



Complete Summary

GUIDELINE TITLE

Guidelines for the diagnosis and treatment of chronic heart failure.

BIBLIOGRAPHIC SOURCE(S)

Remme WJ, Swedberg K. Guidelines for the diagnosis and treatment of chronic heart failure. Eur Heart J 2001 Sep; 22(17):1527-60. [196 references] [PubMed](#)

COMPLETE SUMMARY CONTENT

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SCOPE

DISEASE/CONDITION(S)

Chronic heart failure

GUIDELINE CATEGORY

Diagnosis
Evaluation
Treatment

CLINICAL SPECIALTY

Cardiology
Family Practice
Internal Medicine
Nursing
Surgery

INTENDED USERS

Advanced Practice Nurses
Nurses
Physician Assistants
Physicians

GUIDELINE OBJECTIVE(S)

To provide practical guidelines for the diagnosis, assessment and treatment of heart failure for use in clinical practice and in addition for epidemiological surveys and clinical trials

TARGET POPULATION

Patients with chronic heart failure

INTERVENTIONS AND PRACTICES CONSIDERED

Diagnosis

1. Assessment of signs and symptoms of heart failure
2. Establish severity with New York Heart Association (NYHA) classification and quality of life with Minnesota Living with Heart Failure questionnaire
3. Electrocardiogram (ECG)
4. Chest x-ray
5. Laboratory investigations including haematology and biochemistry
6. Echocardiography (transthoracic Doppler, transoesophageal)
7. Stress echocardiogram
8. Nuclear cardiology (radionuclide angiography [RNA], planar scintigraphy, single photon emission computer tomography [SPECT])
9. Cardiac magnetic resonance imaging (MRI)
10. Measurement of pulmonary function, including forced vital capacity (FVC) measurement, forced expiratory volume (FEV), and peak expiratory flow rate (PEFR)
11. Invasive investigations (coronary angiography, haemodynamic monitoring, endomyocardial biopsy)
12. Measurement of plasma natriuretic peptide
13. Holter electrocardiography

Non-pharmacological Management

1. General advice and measures including weight control; dietary measures such as salt restriction; fluid and alcohol intake reduction; weight control; smoking cessation; advice on traveling, sexual activity, and immunizations; and drug counseling
2. Exercise and exercise training

Pharmacological Therapy

1. Angiotensin-converting enzyme (ACE) inhibitors, such as enalapril, lisinopril, captopril, ramipril, trandolapril, benazepril, and others

2. Diuretics, including loop diuretics (furosemide, bumetanide, torasemide); thiazides (hydrochlorothiazide, metolazone, indapamide); and potassium-sparing diuretics (amiloride, triamterene, spironolactone)
3. Beta-adrenoceptor antagonists, such as bisoprolol, metoprolol, carvedilol
4. Aldosterone receptor antagonists, such as spironolactone and eplerenone
5. Angiotensin receptor antagonists, such as losartan, valsartan, irbesartan, candesartan cilexetil, telmisartan, eprosartan
6. Cardiac glycosides (digoxin, digitoxin)
7. Vasodilator agents (nitrates/hydralazine)
8. Positive inotropic therapy, such as dobutamine and phosphodiesterase inhibitors (milrinone, amrinone, enoximone) (Note: dopaminergic agents are considered but not recommended)
9. Antithrombotic and anticoagulant therapy, such as aspirin and heparin,
10. Antiarrhythmic agents, including amiodarone
11. Calcium antagonists (considered but not recommended for heart failure due to systolic dysfunction)

Oxygen Therapy

(Considered but not Recommended for Chronic Heart Failure)

Devices and Surgery

1. Revascularization (catheter interventions and surgery), other forms of surgery
2. Pacemakers
3. Implantable cardioverter defibrillators
4. Heart transplantation, ventricular assist devices, artificial heart
5. Ultrafiltration, haemodialysis

Follow-up Care

Interventions and practices related to treatment of diastolic heart failure, heart failure in the elderly, and heart failure in patients with concomitant arrhythmia, hypertension or angina are also presented.

MAJOR OUTCOMES CONSIDERED

- Accuracy, sensitivity, and specificity of diagnostic assessments
- Rates of heart failure
- Symptoms of heart failure
- Progression of heart failure, including hospitalization for worsening heart failure
- Mortality, including total mortality, cardiovascular mortality, sudden death, and death due to progression of heart failure
- Quality of life
- Adverse effects

METHODOLOGY

METHODS USED TO COLLECT/SELECT EVIDENCE

Searches of Electronic Databases

DESCRIPTION OF METHODS USED TO COLLECT/SELECT THE EVIDENCE

Not stated

NUMBER OF SOURCE DOCUMENTS

Not stated

METHODS USED TO ASSESS THE QUALITY AND STRENGTH OF THE EVIDENCE

Weighting According to a Rating Scheme (Scheme Given)

RATING SCHEME FOR THE STRENGTH OF THE EVIDENCE

Levels of Evidence:

- A. At least two randomized trials supporting recommendations.
- B. One randomized trial and/or meta-analysis supporting recommendations
- C. Consensus statement from experts based on trials and clinical experience

METHODS USED TO ANALYZE THE EVIDENCE

Review of Published Meta-Analyses
Systematic Review

DESCRIPTION OF THE METHODS USED TO ANALYZE THE EVIDENCE

Not stated

METHODS USED TO FORMULATE THE RECOMMENDATIONS

Expert Consensus

DESCRIPTION OF METHODS USED TO FORMULATE THE RECOMMENDATIONS

Not stated

RATING SCHEME FOR THE STRENGTH OF THE RECOMMENDATIONS

Not applicable

COST ANALYSIS

Various management programmes, aiming at optimizing individual care of heart failure patients, have been evaluated; these are mainly non-pharmacological and only some are controlled. Most programmes were reported to be effective in

improving quality of life, reducing the number of readmissions and in reducing costs. Only a few studies have reported limited or negative outcomes.

