



Department of Health Research
Ministry of Health and Family Welfare, Government of India



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2019 Edition, Vol. I

STANDARD TREATMENT WORKFLOWS

of India



PARTNERS

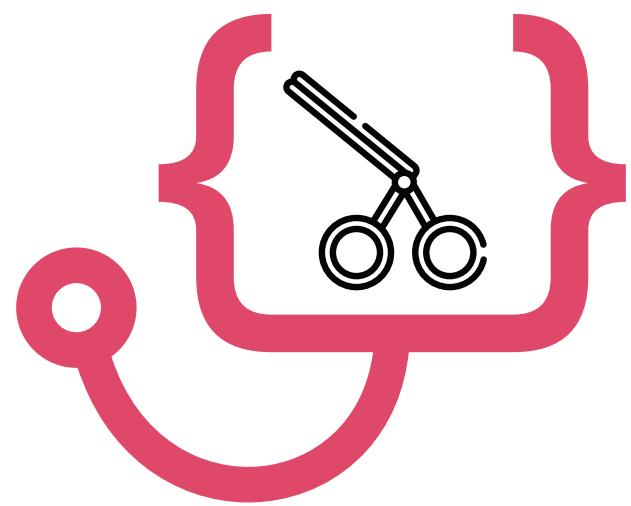


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TREATMENT
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These STWs have been prepared by national experts of India with feasibility considerations for various levels of healthcare system in the country. These broad guidelines are advisory, and are based on expert opinions and available scientific evidence. There may be variations in the management of an individual patient based on his/her specific condition, as decided by the treating physician. There will be no indemnity for direct or indirect consequences. Kindly visit our web portal (stw.icmr.org.in) for more information.
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ATRIAL FIBRILLATION
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STABLE ANGINA
STEMI
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INTRODUCTION

GOAL

To empower the primary, secondary and tertiary care physicians/surgeons towards achieving the overall goal of Universal Health Coverage with disease management protocols and pre-defined referral mechanisms by decoding complex guidelines

OBJECTIVES

Primary Objective:

To formulate clinical decision making protocols for common and serious medical/surgical conditions for both OPD and IPD management at primary, secondary and tertiary levels of healthcare system for equitable access and delivery of health services which are locally contextual

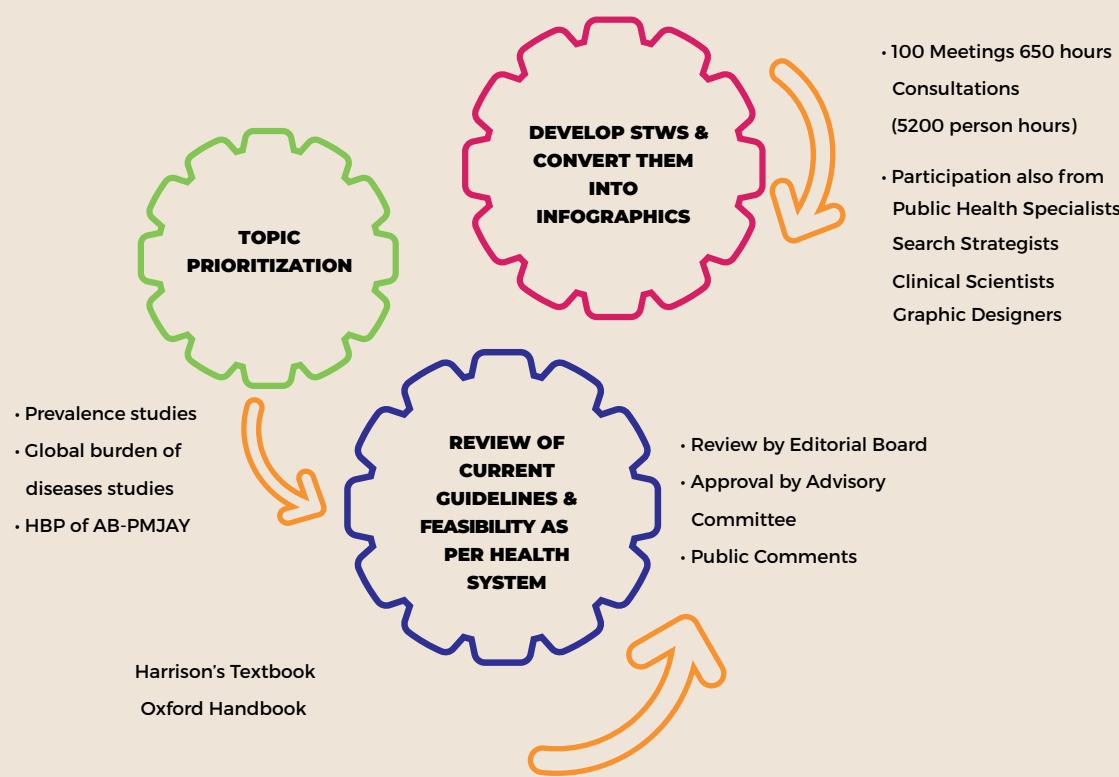
Secondary Objective:

To facilitate PMJAY arm of Ayushman Bharat with secondary and tertiary level management of all surgical and medical conditions covered under the scheme.

METHODOLOGY



PROCESS OVERVIEW





CARDIOLOGY



Standard Treatment Workflow (STW) for the Management of ATRIAL FIBRILLATION

ICD-10-I48.91

**WHEN TO SUSPECT ?**

SYMPTOMS
- Rapid rate palpitations with or without <ul style="list-style-type: none"> • General fatigue or weakness or exhaustion • Dizziness, near syncope or syncope • Shortness of breath • Chest pain
- More marked on exertion
SIGNS
- Irregularly irregular pulse
- Variable heart sound

LOOK FOR RISK FACTORS
- Prior valvular heart disease or CHF or MI
- Prior TIA or stroke or embolic episode
- Hypertension, DM, COPD, CKD, Obesity

LOOK FOR PRECIPITATING FACTORS:
- Post (cardiac) surgery
- Alcoholism or binge drinking
- Myo-pericarditis or ACS
- Pneumonitis or pulmonary embolism
- Sepsis, hyperthyroidism

MANAGEMENT PRINCIPLES:
- Categorize AF
- Look for immediate intervention indicators
- Assess stroke risk & need for anti-coagulation
- Assess bleeding risk
- Need for rate control
- Consideration for rhythm control

CATEGORIZE AF
- Paroxysmal AF: Episodes of AF for less than 7 days
- Persistent AF: AF lasting from 7 days to 1 year
- Long standing persistent AF: AF lasting for > 1 year
- Permanent AF: AF with heart rate control as only option

LOOK FOR IMMEDIATE INTERVENTION INDICATORS:
- Systolic BP 90 mmHg, HR > 150 or < 50/min
- Ongoing Angina
- CHF or TIA or stroke
- Major bleed on Oral Anti-coagulants

STROKE RISK SCORE

CHA₂D₂-VAS_c	SCORE
- Congestive heart failure/LV dysfunction	1
- Hypertension	1
- Aged ≥ 75 years	2
- Diabetes mellitus	1
- Stroke/ TIA/ TE	2
- Vascular disease [prior MI, PAD or aortic plaque]	1
- Aged 65-74 years	1
- Sex category [i.e. female gender]	1
Maximum Score	9

