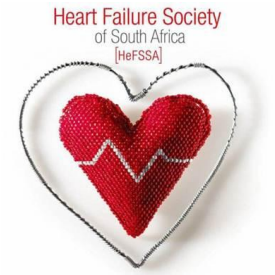
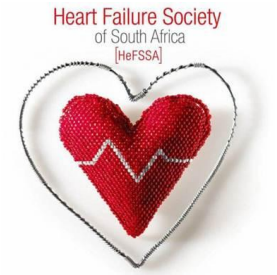


Program

- **Lecture 1:** Update on chronic heart failure –2012 ESC/HeFSSA guidelines
- **Lecture 2**: Update on acute heart failure –2012 ESC/HeFSSA guidelines
- **Lecture 3**: Update on the use of devices and end stage HF -2012 ESC/HeFSSA guidelines
- **Lecture 4**: Diagnosis and management of right heart failure



Program:

Lecture 1:

UPDATE ON CHRONIC HEART FAILURE

- **Background Information to Therapeutic approach**
- **ESC Guidelines on chronic heart failure 2012**
- **Adaptation to the ESC guidelines by South Africa Heart Association**

Treatment Approach for the Patient with Heart Failure

Stage A

At high risk, no structural disease

Therapy

- Treat Hypertension
- Treat lipid disorders
- Encourage regular exercise
- Discourage alcohol intake
- ACE inhibition

Stage B

Structural heart disease, asymptomatic

Therapy

- All measures under stage A
- ACE inhibitors in appropriate patients
- Beta-blockers in appropriate patients

Stage C

Structural heart disease with prior/current symptoms of HF

Therapy

- All measures under stage A

Drugs:

- Diuretics
- ACE inhibitors
- Beta-blockers
- Digitalis
- Dietary salt restriction

Stage D

Refractory HF requiring specialized interventions

Therapy

- All measures under stages A,B, and C
- Mechanical assist devices
- Heart transplantation
- Continuous (not intermittent) IV inotropic infusions for palliation
- Hospice care

Hunt, SA, et al ACC/AHA Guidelines for the Evaluation and Management of Chronic Heart Failure in the Adult, 2001

Treatment of Heart Failure

Two distinct settings:

Treatment of Acute Decompensated Heart Failure

Goal:

Stabilise the patient, return the filling pressures to as close as possible to normal and restore organ perfusion.

Chronic Stable Heart Failure

Goal:

Enhance survival and minimise symptoms.

At All Times Treat Important

Precipitating Factors

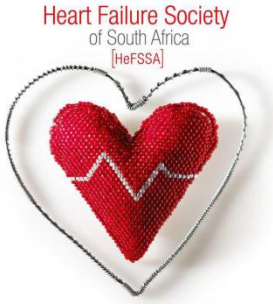
Change a compensated condition to frank heart failure. (Can occur in up to 93% of patients)

Ghali et al. Arch Int Med 1986

- Inappropriate reduction in therapy
- Arrhythmias (including abnormal intra-ventricular conduction)
- Myocardial infarction/ischaemia
- Systemic infection
- Pulmonary embolism
- Drugs causing myocardial depression

-Oestrogens, corticosteroids, NSAIDS.

- Development of another form of heart disease



Pharmacologic Management
ACE Inhibitors

- Blocks the conversion of angiotensin I to angiotensin II; prevents functional deterioration.
- Recommended for all heart failure patients.
- Relieves symptoms and improves exercise tolerance.
- Reduces risk of death and decreases disease progression.
- Benefits may not be apparent for 1-2 months after initiation.

Pharmacologic Management

Angiotensin Receptor Blockers (ARBs)

- Block AT_1 receptors, which bind circulating angiotensin II.
- Examples: valsartan, candesartan, losartan.
- Should not be considered equivalent or superior to ACE inhibitors.
- In clinical practice, ARBs should be used to treat patients who are ACE intolerant due to intractable cough or who develop angioedema.

