



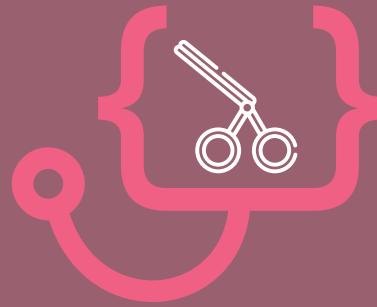
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Department of Health Research

Ministry of Health and Family Welfare, Government of India



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2019 Edition, Vol. I

STANDARD TREATMENT WORKFLOWS *of India*

PARTNERS

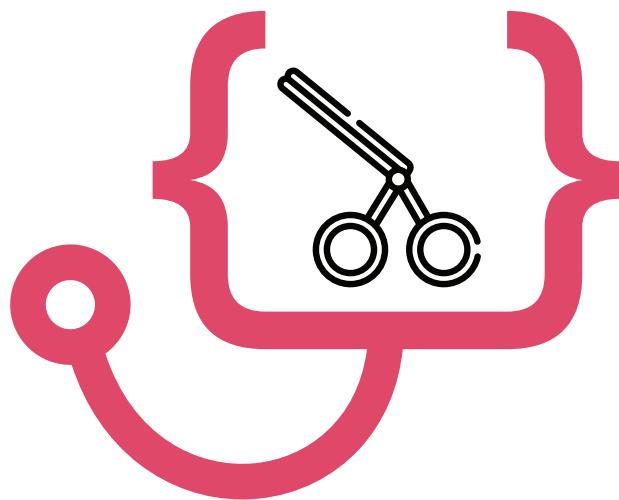


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STANDARD
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- **CARDIOLOGY**
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 - HEART FAILURE
 - STABLE ANGINA
 - STEMI
 - UNSTABLE ANGINA/ NSTEMI



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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

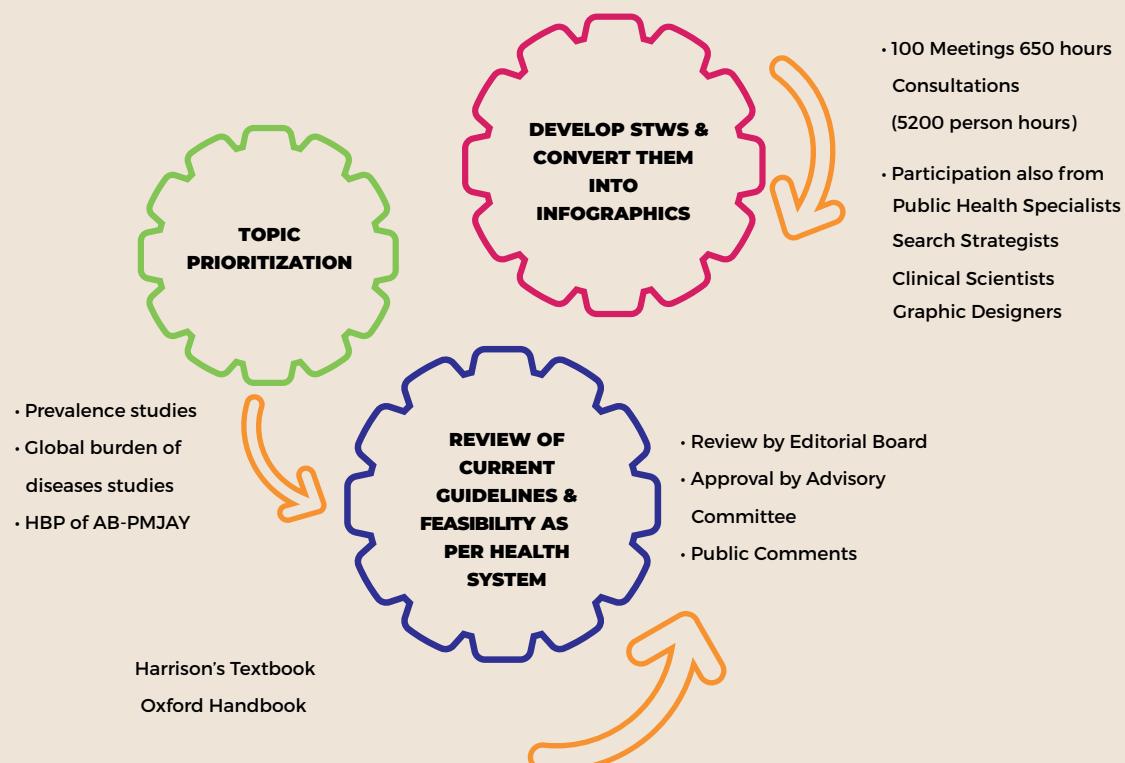
Secondary Objective:

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) ATRIAL FIBRILLATION ICD-11-BC81.31

WHEN TO SUSPECT ?