OAC if score >1 in men and >2 in women

BLEEDING RISK SCORE

SCORE	HAS-BLED	SCORE
1	- Hypertension i.e. uncontrolled BP	1
1	- Abnormal renal/ liver function	1 or 2
2	- Stroke	1
1	- Bleeding tendency or predisposition	1
2	- Labile INR	1
1	- Age (e.g. >65)	1
1	- Drugs (e.g. concomitant aspirin or NSAIDs or alcohol)	1

Bleeding Risk High in score >3

HEART RATE CONTROL

In all patients except hemodynamic instability

Beta blocker or calcium blocker or combination

BB + digoxin in HF

Rate aim to be less than 110/ min

CONVERSION TO NSR

Hemodynamic instability	Uncontrolled symptoms despite HR control	Unacceptable rate control drug side effects	Patients' preference
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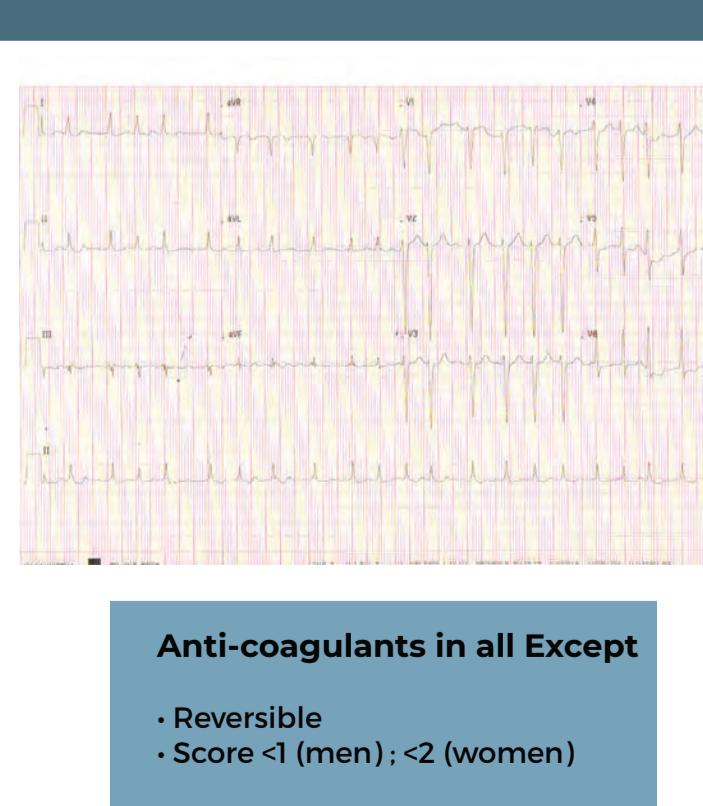
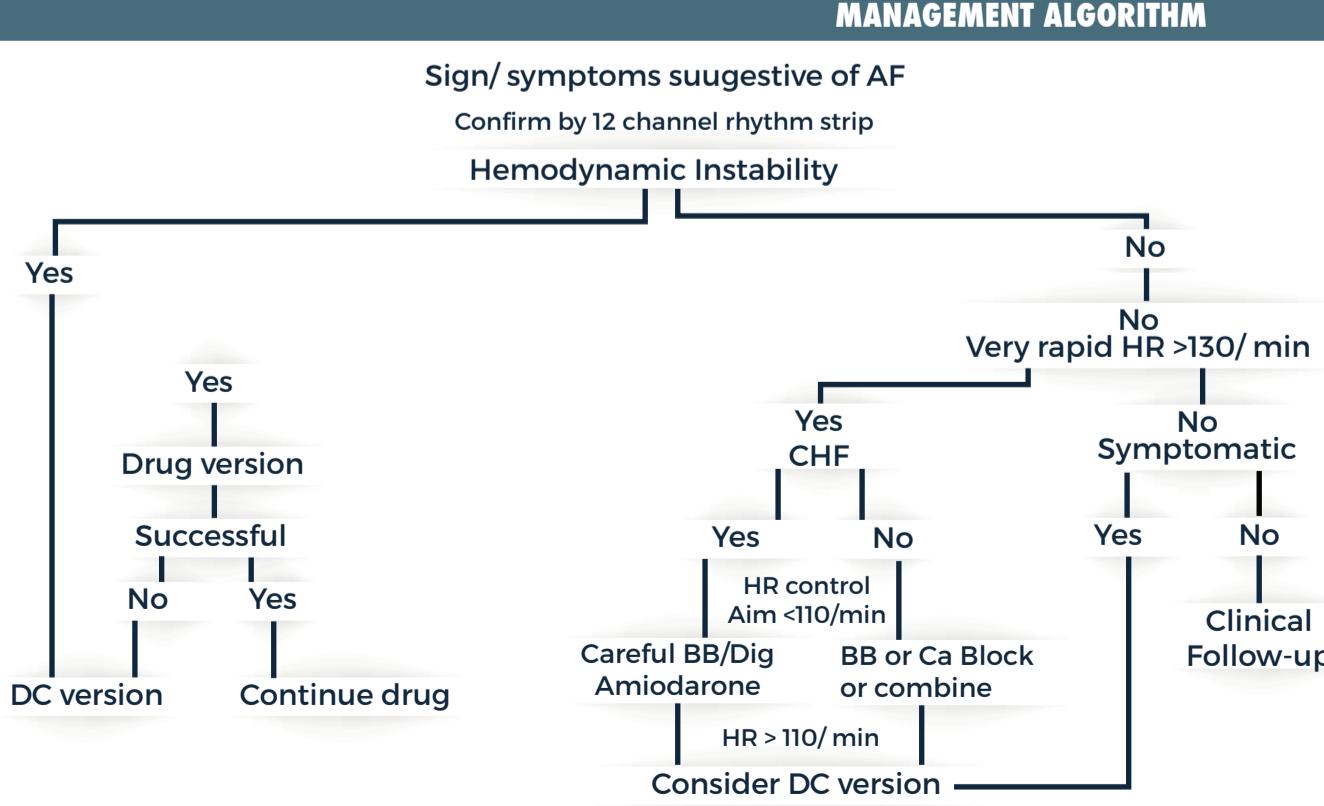
MANAGEMENT

AT PHC/ CHC:	BASIC INVESTIGATIONS:	WHAT TO LOOK FOR IN ECG ?
<ul style="list-style-type: none"> • Detailed clinical evaluation • Basic investigations • Careful ECG evaluation • Start OAC if indicated (based on Stroke risk) • Start Metoprolol if HR >110/ min & no evidence of CHF • Refer if indicators for early intervention 	<ul style="list-style-type: none"> • Hemograms • Blood sugar, Creatinine • Electrolytes • 12 lead ECG 	<ul style="list-style-type: none"> • Ventricular rate • Chamber enlargement • Pre-excitation • Prior MI • Bundle branch block • QT interval

AT DISTRICT HOSPITAL:

