FACILITATOR'S MANUAL FOR ADVANCED HEART FAILURE MANAGEMENT

MINISTRY OF HEALTH
REPUBLIC OF GHANA

GHANA HEALTH SERVICE
Your Health·Our Concern

Ghana Heart Initiative

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PREFACE

Cardiovascular diseases are a growing public health problem in Ghana and other African countries. The increasing burden of cardiovascular diseases is being driven mainly by the changing lifestyle.

Physical inactivity, unhealthy diet, excessive alcohol intake and smoking have been the main lifestyle changes causing the risk factors for cardiovascular diseases such as hypertension, diabetes mellitus, dyslipidemia, and obesity. Cardiovascular diseases such as stroke and heart failure are the leading causes of death in Africa.

Heart failure is a common medical condition in Ghana. Poorly managed heart failure is associated with considerable suffering and poor prognosis. In fact, the prognosis of advanced heart failure has been found to be worse than some cancers.

Development of a facilitator's training manual and actual training of clinicians to improve diagnosis and management of heart failure in Ghana will go a long way to reduce the high morbidity and mortality associated with heart failure.

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LIST OF ABBREVIATIONS

AF	*Atrial fibrillation*
ACE-I	*Angiotensin converting enzyme inhibitor*
ARNI	*Angiotensin receptor neprilysin inhibitor*
ARB	*Angiotensin receptor blocker*
BNP	*Brain natriuretic peptide*
CAD	*Coronary artery disease*
CRT-D/P	*Cardiac resynchronizing therapy*
EF	*Ejection fraction*
Echo	*Echocardiography/echocardiogram*
E/A ratio	*Ratio of peak velocity blood flow from left ventricular relaxation in early diastole to peak velocity flow in late diastole*
E/E'	*Index for evaluating left ventricular filling pressure*
ECG	*Electrocardiography/electrocardiogram*
eGFR	*Estimated glomerular filtration rate*
HF	*Heart failure*
HFrEF	*Heart failure with reduced ejection fraction*
HFmrEF	*Heart failure with mildly reduced ejection fraction*
HFpEF	*Heart failure with preserved ejection fraction*
IVRT	*Isovolumetric relaxation time*
ICU	*Intensive care unit*
IV	*Intravenous*
LA	*Left atrium*
LMWH	*Low molecular weight heparin*
LVEDV	*Left ventricular end diastolic volume*
LVESV	*Left ventricular end systolic volume*
LVEF	*Left ventricular ejection fraction*
LAVI	*Left atrial volume index*
LVH	*Left ventricular hypertrophy*
MRA	*Mineralocorticoid receptor antagonist*
NT-pro BNP	*N-terminal prohormone brain natriuretic peptide*
S3	*Third heart sound*
SV	*Stroke volume*
SR	*Sinus rhythm*
SPO2	*Peripheral capillary oxygen saturation*
SGLT2	*Sodium glucose co-transporter 2 inhibitor*

TABLE OF CONTENT

PART 1

INTRODUCTION

OVERVIEW OF TRAINING COURSE

RATIONALE

This course manual has been developed to address an important need in Ghana. It is intended to improve the knowledge and practices related to the identification, diagnosis and management of heart failure. It is mainly based on the National Guidelines for the Management of Cardiovascular Diseases.

The training course includes lectures on the diagnosis and management of heart failure; and hands-on training on the use of echocardiography for the diagnosis of heart failure.

MAIN OBJECTIVE OF THE TRAINING COURSE

The main objective of this course is to equip medical doctors with the necessary skills to identify, diagnose and manage patients with heart failure.

SPECIFIC OBJECTIVES

At completion of the training course, participants will be able to:

- Identify patients with typical symptoms of heart failure
- Evaluate patients with suspected heart failure
- Perform echocardiography for the diagnosis of heart failure
- Diagnose and manage patients with heart failure
- Do an outpatient follow up of heart failure patients; and refer when necessary

TARGET AUDIENCE

This training is meant for medical doctors.