Pharmacologic Management

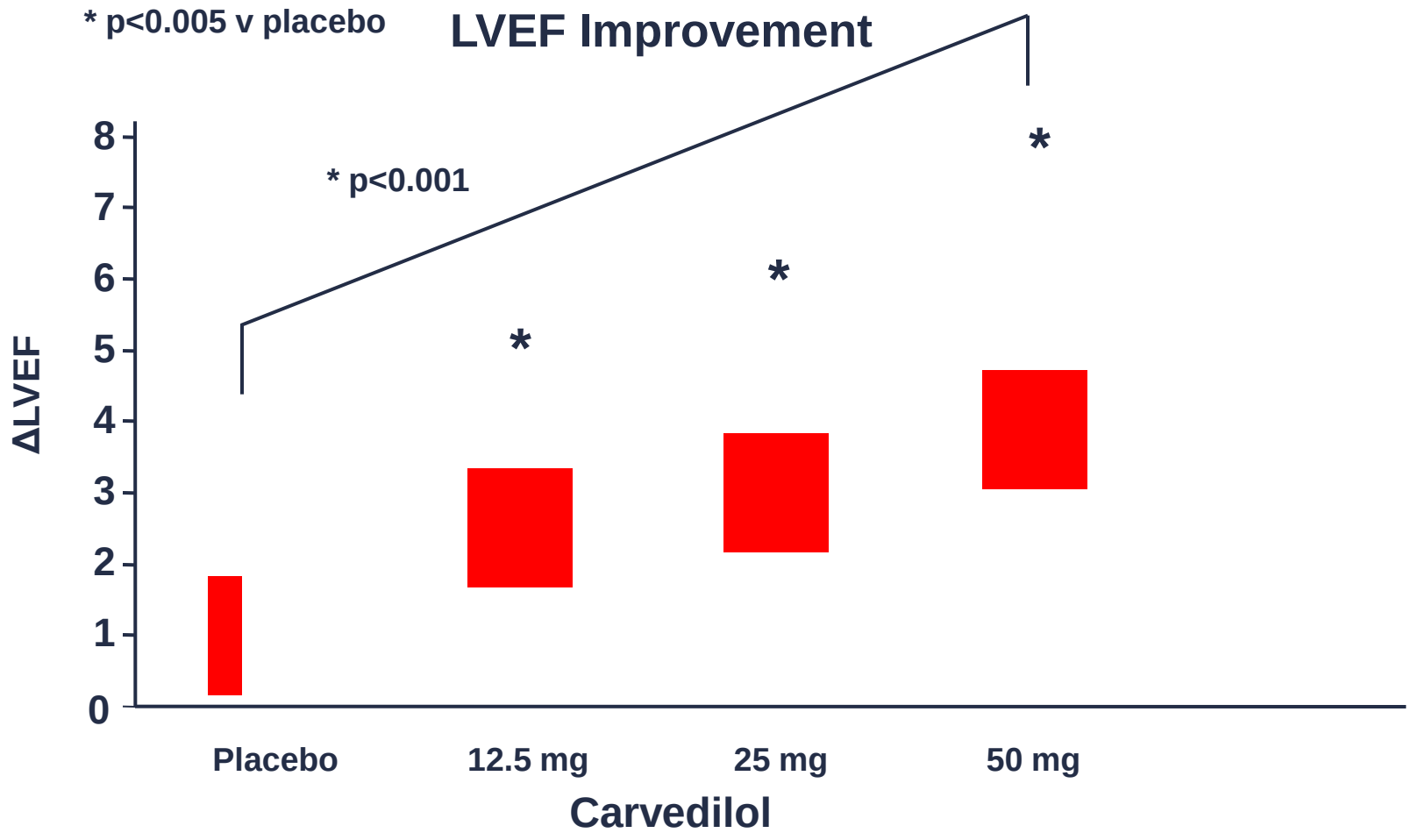
Beta-Blockers

- Cardioprotective effects due to blockade of excessive SNS stimulation.
- In the short-term, beta blocker decreases myocardial contractility; increase in EF after 1-3 months of use.
- Long-term, placebo-controlled trials have shown symptomatic improvement in patients treated with certain beta-blockers.[1]
- When combined with conventional HF therapy, beta-blockers reduce the combined risk of morbidity and mortality, or disease progression.[1]

1 *Hunt, SA, et al ACC/AHA Guidelines for the Evaluation and Management of Chronic Heart Failure in the Adult, 2001 p. 20.*

Heart Failure Society of South Africa [HeFSSA]