AT DISTRICT HOSPITAL:	INVESTIGATIONS:	RHYTHM CONTROL
<ul style="list-style-type: none"> • Admit if indicators of early interventions • Immediate cardioversion after heparinization, if hemodynamic instability • Manage precipitating factors if any • Assess stroke, bleeding risk & coagulation parameters • Detailed echocardiogram • Start OAC, maintain INR around 2-3 • Control HR by single drug or combination of BB & Ca Blocker 	BASIC INVESTIGATIONS: <ul style="list-style-type: none"> • Plain X-ray chest • Thyroid evaluation • Liver function test • Troponins • Prothrombin time, INR (Coagulation profile) • Echocardiography DESIRABLE INVESTIGATIONS: <ul style="list-style-type: none"> • Prolonged ECG monitoring • Trans-esophageal echocardiography • Exercise Stress Test • CT scan • MRI • EP study • Coronary angiography 	Pharmacological Cardioversion <ul style="list-style-type: none"> CHF CAD Abnormal LVH Amiodarone Normal Heart <ul style="list-style-type: none"> Flecainide Ibutilide Propafenone Pill in pocket (Flecainide OR Propafenone)

AT TERTIARY CENTRE:	OPTIONAL INVESTIGATIONS:	Long Term Rhythm Control
<ul style="list-style-type: none"> • Re-assess clinical status, adequacy of AC • Consider need of NOAC • Optimise management of underlying cardiac disease • Stress life style and AF risk factor modification • Assess need for rhythm control and discuss pros & cons • Consider RFA in select patient 	<ul style="list-style-type: none"> • Prolonged ECG monitoring • Trans-esophageal echocardiography • Exercise Stress Test • CT scan • MRI • EP study • Coronary angiography 	<ul style="list-style-type: none"> CHF Normal Heart CAD, LVH Amiodarone Flecainide Propafenone Sotalol

MANAGEMENT ALGORITHM**KEEP A HIGH THRESHOLD FOR INVASIVE PROCEDURES**

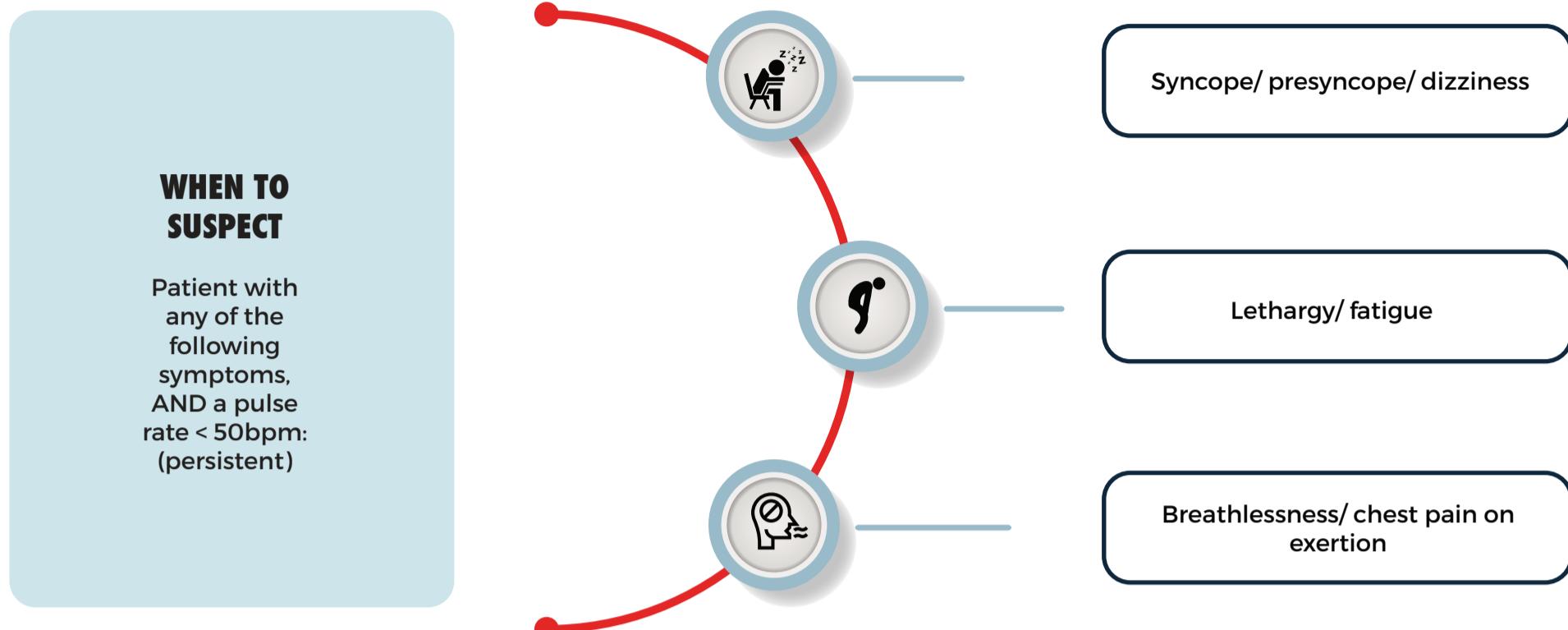
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Standard Treatment Workflow (STW) for the Management of **BRADYARRHYMIAS IN SYMPTOMATIC PATIENTS**

ICD-10-R00.1



BASIC EVALUATION

HISTORY

- Syncope/ presyncope: frequency, associated fall/ injury/ incontinence
- Exertional angina or known coronary artery disease
- Known hypothyroidism or kidney disease
- On beta-blockers, Calcium Channel Blockers or digoxin
- Patient with an implanted pacemaker or other device
- Yellow oleander poisoning

EXAMINATION

- Drowsiness/ impaired consciousness
- BP, heart rate

TESTS TO BE DONE

- Patient presenting to PHC/CHC:**
- 12-lead ECG
 - Blood urea, serum creatinine
 - Electrolytes
 - Blood sugar

EVALUATION AND TREATMENT OF UNSTABLE PATIENTS

1. TREATMENT OF ASSOCIATED CONDITIONS

- Hyperkalemia
- Suspected drug (BB or CCB) overdose:
 - i. Withhold the drug
 - ii. iv insulin (1 U/kg bolus followed by 0.5 U/kg/h) with glucose monitoring(or) iv glucagon if available

2. TEMPORARY PACEMAKER INSERTION

(iv dopamine or adrenaline may be given till the time TPI can be placed)

EVALUATION AND MANAGEMENT OF STABLE PATIENTS

Findings on 12-lead ECG

- Atrioventricular block
- Sinus node dysfunction
- Other conduction disorders with 1:1 AV conduction
- Non-diagnostic ECG

INDICATIONS FOR URGENT TREATMENT/REFERRAL

- Hypotension (SBP <90 mmHg), impaired consciousness or ongoing chest pain
- Recurrent or ongoing syncope/presyncope
- Associated headache with or without neurologic deficit (suspect intracranial event)
- Patient with a pre-existing device
- If ECG available, evidence of any of the following
 - Complete heart block
 - Sinus node disease with pauses >3 s long
 - Bradycardia (HR < 50 bpm) (with or without hyperkalemia, serum K > 5 mEq/L)