TRAINING METHODOLOGIES

Plenary presentation

Discussion

Brainstorming

Group work

Case Scenarios

Hands-on Training

TRAINING AGENDA

DAY 1	TOPIC/ACTIVITY
08.30 - 08.35 AM	Introduction
08.35 - 09.00 AM	Diagnosis and Management of Heart Failure
09.00 - 09.25 AM	Treatment of Heart Failure
09.25 - 09.45 AM	Follow-up of Patients with Heart Failure
09.45 - 09.55 AM	Snack Break
09.55 - 12.30 AM	Diagnosis of Heart Failure with echocardiography
12.30 - 01.30 PM	Lunch
01.30 - 04.00 PM	Hands-on Training (Diagnosis of Heart Failure with Echocardiography)
	Lunch

DAY 2	TOPIC/ACTIVITY
08.30 - 10.30 AM	Study Protocol and Data Collection
10.30 - 10.45 AM	Snack Break
10.45 - 12.30 PM	Hands-on Training (Diagnosis of Heart Failure with Echocardiography)
12.30 - 01.30 PM	Lunch Break
01.30 - 04.00PM	Hands-on Training (Diagnosis of Heart Failure with Echocardiography)

PART 2

DELIVERING THE COURSE

MODULE 1:

INTRODUCTION TO ADVANCED HEART FAILURE MANAGEMENT TRAINING COURSE

RATIONALE

To achieve the learning objectives of this training course, participants should be able to interact and work freely with each other during the 2-day course. They must, therefore get to know each other.

This module serves to help the participants to get to know each other as well as the facilitators, and to create a cordial environment within which to conduct the training.

TRAINER'S ADVANCE PREPARATION

- Prepare blank name tags for all participants and yourself.
- Prepare all materials and equipment needed for the module
- Ensure hygiene and other relevant protocols are considered in the preparation

PRESENTATION

The facilitator should:

- Welcome the participants to the course and introduce himself/herself to the class by mentioning his/her full name, place of work, occupation. He/She should mention key expectations (knowledge and skill areas) from the training
- Mention the name she/he prefers to be called during the training course.
- Write this preferred name on the name tag using the marker and pin the name tag
- to his/her chest.
- Ask all participants to go through the same process to introduce themselves, highlighting the following:
    - ◊ Full name and preferred name for the training course.
    - ◊ Place of work (name of health facility, category of health facility, district, region).
    - ◊ Profession and position in the health facility.
- Briefly inform participants of any administrative issues related to the course organisation.

EXERCISES

The facilitator should make the participants perform the following activities as part of the introductions:

- Each participant should write their preferred name to be used during the course on the name tag and stick it to their chest.
- Each participant should explain and write down one (1) thing they expect to getout of the course on a sticky note sheet and stick it up on a designated space on one of the walls in the training hall.

COURSE NORMS

DO'S

Participants should:

- Attend every session fully
- Arrive early each day
- Participate fully in each exercise and group work
- Put their phones on silent mode

DON'TS

Participants should NOT:

- Miss any session
- Be late for each day's training
- Refuse to participate in exercises and group work
- Miss an opportunity to make a presentation on behalf of their group
- Receive calls during training course
- Use their laptops or phones during the training course

MATERIALS NEEDED

- Flip charts and markers
- LCD Projector or TV monitor
- Laptop
- Answer Sheets
- Sticky notes
- A4 Sheets
- Ultrasound Machine with adult sector Probe
- Ultrasound Gel
- Tissue Papers
- Examination couch and bed sheets

MODULE 2

DIAGNOSIS AND MANAGEMENT OF HEART FAILURE

PRESENTATION

2.1 Definition of Heart Failure

- Facilitator should ask participants to discuss the definition of heart failure
- Facilitator should summarise the collective thoughts and using the PowerPoint as a guide, take participants through the definition of heart failure *slides (7-10)*

DEFINITION OF HEART FAILURE

Heart failure is a syndrome that can be defined clinically by a collection of typical symptoms such as shortness of breath, orthopnoea, easy fatigability, and specific signs such as oedema, S3 gallop, bibasal crepitations; that are due to a cardiac functional or structural abnormality.

Heart failure may also be defined haemodynamically, as inability of the heart to provide adequate cardiac output to meet the requirements of tissue metabolism.