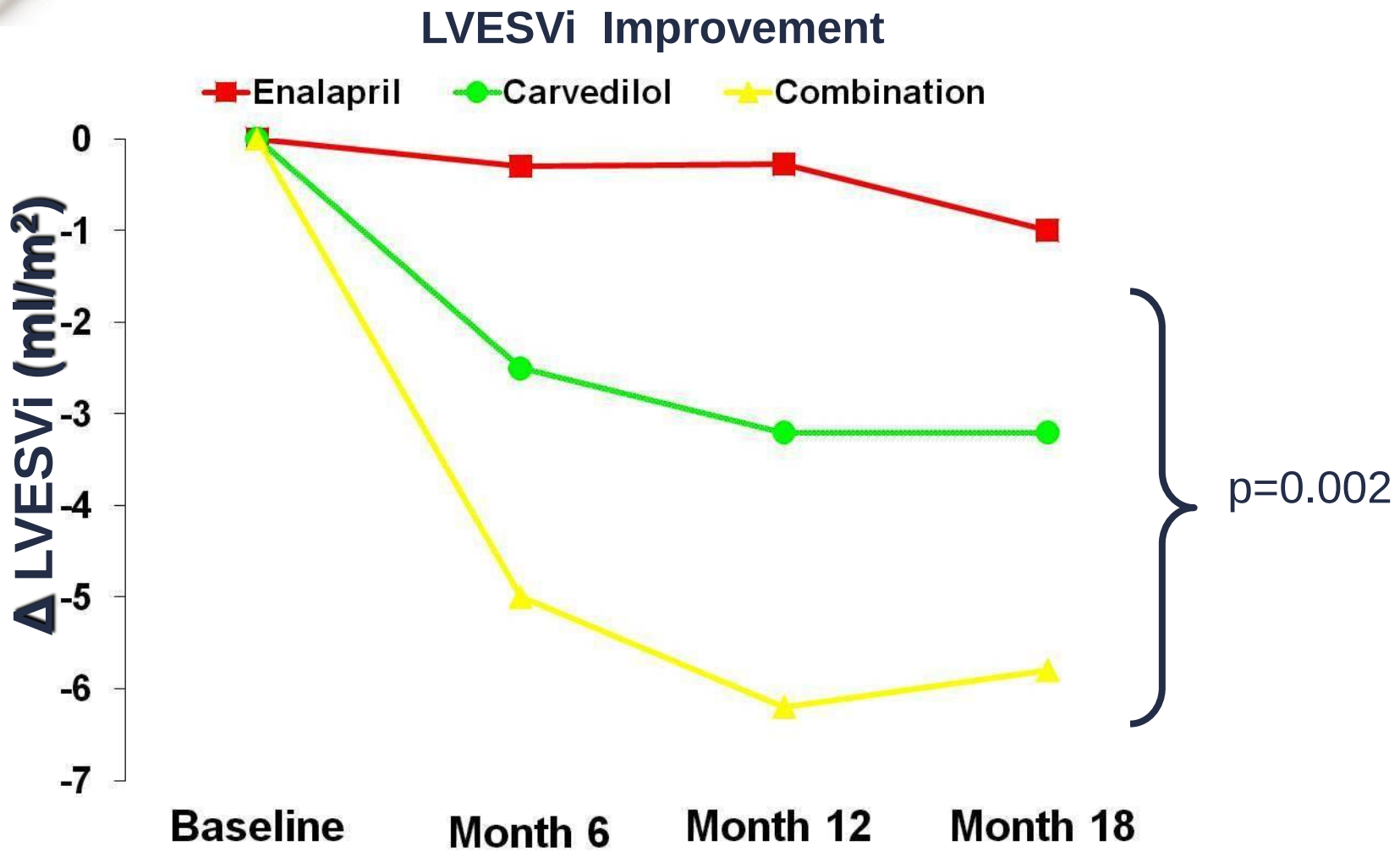
MOCHA: β blocker therapy reverses remodelling over 6 months



Bristow, M. R. et al. Circulation 1996;94:2807-2816

Heart Failure Society of South Africa [HeFSSA]

CARMEN: β blocker + ACE inhibitor therapy reverses remodelling over 18 months

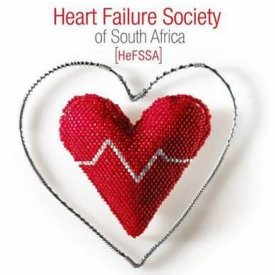


Remme et al Cardiovasc Drugs and Therapy 2004;18;57-66

Pharmacologic Management

Aldosterone Antagonists

- Generally well-tolerated.
- Shown to reduce heart failure-related morbidity and mortality.
- Generally reserved for patients with NYHA Class III-IV HF.
- Side effects include hyperkalemia and gynecomastia. Potassium and creatinine levels should be closely monitored.



Program

Lecture 1:

UPDATE ON CHRONIC HEART FAILURE

- **Background Information**
- **ESC Guidelines on chronic heart failure 2012**
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Evidence-based Doses Of Disease-modifying Drugs Used In Key Randomized Trials In Heart Failure (Or After Myocardial Infarction)(ESC Guidelines 2012)

	Starting dose (mg)	Target dose (mg)
ACE inhibitor		
Captopril[a]	6.25 t.i.d.	50 t.i.d.
Enalapril	2.5 b.i.d.	10–20 b.i.d.
Lisinopril[b]	2.5–5.0 o.d.	20–35 o.d.
Ramipril	2.5 o.d.	5 b.i.d.
Trandolapril[a]	0.5 o.d.	4 o.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[c]	1.25 o.d.	10 o.d.
ARB		
Candesartan	4 or 8 o.d.	32 o.d.
Valsartan	40 b.i.d.	160 b.i.d.
Losartan[b,c]	50 o.d.	150 o.d.
MRA		
Eplerenone	25 o.d.	50 o.d.
Spironolactone	25 o.d.	25–50 o.d.