SYMPTOMS

- Rapid rate palpitations with or without
- 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

CHA ₂ DS ₂ -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
Maximum Score	9

OAC if score >1

BLEEDING RISK SCORE

HAS-BLED	SCORE
- Hypertension i.e. uncontrolled BP	1
- Abnormal renal/ liver function	1 or 2
- Stroke	1
- Bleeding tendency or predisposition	1
- Labile INR	1
- Age (e.g. >65)	1
- Drugs (e.g. concomitant aspirin or NSAIDs or alcohol)	1
Maximum Score	9

Bleeding Risk High in score >3

CHOICE OF ANTI-COAGULATION

- Direct oral anticoagulants (DOAC)
- Aim for INR 2-3
- Assess risk of bleeding
- Take measures to reduce/ modify risk of bleeding
- VKA only if severe M.S or metallic valve

MEASURES TO REDUCE HIGH BLEEDING RISK

- Control SBP to less than 140 mmHg
- Avoid dietary indiscretions
- Avoid concomitant aspirin, anti platelets, NSAIDs
- Avoid alcohol
- Correct anemia

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**
- Detailed clinical evaluation
 - Basic investigations
 - Careful ECG evaluation
 - Start OAC
 - Start Metoprolol/Diltiazem/Verapamil if HR >110/min & no evidence of CHF
 - Refer if indicators for early intervention
- AT DISTRICT HOSPITAL**
- 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 (Oral Anticoagulant)
 - Control HR by single drug or combination of BB & Ca Blocker
- Refer HR uncontrolled or CHF or angina
- AT TERTIARY CENTRE**
- Re-assess clinical status, need and adequacy of OAC
 - Start NOAC (Non-Vitamin K antagonist Oral Anticoagulants)
 - 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

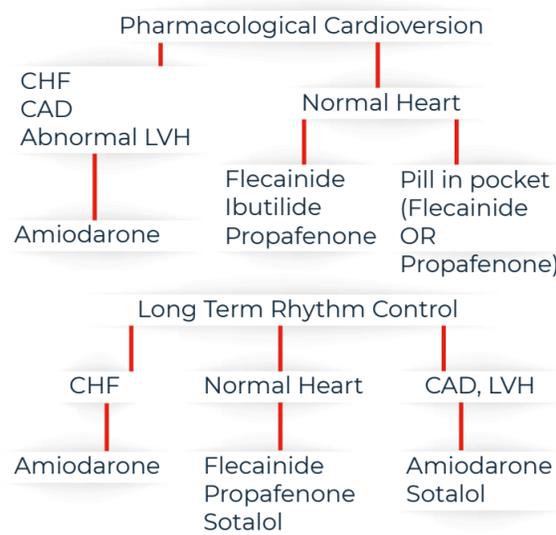
INVESTIGATIONS

- BASIC INVESTIGATIONS**
- Hemograms
 - Blood sugar, Creatinine
 - Electrolytes
 - 12 lead ECG
- DESIRABLE INVESTIGATIONS**
- Plain X-ray chest
 - Thyroid evaluation
 - Liver function test
 - Troponins
 - Prothrombin time, INR (Coagulation profile)
 - Echocardiography
- OPTIONAL INVESTIGATIONS**
- Prolonged ECG monitoring
 - Trans-esophageal echocardiography
 - Exercise Stress Test
 - CT scan
 - MRI
 - EP study
 - Coronary angiography

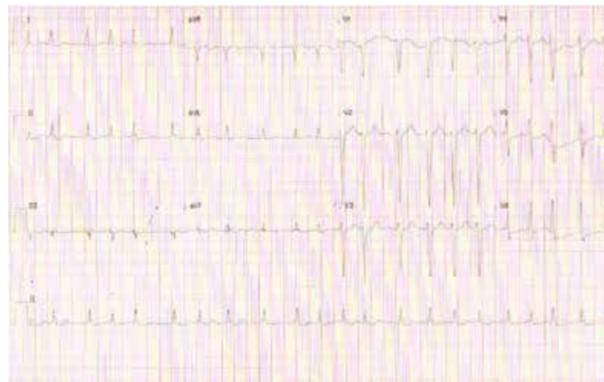
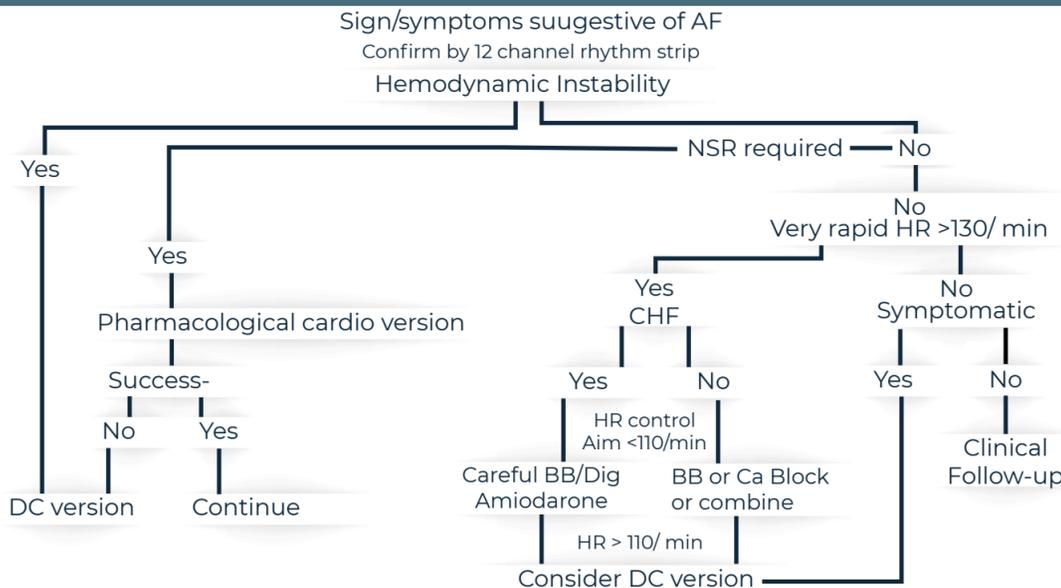
WHAT TO LOOK FOR IN ECG ?