KEY POINTS (SLIDE 9-10)

- HF is a clinical syndrome, not a disease. Always look for the underlying disease causing it.
- It is characterised by inadequate cardiac output to meet tissue metabolism
- Cardiac Output = Stroke Volume X Heart Rate
- Left Ventricular End Diastolic Volume (LVEDV) = The amount of blood in the ventricle after complete ventricular filling.
- Stroke Volume (SV) = Amount of blood pumped out of the left ventricle after each heartbeat. SV=LVEDV-LVESV
- Left ventricular end systolic volume (LVESV) = Amount of blood left in the left ventricle after ejection of blood.
- Ejection Fraction (EF)= Stroke volume/ LVEDV X 100

2.2 PHENOTYPES OF HEART FAILURE

- Facilitator should divide participants into two (2) groups and asked each group to discuss the definition of HFrEF/HmrEF, and HFpEF respectively Subsequently each group should appoint one participant to present the summary of their discussion.
- Facilitator should then take participants through the PowerPoint presentation *(slides 11-12)* on the phenotypes of heart failure.

Phenotypes of Heart Failure

Heart failure can be generally grouped into three (3) distinct phenotypes based on whether it is associated with a reduced left ventricular ejection fraction (LVEF) of ≤ 40 %; heart failure with reduced ejection fraction (HFrEF) or LVEF 41-49 %; heart failure with mildly reduced ejection fraction (HFmrEF) or LVEF ≥ 50 %; heart failure with preserved ejection fraction (HFpEF).

2.3 AETIOLOGY OF HEART FAILURE

- Facilitator should ask participants to write down six (6) common causes of heart failure in Ghana, on sticky notes. The facilitator should then collect the answers and paste them on a central board.
- Facilitator should divide the participants into two (2) groups.

- Facilitator should ask the first group to discuss the causative factors they noted down and how they lead to heart failure.
- Facilitator should also ask the second group to discuss how they will identify or diagnose these causative factors in patients presenting with heart failure.
- Subsequently each group should appoint one participant to present the summary of their discussion
- Facilitator should then take participants through the PowerPoint presentation (slides 13) on the aetiology of heart failure.

AETIOLOGY OF HEART FAILURE

Aetiologies of heart failure include:

1. Hypertension
2. Valvular heart disease; especially rheumatic heart disease
3. Dilated cardiomyopathy; usually non-ischaemic
4. Arrhythmias; most commonly atrial fibrillation
5. Peripartum cardiomyopathy
6. Ischaemic heart disease commonly due to CAD
7. Pericardial disease
8. Endomyocardial fibrosis
9. Infective endocarditis
10. Congenital heart disease
11. Cor pulmonale (right HF due to lung disease)

2.4 PATHOPHYSIOLOGY OF HEART FAILURE

- Facilitator should ask participants to discuss the pathophysiological mechanisms that occur in heart failure.
- Facilitator should take participants through Powerpoint presentation on the neurohormonal activation in heart failure; emphasising on the relationship of the pathophysiological mechanisms, symptoms and therapeutic strategies in heart failure; *Slide (14)*

2.5 CLINICAL PRESENTATION OF HEART FAILURE

- Facilitator should ask participants to describe the typical symptoms and specific signs of heart failure.
- Facilitator should take participants through the PowerPoint presentation on the signs and symptoms of heart failure; *slides (15-16)*.

TABLE 1. SYPMTOMS AND SIGNS OF HEART FAILURE

Symptoms	Signs
Typical • Shortness of breath • Orthopnoea • Paroxysmal nocturnal dyspnoea • Fatigue • Reduced exercise tolerance	Specific • Elevated jugular venous pressure • Hepatojugular reflux • Third heart sound with or without gallop rhythm Laterally displaced apical impulse
Atypical • Nocturnal cough • Wheeze • Bloated feeling • Loss of appetite • Palpitation • Bendopneoa (shortness of breath when bending forward)	Less Specific • Cardiac murmur • Peripheral oedema (ankle, sacral, scrotal) • Pulmonary crepitations • Reduced air entry and dullness to percussion at lung bases (pleural effusion) • Tachycardia • Irregular pulse • Tachypnoea • Tender hepatomegaly • Ascites • Cold extremities

2.6 INVESTIGATIONS FOR HEART FAILURE

- Facilitator should ask participants to write down the various investigations he/she will request for a patient with suspected heart failure on sticky notes. The facilitator should then collect the answers and paste them on a central board.
- Facilitator should then take participants through the PowerPoint presentation (slides 17-18) on the baseline, supportive and other investigations for heart failure.