METHOD OF GUIDELINE VALIDATION

External Peer Review
Internal Peer Review

DESCRIPTION OF METHOD OF GUIDELINE VALIDATION

This report was drafted by a Task Force appointed by the Committee for Practice Guidelines and Policy Conferences of the European Society of Cardiology (ESC). It was circulated among the Nucleus of the Working Group on Heart Failure, other Working Groups, and several experts in the field of heart failure. It was updated based on comments received. It was then sent to the Committee and after their input the document was approved for publication.

RECOMMENDATIONS

MAJOR RECOMMENDATIONS

The level of evidence (A-C) is defined at the end of the "Major Recommendations" field.

Diagnosis of Chronic Heart Failure

Definition of Heart Failure

Criteria 1 and 2 should be fulfilled in all cases:

1. Symptoms of heart failure (at rest or during exercise), and
2. Objective evidence of cardiac dysfunction (at rest), and (in cases where the diagnosis is in doubt)
3. Response to treatment directed towards heart failure

Therapy should not usually be initiated until a diagnosis of chronic heart failure has been established with reasonable certainty.

Aetiology of Heart Failure in Europe

- Heart failure should never be the final diagnosis.

The aetiology of heart failure and the presence of exacerbating factors or other diseases that may have an important influence on management should be carefully considered in all cases. The extent to which the cause of heart failure should be pursued by further investigation will depend on the resources available and the likelihood that diagnosis will influence management.

- A proper diagnostic formulation must extend beyond the cardiac problem, particularly in the elderly population in whom multiple rather than single diseases are common.

Symptoms and Signs in the Diagnosis of Heart Failure

- Symptoms and signs are important as they alert the observer to the possibility that heart failure exists. The clinical suspicion of heart failure must be confirmed by more objective tests, particularly aimed at assessing cardiac function.
- Clinical signs of heart failure should be assessed in a careful clinical examination including observing, palpating, and auscultating the patient.

Symptoms and the Severity of Heart Failure

- There is a poor relationship between symptoms and the severity of cardiac dysfunction and between symptoms and prognosis.
- Once a diagnosis of heart failure has been established symptoms may be used to classify the severity of heart failure and should be used to monitor the effects of therapy. The New York Heart Association classification (NYHA) is in widespread use. The use of examples such as walking distance or number of stairs climbed is recommended. In other situations, the classification of symptoms into mild, moderate, or severe is used. Patients in New York Heart Association class I would have to have objective evidence of cardiac dysfunction, have a past history of heart failure symptoms and be receiving treatment for heart failure in order to fulfill the basic definition of heart failure.

Electrocardiogram

- A normal electrocardiograph suggests that the diagnosis of chronic heart failure should be carefully reviewed.

The Chest X-ray

- A chest x-ray should be part of the initial diagnostic work-up in heart failure.

Haematology and Biochemistry

- The following laboratory investigations are recommended as part of a routine diagnostic evaluation of patients with chronic heart failure: Complete blood count (hemoglobin, leukocytes, platelets), serum electrolytes, serum creatinine, serum glucose, serum hepatic enzymes and urinalysis. Additional tests to consider include: C-reactive protein (CRP), thyroid stimulating hormone (TSH), serum uric acid and serum urea. In acute exacerbations it is important to exclude acute myocardial infarction by myocardial specific enzyme analysis.

Echocardiography

- As objective evidence of cardiac dysfunction at rest is necessary for the diagnosis of heart failure, echocardiography is the preferred method for this documentation.
- The access to and use of echocardiography is encouraged for the diagnosis of heart failure. Transthoracic Doppler echocardiography is rapid, safe, and widely available. It allows the assessment of chamber dimensions, wall thicknesses and geometry, indices of regional, global, systolic and diastolic ventricular function.
- Transoesophageal echocardiography is not recommended routinely and can only be recommended in patients who have an inadequate echo window, in complicated valvular patients, in those with suspected dysfunction of mechanical mitral valve prosthesis or when it is mandatory to identify or exclude a thrombus in the atrial appendage.
- Repeated echocardiography can only be recommended in the follow-up of patients with heart failure when there is an important change in the clinical status suggesting significant improvement or deterioration in cardiac function.

Additional Non-invasive Tests to be Considered

- In patients where echocardiography at rest has not provided enough information and in patients with coronary artery disease (e.g., severe or refractory chronic heart failure and coronary artery disease) further, noninvasive imaging may include:
 - Stress echocardiography: Exercise of pharmacological stress echocardiography may be useful for detecting ischaemia as a cause of reversible or persistent dysfunction and in determining the viability of akinetic myocardium.
 - Nuclear cardiology: Radionuclide angiography provides reasonably accurate measurements of left, and to a lesser extent, right ventricular ejection fraction and cardiac volume. Left ventricular filling dynamics can also be analyzed.
 - Cardiac magnetic resonance imaging: At the present time, cardiac magnetic resonance imaging is only recommended if other imaging techniques have not provided a satisfactory diagnostic answer.

Pulmonary Function

- Measurements of lung function are of little value in diagnosing chronic heart failure. However, they are useful in excluding respiratory causes of breathlessness.

Exercise Testing

- In clinical practice, exercise testing is of limited value for the diagnosis of heart failure. However, a normal maximal exercise test, in a patient not receiving treatment for heart failure, excludes heart failure as a diagnosis. The main applications of exercise testing in chronic heart failure are more focused on functional and treatment assessment and on prognostic stratification.

Invasive Investigation

- Invasive investigation is generally not required to establish the presence of chronic heart failure but may be important in elucidating the cause or to obtain prognostic information.