ACE = angiotensin-converting enzyme; ARB = angiotensin receptor blocker; b.i.d. = bis in die (twice daily); MRA = mineralocorticoid receptor antagonist; o.d. = omni die (once every day); t.i.d. = ter in die (three times daily).

[a]Indicates an ACE inhibitor where the dosing target is derived from post-myocardial infarction trials.

[b]Indicates drugs where a higher dose has been shown to reduce morbidity–mortality compared with a lower dose of the same drug, but there is no substantive placebo-controlled randomized controlled trial and the optimum dose is uncertain.

[c]Indicates a treatment not shown to reduce cardiovascular or all-cause mortality in patients with heart failure or after acute mycocardial infarction (or shown to be non-inferior to a treatment that does).

Other Treatments With Less-certain Benefits In Patients With Symptomatic (NYHA Class II–IV) Systolic Heart Failure (ESC Guidelines 2012)

Recommendations	Class[a]	Level[b]	Ref[c]
ARB			
Recommended to reduce the risk of HF hospitalization and the risk of premature death in patients with an EF ≤40% and unable to tolerate an ACE inhibitor because of cough (patients should also receive a beta-blocker and an MRA).	I	A	108, 109
Recommended to reduce the risk of HF hospitalization in patients with an EF ≤40% and persisting symptoms (NYHA class II–IV) despite treatment with an ACE inhibitor and a beta-blocker who are unable to tolerate an MRA.[d]	I	A	110, 111
Ivabradine			
Should be considered to reduce the risk of HF hospitalization in patients in sinus rhythm with an EF ≤35%, a heart rate remaining ≥70 b.p.m., and persisting symptoms (NYHA class II–IV) despite treatment with an evidence-based dose of beta-blocker (or maximum tolerated dose below that), ACE inhibitor (or ARB), and an MRA (or ARB).[e]	IIa	B	112
May be considered to reduce the risk of HF hospitalization in patients in sinus rhythm with an EF ≤35% and a heart rate ≥70 b.p.m. who are unable to tolerate a beta-blocker. Patients should also receive an ACE inhibitor (or ARB) and an MRA (or ARB).[e]	IIb	C	–
Digoxin			
May be considered to reduce the risk of HF hospitalization in patients in sinus rhythm with an EF ≤45% who are unable to tolerate a beta-blocker (ivabradine is an alternative in patients with a heart rate ≥70 b.p.m.). Patients should also receive an ACE inhibitor (or ARB) and an MRA (or ARB).	IIb	B	113
May be considered to reduce the risk of HF hospitalization in patients with an EF ≤45% and persisting symptoms (NYHA class II–IV) despite treatment with a beta-blocker, ACE inhibitor (or ARB), and an MRA (or ARB).	IIb	B	113

ACE = angiotensin-converting enzyme; ARB = angiotensin receptor blocker; CHARM-Added = Candesartan in Heart Failure: Assessment of Reduction in Mortality and Morbidity-Added; EF = ejection fraction; HF = heart failure; H-ISDN = hydralazine and isosorbide dinitrate; MRA = mineralocorticoid receptor antagonist; NYHA = New York Heart Association; PUFA = polyunsaturated fatty acid.

[a]Class of recommendation.

[b]Level of evidence.

[c]References.

[d]In the CHARM-Added trial, candesartan also reduced cardiovascular mortality.

[e]European Medecines Agency has approved ivabradine for use in patients with a heart rate ≥75 b.p.m.

[f]Preparation studied in cited trial; the GISSI-HF trial had no EF limit.

Other Treatments With Less-certain Benefits In Patients With Symptomatic (NYHA Class II–IV) Systolic Heart Failure cont.