2.7 CASE SCENARIOS (SLIDE 19)

Facilitator should divide participants into two (2) groups and ask them to discuss the following case scenario. Subsequently each group should appoint one participant to present the summary of their discussion.

CASE SCENARIO

Mr Kwame Okyere is a 50-year old trader. He has been taking alcohol heavily for the past 20 years. He presented to the cardiac outpatient clinic with 2 weeks history of progressive exertional shortness of breath, orthopnoea and easy fatiguability. He also has increasing swelling of both feet. His blood pressure and pulse rate were 100/62 mmHg 98 beats per minute respectively. As part of the evaluation, echocardiography was performed and the following parameters were obtained: LVEDV = 200mls and LVESV = 170ml.

1. *Calculate his*
   a. *Stroke volume*
   b. *Cardiac output*
   c. *Left ventricular ejection fraction (LVEF)*
2. *What type of heart failure has he developed?*
3. *What is the likely aetiology of his heart failure?*

Answer

1. *a. Stroke volume: LVEDV – LVESV = 200ml – 170ml = 30ml*
   b. Cardiac output: stroke volume X heart rate= 30 X 98= 2,940 ml/minute
   c. LVEF = 30mls/200mls x 100% = 15 %
2. *HFrEF*
3. *Dilated or alcoholic cardiomyopathy*

2.8 DIAGNOSIS OF HEART FAILURE

- Facilitator should use Powerpoint *slides (20-24)* to explain to participants how the initial evaluation and diagnosis of patients with heart failure should be done.

- Facilitator should then divide participants into two (2) groups and ask each group to discuss the diagnostic criteria for HFrEF/HFmrEF and HFpEF respectively.

- Subsequently each group should appoint one participant to present the summary of their discussion.

DIAGNOSTIC ALGORITHM FOR HEART FAILURE'