Three diagnostic tools may be helpful in different situations: coronary angiography, haemodynamic monitoring and endomyocardial biopsy. None of them is indicated as a routine procedure.

Natriuretic Peptides

- Plasma concentrations of certain natriuretic peptides can be helpful in the diagnostic process, especially in untreated patients.

Other Neuroendocrine Evaluations

- Other tests of neuroendocrine activation are not recommended for diagnostic or prognostic purposes in individual patients.

Holter Electrocardiography (Ambulatory Electrocardiography, Long Time Electrocardiography Recording [LTER])

- Conventional Holter monitoring is of no value in the diagnosis of chronic heart failure, though it may detect and quantify the nature, frequency, and duration of atrial and ventricular arrhythmias, which could be causing or exacerbating symptoms of heart failure. Ambulatory electrocardiographic monitoring should be restricted to patients with chronic heart failure and symptomatic arrhythmias.

Requirements for the Diagnosis of Heart Failure in Clinical Practice

- To satisfy the definition of heart failure, symptoms of heart failure and objective evidence of cardiac dysfunction must be present. The assessment of cardiac function by clinical criteria alone is unsatisfactory. Cardiac dysfunction should be assessed objectively. The echocardiogram is the single most effective tool in widespread clinical use. A diagnosis of heart failure also requires the presence of symptoms and/or signs suggestive of the diagnosis and cannot be made by any single laboratory test. Other conditions may mimic or exacerbate the symptoms and signs of heart failure and need to be excluded. An approach to the diagnosis of heart failure in symptomatic patients is presented, and should be performed routinely in patients with suspected heart failure in order to establish the diagnosis. Additional tests should be performed or re-evaluated in cases where diagnostic doubt persists or clinical features suggest a reversible cause for heart failure. Coronary artery disease is a common, and probably underdiagnosed, cause of heart failure. If there is reason to believe that the patient will benefit from revascularization then an angiogram should be done.

Treatment of Heart Failure

Non-pharmacological Management

(Note: Level of Evidence C is applied to all general advice and measures unless stated otherwise.)

Educating Patients and Families

- Patients with chronic heart failure and their close relatives should receive general advice. (See Table 9 in the original guideline document.)

Weight Control

- Patients are advised to weigh themselves on a regular basis (once a day, twice a week) and, in case of a sudden unexpected weight gain of more than 2 kg in 3 days, to alert a health care provider or adjust their diuretic dose accordingly, e.g., to increase the dose if a sustained increase is noted.

Dietary Measures:

- Sodium. Controlling the amount of salt in the diet is a problem that is a more relevant in advanced heart failure. Salt substitutes must be used with caution, as they may contain potassium.
- Fluids. Fluid intake must be reduced in patients with advanced heart failure, with or without hyponatremia. The exact amount of fluid restriction remains unclear. In practice; a fluid restriction of 1.5 to 2 litres is advised in advanced heart failure.
- Alcohol. Moderate alcohol intake is permitted. Alcohol consumption must be prohibited in suspected cases of alcoholic cardiomyopathy,

Obesity

- Treatment of chronic heart failure should include weight reduction in the overweight or obese.

Abnormal Weight Loss

- Consider the possibility of abnormal weight loss when:
 - a. a body weight <90% of ideal body weight or,
 - b. a documented non-intentional weight loss of at least 5 kg or of more than 7.5% of the previous normal non-oedematous weight in the previous 6 months and/or a body mass index (weight/height²) less than 22 kg.m⁻².
- The aim of treatment is to achieve an increase in non-oedematous body weight, preferably by increasing muscle mass through adequate physical exercise. Small, frequent meals are indicated when reduced food intake results from nausea, dyspnoea or a bloated feeling.

Smoking

- Smoking should always be discouraged. The use of smoking cessation aids should be actively encouraged, and may include nicotine replacement therapies.

Traveling

- High altitudes or very hot or humid places should be discouraged. In general, short air flights are preferable to long journeys by other means of transport.
- The use of diuretics and vasodilators may have to be adapted in cases of excessive sodium and fluid loss in hot humid climates.

Sexual Activity

- It is not possible to dictate guidelines about sexual activity counseling. Recommendations are given to reassure the not severely compromised, but frightened patient, to reassure the partner who is often even more frightened, and perhaps refer the couple for specialist counseling. Advise, if appropriate, the use of sublingual nitrates before sex and discourage major emotional involvements.

Advice on Immunizations

- There is no documented evidence of the effects of immunization in patients with heart failure. Pneumococcal and influenza immunization may reduce the incidence of respiratory infections that may worsen heart failure.

Drug Counseling

- Self-management (when practical) of the dose of the diuretic, based on changes in symptoms and fluid balance should be encouraged.
- Desired effects and side effects of all drugs should be explained. In addition, the following information on drugs should be provided: improvement may be gradual and only complete after several weeks, and with some drugs, months of treatment; the need for gradual titration with angiotensin-converting enzyme inhibitors and beta-blocking drugs to desired dosage levels which will not directly improve the patient's symptoms; in case dehydration occurs (diarrhoea, profuse sweating in hot climates) to reduce the dose of diuretics; how to act if symptomatic hypotension occurs (reduction of the diuretic and, if necessary, temporary reduction of the angiotensin-converting enzyme inhibitor dose); that coughing might occur with the use of angiotensin-converting enzyme inhibitors as well as a decrease in taste; to avoid non-steroidal inflammatory agents in combination with angiotensin-converting enzyme inhibitors; possible use of nitrates, in sublingual or spray form, as a transitory symptomatic treatment, administered at the onset of acute dyspnoea, or as prevention in certain situations.