GENERAL APPROACH TO PATIENTS WITH SYMPTOMATIC BRADYCARDIA

1. Rule out associated conditions
 - Renal dysfunction, hyperkalemia
 - Drug toxicity (BB, CCB, clonidine, Lithium)
 - Sleep apnea (clinical scoring systems such as Epworth Sleepiness Scale may be used for initial assessment)

2. Transthoracic echocardiography

INDICATIONS FOR PERMANENT PACING

AV NODAL DISEASE

- Complete heart block, advanced AV block, or Mobitz Type II block
- Symptomatic patients with AV block other than above
- Associated neuromuscular disease

SINUS NODE DYSFUNCTION

- Symptomatic patients with sinus pauses > 3 s long with symptom correlation
- Asymptomatic patients with sinus pauses > 6 s long

OTHER CONDUCTION DISORDERS WITH 1:1 AV CONDUCTION

- Symptomatic patients with HV ≥100 ms on EPS
- Others (alternating BBB, infiltrative/ neuromuscular disease)

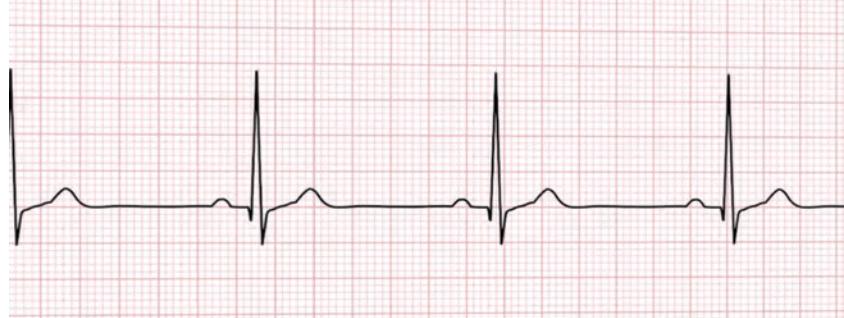
RECOMMENDED PACING MODES

1. SND with intact AV conduction
 - Atrial-based single or dual chamber pacing
 - VVI pacing is reasonable if symptoms are infrequent
2. AV node disease
 - VVI/Dual chamber pacing in patients with LVEF >50%
 - CRT (or HBP) in patients with LVEF 36-50% and requiring ventricular pacing >40% of the time
 - CRT (or HBP) if LVD <35%

ADDITIONAL TESTING

1. Advanced imaging (cMRI) may be needed if infiltrative disease is suspected
2. Ambulatory ECG may be needed
 - In patients with first or second degree AV block for symptom correlation
 - In patients with suspected sinus node disease for detection of pauses and symptom correlation
 - In symptomatic patients with LBBB or bifascicular block
3. Implantable Loop Recorder and EPS (consult published society guidelines)

ECG: SINUS BRADYCARDIA



ECG: THIRD DEGREE HEART BLOCK



Standard Treatment Workflow (STW) for the Management of HEART FAILURE: A BREATHLESS PATIENT

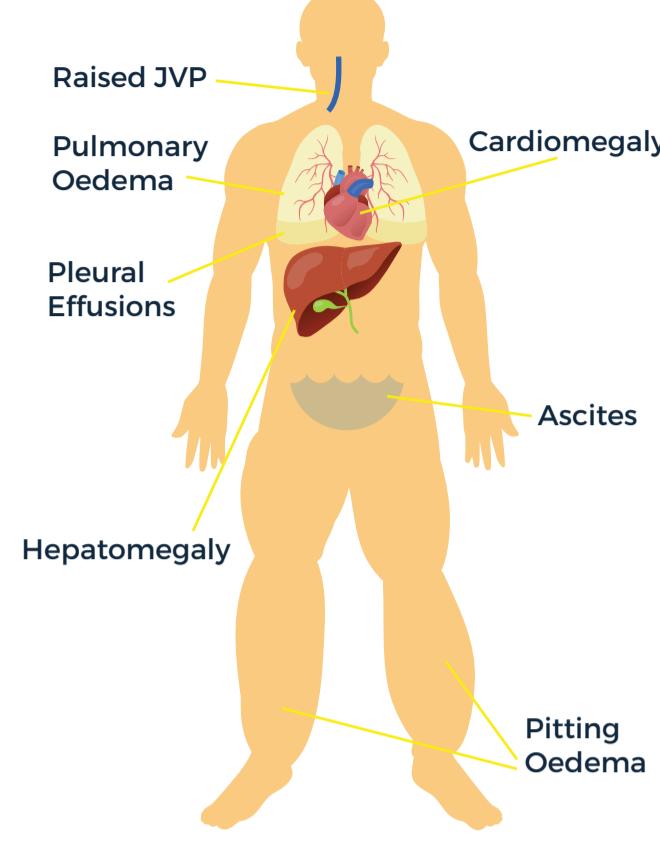
ICD-10-I50.9

SYMPOMTS

- 1. Dyspnea/ orthopnea/ PND
- 2. Pink frothy sputum
- 3. Dependent pedal edema
- 4. Recent weight gain
- 5. Easy fatigability
- 6. H/o CHF/ MI

SIGNS

- 1. Tachypnoea
- 2. Tachycardia or irregular pulse
- 3. Basal crepitations
- 4. Cardiomegaly
- 5. Presence of murmurs
- 6. Systemic desaturation

**ADDITIONAL INFORMATION**

- Prior history of respiratory illness like asthma or COPD
- Known patient of CHF/ similar illness in past with response to therapy
- Prior history of RHD, CAD, pregnancy, cancer chemotherapy
- Risk factors: HT, DM, smoking, hyperlipidemia or premature CAD in first degree relatives

COMMON ETIOLOGY AND INDICATORS

1. Ischemic cardiomyopathy: past MI
2. Diabetic cardiomyopathy
3. RHD: existing valvular disease
4. Post-viral: acute onset breathlessness within last 3 months
5. Peri-partum cardiomyopathy-onset in last trimester or after delivery
6. Idiopathic cardiomyopathy
7. Post-cancer chemotherapy

MANAGEMENT AT PHC

- Rule out respiratory cause: Breathlessness with fever, cough and expectoration or known patient of asthma or COPD
- Likely CHF: Decongest with furosemide

REFER IF FOLLOWING:

- BP < 90 mmHg or > 200 mmHg
- Heart rate < 50/min or > 120/min
- Respiratory rate > 30/min or cyanosis
- Oliguria
- Altered sensorium

REFER TO COMMUNITY HEALTH CENTRE**MANAGEMENT AT CHC**

- Admit and stabilize
- Send for routine investigations
- ECG: Rule out acute ST-Elevation MI
- X-ray chest: Rule out respiratory etiology
- Decongest with intravenous furosemide
- O2 therapy if systemic saturation < 90%
- Start enalapril and spironolactone orally
- Consider carvedilol after decongestion

MANAGEMENT AT DISTRICT HOSPITAL

- Admit and re-assess
- Optimise therapy with furosemide/ enalapril/ spironolactone/ O2 and stabilize
- Consider non-invasive ventilation if marked respiratory distress and O2 saturation < 90%
- Echocardiography: confirm diagnosis of HFrEF: LV ejection fraction < 35%
- Search for etiological diagnosis
- Consider carvedilol after decongestion
- Refer back to CHC/ PHC after stabilization