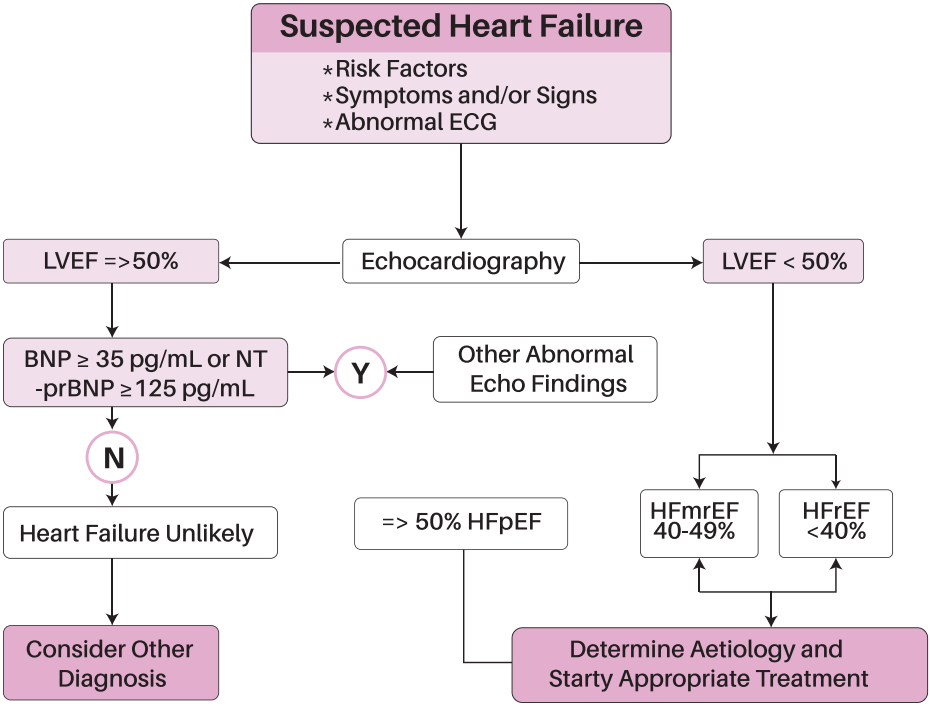

Figure 1: Diagnostic algorithm for suspected heart failure

Table 2: Diagnostic criteria for HFrEF/HFmrEF and HFpEF

Diagnostic criteria for HFrEF/HFmrEF	Diagnostic criteria for HFpEF
1. Typical symptoms of HF 2. Specific signs of HF 3. LVEF below 50% on Echocardiogram	1. Typical symptoms of HF 2. Typical signs of HF 3. LVEF ≥ 50% on Echocardiogram 4. BNP ≥ 35pg/ml or NT-proBNP ≥ 125pg/ml 5. Presence of structural heart disease and/or diastolic dysfunction • LV mass index -Males≥ 115g/m^2 -females≥ 95g/m^2 • Relative Wall Thickness >0.42 • LA Volume index -SR ≥35ml/m^2 -AF>40ml/m^2 • Abnormal E/A ratio, deceleration time, IVRT, • E/e' > 9cm/s • Septal e' velocity<7 cm/s or lateral e' velocity <10cm/s

2.9 TREATMENT OF HEART FAILURE

2.9.1 Treatment of Acute Heart Failure

- Facilitator should ask one of the participants to define acute heart failure.
- Facilitator should then ask the participants to write down on sticky notes how they would treat patients with heart failure in the emergency room.
- Facilitator should ask participants to read out the responses they have written in turns.
- Facilitator should then take the participants through the Powerpoint presentation on the definition and treatment of acute heart failure (Slide 25-29).
- Facilitator should highlight the key aspects that were not discussed in the brainstorming session.

TREATMENT OF ACUTE HEART FAILURE

Acute heart failure (AHF) develops when there is rapid onset or deterioration of typical symptoms and/or signs of HF leading to hospital admission. AHF AHF may be the first manifestation of HF (denovo AHF) or, may be due to an acute decompensation of chronic HF.

- Admit patient and prop up in bed
- Give oxygen in case of hypoxaemia (SPO2 <90%) (oxygen

should not be given routinely in the absence of hypoxaemia). Give oxygen from 4-10 litres per minute until SPO2 >92% in a propped-up position

- Non-invasive positive pressure ventilation should be considered in patients with respiratory distress (respiratory rate >25 breaths/minute and SPO2 <90%) to correct hypoxaemia.
- **Furosemide** 40-80mg 8-12 hourly intravenouly or **Bumetanide** 1-5mg daily iintravenously to treat fluid overload; continue until complete decongestion occurs. Monitor urine output(goal should be urine output ≥ 100-150ml/hour after 6 hours. If urine output is low double loop diuretic dose.
- **Check serum urea, creatinine and electrolytes at least every 24 hours**
- If signs of hypoperfusion are present (SBP<90mmHg) consider, ionotropes and vasopressors in addition to loop diuretics.
- A vasopressor, preferably norepinephrine, may be considered in patients with cardiogenic shock to increase blood pressure and vital organ perfusion.
- Digoxin should be considered (in addition to beta-blockers) in patients with atrial fibrillation with a rapid ventricular rate (>110 beat/minute)
- Thromboprophylaxis with LMWH should be considered in patients with no contraindication to anticoagulation who are no taking anticoagulant therapy, to reduce the risk venous thromboembolism.