Drugs to Avoid or be Aware Of

- The following drugs should be used with caution when co-prescribed with any form of heart failure treatment, or avoided:
 1. Non-steroidal anti-inflammatory drugs (NSAIDS)
 2. Class I antiarrhythmics
 3. Calcium antagonists (verapamil, diltiazem, first generation dihydropyridine derivatives)
 4. Tricyclic antidepressants

5. Corticosteroids
6. Lithium

Rest

- Rest should not be encouraged in stable chronic heart failure.

Exercise

- If in a stable condition, the patient should be encouraged to carry out daily physical and leisure time activities that do not induce symptoms, to prevent muscle de-conditioning. Strenuous or isometric exercises and competitive and tiring sport should be discouraged. If the patient is employed, the work tasks carried out must be assessed and advice given on whether they can be continued.

Exercise Training

- Exercise training programmes are encouraged in stable patients in New York Heart Association class II–III. Exercise training should be performed in the following order: duration, then frequency, then intensity.

Pharmacological Therapy

Angiotensin-converting Enzyme (ACE) Inhibitors

General Principles

- Angiotensin-converting enzyme inhibitors are recommended as first-line therapy in patients with a reduced left ventricular systolic function expressed as a subnormal ejection fraction, i.e., <40% to 45% (Level of Evidence A).
- Angiotensin-converting enzyme inhibitors should be uptitrated to the dosages shown to be effective in the large, controlled trials in heart failure (Level of Evidence A), and not titrated based on symptomatic improvement alone (Level of Evidence C).

Angiotensin-converting Enzyme Inhibitors in Asymptomatic Left Ventricular Dysfunction

- Asymptomatic patients with a documented left ventricular systolic dysfunction benefit from long-term angiotensin-converting enzyme inhibitor therapy. The consistency of data from the SOLVD Prevention Study, SAVE and TRACE have shown that asymptomatic patients, but with left ventricular dysfunction, will have less development of symptomatic heart failure and hospitalizations for heart failure (Level of Evidence A).

Angiotensin-converting Enzyme Inhibitors in Symptomatic Heart Failure

All patients with symptomatic heart failure due to systolic left ventricular dysfunction should receive an angiotensin-converting enzyme inhibitor (Level of Evidence A).

- Angiotensin-converting enzyme inhibition significantly improves survival and symptoms and reduces hospitalization in patients with moderate and severe heart failure and left ventricular systolic dysfunction. In the absence of fluid retention, angiotensin-converting enzyme inhibitors should be given first. In patients with fluid retention together with diuretics (Level of Evidence B).

Recommended Procedure for Starting an Angiotensin-converting Enzyme Inhibitor

1. Review the need for and dose of diuretics and vasodilators
2. Avoid excessive diuresis before treatment. Reduce or withhold diuretics, if being used, for 24 hours.
3. It may be advisable to start treatment in the evening, when supine, to minimize the potential negative effect on blood pressure, although there are no data on heart failure to support this (Level of Evidence C). When initiated in the morning, supervision for several hours with blood pressure control is advisable.
4. Start with a low dose and build up to maintenance dosages shown to be effective in large trials.
5. If renal function deteriorates substantially, stop treatment.
6. Avoid potassium-sparing diuretics during initiation of therapy.
7. Avoid non-steroidal anti-inflammatory drugs (NSAIDs).
8. Check blood pressure, renal function and electrolytes 1 to 2 weeks after each dose increment, at 3 months and subsequently at 6-month intervals.

The following patients should be referred for specialist care:

1. Cause of heart failure unknown
2. Systolic blood pressure < 100 mmHg
3. Serum creatinine > 150 micromol.L⁻¹
4. Serum sodium < 135 mmol.L⁻¹
5. Severe heart failure
6. Valve disease as primary cause

Diuretics

Loop Diuretics, Thiazides and Metolazone

- Diuretics are essential for symptomatic treatment when fluid overload is present and manifest as pulmonary congestion or peripheral oedema (Level of Evidence A), although there are no controlled, randomized trials that have assessed the effect on survival of these agents. The use of diuretics results in rapid improvement of dyspnoea and increased exercise tolerance (Level of Evidence B)
- Diuretics should always be administered in combination with angiotensin-converting enzyme inhibitors if possible (Level of Evidence C).

Potassium-sparing Diuretics

- Potassium-sparing diuretics should only be prescribed if hypokalaemia persists despite angiotensin-converting enzyme inhibition or, in severe heart

- failure despite the combination angiotensin-converting enzyme inhibition and low-dose spironolactone (Level of Evidence C).
- Potassium supplements are less effective in this situation (Level of Evidence B).

Recommended Procedure for Diuretic Treatment

Initial diuretic treatment:

- Loop diuretics or thiazides.
Always administered in addition to an angiotensin-converting enzyme inhibitor.
- If glomerular filtration rate (GFR) $<30 \text{ mL}\cdot\text{min}^{-1}$ do not use thiazides, except as therapy prescribed synergistically with loop diuretics.

Insufficient response:

1. Increase dose of diuretic
2. Combine loop diuretics and thiazides
3. With persistent fluid retention: administer loop diuretics twice daily
4. In severe chronic heart failure add metolazone with frequent measurement of creatinine and electrolytes.

Potassium-sparing diuretics: triamterene, amiloride, spironolactone:

- Use only if hypokalaemia persists after initiation of therapy with angiotensin-converting enzyme inhibitors and diuretics.
- Start 1-week low-dose administration, check serum potassium and creatinine after 5 to 7 days and titrate accordingly. Recheck every 5 to 7 days until potassium values are stable.