REFER TO A DISTRICT HOSPITAL**KEEP WATCHING**

1. Respiratory distress and oxygen saturation
2. BP and heart rate
3. Electrolytes and renal parameters

REFER TO TERTIARY CARE IF

- CHF uncontrolled,
- Unstable hemodynamics
- Suspected ongoing ischemia
- Abnormal electrolytes
- Abnormal renal functions
- Structural heart disease
- Unclear etiology

MANAGEMENT AT TERTIARY HOSPITAL

1. Re-assess and confirm diagnosis of HF
2. Categorize acute (< 3 months) vs chronic (> 3 months) and HFrEF (EF 35%) vs HFpEF (EF 35-50%)
3. Optimize therapy with furosemide, enalapril, carvedilol, spironolactone and O2
4. Consider ARNI and ivabradine
5. Pneumococcal and influenza vaccines
6. Investigate for etiology and manage
7. Consider non-pharmacological invasive therapy
 - a. ICD: In selected patients (Ref Arrhythmia STW)
 - b. BiV: Consider in NYHA class II/ III Symptomatic patient , EF <35%, QRS >150msec in sinus rhythm with LBBB morphology and optimal medical therapy of >3 months
8. Etiology based Interventions
 - a. PCI
 - b. Valve replacement
 - c. CABG

CONSIDER AT ALL LEVELS

Smoking Cessation

Salt restriction

Physical activity

Weight Reduction

Moderation of alcohol

Control of DM/ HTN/ Lipids

Secondary CVD prevention with aspirin and statins

INVESTIGATIONS:**BASIC INVESTIGATIONS**

- Hemogram, ESR
- Blood sugar
- Urine examination
- Urea/ Creatinine
- Sodium/ Potassium
- ECG
- Chest X-ray PA view

WHAT TO LOOK FOR IN X RAY

- Cardiomegaly
- Pulmonary venous congestion
- Pneumonia or other lung pathology

WHAT TO LOOK FOR IN AN ECG?

- Pathological Q wave
 - Conduction abnormalities, especially LBBB
 - Chamber enlargement
 - Atrial fibrillation
- Note: If ST elevation present, manage as STEMI

DESIRABLE INVESTIGATIONS

- 2D Echocardiography
- BNP/NT pro-BNP
- Troponin
- Lipid profile
- Thyroid function test
- Iron profile

OPTIONAL INVESTIGATION

- Prolonged ECG monitoring
- Coronary angiography
- Radionuclide imaging
- CT scan
- MRI
- PET
- Myocardial biopsy
- Electrophysiological study

COMMON DRUGS AND DOSAGE FOR CHF**CARVEDILOL**

- Dose 3.125 to 25 mg twice daily PO
- Start after decongestion with low dose with BP > 100 mmHg and HR > 60/ min
- Uptitrate dose 1-2 weekly till maximum tolerable dose
- Keep watch on BP, heart rate and recitation of CHF symptoms
- Increase diuretics and reduce carvedilol to manage reappearance of CHF

ENALAPRIL

- Dose 2.5 to 10 mg twice daily PO
- Start with low dose with BP > 100 mmHg, normal electrolyte and creatinine less than 2.5 mg/dl
- Uptitrate dose 1-2 weekly till maximum tolerable dose
- Keep watch on BP and electrolytes before every increment and on follow-up

KEEP A HIGH THRESHOLD FOR INVASIVE PROCEDURES**ABBREVIATIONS**

- ICD:** Implantable Cardioverter defibrillator
BiV: Bi-Ventricular Pacing
PND: Paroxysmal Nocturnal Dyspnea

PCI: Percutaneous Coronary Intervention**CABG:** Coronary Artery Bypass Graft**CVD:** Cardiovascular Diseases**RHD:** Rheumatic Heart Disease**CAD:** Coronary Artery Disease**HFrEF:** Heart Failure with reduced Ejection Fraction**HFpEF:** Heart Failure with preserved Ejection Fraction**STEMI:** ST elevation Myocardial Infarction**LV:** Left Ventricle**COPD:** Chronic Obstructive Pulmonary Disease**REFERENCES**

1. Management Protocols for Chronic Heart Failure in India. Mishra S, Mohan JC, Nair T et al. Indian Heart J. 2018;70:105-127.
2. ESC Guidelines for the diagnosis and treatment of acute and chronic heart failure: The Task Force for the diagnosis and treatment of acute and chronic heart failure of the European Society of Cardiology (ESC). Developed with the special contribution of the Heart Failure Association (HFA) of the ESC. Ponikowski P, Voors AA, Anker SD et al. European Heart Journal. 2016;37:2129-2200
3. Chronic heart failure in adults: diagnosis and management. NICE guideline [NG106] Published date: September 2018
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Standard Treatment Workflow (STW) for the Management of STABLE ANGINA

ICD-10-I20.9

PATIENT PRESENTING WITH CHEST PAIN



CONSIDER ANGINA IF

- Diffuse retrosternal pain, heaviness or constriction, radiating to arms or neck or back
- Associated with sweating
- Easily reproduced with post-meal exertion
- Consider atypical presentation: Exertional fatigue or breathlessness or profuse sweating or epigastric discomfort

Likelihood more if known patient of CAD

ANGINA UNLIKELY IF

- Variable location or characteristic
- Long lasting (hours to days) or short lasting (less than a minute)
- Restricted to areas above jaw or below epigastrium
- Localized to a point
- Pricking or piercing or stabbing type of pain
- Precipitated by movement of neck or arms or respiration

CATEGORIZE ANGINA

ACUTE CORONARY SYNDROME

- Angina at rest or lasting more than 20 minutes
- Recent worsening of stable angina (crescendo) to CCS class III
- New onset effort angina of less than 1 month in CCS class II/ III
- Post infarction angina

For management: refer to STEMI/ NSTEMI STW

STABLE ANGINA

Any effort related pain fitting in previous category, relieved by rest or NTG in 1-2 min

STABLE ANGINA: GENERAL MANAGEMENT

1. Manage factors potentaiting angina
 - Anemia, Thyrotoxicosis, Pregnancy, febrile illness
 - Hypertension, Ventricular hypertrophy, CHF
 - Tachy or brady-arrhythmia
 - Drugs : bronchodilators, steroids
2. Risk factor control
3. Other atherosclerotic CV disease : PVD, stroke
4. Secondary prevention : Statins, BB, ACE-I

INVESTIGATIONS

ESSENTIAL INVESTIGATIONS

1. Hemogram
2. Urea, Creatinine, Electrolytes
3. Sugar, HbA1C
4. Lipids
5. Liver function test
6. ECG
7. Plain X-ray chest

DESIRABLE INVESTIGATIONS

1. Echocardiography
2. Exercise Treadmill Test
3. Thyroid Function Test
4. Iron profile
5. Uric acid

OPTIONAL INVESTIGATIONS

1. Stress radionuclide/ echocardiographic imaging
2. CT scan including multi-slice coronary angiography
3. Coronary Angiography
4. Coronary Fractional Flow Reserve
5. Intra-vascular Ultrasound/ OCT

