in the acute phase of the ischemic event due to electrical instability generated during myocyte destruction or in the recovery phase due to ventricular remodeling.
- Heart failure is possible depending on the extent of myocardial necrosis and subsequent impairment of ventricular contractility.
- In fact, approximately 5%–6% of patients with STEMI develop cardiogenic shock, an acute, severe form of heart failure associated with hypotension, systemic hypoperfusion, and poor outcomes.
- Myocardial rupture of the papillary muscle, ventricular septum, or free wall of the ventricle are possible within the first 10 days of infarction due to extensive myocyte necrosis in those areas.
- Thromboembolism, including stroke, is also possible due to embolization of left ventricular thrombi that can form due to infarct-related ventricular aneurysm or left ventricular dysfunction.
- Pericarditis, an autoimmune-mediated inflammation of the pericardium, can occur weeks after an MI, particularly after a large infarct.
- Many patients with ACS develop depression during the convalescent period.

Diagnosis:

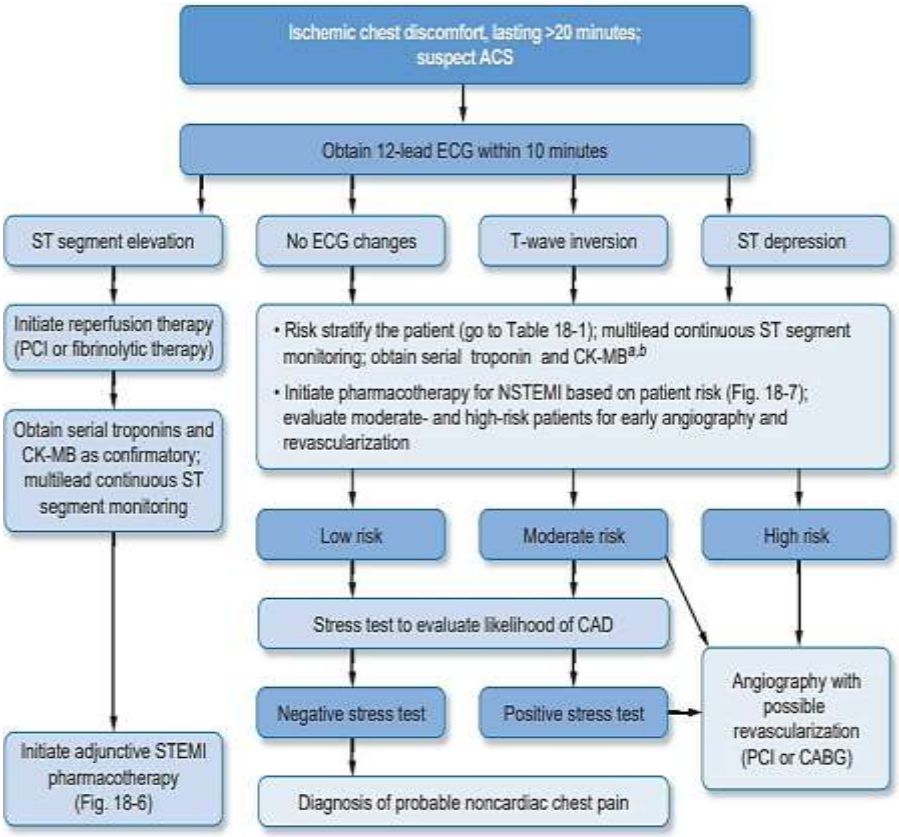

Figure 2: Evaluation algorithm for the patient presenting with acute coronarysyndrome [11]

Diagnostic test results for unstable anginapectoris:

EKG/ECG:

An EKG/ECG with evidence of left ventricular hypertrophy or ST-T-wavechanges consistent with myocardial ischemia favours the diagnosis of angina pectoris.An EKG/ECG obtained during chest pain is abnormal in 50% of patients with angina who have a normal resting EKG/ECG. The ST segment can be either elevated or depressed.

Stress testing (exercise EKG/ECG):

It is a well-established procedure, which aids the diagnosis in patients who have normal resting EKGs/ECGs. The most commonly used definition for a positive test is a 1-mm ST-segment depression or elevation for 60 to 80 msec either during or after exercise. Exercise stress testing is preferable to other variations of the stress test (pharmacological) in patients who are able to exercise.

Pharmacological stress testing:

Pharmacological stress testing is performed in suspected IHD patients when they are not able to perform more than moderate exercise due to various reasons (i.e., severe arthritis, prior injury,

reduced exercise tolerance as a result of debilitating illnesses, etc.), or in patients who are unable to increase the heart rate.

Intravenous dipyridamole, adenosine by inhibiting cellular uptake anddegradation of adenosine increase coronary blood flow, and high-dose dobutamine 20 to 40 mcg/kg/min increase oxygen demand through increased heart rate, systolic blood pressure, and myocardial contractility causing an increase in myocardial blood flow are all able to induce detectable cardiac ischemia in conjunction with EKG/ECG testing.

Stress perfusion imaging:

Stress perfusion imaging with thallium-201 or more recently, technetium- 99m (99mTc) or tetrafosmin can diagnose multi vessel disease, localized ischemia, and may be able to determine myocardial viability. Coronary arteriography and cardiac catheterization are very specific and sensitive but are also invasive, expensive, and risky(the mortality rate is 1% to 2%); therefore, they must be used judiciously when trying to confirm suspected angina and to differentiate its origin.