TABLE 3: DIURETICS USED IN HEART FAILURE

Diuretics	Initial dose (mg)	Usual daily dose (mg)
Loop Diuretics		
Furosemide (oral/IV)	20-80	20-420
Bumetanide (oral)	0.5-1.0	1-5
Thorasemide (oral)	5-10	10-20
Thiazide/thiazide-like Diuretics		
Metolazone	5	2.5-10
Hydroclorothiazide	25	12.5-100
Bendroflumethiazide	2.5	2.5 -10

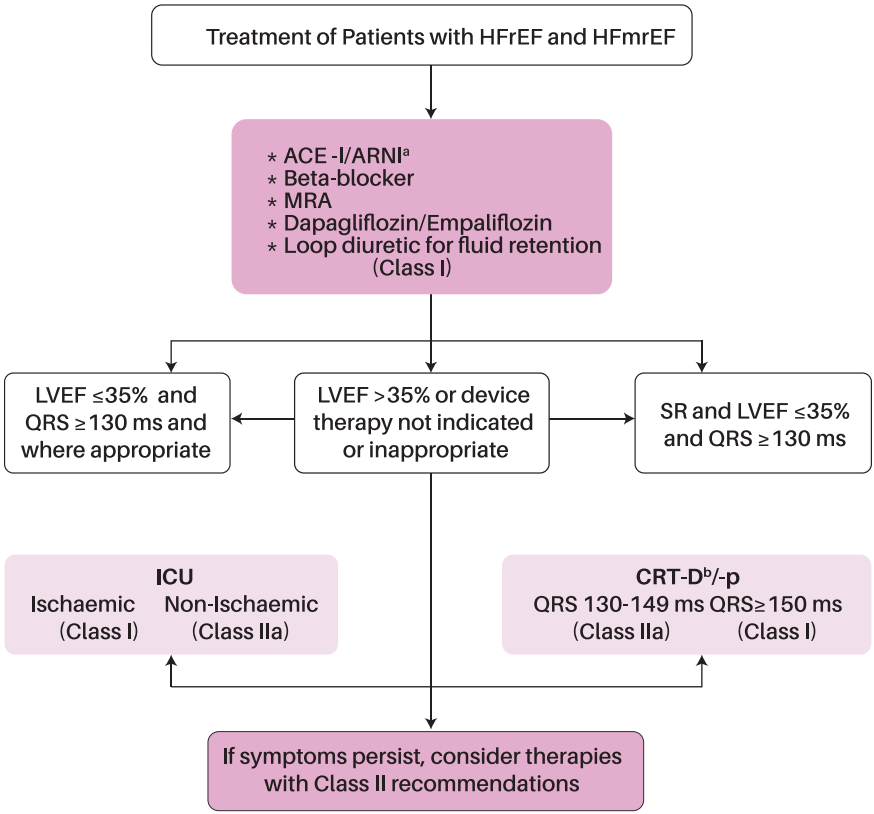

Figure 2: Management of patients with HFrEF and HFmrEF

2.9.2 TREATMENT OF CHRONIC HEART FAILURE

- Facilitator should ask one of the participants to define chronic heart failure.
- Facilitator should divide participants into two (2) groups and asked each group to discuss the treatment of HFrEF/HFmrEF and HFpEF respectively. Subsequently each group should appoint one participant to present the summary of their discussion.
- Facilitator should use figure 2 to explain the treatment of HFrEF/HFmrEF using the Powerpoint presentation *(slide 30-43)*.
- Facilitator should highlight the key aspects that were not discussed.
- Facilitator should also take the participants through the Powerpoint presentation on the treatment of HFpEF *(Slide 44-47)*.

TREATMENT OF HFrEF AND HFmrEF

Recommendation	Class	Level
An ACE-I is recommended for patients with HFrEF to reduce the risk of HF	I	A
A beta-blocker is recommended for patients with stable HFrEF to reduce the risk of HF hospitalization and death	I	A
An MRA is recommended for patients with HFrEF to reduce the risk of HF hospitalization and death.	I	A
Dapagliflozin or empagliflozin are recommended for patients with HFrEF to reduce the risk of HF hospitalization and death	I	A
Sacubitril/valsartan(ARNI) is recommended as a replacement for an ACE-I in patients with HFrEF to reduce the risk of HF hospitalization and death	I	B
Loop diuretics: Diuretics are recommended in patients with HFrEF with signs and/or symptoms of congestion to alleviate HF symptoms, improve exercise capacity, and reduce HF hospitalizations	I	C
An ARBc is recommended to reduce the risk of HF hospitalization and CV death in symptomatic patients unable to tolerate an ACE-I or ARNI (patients should also receive a beta-blocker and an MRA).	I	B

Loop Diuretics

- Treat symptoms of fluid overload with loop diuretics

Neurohomornal blockers (disease modifying drugs)

- These have been shown to improve survival in patients with HFrEF; by reducing the risk of death and/or hospitalisation.