(ESC Guidelines 2012)

Recommendations	Class[a]	Level[b]	Ref[c]
H-ISDN			
May be considered as an alternative to an ACE inhibitor or ARB, if neither is tolerated, to reduce the risk of HF hospitalization and risk of premature death in patients with an EF ≤45% and dilated LV (or EF ≤35%). Patients should also receive a beta-blocker and an MRA.	IIb	B	114, 115
May be considered to reduce the risk of HF hospitalization and risk of premature death in patients in patients with an EF ≤45% and dilated LV (or EF ≤35%) and persisting symptoms (NYHA class II–IV) despite treatment with a beta-blocker, ACE inhibitor (or ARB), and an MRA (or ARB).	IIb	B	116
An *n*-3 PUFA[f] preparation may be considered to reduce the risk of death and the risk of cardiovascular hospitalization in patients treated with an ACE inhibitor (or ARB), beta-blocker, and an MRA (or ARB).	IIb	B	117

ACE = angiotensin-converting enzyme; ARB = angiotensin receptor blocker; CHARM-Added = Candesartan in Heart Failure: Assessment of Reduction in Mortality and Morbidity-Added; EF = ejection fraction; HF = heart failure; H-ISDN = hydralazine and isosorbide dinitrate; MRA = mineralocorticoid receptor antagonist; NYHA = New York Heart Association; PUFA = polyunsaturated fatty acid.

[a]Class of recommendation.

[b]Level of evidence.

[c]References.

[d]In the CHARM-Added trial, candesartan also reduced cardiovascular mortality.

[e]European Medecines Agency has approved ivabradine for use in patients with a heart rate ≥75 b.p.m.

[f]Preparation studied in cited trial; the GISSI-HF trial had no EF limit.

Diuretics

Fluid retention may increase cardiac output by a Frank-Starling mechanism.

Other consequences of fluid retention include:

Increase diastolic pressure

thus

Increase in wall stress

thus

Hypertrophy and remodelling

There may be oedema, dyspnoea and pulmonary oedema.

Hence the use of diuretics

Classes of Diuretics

Loop Diuretics

Furosemide, Torasemide, Bumetanide

Thiazide and Thiazide-like

Potassium Sparing Diuretics

Amiloride, triamterine

Mineralo Corticoid Inhibitory

Spironolactone

Carbonic Anhydrase Inhibitors

Acetezolamide (diamox)

Diuretics

With the exception of spironolactone (an aldosterone antagonist) diuretics do not influence the natural history of chronic heart failure.

Bristow MR et al.

Heart Disease. P562. Ed Braunwald, Zipes, Lippy, WB Saunders 2001

However….

Diuretics potentially improve congestive symptoms and may slow down ventricular remodelling.

Doses Of Diuretics Commonly Used To Treat Heart Failure (With And Without A Preserved Ejection Fraction, Chronic And Acute)

(ESC Guidelines 2012)

Diuretics	Initial dose (mg)		Usual daily dose (mg)	
Loop diuretics[a]				
Furosemide	20–40		40–240	
Bumetanide	0.5–1.0		1–5	
Torasemide	5–10		10–20	
Thiazides[b]				
Bendroflumethiazide	2.5		2.5–10	
Hydrochlorothiazide	25		12.5–100	
Metolazone	2.5		2.5–10	
Indapamide[c]	2.5		2.5–5	
Potassium-sparing diuretics[d]				
	+ACEi/ ARB	−ACEi/ ARB	+ACEi/ ARB	−ACEi/ ARB
Spironolactone/ eplerenone	12.5–25	50	50	100–200
Amiloride	2.5	5	5–10	10–20
Triamterene	25	50	100	200

ACEi = angiontensin-converting enzyme inhibitor; ARB = angiotensin receptor blocker.

[a]Oral or intravenous; dose might need to be adjusted according to volume status/ weight; excessive doses may cause renal impairment and ototoxicity.

[b]Do not use thiazides if estimated glomerular filtration rate <30 mL/min, except when prescribed synergistically with loop diuretics.

[c]Indapamide is a non-thiazide sulfonamide.

[d]A mineralocorticoid antagonist (MRA) i.e. spironolactone/eplerenone is always preferred. Amiloride and triamterene should not be combined with an MRA.

Problems Encountered With Diuretics

1. Metabolic Side Effects
   Hyperglycaemia, hyperuricaemia

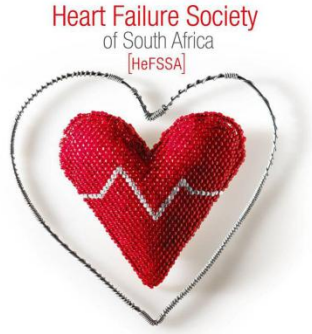
2. Electrolyte Imbalance

3. Volume Depletion
   Hypertension, interference with other medications (Ace I, ARB, beta blockade)

4. Diuretic Resistance (Na=sodium)
   - Net gain of Na with a high Na diet
   - Compensatory hypertrophy of tubular epithelial cells distal to their site of action
   - Other drugs NSAIDS
   - ↓ Renal perfusion

Cardiac Glycosides

- Have a definite inotropic effect (more Starling curve-calcium mediated).
- Does not decrease mortality.
- Beneficial effects in mild to moderate failure in sinus rhythm.
- Requires vigilance regarding toxic accumulation (NB: GFR, body mass).
- Measurement of serum levels advisable.
- Contra-indicated in predominantly diastolic dysfunction.