Beta-adrenoceptor Antagonists

General Principles

- Beta-blocking agents are recommended for the treatment of all patients with stable, mild, moderate and severe heart failure from ischaemic or non-ischaemic cardiomyopathies and reduced left ventricular ejection fraction, in New York Heart Association Class II to IV, on standard treatment, including diuretics and angiotensin-converting enzyme inhibitors, unless there is a contraindication (Level of Evidence A).
- In patients with left ventricular systolic dysfunction, with or without symptomatic heart failure, following an acute myocardial infarction long-term beta-blockade is recommended in addition to angiotensin-converting enzyme inhibition to reduce mortality (Level of Evidence B).

The Recommended Procedure for Starting a Beta-blocker

1. Patients should be on a background therapy with angiotensin-converting enzyme inhibition, if not contraindicated.

2. The patient should be in a relatively stable condition, without the need of intravenous inotropic therapy and without signs of marked fluid retention.
3. Start with a very low dose (see Table 17 titled "Initiating Dose, Target Dose and Titration Scheme of Beta-blocking Agents as Used in Recent Large Controlled Trials" in the original guideline document) and titrate up to maintenance dosages shown to be effective in large trials. The dose may be doubled every 1 to 2 weeks if the preceding dose was well tolerated. Most patients can be managed as outpatients.
4. Transient worsening failure, hypotension or bradycardia may occur during the titration period or thereafter
 - Monitor the patient for evidence of heart failure symptoms, fluid retention, hypotension and bradycardia
 - If worsening of symptoms, first increase the dose of diuretics or angiotensin-converting enzyme -inhibitor; temporarily reduce the dose of beta-blockers if necessary
 - If hypotension, first reduce the dose of vasodilators; reduce the dose of the beta-blocker if necessary
 - Reduce or discontinue drugs that may lower heart rate in the presence of bradycardia; reduce dose of beta-blockers if necessary, but discontinue only if clearly necessary.
 - Always consider the reintroduction and/or uptitration of the beta-blocker when the patient becomes stable.
5. If inotropic support is needed to treat a decompensated patient on beta-blockade, phosphodiesterase inhibitors should be preferred because their haemodynamic effects are not antagonized by beta-blocker agents.

The following patients should be referred for specialist care:

- Severe heart failure Class III/IV
- Unknown aetiology
- Relative contraindications: bradycardia, low blood pressure
- Intolerance to low doses
- Previous use of beta-blocker and discontinuation because of symptoms
- Suspected asthma or bronchial disease

Contraindications to beta-blockers in patients with heart failure:

- Asthma bronchiale
- Severe bronchial disease
- Symptomatic bradycardia or hypotension

Aldosterone Receptor Antagonists: Spironolactone

- Aldosterone antagonism is recommended in advanced heart failure (New York Heart Association III-IV), in addition to angiotensin-converting enzyme inhibition and diuretics to improve survival and morbidity (Level of Evidence B).

Angiotensin II Receptor Antagonists

- Angiotensin II receptor antagonists (ARBs) could be considered in patients who do not tolerate angiotensin-converting enzyme inhibitors for symptomatic treatment (Level of Evidence C).
- However, it is unclear whether angiotensin II receptor antagonists are as effective as angiotensin-converting enzyme inhibitors for mortality reduction (Level of Evidence B).
- In combination with angiotensin-converting enzyme inhibition, angiotensin II receptor antagonists may improve heart failure symptoms and reduce hospitalizations for worsening heart failure (Level of Evidence B).

Cardiac Glycosides

- Cardiac glycosides are indicated in atrial fibrillation and any degree of symptomatic heart failure, whether or not left ventricular dysfunction is the cause, in order to slow ventricular rate, thereby improving ventricular function and symptoms (Level of Evidence B).
- A combination of digoxin and beta-blockade appears superior to either agent alone (Level of Evidence C).

Vasodilator Agents in Chronic Heart Failure

- There is no specific role for vasodilators in the treatment of heart failure (Level of Evidence A), although they may be used as adjunctive therapy for angina or concomitant hypertension (Level of Evidence C).
- In case of intolerance to angiotensin-converting enzyme inhibitors angiotensin II receptor antagonists are preferred to the combination hydralazine-nitrates (Level of Evidence A).

Alpha-adrenergic Blocking Drugs

- There is no evidence to support the use of alpha-adrenergic blocking drugs in heart failure (Level of Evidence B).

Calcium Antagonists

- In general, calcium antagonists are not recommended for the treatment of heart failure due to systolic dysfunction. Diltiazem and verapamil-type calcium antagonists in particular are not recommended in heart failure due to systolic dysfunction, and are contraindicated in addition to beta-blockade (Level of Evidence C).
- Newer calcium antagonists (felodipine, amlodipine) in addition to baseline therapy including angiotensin-converting enzyme inhibitors and diuretics do not provide a better effect on survival compared to placebo (Level of Evidence A).

Positive Inotropic Therapy

- Inotropic agents are commonly used to limit severe episodes of heart failure or as a bridge to heart transplantation in end-stage heart failure (Level of Evidence C). However, treatment-related complications may occur and their effect on prognosis is not well recognized.

- Repeated or prolonged treatment with oral inotropic agents increases mortality (Level of Evidence A).
- Currently, insufficient data are available to recommend dopaminergic agents for heart failure treatment. The dopaminergic agent ibopamine, which also has sympathomimetic properties, is not recommended for the treatment of chronic heart failure due to systolic ventricular dysfunction (Level of Evidence B).

Antithrombotic Therapy

- There is little evidence to show that antithrombotic therapy modifies the risk of death, or vascular events in patients with heart failure other than in the setting of atrial fibrillation when anticoagulation is firmly indicated (Level of Evidence C), and prior myocardial infarction when either aspirin or oral anticoagulants should be used as secondary prophylaxis.
- Low molecular weight heparins should be used prophylactically in patients on bed-rest with severe heart failure (Level of Evidence C).