They include:

Angiotensin converting enzyme inhibitors (ACE-I)

- An ACE-I is recommended for all patients with symptomatic HFrEF to reduce the risk of death and hospitalisation.

Beta-blockers

- A Beta-blocker is recommended for all patients with symptomatic HFrEF to reduce the risk of death and hospitalisation; patients should be on an ACEI (or ARB if an ACEI is not tolerated) or ARNI.

Mineralocorticoid Receptor Antagonists (MRA)

- An MRA is recommended for all patients with HFrEF and persisting symptoms (NYHA class II - IV) despite treatment with an ACEI (or an ARB if an ACEI is not tolerated) and a Beta-blocker.

Sodium-Glucose Co-Transporter 2 Inhibitor (SGLT 2 Inhibitors)

- A Dapagliflozin or empagliflozin are recommended for patients with HFrEF to reduce the risk of death or hospitalization.

Angiotensin receptor blockers (ARB)

- ARBs are recommended for patients with HFrEF who are unable to tolerate an ACEI because of cough (patients should also receive a BB and an MRA);
- They are also recommended for patients with HFrEF who have persisting symptoms (NYHA class II - IV) despite treatment with an ACEI and a BB, and who are unable to tolerate an MRA; ARBs have not been consistently proven to reduce mortality in patients with HFrEF

Angiotensin receptor neprilysin inhibitor (ARNI)

- An ARNI is recommended to all patients with symptomatic HFrEF to reduce the risk of death and hospitalization

Digoxin

- In patients with symptomatic HF and atrial fibrillation, Digoxin may be used, in addition to a Beta-blocker to slow down a rapid ventricular rate
- Digoxin may also be used in patients with HFrEF in sinus rhythm, who are symptomatic despite full tolerated doses of HF standard therapy;

Table 4: Disease Modifying Drugs and Doses

Disease Modifying Drug	Initial Dose (mg)	Target Dose (mg)
ACE-I		
Lisinopril	2.5 - 5.0 o.d	20 - 35 o.d.
Captopril	6.25 t.i.d	50 t.i.d
Ramipril	2.5 o.d.	5 b.i.d.
Enalapril	2.5 b.i.d.	10 - 20 b.i.d
ARNI		
Sacubitril/valsartan	49/51 b.i.d	97/103 b.i.d
Beta-blocker		
Bisoprolol	1.25 o.d	10 o.d
Carvedilol	3.125 b.i..d	25-50 b.i.d
Metoprolol succinate (CR/XL)	12.5-25 o.d	200 o.d
Nebivolol	1.25 o.d.	10 o.d
ARB		
Candesartan	4-8 o.d	32 o.d
Valsartan	40 b.i.d	160 b.i.d
Losartan	25 o.d	150 o.d
MRA		
Spironolactone	25 o.d	50 o.d
Eplerenone	25 od	50 od
Others		
Ivabradine	5 b.i.d	7.5 b.i.d
Digoxin	62.5 microgram o.d	250 microgram o.d

KEY POINTS OF TREATMENT OF HEART FAILURE(SLIDE 48)

- Loop diuretic therapy improves symptoms especially congestion, and restores normal oxygenation
- Identify aetiology
- Identify and address precipitating factors
- Optimize chronic oral therapy
- Identify patients who will benefit from device therapy
- Educate patients concerning medications, side effects and self-management of heart failure

TREATMENT OF PATIENTS WITH HEART FAILURE WITH PRESERVED EJECTION FRACTION (HFpEF)