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Medications Which Increase Serum Digoxin Levels Mainly By ↓ Renal Clearance

Amiodarone
Verapamil
Nifedipine
Diltiazem
Quinidine
Propafenone
Captopril
Carvedilol
Saint John's wort

Amiloride
Triamterene
Macrolide Antibiotics
Tetracycline
Indomethacin
Alprazolam
Itraconazole
Cyclosporine Spironolactone

Vasodilators

Decrease arteriolar tone ↑ CO
Decrease venous preload ↓ congestion

Acute Phase

Sodium nitroprusside
Nitrates initially may also have a beneficial primary coronary effect, secondary ↑CO.

Chronic Stable Phase

Oral Nitrates – Note: Avoid nitrate resistance by having a drug free time.
Hydrallazine – Need for 3-4 times daily dose. (major increase in systemic and pulmonary after load).

Anticoagulants

The presence of heart failure markedly lowers the threshold for instituting anticoagulant therapy e.g. atrial fibrillation, bed rest.

Assessment Of Stroke Risk In Patients With Atrial Fibrillation

(ESC Guidelines 2012)

CHA_2DS_2-VASc	
Congestive HF or LVEF ≤40%	1
Hypertension	1
Age ≥75 years	2
Diabetes mellitus	1
Stroke, transient ischaemic attack, or thrombo-embolism	2
Vascular disease (previous myocardial infarction, peripheral artery disease, or aortic plaque)	1
Age 65–74 years	1
Sex category (i.e. female sex)	1
Maximum score	9
CHA_2DS_2-VASc score = 0: recommend no antithrombotic therapy.	
CHA_2DS_2-VASc score = 1: recommend antithrombotic therapy with oral anticoagulation or antiplatelet therapy, but preferably oral anticoagulation.	
CHA_2DS_2-VASc score = 2: recommend oral anticoagulation.	

CHA_2DS_2-VASc = Cardiac failure, Hypertension, Age ≥75 (Doubled), Diabetes, Stroke (Doubled), Vascular disease, Age 65–74, and Sex category (Female); HF = heart failure; LVEF = left ventricular ejection fraction.

Assessment Of Bleeding Risk In Patients With Atrial Fibrillation

(ESC Guidelines 2012)

HAS-BLED	
Hypertension (systolic blood pressure >160 mmHg)	1
Abnormal renal and liver function (1 point each)	1 or 2
Stroke	1
Bleeding tendency or predisposition	1
Labile international normalized ratio (if on warfarin)	1
Elderly (e.g. age > 65 years)	1
Drugs (e.g. concomitant aspirin, NSAID) or alcohol (1 point each)	1 or 2
Maximum score	9
A HAS-BLED score ≥3 suggests that caution is warranted when prescribing oral anticoagulation and regular review is recommended.	

HAS-BLED = Hypertension, Abnormal renal/liver function (1 point each), Stroke, Bleeding history or predisposition, Labile international normalized ratio, Elderly (>65), Drugs/alcohol concomitantly (1 point each); NSAID = non-steroidal anti-inflammatory drug.

Treatments (Or Combinations Of Treatments) That May Cause Harm In Patients With Symptomatic (NYHA Class II–IV) Systolic Heart Failure (ESC Guidelines 2012)

Recommendations	Class[a]	Level[b]	Ref[c]
Thiazolidinediones (glitazones) should not be used as they cause worsening HF and increase the risk of HF hospitalization.	III	A	131–133
Most CCBs (with the exception of amlodipine and felodipine) should not be used as they have a negative inotropic effect and can cause worsening HF.	III	B	134
NSAIDs and COX-2 inhibitors should be avoided if possible as they may cause sodium and water retention, worsening renal function and worsening HF.	III	B	135, 136
The addition of an ARB (or renin inhibitor) to the combination of an ACE inhibitor AND a mineralocorticoid antagonist is NOT recommended because of the risk of renal dysfunction and hyperkalaemia.	III	C	–