Antiarrhythmics

- In general, there is no indication for the use of antiarrhythmic agents in heart failure (Level of Evidence C). Indications for antiarrhythmic drug therapy in the individual patient include atrial fibrillation (rarely flutter), non-sustained or sustained ventricular tachycardia.

Class I Antiarrhythmics

- Class I antiarrhythmics should be avoided as they have pro-arrhythmic effects on the ventricular level and an adverse effect on haemodynamics and prognosis in heart failure (Level of Evidence C).

Class II Antiarrhythmics

- Beta-blockers reduce sudden death in heart failure (level of evidence A). They may also be indicated alone or in combination with amiodarone or non-pharmacological therapy in the management of sustained or non-sustained ventricular tachyarrhythmias (Level of Evidence C).

Class III Antiarrhythmics

- Amiodarone is effective against most supraventricular and ventricular arrhythmias (Level of Evidence B).
- Dofetilide, a new Class III agent, was found to be safe in heart failure patients as no modification of total mortality was noted (Level of Evidence B).

Oxygen Therapy

- Oxygen is used for the treatment of acute heart failure, but at present has no application in chronic heart failure. Oxygen supplementation may lead to haemodynamic deterioration in severe heart failure.

Devices and Surgery

Revascularization Procedures, Mitral Valve Surgery, Cardiomyoplasty and Partial Left Ventriculotomy

- Surgical treatment should be directed towards the underlying aetiology and mechanisms. In addition to revascularization, it is important to approach patients with significant valvular disease, e.g., aortic stenosis, before they develop significant left ventricular dysfunction.

Revascularization

- There are no controlled data to support the use of revascularization procedures for the relief of heart failure symptoms, but in the individual patient with heart failure of ischaemic origin revascularization may lead to symptomatic improvement (Level of Evidence C).

Mitral Valve Surgery

- Mitral valve surgery in patients with severe left ventricular dysfunction and severe mitral valve insufficiency may lead to symptomatic improvement in selected heart failure patients (Level of Evidence C).

Cardiomyoplasty

- Currently, cardiomyoplasty cannot be recommended for the treatment of heart failure (Level of Evidence C). Cardiomyoplasty has only been applied in a very limited number of patients and is still undergoing investigation. Class IV patients should be avoided since they have a high operative mortality. Cardiomyoplasty cannot be considered a viable alternative to heart transplantation (Level of Evidence C).

Partial Left Ventriculotomy (Batista Operation)

- Currently, partial left ventriculotomy cannot be recommended for the treatment of heart failure (Level of Evidence C).
- Partial, lateral resection of the left ventricle plus or minus mitral valve surgery initially gained interest for treatment of end stage heart failure patients. However, in recent studies a number of patients required ventricular assist devices or subsequent transplantation for failed surgery. The Batista operation cannot be considered an alternative to heart transplantation (Level of Evidence C).

Pacemakers

- Pacemakers have no established role in the treatment of heart failure except for conventional bradycardia indication.
- Resynchronization therapy using bi-ventricular pacing may improve symptoms and sub-maximal exercise capacity (Level of Evidence B), but its effect on mortality and morbidity is as yet unknown.

Arrhythmia Devices and Surgery

Implantable Cardioverter Defibrillators (ICD)

- There is as yet no specifically defined role for implantable cardioverter defibrillators in chronic heart failure (Level of Evidence C). Available data from controlled trials have not specifically addressed the effect of implantable cardioverter defibrillators in heart failure patients.

Radiofrequency Catheter Ablation

- Catheter ablation may be indicated in patients with heart failure and reciprocating tachycardias or selected patients with atrial fibrillation. However, there is insufficient data on the role of ablation on sustained ventricular tachycardias in patients with heart failure. It may be an adjunctive therapy to implantable cardioverter defibrillators in some patients.

Heart Transplantation, Ventricular Assist Devices and Artificial Heart

Heart Transplantation

- Heart transplantation is an accepted mode of treatment for end-stage heart failure. Although controlled trials have never been conducted, it is considered to significantly increase survival, exercise capacity, return to work and quality of life compared to conventional treatment, provided proper selection criteria are applied (Level of Evidence C).

Ventricular Assist Devices and Artificial Heart

- Current indications for ventricular assist devices and artificial heart include bridging to transplantation, transient myocarditis and in some permanent haemodynamic support (Level of Evidence C)

Ultrafiltration

- Ultrafiltration has been used for patients with pulmonary oedema and/or severe refractory congestive heart failure. In most patients with severe disease, the relief is temporary.

Choice and Timing of Pharmacological Therapy

The choice of pharmacological therapy in the various stages of heart failure due to systolic dysfunction is displayed in Tables 21a and 21b ("Chronic Heart Failure – Choice of Pharmacological Therapy") in the original guideline document.

Pharmacotherapy of Diastolic Heart Failure

- The recommendations provided below are largely speculative, as limited data exist in patients with preserved left ventricular systolic function or diastolic dysfunction (Level of Evidence C), patients being excluded from nearly all large controlled trials in heart failure.

1. Beta-blockade to lower heart rate and increase the diastolic period.
2. Verapamil-type calcium antagonists may be used for the same reason. Some studies with verapamil have shown a functional improvement in patients with hypertrophic cardiomyopathy.
3. Angiotensin-converting enzyme inhibitors may improve relaxation and cardiac distensibility directly, may have a long-term effect through regression of hypertrophy and reduce hypertension.
4. Diuretics may be necessary when episodes with fluid overload are present, but should be used cautiously so as not to lower preload excessively and thereby reduce stroke volume and cardiac output.