Diagnostic test results for STEMI & NSEMI:

The development of an ACS is a life-threatening emergency; diagnosis is presumed and treatment is instituted based on the patient's complaints and the results of an immediate 12-lead EKG/ECG. Laboratory tests and further diagnostic tests can rule out or provide confirmation and help identify the locale and extent of myocardial damage.

Serial 12-lead EKG:

Abnormalities may be absent or inconclusive during the first few hours after presentation of the ACS and may not aid the diagnosis in about 15% of the cases.When present, characteristic findings show progressive changes. First, ST-segment elevation (injury current) appears in the leads, reflecting the injured area. Peaked upright or inverted T waves usually indicate acute myocardial injury, the early stages of a transmural Q-wave MI. Persistent ST depression may also indicate a non–Q-waveMI. Q waves developing (indicating necrosis) is generally diagnostic of an MI but can be seen in other conditions. However, the manifestations depend on the area of injury.For example, in non–Q-wave infarction, only ST-segment depression may appear.

The most serious arrhythmic complication of an AMI is ventricular fibrillation, which may occur without warning.

Ventricular premature beats (VPBs) are the most commonly encountered arrhythmias and may require treatment [12]

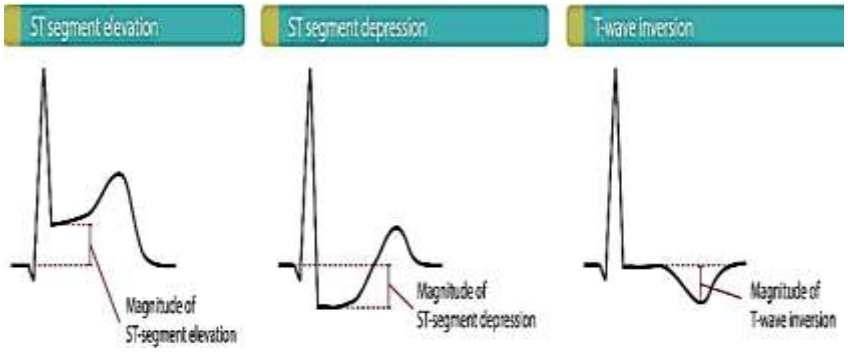

Figure 3: ST segment elevation, ST depression & T-wave inversion.

Patients with STEMI display ST elevations, ST depressions & T-wave inversions. Patients with NSTEMI & unstable angina display ST depressions & T-wave inversions [13]

Cardiac enzymes

Creatine kinase–heart muscle (CK-MB) is first elevated 3 to 12 hrs after the onset of pain, peaks in 24 hrs, and returns to baseline in 48 to 72 hrs. Other conditions elevate the CK-MB enzyme but do not demonstrate the typical pattern of rise and fall as seen in an MI. Until recently, CK-MB had been the principal serum cardiac marker used in the evaluation of ACS. Cardiac troponin I (cTnI) and cardiac troponin T (cTnT) are even more sensitive than CK-MB. They represent a powerful tool for risk stratification and have greater sensitivity and specificity than CK-MB. However, they do provide a low sensitivity in the early phases of an MI (<6 hrs after symptom onset) and require repeat measurements at 12 to 16 hrs, if negative. Levels increase 3 to 12 hrs after the onset of pain, peak at 24 to 48 hrs, and return to baseline over 5 to 14 days.

Lactate dehydrogenase:

Lactate dehydrogenase (LDH) is followed for its characteristic patterns ofrise and fall. The ratio of LDH1:LDH2 is helpful in diagnosing an MI. LDH assays arebeing replaced by cTnT assays.

Cardiac imaging:

As cardiac enzyme assays improve, the use of non-invasive cardiac imaging techniques are not indicated for initial diagnosis of an MI. Tests include 99mTc-pyrophosphate scintigraphy, myocardial perfusion imaging, radionucleotide ventriculography, two-dimensional echocardiography, and coronary angiography [12]

MANAGEMENT:

The management for acute caronary syndrome includes:

Goals of therapy:

- In the case of ACS, to complete coronary occlusion, STEMI, the goal is for immediate revascularization to salvage myocardium.
- For NSTEMI and unstable angina (UA), treatment is to mitigate the changes of

recurrent infarction and/or to reduce the size of infarction [14]

- To ease pain and discomfort
- Improve blood flow
- Reinstate heart function as rapidly as possible
- Long-term treatments goals are aimed to enhance overall cardiac function deal with risk factors lower the risk of a heart attack.

A combination of medications and surgical procedures may be employed to attain thesegoals [15]

Short-term desired outcomes in a patient with ACS are as follows:

- Early restoration of blood flow to the infarct-related artery to prevent infarctexpansion prevent complete occlusion and MI
- Prevention of death and other MI complications
- Prevention of coronary artery reocclusion
- Relief of ischemic chest discomfortLong-term desired outcomes are
- Control of CAD risk factors
- prevention of additional MACE, including reinfarction, stroke, and HF
- Improve the quality of life [16]

TREATMENT ALGORITHM FOR ACS: [17]