- Ventricular rate
- Chamber enlargement
- Pre-excitation
- Prior MI
- Bundle branch block
- QT interval

RHYTHM CONTROL



MANAGEMENT ALGORITHM



Anti-coagulants in all Except

- Limited period with reversible etiology
- Score <2

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- VanGelder et al. 2024 ESC guidelines for the management of AF developed in collaboration with EACTS. European Heart J.2024;45,3314-3414

RESTORING RHYTHM, RESTORING FREEDOM

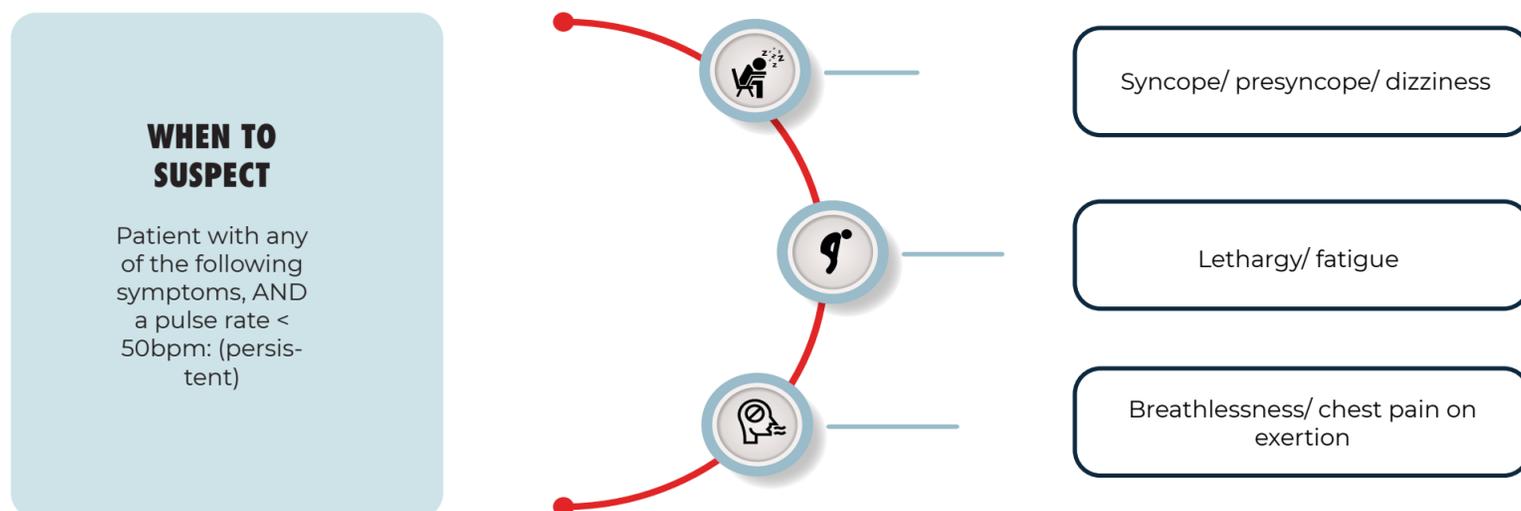
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Standard Treatment Workflow (STW)

BRADYARRHYMIAS IN SYMPTOMATIC PATIENTS

ICD-11-MC81.1



BASIC EVALUATION

HISTORY

- Syncope/presyncope: frequency, associated fall/ injury/incontinence
- Exertional angina or known coronary artery disease
- Sleep apnea
- Look for reversible cause like drugs
- 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
- TSH

EVALUATION AND TREATMENT OF UNSTABLE PATIENTS

1. TREATMENT OF ASSOCIATED CONDITIONS

- Hyperkalemia

- iv insulin (1 U/kg bolus followed by 0.5 U/kg/h) with glucose (or) iv glucagon if available