MANAGEMENT

MANAGEMENT AT PHC/ CHC LEVEL

1. Control angina : Metoprolol
Add nitrates if symptoms not controlled
2. ECG for Q waves, ST - T changes, BBB or chamber enlargement
3. Aspirin & high intensity statins
4. Refer to higher centre electively

MANAGEMENT AT DISTRICT HOSPITAL LEVEL

1. Optimise anti-anginal treatment
2. Echocardiography for LV function or structural heart disease
3. Risk stratify by exercise treadmill test in low, intermediate or high risk (DUKE risk score) for cardio-vascular events , if patient is ambulatory and ECG is interpretable
4. Refer to tertiary centres if:
 - Angina uncontrolled on optimal medical therapy
 - Echo reveals abnormality
 - Non-ambulatory patient or un-interpretable ECG
 - High risk on exercise stress test for possible re-vascularization

MANAGEMENT AT TERTIARY LEVEL

1. Reassess and optimise drug therapy: If uncontrolled choose from trimetazidine, nicorandil ranolazine and ivabid
2. Risk stratify with exercise treadmill test if not already done
3. Stress imaging if following:
 - Non ambulatory patient
 - Abnormal or uninterpretable baseline ECG
 - Exercise treadmill test result is equivocal
 - Compromised LV function

RISK CATEGORIZATION

Based on clinical features, GRACE score & TIMI score

A. Very high:

- Acute LVF
- Hypotension
- Uncontrolled Ventricular arrhythmia
- Severe MR

B. High Risk:

- GRACE score > 140 or TIMI score >4

C. Intermediate Risk:

- GRACE score 109-140 or TIMI score 2-3

D. Low Risk:

- Grace score <108 or TIMI score 0-1

RISK CATEGORY MANAGEMENT

Low/ Intermediate Risk Group

1. Optimal anti-anginal therapy
2. Follow up 3-6 monthly at primary/ secondary care centre
3. Refer to tertiary centre when change in symptomatic status

High Risk Group

1. Discuss pros and cons of possible revascularization and dual anti-platelet therapy
2. Angiography, if any of following
 - Angina not controlled on optimal medical therapy
 - High risk on non-invasive testing
 - Cardiac arrest survivor or documented VT

REVASCULARIZATION

1. Revascularize if anatomy is suitable
2. Prefer CABG over PCI in DM with multivessel disease or left main disease
3. Complete re-vascularization is preferable
4. Use invasive functional and imaging modalities (FFR, IVUS, OCT) when indicated
5. Stress on continuing dual anti-platelets (aspirin and clopidogrel) after PCI

DRUGS & DOSAGE

Anti-platelets

1. Aspirin 75 mg OD
2. Clopidogrel 75 mg OD (if intolerant to aspirin)

Statins:

- Atorvastatin: 40-80 mg OD
- Rosuvastatin: 20-40 mg OD

Ace-inhibitor

- Ramipril: 2.5-10 mg OD
- Enalapril: 2.5-10 mg BD

Anti-ischemic:

1. Metoprolol:
 - Short acting: 25-100 mg BD
 - Long acting: 25 -100 mg OD
2. Nitrates:
 - Isosorbide mono-nitrate: 20 to 60 mg in 2 devided dose
 - Nitroglycerine sustained release: 2.6 to 6.5 mg BD
3. Calcium channel blockers:
 - Verapamil 40-80 mg TDS
 - Diltiazem 30 to 90 mg TDS
4. Nicorandil: 5-10 mg BD
5. Ranolazine: 500 -1000 mg BD
6. Trimetazidine: 20 mg mg TDS

KEEP A HIGH THRESHOLD FOR INVASIVE PROCEDURES : STRENGTHEN SECONDARY PREVENTION WITH STATINS, BB & ACE-I

Standard Treatment Workflow (STW) for the Management of ST ELEVATION MYOCARDIAL INFARCTION (STEMI)

ICD-10-I21.3



CONSIDER ANGINA IF

- Diffuse retrosternal pain, heaviness or constriction
- Radiation to arms or neck or back
- Associated with sweating
- Easily reproduced with post-meal exertion
- Consider atypical presentation: Exertional fatigue or breathlessness or profuse sweating or epigastric discomfort/syncope

More likelihood if known patient of CAD/multiple risk factors

ACUTE CORONARY SYNDROME:

1. Angina at rest or lasting more than 20 minutes
2. Recent worsening of stable angina (crescendo) to CCS class III
3. New onset effort angina of less than 1 month in CCS class II/III
4. Post infarction angina

ECG: If ST Elevation: Follow ST Elevation MI (STEMI) protocol
If no ST Elevation: UA/NSTEMI

ANGINA UNLIKELY IF:

Variable location or characteristic	Long lasting (hours to days) or short lasting (less than a minute)	Restricted to areas above jaw or below epigastrium	Localized to a point	Pricking or piercing or stabbing type of pain	Precipitated by movement of neck or arms or respiration
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PATIENT WITH STEMI WITHIN 12 HOURS

ECG REVEALS ST ELEVATION MI*

Refer to primary angioplasty/thrombolysis capable hospital

*Includes new onset LBBB

GENERAL MEASURES

1. Admit in ICU equipped with continuous ECG monitoring & defibrillation
2. Routine bio-chemistry and serial cardiac enzymes (troponin)
3. Pain relief by opioid
4. O₂ if saturation less than 90%
5. Aspirin 325 mg, Clopidogrel 300 mg and Atorvastatin 80 mg
6. Echocardiography, particularly for mechanical complication

PCI CAPABLE HOSPITAL

1. Proceed for PCI
2. Radial route preferred
3. Preferably within 90 minutes

DURING PROCEDURE

1. Use unfractionated heparin
2. No routine thrombectomy
3. Tackle culprit artery only unless shock
4. DES to be preferred

POST PROCEDURE

1. Continue dual antiplatelets for at least 1 year

PCI INCAPABLE CENTRE

A. Transfer to PCI capable hospital if PCI can be performed within 120 min

B. If Transfer to PCI capable hospital not feasible

THROMBOLYSE

1. Within 12 hours of symptom onset, if no contra-indication
2. Preferably with fibrin specific agent Tenecteplase/TPA/ Reteplase or Streptokinase, if fibrin-specific are unavailable
3. Therapy to be started within 10 min preferably

POST THROMBOLYSIS

1. ECG to be done at 60-90 min after starting thrombolysis to assess whether thrombolysis is successful (>50% ST resolution with pain relief) or not
2. If successful, transfer patient for PCI within 3-24 hours
3. If thrombolysis failed, transfer patient immediately for PCI capable hospital
4. Enoxaparin (preferred over unfractionated heparin) to be continued till PCI OR discharge

LOOK FOR OTHER CAUSES OF CHEST PAIN (ONGOING OR WITHIN 12 HRS)

Unequal or absent peripheral pulses

Dissection of Aorta

Respiratory evaluation

Pleuritis/ Pneumonitis/ embolism/ pneumothorax

Pericardial rub

Neuralgia or herpes

PATIENT WITH STEMI IN 12-24 HOURS

Transfer to PCI capable hospital immediately

If ongoing pain, thrombolysis and transfer immediately

PATIENT WITH STEMI AFTER 24 HOURS

Angiography with a view to PCI only if any of following/ Contra indications of angiography:

Recurrent anginal pain not controlled by medical therapy

Cardiogenic shock

Acute LVF

Mechanical complication

Dynamic ST-T changes

Life threatening ventricular arrhythmias

ABSOLUTE CONTRA-INDICATIONS TO THROMBOLYTIC THERAPY:

Previous intra-cerebral hemorrhage or stroke of unknown etiology	Ischemic stroke in last 6 months	CNS neoplasm or AV malformation	Recent (within 1 month) major trauma/ surgery/ head injury	Recent (within 1 month) major GI bleed	Known bleeding tendency (except menstrual bleed)	Aortic dissection	Severe uncontrolled hypertension
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DRUGS & DOSAGE

Anti-platelets

1. Aspirin: Loading dose 325 mg followed by 75 mg OD
2. Clopidogrel: Loading dose 300 mg followed 75 mg OD
3. Prasugrel: Loading dose 60 mg followed by 10 mg OD
4. Ticagrelor: Loading dose 180 mg followed by 90 mg BD

Anti-ischemic:

Metoprolol:
Short acting: 25-100 mg BD
Long acting: 25 -100 mg OD

Nitrates:
Isosorbide mono-nitrate 20 to 60 mg in 2 divided dose
Nitroglycerine sustained release 2.6 to 6.5 mg BD
Nitroglycerine IV 5-25 mcg/ min infusion

Statins:

High dose Atorvastatin 80 mg OD

ACE-inhibitor

Ramipril 2.5 -10 mg OD
Enalapril 2.5 -10mg BD

Oxygen:

If oxygen saturation below 90%

Morphine:

Titrated in a dose of 2-4 mg IV every 15 minutes

Beta-blocker:

Oral beta-blocker if LVEF is less than 40%

STEMI DIAGNOSIS*

Anti thrombotics:

1. Unfractionated heparin: Bolus of 60 U/Kg (maximum 5000 U) followed by 12 U/Kg hourly infusion to maintain APTT at 50-70 sec
2. Enoxaparin: 1 mg/Kg SC 12 hrly

Thrombolytic Therapy:

Tenecteplase

35 mg IV bolus if 60-70 Kg
40 mg IV bolus if 70-80 Kg
45 mg IV bolus if more than 80 Kg

Reteplase

10 mg IV bolus, repeat after 30 min

Alteplase

15 mg IV bolus followed by 0.75 mg/Kg over 30 min upto 50 Kg weight, then 0.5 mg/Kg over 60 min up to 35 mg

Streptokinase

1.5 million units IV over 60 min

↓

Primary-PCI capable centre

↓

Primary PCI

Preferably <60 mins

↓

Rescue PCI

↓

Immediately

↓

No

Yes

↓

Successful fibrinolysis

↓

Immediate fibrinolysis

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Coronary angiography

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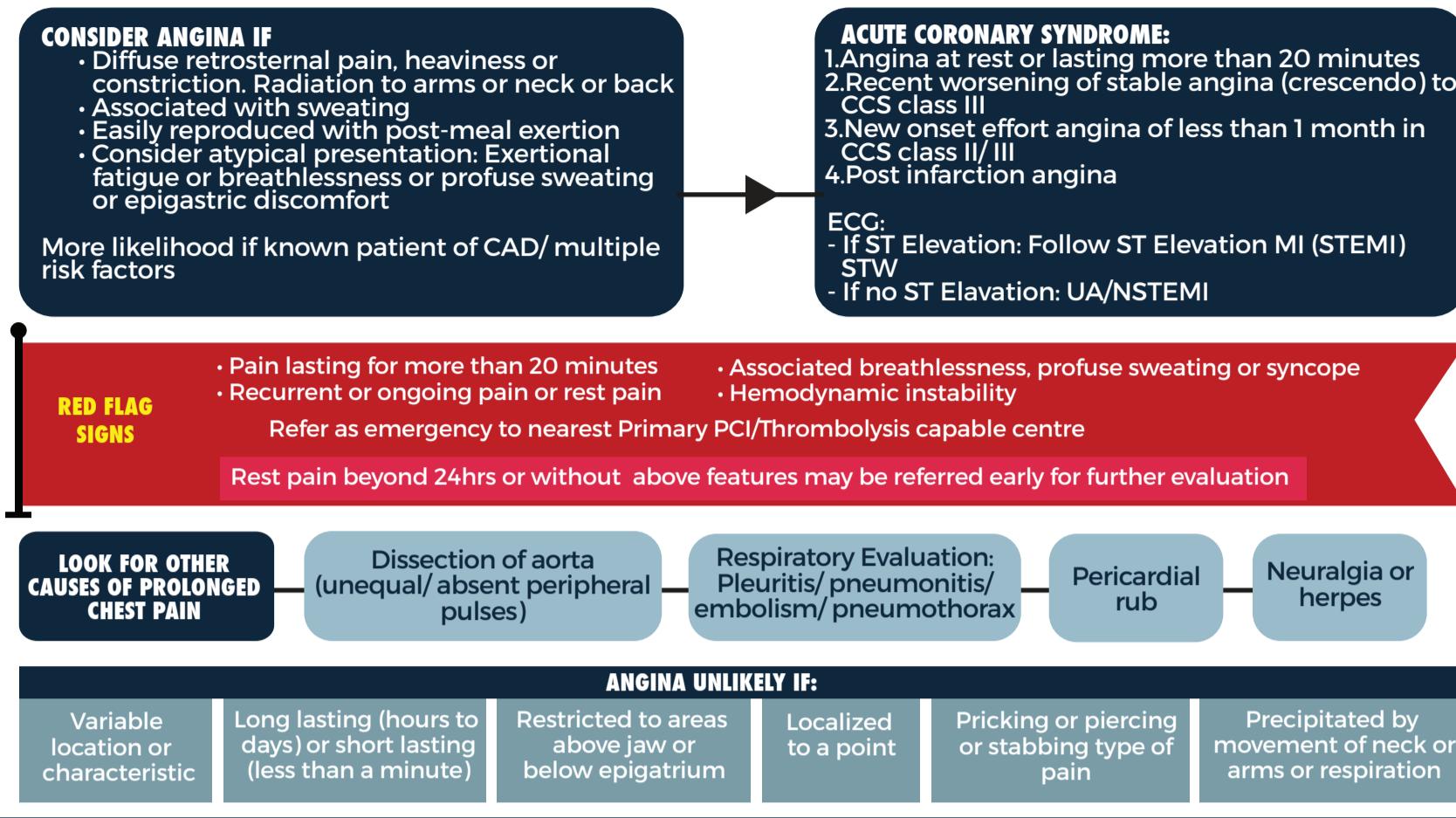
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Standard Treatment Workflow (STW) for the Management of UNSTABLE ANGINA/ NSTEMI

ICD-10-I20.0



ANGINA UNLIKELY IF:					
Variable location or characteristic	Long lasting (hours to days) or short lasting (less than a minute)	Restricted to areas above jaw or below epigastrium	Localized to a point	Pricking or piercing or stabbing type of pain	Precipitated by movement of neck or arms or respiration