Heart Failure Treatment in the Elderly

- The therapeutic approach to systolic dysfunction in the elderly should be principally identical to that in younger patients with respect to choice of drug treatment. Due to altered pharmacokinetic and pharmacodynamic properties of cardiovascular drugs in the elderly, therapy should be applied more cautiously. Sometimes reduced dosages are necessary. See the original guideline document for a more detailed discussion of specific pharmacological agents.

Arrhythmias

General Approach

- In the approach to arrhythmia it is essential to recognise and correct precipitating factors, improve cardiac function and reduce neuro-endocrine activation with beta-blockade, angiotensin-converting enzyme inhibition and possibly aldosterone receptor antagonists (Level of Evidence C).

Ventricular Arrhythmias

- In patients with ventricular arrhythmias, the use of antiarrhythmic agents is only justified in patients with severe, symptomatic, sustained ventricular tachycardias and amiodarone should be the preferred agent (Level of Evidence B).
- The indications of implantable cardioverter defibrillators therapy in patients with heart failure are restricted to patients with life threatening ventricular arrhythmias i.e. ventricular fibrillation or sustained ventricular tachycardia and in selected post-infarction patients at high risk of sudden death (Level of Evidence A).
- Electrophysiological studies may be indicated in selected, high-risk patients with left ventricular dysfunction and coronary artery disease with non-sustained ventricular tachycardia (Level of Evidence B).

Atrial Fibrillation

- In patients with atrial fibrillation and heart failure or/and depressed left ventricular function the use of antiarrhythmic therapy to maintain sinus rhythm should be restricted to amiodarone (Level of Evidence C) and, if available, to dofetilide (Level of Evidence B). Anticoagulation in chronic atrial

fibrillation with warfarin should always be considered unless contraindicated in patients with persistent atrial fibrillation and chronic heart failure (Level of Evidence C).

- In permanent (cardioversion not attempted or failed) atrial fibrillation, rate control is mandatory. In asymptomatic patients, beta-blockade, digitalis glycosides or the combination may be considered. In symptomatic patients digitalis glycosides are the first choice (Level of Evidence C). If digoxin or warfarin are used in combination with amiodarone, their dosages may need to be adapted.

Symptomatic Systolic Left Ventricular Dysfunction and Concomitant Angina or Hypertension

Specific recommendations in addition to general treatment for heart failure due to systolic left ventricular dysfunction.

If angina is present:

1. Optimize existing therapy, e.g., beta-blockade
2. Consider coronary revascularization
3. Add long-acting nitrates
4. If not successful: add second generation dihydropyridine derivatives

If hypertension is present:

1. Optimize dose angiotensin-converting enzyme inhibitors, beta-blocking agents and diuretics
2. Add spironolactone or angiotensin ii receptor antagonists if not present already
3. If not successful: try second generation dihydropyridine derivatives

Care and Follow-up

- Comprehensive non-pharmacological intervention programmes are helpful in improving quality of life, reducing readmission and decreasing cost (Level of Evidence B).
- Different models (e.g., heart failure outpatient clinic, heart failure nurse specialist, community nurse specialist, patient tele-monitoring) may be appropriate depending on the stage of the disease, patient population and national resources (Level of Evidence C).
 - Recommended components of follow-up programs (Level of Evidence C)
 - Use a team approach
 - Vigilant follow-up, first follow-up within 10 days of discharge
 - Discharge planning
 - Increased access to health care
 - Optimizing medical therapy with guidelines
 - Intense education and counseling:
 - Inpatient and outpatient (home-based)
 - Attention to behavioural strategies
 - Address barriers to compliance
 - Early attention to signs and symptoms

- Flexible diuretic regimen

Definitions:

Levels of Evidence:

- A. At least two randomized trials supporting recommendations
- B. One randomized trial and/or meta-analysis supporting recommendation
- C. Consensus statement from experts based on trials and clinical experience

CLINICAL ALGORITHM(S)

An algorithm is provided for the diagnosis of heart failure.

EVIDENCE SUPPORTING THE RECOMMENDATIONS

TYPE OF EVIDENCE SUPPORTING THE RECOMMENDATIONS

The level of evidence is given for selected recommendations (see "Major Recommendations" field).

BENEFITS/HARMS OF IMPLEMENTING THE GUIDELINE RECOMMENDATIONS

POTENTIAL BENEFITS

- Accurate diagnosis of chronic heart failure, including establishing the proper epidemiology and prognosis; can aid in optimizing treatment.
- Appropriate treatment of heart failure may prevent disease progression, maintain or improve quality of life, and increase survival.

Subgroups Most Likely to Benefit:

- The absolute benefit of treatment with angiotensin-converting enzyme (ACE) inhibitors is greatest in patients with the most severe heart failure.
- Mortality is higher among patients with elevated creatinine levels and these patients in particular benefit from treatment with angiotensin-converting enzyme inhibitors.

POTENTIAL HARMS

Angiotensin-converting Enzyme (ACE) Inhibitors

- Important adverse effects associated with angiotensin-converting enzyme inhibitors are hypotension, syncope, renal insufficiency, hyperkalaemia and angioedema. Although cough may often be due to heart failure or concomitant diseases, e.g., respiratory disease, dry cough is a side effect of angiotensin-converting enzyme inhibitors.

Diuretics

- Adverse effects of diuretics include hypokalaemia, hypomagnesaemia, hyponatraemia, hyperuricaemia, glucose intolerance, acid-base disturbance, and rash.

Beta-blockers

- Beta-blockers may reduce heart rate excessively, may temporarily induce myocardial depression and precipitate heart failure. In addition, beta-blockers may initiate or exacerbate asthma and induce peripheral vasoconstriction.

Spirolactone

- Gynecomastia has been observed in 10% of patients in one trial involving spironolactone.