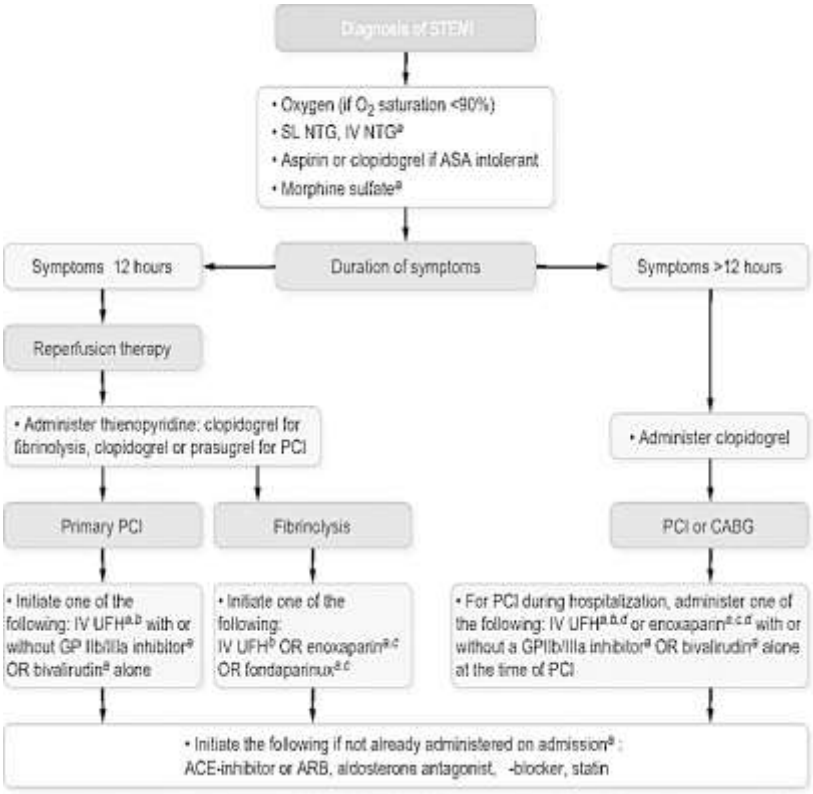

Figure 4: Initial treatment algorithm for STEMI.

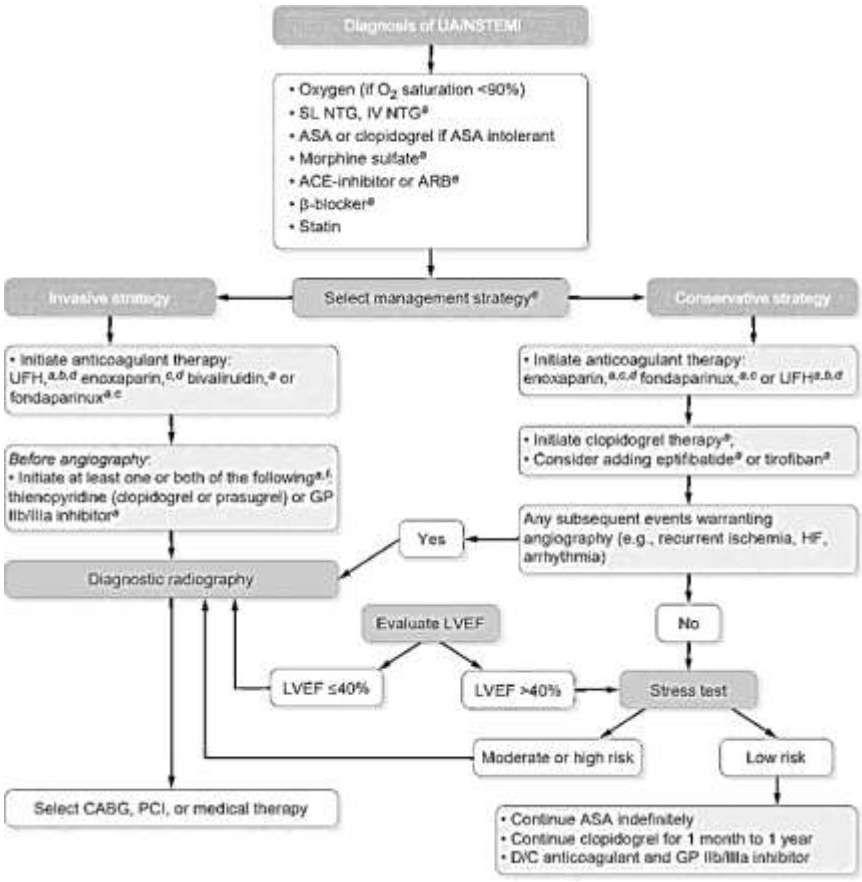

Figure 5: Initial treatment algorithm for NSTEMI

Pharmacological Treatment: [17]

The Evidenced-based Pharmacotherapies for Acute Coronary Syndromes includes the following drugs:

Table 2: Evidenced-based Pharmacotherapies for Acute Coronary Syndromes

Drug	Indication	Dosage
ACE inhibitors[a]	• STEMI and NSTEMI within the first 24 hours of presentation for those with EF ≤40% or s/s of HF. • STEMI and NSTEMI for latehospital care for patients withhypertension, EF ≤40%, DM,or CKD • STEMI and NSTEMI forindefinite use for all patients with EF ≤40%	Usual captopril dose 12–50 mg TID; then start longer-acting ACE inhibitor. Durationindefinite.
Angiotensin receptor blockers[a]	STEMI and NSTEMI withACE inhibitor intolerance	Usual doses of ARBs
Aldosterone antagonists[a]	STEMI and NSTEMI with EF ≤40% and either DM or HF symptoms already receiving therapeutic doses ofan ACE inhibitor and β-blocker.	Spironolactone 12.5–50 mg daily or eplerenone 25–50 mg daily. Duration indefinite.
Aspirin[a]	STEMI and NSTEMI for allpatients.	162–325 mg during AMI, then 75–325 mg/d for anindefinite period
β-Blockers[a]	STEMI and NSTEMI in all patients without contraindications	It is reasonable to administer an IV β- blocker at the time of presentation to STEMI patients who are hypertensive and who do not have any of the following: (a) signs of heart failure, (b) evidence of a low output state, (c) increased risk for cardiogenicshock, or (d) Other relative contraindications to β- blockade duration indefinite.
Bivalirudin[a]	STEMI and NSTEMI patients undergoing PCI whoare at high risk of bleeding	PCI: 0.75 mg/kg IV bolus followed by 1.75mg/kg/h infusion. If UFH given, discontinue UFH and wait 30 minutes beforestarting bivalirudin. Discontinue at the end ofPCI or continue at 0.2 mg/kg/h if prolonged anticoagulationnecessary. Medical management before PCI: 0.1 mg/kg IVbolus followed by 0.25 mg/kg/h infusion
Calcium-channel blockers	• STEMI and NSTEMI forpatients with ongoingischemia who are receivingadequate doses of nitrates andβ-blockers. • Consider diltiazem orverapamil for patients with contraindication to β-blocker if EF normal	Usual doses of calcium-channel blockers are used.