- Suspected drug (BB or CCB) overdose:

- Withhold the drug

2. TEMPORARY PACEMAKER INSERTION

(iv dopamine or isoprenaline 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 > 3s long with symptom correlation or heart rate <40/min during awake hours
- Asymptomatic patients with sinus pauses > 6s 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 conduction system pacing in patients with LVEF <40%

ADDITIONAL TESTING

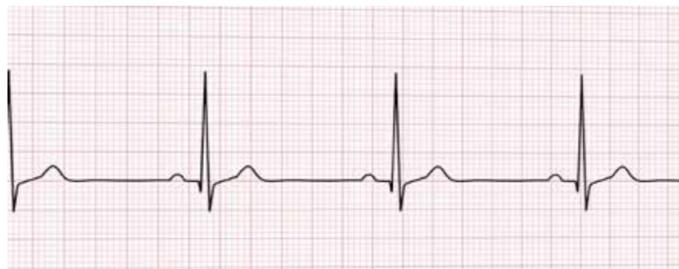
1. **Advanced imaging** (cMRI) may be needed if infiltrative disease is suspected

2. **Ambulatory ECG** may be needed

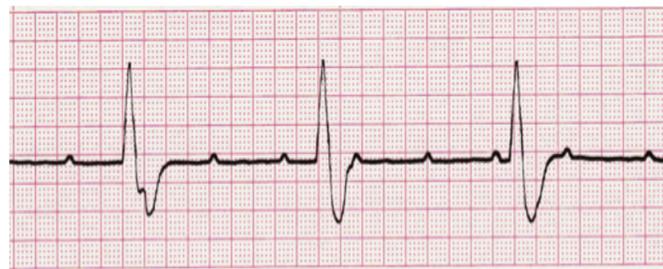
- In patients with first or second degree AV block for symptom correlation
- In patients with suspected sinus node disease for detection of pauses and symptom correlation
- In symptomatic patients with LBBB or bifascicular block

3. **Implantable Loop Recorder and EPS** (consult published society guidelines)

ECG: SINUS BRADYCARDIA



ECG: THIRD DEGREE HEART BLOCK



ABBREVIATIONS

BB: Beta Blocker

CCB: Calcium Channel Blockers

CMRI: Cardiac Magnetic Resonance Imaging

CRT: Cardiac Resynchronization Therapy

ECG: Electrocardiogram

LVEF: Left Ventricular Ejection Fraction

VVI: Velocity Vector Imaging

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1. Kusumoto FM et al. 2018 ACC/AHA/HRS guidelines on evaluation and management of patients with bradycardia & cardiac conduction delay. J Am Coll Cardiol(2019)74,e51-156
2. Glikson M et al. 2021 ESC guidelines on cardiac pacing and cardiac resynchronization therapy. European Heart J (2021)00,1-94