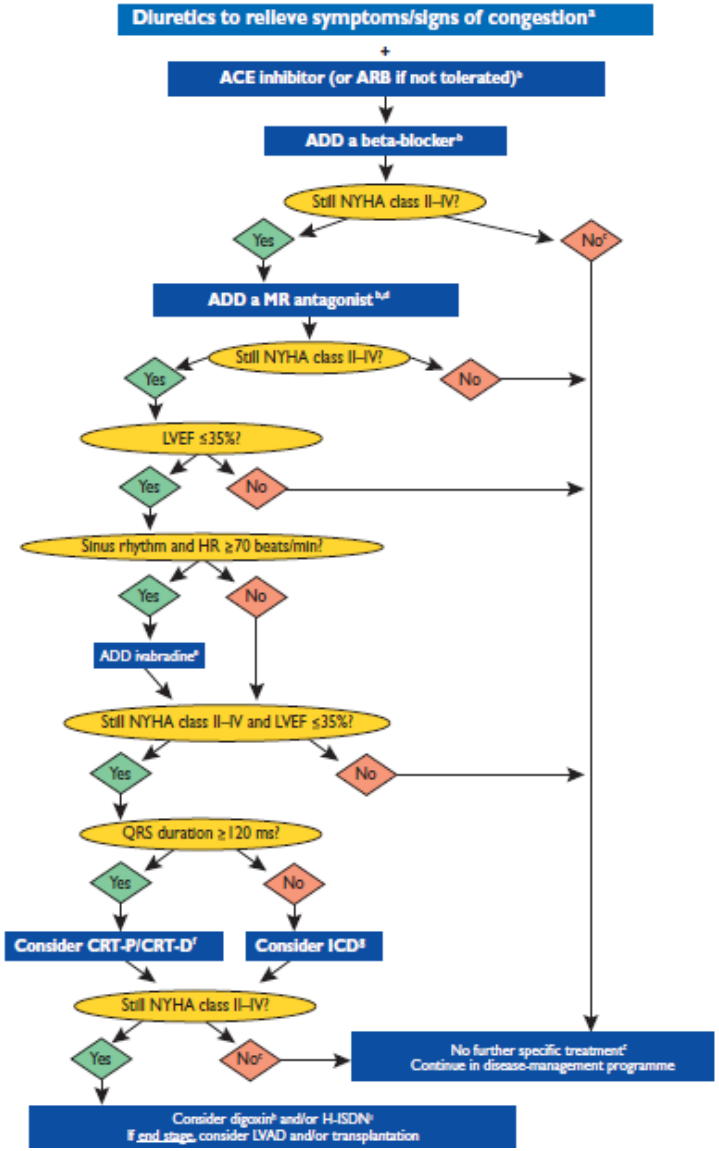
ACE = angiotensin-converting enzyme; ARB = angiotensin receptor blocker; CCB = calcium-channel blocker; COX = cyclo-oxygenase; EF = ejection fraction; HF = heart failure; NSAID = non-steroidal anti-inflammatory drug; NYHA = New York Heart Association.

[a]Class of recommendation.

[b]Level of evidence.

[c]References.

Treatment Options For Patients With Chronic Symptomatic Systolic Heart Failure (NYHA Functional Class II–IV) (ESC Guidelines 2012)

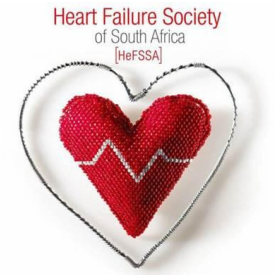


Essential Topics That Should Be Covered During Patient Education, And The Skills And Self-care Behaviours That Should Be Taught In Relation To These Topics (ESC Guidelines 2012)

Educational topic	Patient skills and self-care behaviours
Definition and aetiology	• Understand the cause of heart failure and why symptoms occur
Prognosis	• Understand important prognostic factors and make realistic decisions
Symptom monitoring and self-care	• Monitor and recognize signs and symptoms
	• Record daily weight and recognize rapid weight gain
	• Know how and when to notify healthcare provider
	• In the case of increasing dyspnoea or oedema or a sudden unexpected weight gain of >2 kg in 3 days, patients may increase their diuretic dose and/or alert their healthcare team
	• Use flexible diuretic therapy if appropriate and recommended after appropriate education and provision of detailed instructions
Pharmacological treatment	• Understand indications, dosing, and effects of drugs
	• Recognize the common side effects of each drug prescribed
Adherence	• Understand the importance of following treatment recommendations and maintaining motivation to follow treatment plan
	• Sodium restriction may help control the symptoms and signs of congestion in patients with symptomatic heart failure classes III and IV
Diet	• Avoid excessive fluid intake: fluid restriction of 1.5–2 L/day may be considered in patients with severe heart failure to relieve symptoms and congestion. Restriction of hypotonic fluids may improve hyponatraemia. Routine fluid restriction in all patients with mild to moderate symptoms is probably not of benefit. Weight-based fluid restriction (30 mL/kg body weight, 35 mL/kg if body weight >85 kg) may cause less thirst
	• Monitor and prevent malnutrition
	• Eat healthily and keep a healthy weight (see Section 11)