Clopidogrel[a]	STEMI and NSTEMI for patients allergic to aspirin	75 mg/d
Clopidogrel +aspirin[a]	STEMI, before fibrinolytictherapy or before PCI after fibrinolytic therapy	STEMI with fibrinolytictherapy without PCI: 300–600 mg load followed by 75 mg dailyand continue for 14 days then decrease to 75–162mg daily indefinitely.
NSTEMI or STEMI before PCI	For NSTEMI and unstable angina patients	300–600 mg load,followed by 75 mg daily for 1–12 months; aspirin 75–325 mg daily
Enoxaparin[a]	• STEMI as an alternative for UFH or LMWH for patients receiving fibrinolytic therapyor for those not undergoing reperfusion therapy. • NSTEMI for patients undergoing a conservative or invasive approach. • For PCI, as an alternative forUFH or LMWH	STEMI or NSTEMI: 1 mg/kg SQ every 12 hours1 mg/kg SQ daily NSTEMI undergoing PCI: A supplemental 0.3 mg/kg IV dose should be administered at the time of PCI if the last dose of SC enoxaparin was given 8–12 hours before PCI STEMI with fibrinolytic therapy: Age <75 years, administer 30 mg IV bolus followed by 1 mg/kg SQ every 12 hours Age ≥75, administer 0.75 mg/kg SQ every 12 hours For STEMI and NSTEMI continue throughout hospitalization or up to 8days
Fibrinolytictherapy[a]	STEMI presenting within 12 hours after onset of symptoms, can be considered in patients presenting within 12–24 hours after onset of symptoms with continuing s/s of ischemia	Streptokinase: 1.5 millionunits Alteplase: 100 mg Reteplase: 10 U IV bolus Tenecteplase: 30-50 mg
Fondaparinux[a]	• STEMI as an alternative for UFH or LMWH for patients receiving fibrinolytic therapyor for those not undergoing reperfusion therapy • NSTEMI as an alternative forUFH or LMWH for patients undergoing a conservative orinvasive approach	STEMI and NSTEMI: 2.5 mg SQ daily startingon day 2 of hospitalization, continuefor 8 days or discharge. NSTEMI: 2.5 mg SQ daily for 6 days.
GP IIb/IIIainhibitors[a]	NSTEMI for patients undergoing PCI or those without high-risk features notundergoing PCI STEMI forpatients undergoing PCI.	Abciximab: 0.25mg/kgIV bolus followed by 0.125mcg/kg/min infusion. Eptifibatide: 180mcg/kgIV bolus followed by 2mcg/kg/min infusion.
Heparin[a]	• STEMI for patients undergoing PCI or for patients treated withfibrinolytic therapy • NSTEMI in combination with antiplatelet therapy for conservative or invasiveapproach	STEMI with fibrinolytictherapy or NSTEMI: 60units/kg IV bolus followed by 12 units/kg/h STEMI with PCI: 50–70 units/kg IV bolus if a GP IIb/IIIa inhibitor planned;or 70–100 units/kg IV bolus if no GP IIb/IIIa inhibitor Continue for 48 hours or until end of PCI
Lidocaine	Treatment of VT, VF	Variable, 1.5 mg/kg loading dose, then 1–4 mg/min. Use for < 48 hours.

Morphine and other analgesics	STEMI and NSTEMI forpatients whose symptoms not relieved by NTG or adequate anti-ischemic therapy	2–5 mg IV every 5–30minutes PRN
Prasugrel[a]	STEMI and NSTEMI addedto aspirin for PCI	60 mg loading dose followed by 10 mg or 5 mg. If a coronary stent isdeployed continue prasugrel for 12–15 months. For a BMS, administer aspirin 162– 325 mg daily for at least1 month after PCI, then drop to 75–162 mg indefinitely; For a DES,administer aspirin 162– 325 mg daily for 3–6 months after PCI, then drop to 75–162 mg daily indefinitely
Nitrates[a]	STEMI and NSTEMI with persistent ischemia,hypertension, or control of pulmonary congestion.	Variable; titrate to painrelief or SBP: 5–10 mcg/min titrated to 200 mcg/min typical regimen. Usually maintain IV therapy for 24–48 hours after infarct.
Ticagrelor +Aspirin	STEMI, NSTEMI, UnstableAngina with or without PCI	STEMI, NSTEMI, or Unstable Angina: 180 mgload followed by 90 mg twice daily for at least 1 year; administer 325 mg load of aspirin followed by a maintenance dose of75–100 mg daily indefinitely.
Warfarin	STEMI and NSTEMI for leftventricular thrombus or for patients with AF with CHAD2 score ≥2	Variable; titrate to INR 3.Duration usually for several months to indefinitely.