Angiotensin II Receptor Antagonists

- Cough is significantly less with angiotensin II receptor antagonists than with angiotensin receptor antagonists
- The incidence of renal dysfunction is similar to that of angiotensin-converting enzyme inhibitors.

Dobutamine

- Problems related to the use of dobutamine are tachyphylaxis, increase in heart rate and often inadequate vasodilatory effect.

Positive Inotropic Agents

- Repeated or prolonged treatment with oral inotropic agents increases mortality.

Amiodarone

- The risk of adverse effects, such as hyper- and hypothyroidism, hepatitis, pulmonary fibrosis and neuropathy, although shown to be relatively low in recent, large, placebo-controlled trials must be weighed against the potential benefits of amiodarone.

Heart Transplantation

- The main problem of heart transplantation is rejection of the allograft, which is responsible for a considerable percentage of deaths in the first postoperative year. The long-term outcome is limited predominantly by the consequences of immuno-suppression (infection, hypertension, renal failure, malignancy, and by transplant coronary vascular disease.
- Venodilating drugs, such as nitrates, hydralazine and the combination of these drugs should be administered carefully due to the risk of hypotension.

Subgroups Most Likely to be Harmed:

- The risk of hypotension and renal dysfunction during treatment with angiotensin-converting enzyme inhibitors increases in patients with severe heart failure, those treated with high doses of diuretics, elderly patients and patients with renal dysfunction or hyponatremia.
- In elderly patients, hyperkalaemia is more frequently seen with a combination of potassium sparing diuretics and angiotensin-converting enzyme inhibitors or non-steroidal anti-inflammatory drugs.
- Elderly patients may be more susceptible to adverse effects of digoxin.

CONTRAINDICATIONS

CONTRAINDICATIONS

- Absolute contraindications for initiation of angiotensin-converting enzyme inhibitor treatment are bilateral renal artery stenosis and angioedema during previous therapy.
- Contraindications to the use of beta-blockers in patients with heart failure include bronchial asthma, severe bronchial disease, and symptomatic bradycardia or hypotension.
- Contraindications to the use of cardiac glycosides include bradycardia, second- and third-degree atrioventricular block, sick sinus syndrome, Wolff-Parkinson White syndrome, hypertrophic obstructive cardiomyopathy, hypokalaemia, and hypercalcaemia.

QUALIFYING STATEMENTS

QUALIFYING STATEMENTS

- The recommendations in this guideline should always be considered in the light of local regulatory requirements for the administration of any chosen drug or device.
- Primary prevention of cardiac dysfunction and heart failure falls outside the scope of this guideline.

IMPLEMENTATION OF THE GUIDELINE

DESCRIPTION OF IMPLEMENTATION STRATEGY

An implementation strategy was not provided.

INSTITUTE OF MEDICINE (IOM) NATIONAL HEALTHCARE QUALITY REPORT CATEGORIES

IOM CARE NEED

Living with Illness
Staying Healthy

IOM DOMAIN

Effectiveness
Patient-centeredness
Safety

IDENTIFYING INFORMATION AND AVAILABILITY

BIBLIOGRAPHIC SOURCE(S)

Remme WJ, Swedberg K. Guidelines for the diagnosis and treatment of chronic heart failure. Eur Heart J 2001 Sep;22(17):1527-60. [196 references] [PubMed](#)

ADAPTATION

Not applicable: The guideline was not adapted from another source.

DATE RELEASED

2001 Sep

GUIDELINE DEVELOPER(S)

European Society of Cardiology - Medical Specialty Society

SOURCE(S) OF FUNDING

European Society of Cardiology

GUIDELINE COMMITTEE

Task Force for the Diagnosis and Treatment of Chronic Heart Failure

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FINANCIAL DISCLOSURES/CONFLICTS OF INTEREST

Not stated

GUIDELINE STATUS

This is the current release of the guideline. It represents an update of the European Society of Cardiology Diagnostic and Therapeutic Guidelines published in 1995 and 1997 ([1] The Task Force on Heart Failure of the European Society of Cardiology. Guidelines for the diagnosis of heart failure. Eur Heart J 1995; 16: 741–51; [2] The Task Force of the Working Group on Heart Failure of the European Society of Cardiology. The treatment of heart failure. Eur Heart J 1997; 18: 736–53).

An update is not in progress at this time.

GUIDELINE AVAILABILITY

Electronic copies: Available in Portable Document Format (PDF) from the [European Society of Cardiology \(ESC\) Web site](#).

Print copies: Available from Harcourt Publishers Ltd. European Heart Journal, ESC Guidelines - Reprints 32 Jamestown Road, London, NW1 7BY, United Kingdom. Tel +44.207.424.4200/ Tel: +44 207 424 4389; Fax: +44 207 424 4433; Web site: www.eurheartj.com.

AVAILABILITY OF COMPANION DOCUMENTS

The following is available:

- Recommendations for Task Force creation and report production. Sophia Antipolis (France): European Society of Cardiology, 2002.

Electronic copies: Available in Portable Document Format (PDF) from the [European Society of Cardiology \(ESC\) Web site](#).

- Guidelines for the diagnosis and treatment of chronic heart failure. Pocket guidelines. Sophia Antipolis (France): European Society of Cardiology, 2001.

Electronic copies: An order form for ESC pocket guidelines is available in Portable Document Format (PDF) from the [European Society of Cardiology \(ESC\) Web site](#).

- Guidelines for the diagnosis and treatment of chronic heart failure. Educational slides. Sophia Antipolis (France): European Society of Cardiology, 2001.

Electronic copies: Available in Microsoft PowerPoint from the [European Society of Cardiology \(ESC\) Web site](#).

PATIENT RESOURCES

None available

NGC STATUS

This summary was completed by ECRI on April 2, 2002.

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Date Modified: 11/8/2004

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