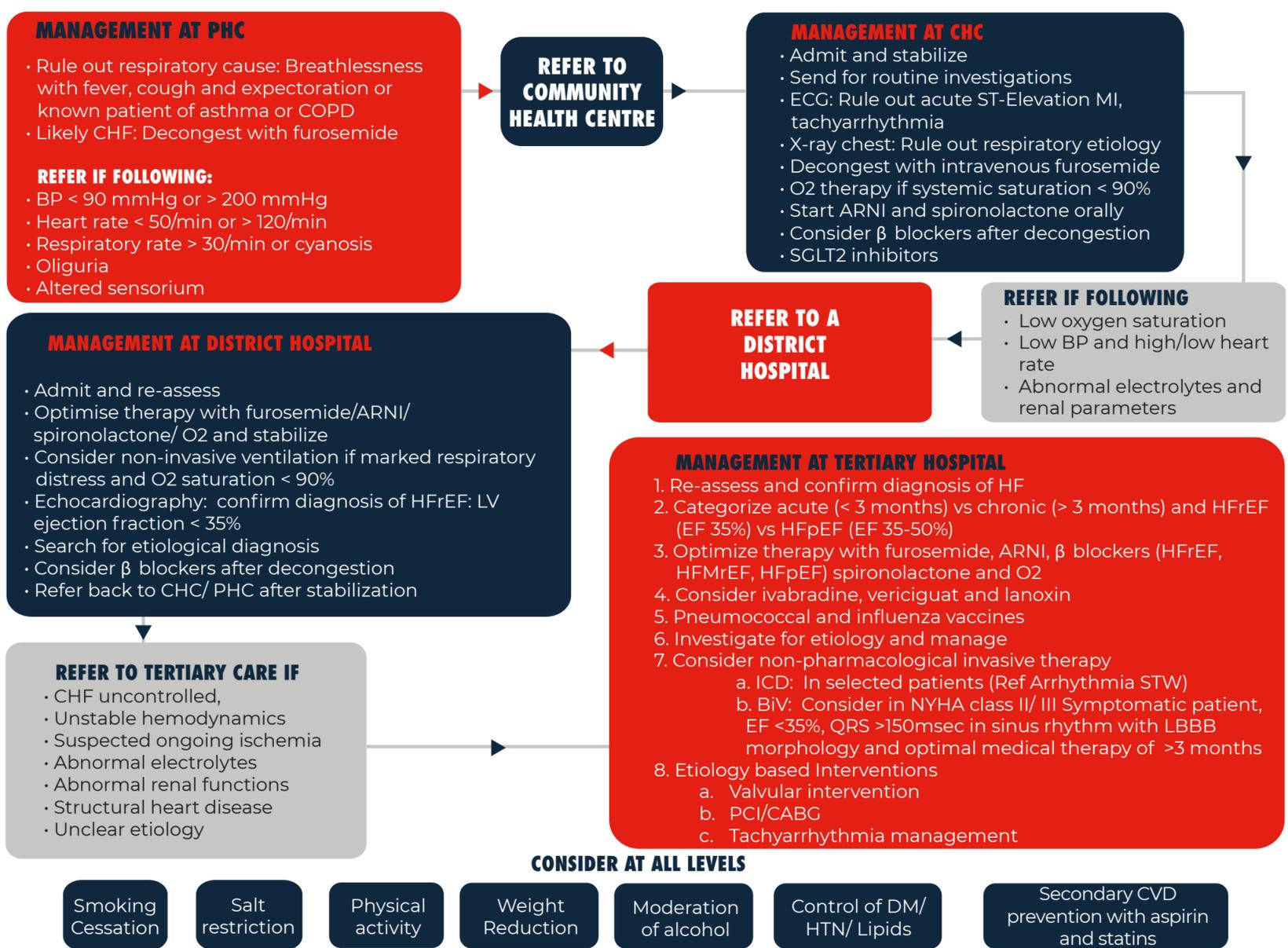
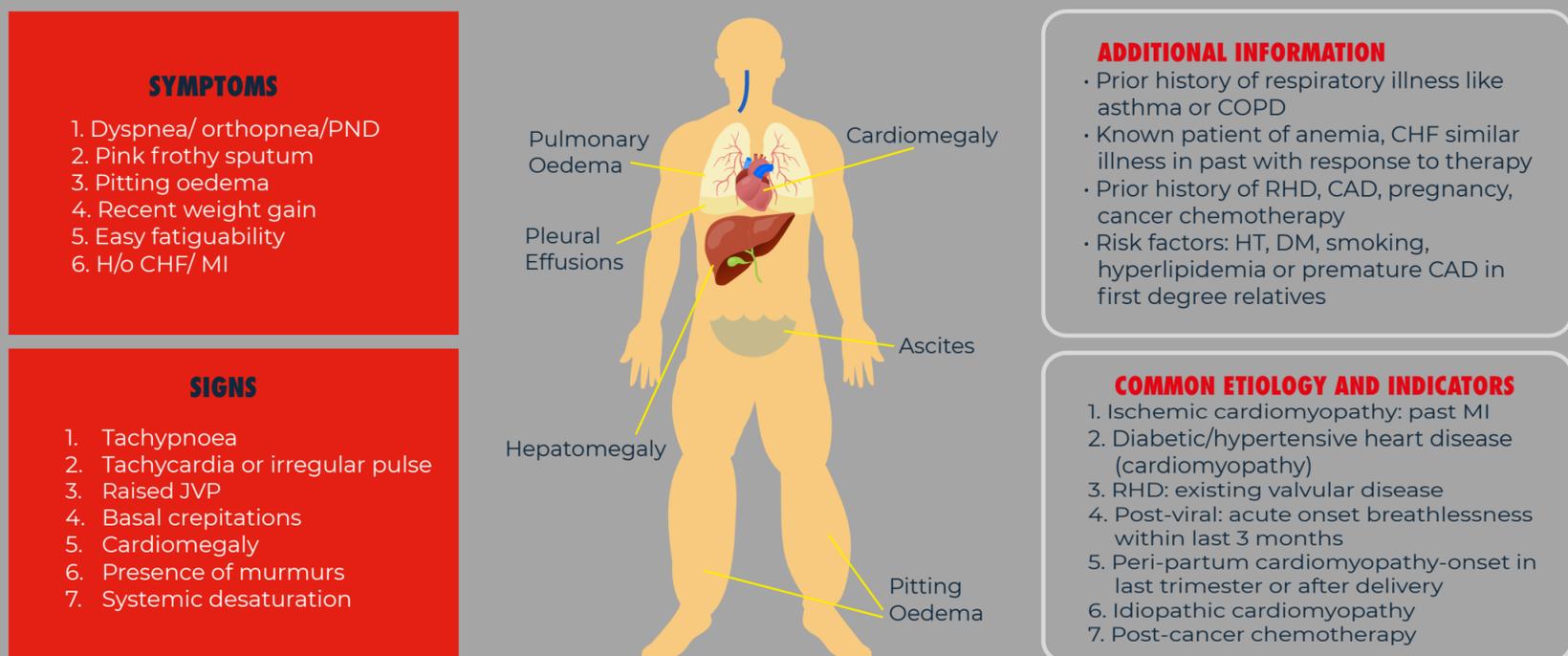
BRADYARRHYTHMIA MANAGEMENT: RESTORING LIFE'S NATURAL RHYTHM