[a]Indicates specific drug therapies that are known to reduce morbidity or mortality.

[b]For patients given fibrin- and nonfibrin-specific fibrinolytic drugs who are undergoing PCI within 24 hours, 300 mg should be used.

- For patients given a fibrin-specific fibrinolytic undergoing PCI after more than
- 24 hours, 300–600 mg should be used; for patients given a nonfibrin-specific fibrinolytic undergoing PCI between 24 and 48 hours, 300 mg should be used.
- For patients given a nonfibrin-specific fibrinolytic undergoing PCI after 48 hours, 300–600mg should be considered.

ACE, angiotensin-converting enzyme; AF, atrial fibrillation; AMI, acute myocardial infarction; aPTT, activated partial thromboplastin time; ARBs, angiotensin receptor blockers; BMS, bare-metal stent; CABG, coronary artery bypass graft; CHADS2, risk score for atrial fibrillation comprising congestive heart failure, hypertension, age, diabetes, and prior stroke; CKD, chronic kidney disease; CNS, central nervous system; COX-2, cyclo-oxygenase-2; CrCl, creatinine clearance; CV, cardiovascular; DES, drug-eluting stent; DM, diabetes mellitus; ECG, electrocardiogram; EF, ejection fraction; GP IIb/IIIa, glycoprotein IIb/IIIa inhibitor; HF, heart failure; HIT, heparin- induced thrombocytopenia; HR, heart rate; INR, international normalized ratio; IV, intravenously; LMWH, low-molecular-weight heparin; MI, myocardial infarction; NSAIDs, non-steroidal anti-inflammatory drugs; NSTEMI, non–ST segment elevation myocardial infarction; NTG, nitroglycerin; PCI, percutaneous coronary intervention; PRN, as needed; SBP, systolic blood pressure; SCr, serum creatinine; SQ, subcutaneously; s/s, signs and symptoms; STEMI, ST segment elevation myocardial infarction; TIA, transient ischemic attack; TID, three times a day; TIMI, Thrombolysis in Myocardial Infarction; UHF, unfractionated heparin; VF, ventricular fibrillation; VT,ventricular tachycardia.

Surgical Therapy[18]

Surgical therapy for ACS is as follows:

Angioplasty, also called balloon angioplasty, is a procedure that opens arteries to let blood go through more easily. Healthcare providers use this minimally invasive procedure in tight spots in arteries where plaque makes the space inside an artery too narrow or blocks it.

Coronary artery bypass grafting (CABG), also known as heart bypass surgery, is a procedure to restore blood flow to areas of heart. Artery blockages can cut off blood flow, causing heart attacks or heart attack-like symptoms. CABG restores blood flow by using blood vessels from other parts of body to create a detour aroundblockages.

Percutaneous coronary intervention (PCI) A percutaneous coronary intervention (PCI) is a minimally invasive procedure to open blocked coronary (heart) arteries. An older name for PCI is coronary angioplasty with stenting or angioplasty for short. Arteries are the blood vessels that carry oxygen-rich blood from your heart throughout your body. A PCI procedure uses a small

balloon to reopen a blocked artery to increase blood flow. Usually, your interventional cardiologist then places a small, permanent tube (stent) to keep the artery open long term. The stent usually contains medication that releases directly into your artery (drug-eluting stent) to reduce the risk of re-narrowing within the stent.

Patient Counselling[19]

1. Eat a heart-healthy diet that includes whole grains, fruits and vegetables, lean proteins, and low-fat or nonfat dairy products.
2. Limit how much salt (sodium). Follow instructions eating or drinking restrictions,such as limiting foods that are high in fat and processed sugars.
3. Do not use any products that contain nicotine or tobacco. These products include cigarettes, chewing tobacco, and vaping devices, such as e-cigarettes.
4. Do not drink alcohol
5. Maintain a healthy weight
6. Manage any other health conditions such as hypertension or diabetes.

METHODOLOGY

The methodology section describes in detail all the materials that have been used toconduct a study as well as the procedures that are under taken.

Study design:

A Prospective Observational study

Study period:

The study was conducted for a period of 6 months i.e., from August 2022- January2023.

Study site:

This study was conducted at the Vivekananda heart and critical care hospital, Narasaraopeta, Palnadu district.

Materials:

Informed consent document, Data collection form, Counselling aids – Patient information leaflet

Inclusion criteria:

1. Patients with comorbidities like Diabetes mellitus, Hypertension wereincluded in this study.
2. People of both gender whose age group between 20-80 years were included.
3. Patients who are newly diagnosed with ACS were only considered in thisstudy.

Exclusion criteria:

1. People with history of cardiac surgeries were excluded.

2. Patients who are not willing to participate were excluded.

Plan of work:

Phase 1:

1. Obtain the IEC approval for study.
2. Detailed literature review.
3. Procure the statistical tools.

Phase 2:

1. Selection of sample population.
2. Collection of data and preparation of abstract.

Phase 3:

1. Data analysis
2. Preparing the outcomes of the study.

STUDY METHOD:

- Study is conducted in Narasaraopeta.
- A data collection form will be developed in which all the details of the patientsare noted.
- Consent form will be taken from subjects who wish to participate in our study.
- Patients will be given adequate knowledge on Acute Coronary Syndrome – thebenefits of early presentation and also on Dietary changes, lifestyle modifications have to be followed.
- Subjects who are not willing to participate in the study will also be counseled with the help of information leaflets.
- The patients were advised to attend for regular follow-up.
- The patients were counseled about the importance of medication adherence and life style modifications which helps to reduce hospitalization.
- The data will be analyzed by using descriptive analysis and suitable statistical tests.