MANAGEMENT

PHC / CHC LEVEL

- ECG, Troponin.
- Start
 - Aspirin, Clopidogrel
 - Heparin/ LMWH
 - High dose atorvastatin
 - Metoprolol
- Risk stratify GRACE score or TIMI score
 - Refer High/ Intermediate risk to PCI capable centre
 - Refer Low risk for further evaluation to DH
- Refer to PCI capable centre if:
 - Acute LVF
 - Hypotension
 - Systolic murmur
 - Arrhythmia

DISTRICT HOSPITAL

- Admit in ICU equipped with ECC monitoring and defibrillator
- Troponin & bio-chemistry if not done
- Serial ECG & echocardiography
- Continue Aspirin, Clopidogrel, Heparin & Metoprolol
- Add nitrates if needed
- Management for different risk categories:
 - Very high, High or Intermediate risk or LVEF <40%: Refer for revascularization
 - Low risk patients: Conservative management Life style modification Risk factor control Secondary prevention

TERTIARY CENTRE

- Admit, reassess clinically and monitor in ICCU
 - Continue aspirin and heparin
 - Load with clopidogrel or prasugrel or ticagrelor if not already done
 - Optimal medical therapy to continue (BB, high dose atorvastatin, ACE-inhibitors, intra-venous nitrates if ongoing pain, severe MR or LVF)
 - Detailed echocardiography
 - Low risk patients may undergo non-invasive risk stratification with exercise stress test, CT coronary angiography or stress imaging
 - Very high risk, high risk and intermediate risk patients may be subjected to coronary revascularization
- Revascularization:**
- Discuss pros & cons of re-vascularization and prolonged dual anti-platelet therapy
 - Revascularize if anatomy is suitable
 - Prefer CABG over PCI in DM with multivessel disease or left main disease
- Revascularization strategy:**
- Very High risk: Urgent re-vascularization (within few hours) after loading preferably with Ticagrelor or prasugrel if PCI is planned
 - High risk patients: Early revascularization (within 24 hours)
 - Intermediate risk patients: Revascularization (within 72 hours)
 - Continue Dual anti-platelets in patients undergoing PCI for atleast 12 months in DES and for 3 months in BMS

1. GRACE SCORE:

Killip Class	Points	SBP1 mm Hg	Points	Heart rate Beats/ min	Points	Age. y	Points	Creatinine Level, mg/ dL	Points
I	0	<80	58	≤50	0	≤30	0	0-0.39	1
II	20	80-99	53	50-69	3	30-39	8	0.40-0.79	4
III	39	100-119	43	70-89	9	40-49	25	0.80-1.19	7
IV	59	120-139	34	90-109	15	50-59	41	1.20-1.59	10
		140-159	24	110-149	24	60-69	58	1.60-1.99	13
		160-199	10	150-199	38	70-79	75	2.00-3.99	21
		≥200	0	≥200	46	80-89	91	>4.0	28
						≥90	100		

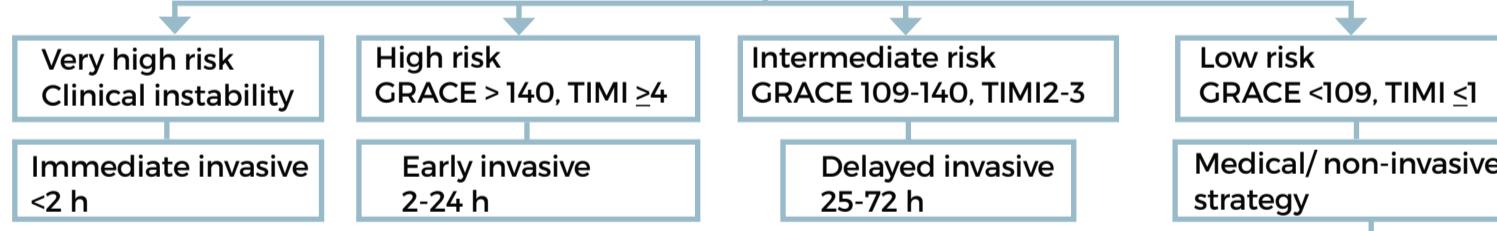
2. TIMI SCORE:

- One point for each of following
- Age >65 yrs
 - More than 3 risk factors
 - Known CAD (>50% lesion)
 - Recurrence of angina in 24 hrs
 - Aspirin use within 7 days
 - ST deviation >0.5 mV
 - Raised cardiac markers
- Sum total = TIMI score of patient

Other risk factors	Points
Cardiac arrest at admission	39
ST-Segment Deviation	28
Elevated Cardiac Enzyme Levels	14

Sum Total= GRACE score of patient

UNSTABLE ANGINA OR NSTEMI DIAGNOSIS



INVESTIGATIONS

ESSENTIAL INVESTIGATIONS

- Hemogram
- Creatinine
- Sugar, HbA1C
- Fasting lipids
- ECG
- Troponin T/ Troponin I
- Plain X-ray chest

DESIRABLE INVESTIGATIONS

- Echocardiography
- Exercise Treadmill Test
- C reactive protein
- B-Natriuretic Peptide
- D dimer
- Bleeding and coagulation profile
- Liver function test
- Coronary Angiography

OPTIONAL INVESTIGATIONS

- Stress Radionuclide/ echocardiographic imaging
- CT scan including coronary angiography
- MRI
- Coronary Fractional Flow Reserve
- Intra-vascular Ultrasound
- VQ scan

UA/NSTEMI: RISK CATEGORIZATION:

Based on clinical features, GRACE score & TIMI score

- Very high risk:
 - Acute LVF
 - Hypotension
 - Uncontrolled Ventricular arrhythmia
 - Severe MR
- High Risk:
 - GRACE score > 140 or TIMI score >4
- Intermediate Risk:
 - GRACE score 109-140 or TIMI score 2-3
- Low Risk:
 - Grace score <108 or TIMI score 0-1

UA/NSTEMI: RISK CATEGORY MANAGEMENT:

- Low risk:
 - Conservative management: Aspirin, clopidogrel, BB and statin
 - TMT if ambulatory patient within a week to risk stratify
 - Refer low risk for re-vascularization if
 - Recurrent pain
 - Hemodynamic deterioration
 - New ECG change
- Intermediate/ Very High/ High risk: Re-vascularization

Anti-platelets

- Aspirin: Loading dose 325 mg followed by 75 mg OD
- Clopidogrel: Loading dose 300 mg followed 75 mg OD
- Prasugrel: Loading dose 60 mg followed by 10 mg OD
- Ticagrelor: Loading dose 180 mg followed by 90 mg BD

Anti-thrombotics:

- Enoxaparin: 1 mg/Kg SC 12 hrly
- Unfractionated heparin: Bolus of 60 U/Kg (maximum 5000 U) followed by 12 U/Kg hourly infusion to maintain APTT at 50-70 sec

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Statins:

- High dose Atorvastatin 80 mg OD

Ace-inhibitor

- Ramipril 2.5 -10 mg OD

- Enalapril 2.5-10 mg BD

KEEP A HIGH THRESHOLD FOR INVASIVE PROCEDURE

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