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Standard Treatment Workflow (STW) HEART FAILURE: A BREATHLESS PATIENT ICD-11-BD10-BD1Z



REFER TO TERTIARY CARE IF

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

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	WHAT TO LOOK FOR IN X RAY	WHAT TO LOOK FOR IN AN ECG?	DESIRABLE INVESTIGATIONS	OPTIONAL INVESTIGATION
<ul style="list-style-type: none"> • Hemogram, ESR • Blood sugar • Urine examination • Urea/ Creatinine • Sodium/ Potassium • ECG • Chest X-ray PA view 	<ul style="list-style-type: none"> • Cardiomegaly • Pulmonary venous congestion • Pneumonia or other lung pathology 	<ul style="list-style-type: none"> • Pathological Q wave • Conduction abnormalities, especially LBBB • Chamber enlargement • Atrial fibrillation <p style="margin: 0;"><i>Note: If ST elevation present, manage as STEMI</i></p>	<ul style="list-style-type: none"> • 2D Echocardiography • BNP/NT pro-BNP • Troponin • Lipid profile • Thyroid function test • Iron profile 	<ul style="list-style-type: none"> • Prolonged ECG monitoring • Coronary angiography • Radionuclide imaging • CT scan • MRI • PET • Myocardial biopsy • Electrophysiological study

COMMON DRUGS AND DOSAGE FOR CHF

<p>FUROSEMIDE</p> <ul style="list-style-type: none"> • Dose 20-80 mg daily PO • Intravenous 10-80 mg SOS in acute stage • Change to oral when symptoms subside • Monitor serum electrolytes, creatinine and uric acid on therapy <p>SPIRONOLACTONE</p> <ul style="list-style-type: none"> • Dose 25-50 mg once daily PO • Keep watch on serum potassium and creatinine every 2-4 weekly 	<p>CARVEDILOL Dose 3.125 to 25 mg twice daily PO</p> <p>METOPROLOL 12.5-50mg twice daily PO</p> <p>BISOPROLOL 1.25-10mg once a day PO</p> <p>PRECAUTIONS</p> <ul style="list-style-type: none"> • 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 recipitation of CHF symptoms • Increase diuretics and reduce carvedilol to manage reappearance of CHF 	<p>ARNI</p> <ul style="list-style-type: none"> • Dose 50 to 200 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
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ABBREVIATIONS

<p>ICD: Implantable Cardioverter defibrillator</p> <p>BiV: Bi-Ventricular Pacing</p> <p>PND: Paroxysmal Nocturnal Dyspnea</p> <p>HFMREF: Heart Failure with Mid-Range Ejection Fraction</p>	<p>PCI: Percutaneous Coronary Intervention</p> <p>CABG: Coronary Artery Bypass Graft</p> <p>CVD: Cardiovascular Diseases</p> <p>RHD: Rheumatic Heart Disease</p> <p>CAD: Coronary Artery Disease</p>	<p>HFrEF: Heart Failure with reduced Ejection Fraction</p> <p>HFpEF: Heart Failure with preserved Ejection Fraction</p> <p>STEMI: ST elevation Myocardial Infarction</p> <p>LV: Left Ventricle</p> <p>COPD: Chronic Obstructive Pulmonary Disease</p>
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1. 2021 ESC Guidelines for the diagnosis and treatment of acute and chronic heart failure: Developed by the Task Force for the diagnosis and treatment of acute and chronic heart failure of the European Society of Cardiology (ESC) With the special contribution of the Heart Failure Association (HFA) of the ESC
2. Heart failure guidelines 2025 by Heart Failure Association of India. Heart Failure Journal of India | Volume 3 | Supplement 1 | January 2025."

MONITOR, MANAGE, AND MAINTAIN HEART HEALTH

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Standard Treatment Workflow (STW) UNSTABLE ANGINA/NSTEMI ICD-11-BA40.0



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

More likelihood if known patient of CAD/ multiple risk factors

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

ECC:

- If ST Elevation: Follow ST Elevation MI (STEMI) STW
- If no ST Elavation: UA/NSTEMI

RED FLAG SIGNS

- Pain lasting for more than 20 minutes
- Recurrent or ongoing pain or rest pain
- Associated breathlessness, profuse sweating or syncope
- Hemodynamic instability

Refer as emergency to nearest Primary PCI/Thrombolysis capable centre

Rest pain beyond 24hrs or without above features may be referred early for further evaluation

LOOK FOR OTHER CAUSES OF PROLONGED CHEST PAIN

Dissection of aorta (unequal/absent peripheral pulses)