RESULTS AND DISCUSSION

Table 3: Age Wise Distribution:

S.NO.	Age group	No. of Subjects (n = 120)	Percentage
1.	21- 30	1	0.833%
2.	31- 40	4	3.334%
3.	41- 50	22	18.333%
4.	51- 60	46	38.334%
5.	61- 70	36	30%
6.	71- 80	11	9.166%

The information provides the summary of all the results that are characterized based on various

parameters.

Table 3: It shows the age wise distribution. Out of 120 people, people with age groupbetween 51-60 years (38.334%; n= 46), 61-70 years (30%; n= 36), 41-50 years (18.33%; n= 22) were most commonly affected with different types of ACS and the leastaffected age groups were 71- 80 years (9.166%; n= 11), 31- 40 years (3.334%; n= 4),

Table 4: Gender wise distribution:

S.no.	Gender	No. Of subjects (n = 120)	Percentage
1.	Males	79	65.834%
2.	Females	41	34.166%

Table 4: It describes the gender wise distribution, out of 120 subjects, males (65.834%;n= 79) were more prone to ACS when compared to females (34.166%; n= 41).

Table 5: Categorization of subjects based on riskfactors:

S.no.	Presenceof risk Factor	No. Of subjects Males(n=79)	Females(n=41)	Percentage Males	Females
1.	With risk factor	64	34	81.01%	82.92%
2.	Without risk factor	15	07	18.99%	17.08%

Table 5: Shows that males 64 (81.01%) subjects and females 34(82.92%) subjects are with risk factors are more prone to ACS while males 15 (18.99%) subjects and females 7(17.08%) subjects are diagnosed as ACS without risk factors.

Table 6 (a): Distribution based on smoking habit:

S.no.	Smoking	No. Of subjects (n = 120)	Percentage
1.	Smoker	25	20.834%
2.	Non- smoker	95	79.166%

Table 6(a): It describes the smoking habit of subjects. Among 120 subjects, 25 (20.834%) subjects were found to be smokers and 95(79.166%) subjects were found tobe non – smokers.

Table 6(b): Distribution based on alcohol consumption of subjects:

S.no.	Alcohol consumption	No. Of subjects (n = 120)	Percentage
1.	Alcoholic	19	15.834%
2.	Non- alcoholic	101	84.166%

Table 6(b): This table shows the alcohol consumption of subjects. Among 120 subjects,19(15.834%) subjects were found to be alcoholics and 101(84.166%) subjects were found to be non – alcoholics.

Table 7: Distribution based on obesity:

S.no.	Obese/ non- obese	No. Of subjects(n= 120)	Percentages
1.	Obese	18	15%
2.	Non- obese	102	85%

Table 7: This table evaluates that among 120 subjects, 18(15%) were obese whereas 102 (85%) were found to be non- obese.

Table 8: Distribution based on educationalstatus:

S.no.	Educational status	No. Of subjects (n = 120)	Percentage
1.	High school/ university qualification	21	17.5 %
2.	Below High school qualification	42	35%
3.	No educational qualification	57	47.5 %

Table 8: Represents the educational status of the study population, out of 120 subjects 57(47.5%) subjects were illiterates, 42(35%) subjects with below high school qualification and 21(17.5%) subjects were with high school/university qualification.

Table 9: Past medical history wise distribution:

S.no.	Past medical History	No. Of subjects(n = 120)	Percentage
1.	Hypertension and Diabetes	41	34.166%
2.	Hypertension	23	19.167%
3.	Diabetes mellitus	17	14.167%
4.	No	39	32.5%

Table 9: This table shows that among all the 120 subjects 41(34.166%) subjects were having both Hypertension and Diabetes Mellitus as past medical history, 23(19.167%) subjects were having only Hypertension, 17 (14.167%) subjects were having only Diabetes Mellitus as past medical history. And 39(32.5%) subjects were having No pastmedical history.

Table 10: Distribution Based On Time of Onset Of Symptoms:

S.no.	Time of onset of Symptoms	No. Of subjects (n= 120)	Percentages
1.	< 2 hours	25	20.83%
2.	2-4 hours	12	10%
3.	4-6 hours	13	10.834%
4.	6-12 hours	21	17.5%
5.	> 12 hours	49	40.83%

Table 10: This table shows distribution depending upon the time of onset of symptoms,patients who presented to the hospital after 12 hours of onset of symptoms were found to be more 40.83% (n=49) when compared with the patients who were present to the hospital within 2 hours 20.83% (n=25), 6-12 hours were 17.5% (n=21), 4-6 hours were
10.83% (n=13) and 2-4 hours were 10% (n=12).

Table 11: Diagnosis wise distribution:

S.no.	Diagnosis	No.of subjects		Percentage	
		Males	Females	Males	Females
1.	STEMI	32	17	40.5%	41.46%
2.	Unstable Angina	28	12	35.44%	29.26%
3.	NSTEMI	18	13	22.78%	31.70%

Table 11: This represents different types of ACS diagnosed among the selectedsubjects out of 120 subjects, highest incidence was observed for STEMI (40.43%; n= 49), followed by Unstable Angina (33.34%; n= 40) and the least incidence was for NSTEMI (25.83%; n=31) in both males and females.