Essential Topics That Should Be Covered During Patient Education, And The Skills And Self-care Behaviours That Should Be Taught In Relation To These Topics cont. (ESC Guidelines 2012)

Educational topic	Patient skills and self-care behaviours
Alcohol	• Modest intake of alcohol: abstinence is recommended in patients with alcohol-induced cardiomyopathy. Otherwise, normal alcohol guidelines apply (2 units per day in men or 1 unit per day in women). 1 unit is 10 mL of pure alcohol (e.g. 1 glass of wine, 1/2 pint of beer, 1 measure of spirit)
Smoking and drugs	• Stop smoking and/or taking illicit drugs
Exercise	• Understand the benefits of exercise
	• Perform exercise training regularly
	• Be reassured and comfortable about physical activity
Travel and leisure	• Prepare travel and leisure activities according to physical capacity
	• When travelling, carry a written report of medical history and current medication regimen and carry extra medication. Monitor and adapt fluid intake particularly during flights and in hot climates. Beware adverse reactions to sun exposure with certain medications (e.g. amiodarone)
Sexual activity	• Be reassured about engaging in sex and discuss problems with healthcare professionals. Stable patients can undertake normal sexual activity that does not provoke undue symptoms. For treatment of erectile dysfunction, see Section 11.10
Immunization	• Receive immunization against influenza and pneumococcal disease according to local guidelines and practice
Sleep and breathing disorders	• Recognize preventive behaviour such as reducing weight in obese patients, smoking cessation, and abstinence from alcohol
	• Learn about treatment options if appropriate
Psychosocial aspects	• Understand that depressive symptoms and cognitive dysfunction are common in patients with heart failure and the importance of social support
	• Learn about treatment options if appropriate



Program

Lecture 1:

UPDATE ON CHRONIC HEART FAILURE

- **Background Information to Therapeutic approach**
- **ESC Guidelines on chronic heart failure 2012**
- **Adaptation to the ESC guidelines by South Africa Heart Association**

Chronic Heart Failure: Diagnosis and Treatment Algorithm

adopted from ESC HF guideline 2012

Algorithm for the diagnosis of Heart Failure with Reduced Ejection Fraction (HF-REF) or left ventricular systolic dysfunction (LVEF<50%)

General Assessment

- Risk factor profile (hypertension etc.)
- Family History
- Recent pregnancy < 1 year

Symptoms

- Shortness of breath - on effort
  - lying flat
  - during the night
- New cough
- Ankle swelling
- Irregular or fast heart beat
- Effort fatigue
- More frequent nocturia

Signs

Signs of congestion:
- raised JVP
- tender hepatomegaly
- peripheral oedema
- ascites

Chest signs:
- inspiratory crackles
- pleural effusion

Signs of heart disease:
- tachycardia
- displaced apex beat
- presence of cardiac murmur
- presence of S3
- cool peripheries

Suspected **Heart Failure / LV Dysfunction** because of signs and symptoms

↓

Assess presence of cardiac disease by ECG, CXR and/or NTproBNP / BNP

→ Normal → HF-REF unlikely

↓ Any abnormalities

Imaging by Echocardiography

→ Normal → HF-REF unlikely

↓ Any abnormalities

Assess aetiology, precipitating factor/s and NYHA functional class

→ Additional diagnostic tests in selected cases → Referral to specialist for e.g. cardiac catheterisation, MRI, endomyocardial biopsy

↓

*Choose **THERAPY***

Holistic Care

- Salt restriction (in hypertensives only)
- Exercise (once stabilised)
- Heart failure management programme
- Avoid : NSAID, glitazones, CCB (except amlodipine, felodipine)
- Palliative care

Pharmacological Management in patients with HF / Reduced ejection fraction

Therapy that reduces:

Mortality	Hospitalisation	Symptoms	Surgical
ACE-I	ARB	Diuretic	Heart transplant
B Blocker	Ivabradine		Valvular intervention
Aldosterone antagonist	Digoxin		LV assist device
Hydralazine + Nitrate			
Biventricular pacing + ICD (CRT-P / CRT-D)			

Precipitating Factors

Mandatory: U & E, Glucose, TSH

Possible: LFT, Ferritin, Calcium, hsTroponin T (Table 6 ESC guidelines)

Special consideration

Hydralazine + Nitrates (Black African patients)

Digoxin (AF, resistant symptomatic heart failure)

Warfarin (AF, LV clot)

Amiodarone (to sustain Sinus Rhythm)

Aldosterone antagonist (Early post-MI heart failure)

ACE-I + ARB if Aldosterone antagonist cannot be used

Heart Failure Society of South Africa (HEFSSA)

www.hefssa.org