Respiratory Evaluation: Pleuritis/pneumonitis/embolism/pneumothorax

Pericardial rub

Neuralgia or herpes

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 in loading dose
 - Heparin/ LMWH
 - High dose statin
 - 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
 - Arrythmia

DISTRICT HOSPITAL

- Admit in ICU equipped with ECG 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 ticagralor 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-vacularization (within few hours) after loading preferably with Ticagrelor or prasugrel if PCI is planned
 - High risk patients: Early revascularization (within 24 hours)
 - Intermeditae 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	SBPI mm Hg	Points	Heart rate Beats/ min	Points	Age. y	Points	Creatinine Level, mg/ dL	Points	Other risk factors	Points
I	0	<80	58	≤50	0	≤30	0	0-0.39	1	• Cardiac arrest at admission	39
II	20	80-99	53	50-69	3	30-39	8	0.40-0.79	4	• ST-Segment Deviation	28
III	39	100-119	43	70-89	9	40-49	25	0.80-1.19	7	• Elevated Cardiac Enzyme Levels	14
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			Sum Total= GRACE score of patient	

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

INVESTIGATIONS

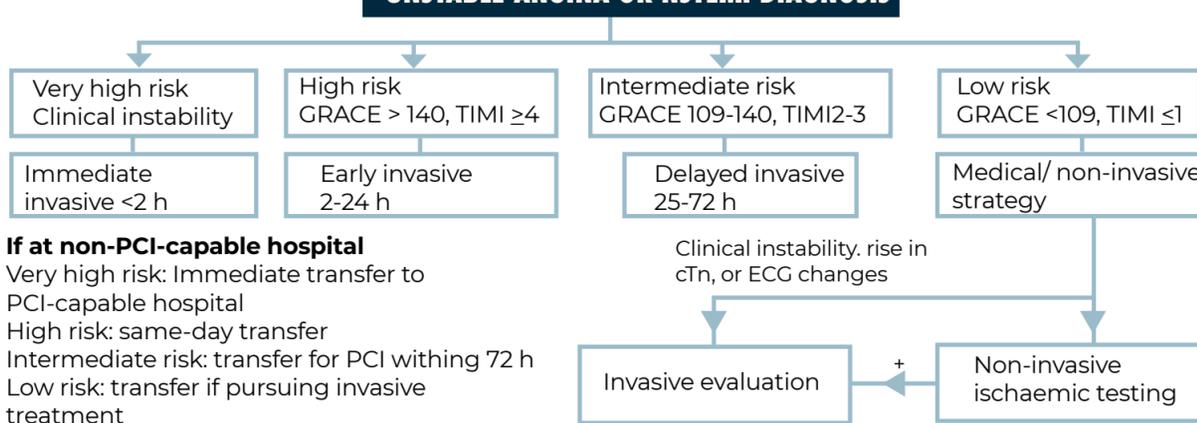
ESSENTIAL INVESTIGATIONS

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

OPTIONAL INVESTIGATIONS

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

UNSTABLE ANGINA OR NSTEMI DIAGNOSIS



If at non-PCI-capable hospital

Very high risk: Immediate transfer to PCI-capable hospital
 High risk: same-day transfer
 Intermediate risk: transfer for PCI within 72 h
 Low risk: transfer if pursuing invasive treatment

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
 - CT coronary angiography/TMT 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

DRUGS & DOSAGE

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
- Ticagralor: 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

Ace-inhibitor

- Ramipril 2.5-10 mg OD
 Enalapril 2.5-10 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 or Rosuvastatin 20-40 mg OD

REFERENCES

- Byrne RA et al. 2023ESC guidelines for the management of acute coronary syndrome. European Heart J (2024) 44, 3720-3826
- Rao SV et al. 2025 ACC/AHA/ACEP/NAEMSP/SCAI guidelines for the management of acute coronary syndrome. J Am Coll Cardiol(2025) 85, 2135-2237

ASSESS SWIFTLY, TREAT PRECISELY

This STW has 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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Standard Treatment Workflow (STW) ST ELEVATION MYOCARDIAL INFARCTION (STEMI)

ICD-11-BA41.0
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:

- 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

 ECG: If ST Elevation: Follow ST Elevation MI (STEMI) protocol
 If no ST Elavation: 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 epigatrium	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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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 WITHIN 12 HOURS
ECG REVEALS ST ELEVATION MI

 Refer to primary angioplasty/
 thrombolysis capable hospital

GENERAL MEASURES

- Admit in ICU equipped with continuous ECG monitoring & defibrillation
- Routine bio-chemistry and serial cardiac enzymes (troponin)
- Pain relief by opioid
- O₂ if saturation less than 90%
- Aspirin 325 mg, Clopidogrel 300 mg and Atorvastatin 80 mg/Rosuvastatin 20-40mg
- Echocardiography, particularly for mechanical complication