Table 12: Distribution based on time ofpresentation:

S.no.	Early/ delayed Presentation	No. Of subjects (n = 120)	Percentage
1.	Early presentation	25	20.834%
2.	Delayed presentation	95	79.166%

Table 12: Table 12 shows that a total of 95(79.166%) subjects were presented delayed to the hospital & 25(20.834%) subjects were presented early to the hospital i.e., < 2 hours after onset of symptoms.

Table 13: Distribution of Subjects Based OnComplications:

S.No.	Complications	No. of Subjects	Percentage
1.	Decreased ejection fraction	79	65.834%
2.	Dyspnoea/ SOB	53	44.167%
3.	Pulmonary edema	2	1.667%
4.	Cardiogenic shock	1	0.834%

Table 13: It represents the distribution of subjects based on complications majorly 79(65.834%) subjects were found to be with decreased ejection fraction as complication, 53(44.167%) subjects were with dyspnoea/SOB, 2(1.66%) subjects were with pulmonary edema & least 1(0.834%) subjects with cardiogenic shock.

Table 14: Distribution based on pre-hospital delayfactors:

S.No.	Pre-hospital delay Factors	No. of Patients n= 120	Percentages
1.	Attributing symptoms to non- cardiac origin	56	46.67%
2.	Waiting for spontaneous recovery	18	15%
3.	Symptoms were not severe	9	7.5%
4.	Transportation problems	7	5.83%
5.	Unawareness about disease	5	0.41%

Table 14 categorizes the factors for delayed presentation to hospital. Majorly patients (n=56, 46.67%) delayed as they are considering as non- cardiac sign such as gastritis etc., some patients (n=18, 15%) are waiting for the spontaneous recovery without presenting to hospital, some patients

(n=9, 7.5%) experienced mild/moderate symptoms, some of the patients (n=7, 5.83%) have transportation problem and lastly some patients (n=5, 0.41%) are unaware of the disease.

DISTRIBUTION BASED ON TREATMENT:

Treatment distribution among patients is as follows:

Standard Treatment for Early presented patients:

According to American College of Cardiology and American Heart Association, ACS patients who are presented within golden period are treated with Aspirin (300 mg) and Heparin bolus and intravenous (IV) Heparin infusion if there areno contraindications to the same. Antiplatelet therapy with Ticagrelor or clopidogrel is also recommended. Ticagrelor is not given to the patients receiving thrombolysis. Supportive measures like pain control with Morphine/ Fentanyl and oxygen in case of hypoxia are provided as required. Nitroglycerin sublingual or infusion can be used forpain relief as well. A thrombolytic (Tenecteplase or other thrombolytic) isrecommended if there is no PCI available and the patient cannot be transferred to the catheterization lab in less than 120 minutes. Beta-blockers, statin, and ACE inhibitors should be initiated in all ACS cases as quickly as possible unless contraindications exist.

From our study, treatment provided to the subjects who presented within golden period is as follows.

Table 15(a): Treatment Pattern In Early Presented Subjects:

S. No.	Drug Category	No. Of Subjects
1.	Thrombolytics	25
2.	Anti-Coagulants	25
3.	Anti- Platelets	23
4.	Statins	23
5.	Beta-Blockers	16
6.	Vasodilators	15
7.	ACE Inhibitors	3

Table 15 (a): It represents the treatment pattern for early presented subjects. Thrombolytics (n= 25) and Anti-coagulants (n= 25) are highly prescribed drug categories followed by Anti platelets (n= 23), Statins (n= 23), Beta- Blockers (n=

Treatment for delayed presented subjects:

Treatment for delayed presented patients is similar to the early presented patients except Thrombolysis. In delayed presented patients thrombolysis should not bedone. They are advised for Percutaneous Transluminal Coronary Angioplasty (PTCA) or Coronary Artery Bypass Graft (CABG). In our study, delayed presented patients are prescribed with following treatment: Table 15 treatment pattern for delayed presented subjects:

Table 15(b) shows the treatment pattern for delayed presented patients. In those highly prescribed drugs are Anti-coagulants (n= 95) and Anti-platelets (n=95) followed by Statins (n=72), Beta-blockers (n=33), and Vasodilators (n=31) and least prescribed was ACE inhibitors (n=3).

Table 15(b): shows the treatment pattern for delayed presented patients.

S.no.	Drug category	No. Of subjects
1.	Anti-Coagulants	95
2.	Anti- Platelets	95
3.	Statins	72
4.	Beta-Blockers	33
5.	Vasodilators	31
6.	ACE Inhibitors	3

Table 16: Non- cardiac drugs for both early anddelayed presented patients:

S.no	Drug category	Number of subjects	
		Delayed Presented	Early Presented
1	PPI'S	94	26
2	Anti-Emetics	58	23
3	Antibiotics	61	11
4	Steroids	10	2
5	Loop Diuretics	36	8
6	Thiazide Diuretics	3	-
7	Hypoglycemics	21	7
8	Anti-Histamines	11	3
9	CCB'S	8	1
10	Catecholamines	5	4
11	Mucolytics	1	1
12	Bronchodilators	10	-
13	Laxatives	3	1
14	Vitamin Supplements	1	-
15	Proteolytic Enzymes	2	-
16	Anti Thyroid	1	1
17	Vasopressin Antagonists	1	-
18	ARB'S	2	1
19	Anti-Anginal	3	2
20	Alpha Blockers	1	-
21	Potassium Sparing Diuretics	-	3
22	Benzodiazepines	-	1
23	Anti vertigo & Anti Convulsant	-	2
24	Anti Cholinergics	-	1
25	Leukotriene Receptor Antagonists	-	1
26	Nitrates	-	5

DISCUSSION

In our study, we educated patients regarding medications, Dietary and lifestyle modifications by using PIL's. A total of 120 study population were reviewed and quantified the proportion of early and delay presentation of patients with ACS in different age groups, genders & risk factors.