- Treat symptoms of fluid overload with loop diuretics.
- Start MRA, ARNI and SGLT2I
- Identify and treat the underlying aetiology, and coexisting conditions in HFpEF such hypertension, coronary artery disease and valvular heart disease. Undoubtedly, treatment of some of the underlying phenotypes of the HFpEF syndrome leads to improved outcomes.
- Encourage weight reduction and frequent physical activity in obese patients with HFpEF

CASE SCENARIO (SLIDES 49-51)

A 67 year old female presents to the cardiac clinic with increasing shortness of breath and fatigue (NYHA II-III). She had been a known patient with hypertension and type 2 diabetes mellitus for over 10 years. She had also been diagnosed with chronic kidney disease for the past 5 years.
On physical examination, her BMI was 33 kg/m^2, blood pressure was 130/88 mmHg, pulse rate was 86 beats per minute and regular. Her neck veins were not visualized, she had bilateral lung bases crackles and minimal pitting bipedal oedema.
Laboratory examination showed NT-proBNP of 550 pg/ml and eGFR of 48 ml/minute/1.73m^2.
Echocardiography showed LVEF of 50%, LVH, e/e' of 10 amd LAVI of 35 ml/m^2.

What is the presenting diagnosis?
How will you treat her?

Heart failure with preserved ejection fraction
Loop diuretics, MRA, ARNI, SGLT2I

KEY POINTS TO NOTE WHEN REVIEWING PATIENTS FOR FOLLOW UP (SLIDES 52)

- Check Patient's weight
- Re-assess New York Heart Association Functional
- Blood Pressure
- Pulse Rate
- ECG if pulse is irregular
- Treatment adherence: patient's medications should be inspected

MODULE 3

DIAGNOSIS OF HEART FAILURE WITH ECHOCARDIOGRAPHY

- Facilitator should divide participants into two (2) groups and asked each group to discuss the echocardiographic diagnostic criteria for HFrEF/ HFmrEF and HFpEF respectively. Subsequently each group should appoint one participant to present the summary of their discussion.
- Facilitator should also ask each group to discuss the echocardiographic methods and criteria for diagnosis of LV systolic dysfunction/RV diastolic dysfunction and LV diastolic dysfunction/RV systolic dysfunction respectively. Each group should subsequently appoint one participant to present the summary of their discussion.
- Facilitator should take participants through the presentation on the diagnosis of heart failure with echocardiography, Powerpoint *slides (53-69)*.

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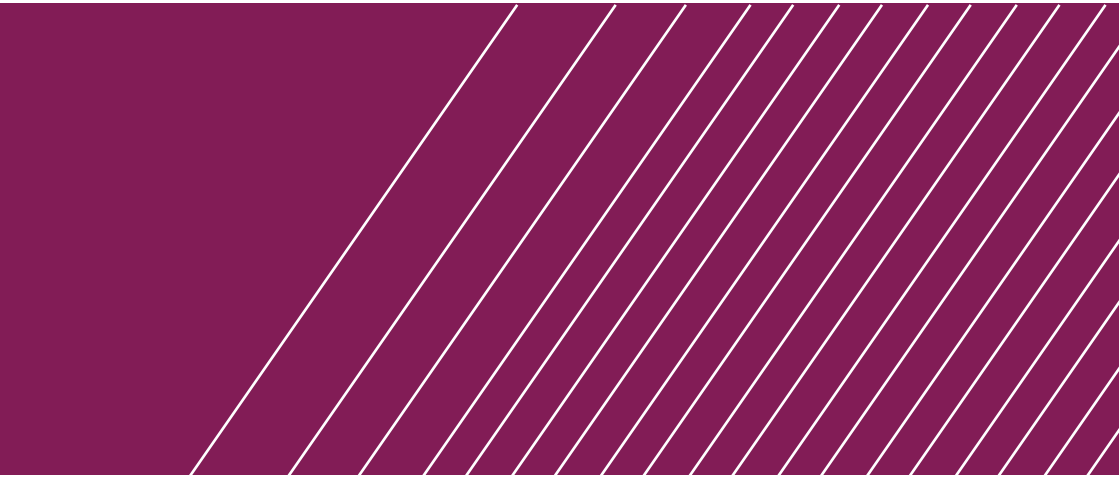

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