PCI CAPABLE HOSPITAL

- Proceed for PCI
- Radial route preferred
- Preferably within 90 minutes

DURING PROCEDURE

- Use unfractionated heparin
- No routine thrombosuction
- Tackle culprit artery only unless shock
- DES to be preferred

POST PROCEDURE

- 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 incapable hospital not feasible

THROMBOLYSE

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

POST THROMBOLYSIS

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

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

DRUGS & DOSAGE
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
- Ticagralor: 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

Lipid lowering agents:

 High dose Atorvastatin 80 mg OD
 Rosuvastatin 20-40mg OD
 Non-statin lipid modifying agents

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%

Anti thrombotics:

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

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

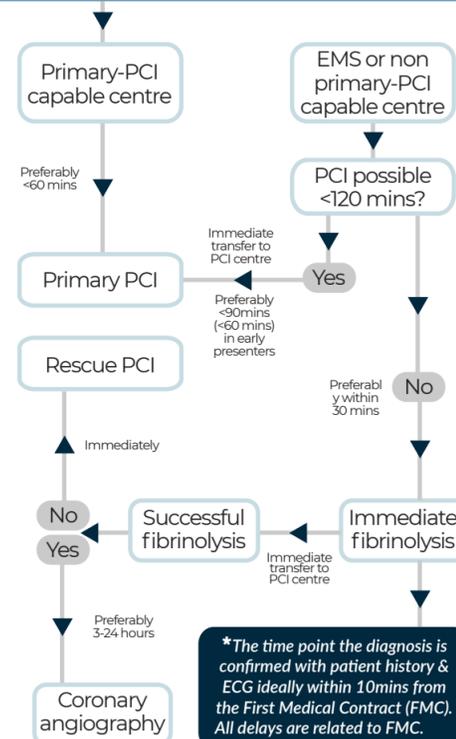
10 mg IV bolus, repeat after 30 min

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

STEMI DIAGNOSIS*

REFERENCES

- Byrne RA et al. 2023ESC guidelines for the management of acute coronary syndrome. European Heart J (2024) 44, 3720-3826
- Rao SV et al. 2025 ACC/AHA/ACEP/NAEMSP/SCAI guidelines for the management of acute coronary syndrome. J Am Coll Cardiol(2025) 85, 2135-2237

MISSION: LIFELINE

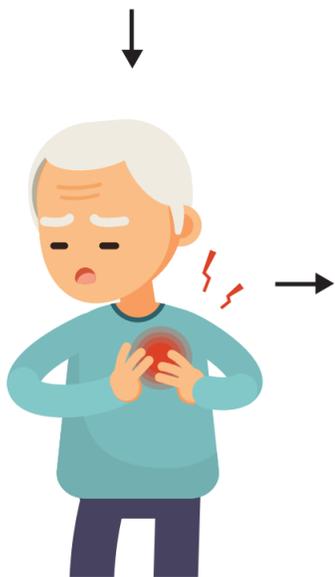


Standard Treatment Workflow (STW)

STABLE ANGINA

ICD-11-BA40.1

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 potentiating 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
4. Lipids
5. ECG

OTHER INVESTIGATIONS

1. Echocardiography
2. Exercise Treadmill Test
3. Thyroid Function Test
4. Iron profile
5. Uric acid
6. HbA1C

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 with/without DHP Ca channel blockers
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 and ranolazine
2. Risk stratify with CT coronary angiogram or stress imaging or exercise treadmill test

RISK CATEGORIZATION

Identify high risk patients on non-invasive evaluation

1. Uncontrolled angina
2. Poor LV function
3. Left main/proxi multivessel disease on CT coronary angioplasty
4. Large defect on stress imaging

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

DRUGS & DOSAGE

Anti-platelets

- Aspirin 75 mg OD
- Clopidogrel 75 mg OD (if intolerant to aspirin)
- Ticagralor 90 mg BD

Lipid lowering agents

- Atorvastatin: 40-80 mg OD
- Rosuvastatin: 20-40 mg OD
- Non-statin lipid modifying agents

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 divided dose
 - Nitroglycerine sustained release: 2.6 to 6.5 mg BD
3. Calcium channel blockers:
 - Amlodipine 5-10mg OD
 - 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

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 at least for six months after PCI

ABBREVIATIONS

CHF: Congestive Heart Failure
FFR: Fractional Flow Reserve

IVUS: Intravascular Ultrasound
OCT: Optical Coherence Tomography
PVD: Peripheral Vascular Disease

REFERENCES

1. Vrints C et al. 2024 ESC guidelines for management of chronic coronary syndrome. European Heart J (2024) 44, 3415-3537
2. Virani SS et al. 2023 ACC/AHA/ACCP/ASPC/NLA/PCNA guidelines for the management of chronic coronary diseases, a report of ACC/AHA joint committee on clinical practice guidelines. 2023,doiCIR.00000000000001168

LISTEN TO YOUR HEART: PREDICTABLE PAIN NEEDS PREDICTABLE CARE

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