Regarding the type of ACS, out of 120 population, highest incidence & prevalence was observed for STEMI (F= 32, M=17 , n=49), Unstable Angina Pectoris(F=28 , M=12, n=40), NSTEMI (F=18 , M= 13 , n=31) were commonly diagnosed in both males and females due to family history, alcohol, smoking, obesity, hypertension, diabetes mellitus, hypothyroidism, CKD/AKD, CHF & unhealthy lifestyle habits.

Regarding the demographic profile of the subjects, epidemiological status shows that people with age group is in between 71–80 years (9.166 %, n=11), 61-70 years (30%, n=36), 51–60 years (38.334%, n=46), 41-50 years (18.333%, n=22), 31–

40 years (3.334%, n=4) & 21- 30 years (0.833%, n=1), were most commonly affected with different types of ACS. The most effected subjects were in between the age groupof 41 – 70 years.

Based on the epidemiological survey, males (65.8%; n=79) were more prone to ACS when compared to females (34.16%, n=41) due to alcohol, smoking, obesity, hypertension, diabetes mellitus, unhealthy lifestyle habits & less physical activities.

From the epidemiological study, out of total study population results shows thatmaximum number of patients were present delay to the hospital after the onset of symptoms (78.34%, n=94) & the patients who were presented early to the hospital wasfound to be (21.66%, n=26).

Out of total study population results shows that 20.83% (n=25) of subjects weresmokers, 79.16% (n=95) subjects were non-smokers & 15.83% (n=19) subjects were alcoholic, 84.16% (n=101) subjects were non-alcoholic.

Among all the people involved in the study, 53.34% (n=64) of male subjects were majorly prone to risk factors rather than the female subjects of 28.33% (n=34) andwithout risk factors the number of male subjects were found to be 12.5% (n=15) whencompared to female subjects of 5.83% (n=7).

Regarding the past medical history, the patients with both hypertension & diabetes mellitus were majorly found 34.16% (n=41) than the patients with only hypertension of 19.16% (n=23) and diabetes mellitus of 14.16% (n=17). The patients without any past medical history were found to be 32.5% (n=39).

Depending upon the time of onset of symptoms, patients who presented to the hospital after 12 hours of onset of symptoms were found to be more 40% (n=48) when compared with the patients

who were present to the hospital within 2 hours 21.67% (n=26), 6-12 hours were 17.5% (n=21), 4-6 hours were 10.83% (n=13) and 2-4 hours were 10% (n=12).

Out of total study population 47.5% (n=57) subjects were found to be with no educational qualification, 35% (n=42) subjects were found to be with below high school qualification & 17.5% (n=21) subjects with high school/University qualification.

During the study period various classes of drugs were given to the patients based on the time of presentation to hospital. For delayed patients PPI 67.5% (n=81), Anti Emetics 48.33% (n= 58), Anti coagulants 61.66% (n=74), Statins 60% (n=72), Anti platelets 65% (n=78), Antibiotics 50.83% (n=61), Beta-blockers 27.55% (n=33), Vasodilators 25.83% (n= 31), Loop diuretics 30% (n=36), Hypoglycemics 17.5% (n=21), Steroids 8.33% (n=10), Anti histamines 9.16% (n=11), CCBs 6.66% (n=8), Bronchodilators 8.33% (n=10) were commonly prescribed.

For the patients who presents early to the hospital after the onset of symptoms PPI 21.66% (n= 26), Thrombolytics 21.66% (n=26) Anti Emetics 19.16%(n=23), Anti coagulants 21.66%(n=26), Statins 19.16% (n=23), Anti platelets 19.16% (n=23), Beta blockers 13.33% (n=16), Antibiotics 9.16% (n=11), Vasodilators 8.33% (n=10), Loop diuretics 6.66% (n=8), Anti diabetics 5.83% (n=7), Nitrates 4.16% (n=5), Catecholamine's 3.3% (n=4) were commonly prescribed.

CONCLUSION

Time was crucial in the treatment of ACS (STEMI, NSTEMI, and UA). Time delay between onset of acute symptoms to reach the hospital is noted i.e., patients present <2hrs are considered as Early presentation to hospital, > 2hrs are considered as late presentation. Hence early presentation of the patients with ACS can be treated with Thrombolysis and have a better quality of life compared to delay presentation. Treatment outcomes in ACS was observed that there is longer treatment duration of anti-coagulant therapy for delay presentation than early presentation. It was identified that main factors for delaying was pre hospital factors like unaware of condition, patients may feel that it is gastric problem and delays till chest pain becomes worse. However early presented patients who undergone thrombolysis and delay presented patients both have the complications of pulmonary edema, decreased ejection fraction and dyspnoea. The results of this study will provide that Age, gender, risk factors wise data of ACS Treatment outcomes and complications. Within a short study period we observed that pulmonary edema, decreased EF and dyspnoea was common Complications we observed in delay presentation patients. Some patients may get severe complications for delaying >12 hrs to days are advised to PTCA and CABG after Coronary angiogram. The aim of improving the QOL & to reduce hospitalization in both early and delay presented patients, as a clinical pharmacist having the knowledge in Pharmacology, Therapeutics

& Pharmacoeconomics we educate them regarding the disease, medications, life style modifications and cost-effective treatment.

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