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 2: UPDATE ON ACUTE HEART FAILURE

• Background Information
• ESC Guidelines on chronic heart failure 2012
• Adaptation to the ESC guidelines by South Africa Heart Association
The 2012 ESC heart failure guidelines

ESC Guidelines for the diagnosis and treatment of acute and chronic heart failure 2012 of the European Society of Cardiology.

26 Task Force members!

Authors/Task Force Members: John J. V. McMurray (Chairperson) (UK)*, Stamatis Adamopoulos (Greece), Stefan D. Anker (Germany), Angelo Auricchio (Switzerland), Michael Böhm (Germany), Kenneth Dickstein (Norway), Volkmar Falk (Switzerland), Gerasimos Filippatos (Greece), Cândida Fonseca (Portugal), Miguel Angel Gomez Sanchez (Spain), Tiny Jaarsma (Sweden), Lars Köber (Denmark), Gregory Y. H. Lip (UK), Aldo Pietro Maggioni (Italy), Alexander Parkhomenko (Ukraine), Burkert M. Pieske (Austria), Bogdan A. Popescu (Romania), Per K. Rønnevik (Norway), Frans H. Rutten (The Netherlands), Juerg Schwitter (Switzerland), Petar Seferovic (Serbia), Janina Stepinska (Poland), Pedro T. Trindade (Switzerland), Adriaan A. Voors (The Netherlands), Faiez Zannad (France), Andreas Zeiher (Germany).
DEFINITION

Rapid onset of signs or symptoms of heart failure (de novo), or
Recurring signs and symptoms in a patient with known heart failure (acute decompensated chronic heart failure)

Serious public health problem in USA and Europe
In EU in 2010, 15 million patients with heart failure and 3.6 million emergency admissions for acute heart failure
Mortality of acute heart failure syndromes.
In-hospital mortality in Euro-Heart Failure Survey II by history of heart failure and clinical class.

EHFS II, Euro-Heart Failure Survey II.
AHF is not a distinct diagnosis but rather a collection of syndromes with different causes and varying clinical features which fall under the heart failure umbrella and require urgent medical intervention. 

Treating these AHF syndromes as a single entity and attempting to evaluate the benefits of a single new agent would appear to be futile!
Patients with certain clinical presentations, especially those with ‘de novo’ heart failure, are more difficult to study in clinical trials.

- First, a diagnosis of the underlying cause of the clinical presentation is required.
- Second, due to the potential instability of the underlying disease processes involved such as acute valve malfunction or acute myocardial diseases such as myocarditis, baseline stability of clinical or haemodynamic status cannot be assumed or even expected.
Lecture 2: UPDATE ON ACUTE HEART FAILURE

• Background Information
• ESC Guidelines on chronic heart failure 2012
• Adaptation to the ESC guidelines by South Africa Heart Association
### Precipitants And Causes Of Acute Heart Failure

(ESC Guidelines 2012)

<table>
<thead>
<tr>
<th>Events usually leading to rapid deterioration</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Rapid arrhythmia or severe bradycardia/conduction disturbance</td>
</tr>
<tr>
<td>• Acute coronary syndrome</td>
</tr>
<tr>
<td>• Mechanical complication of acute coronary syndrome (e.g. rupture of interventricular septum, mitral valve chordal rupture, right ventricular infarction)</td>
</tr>
<tr>
<td>• Acute pulmonary embolism</td>
</tr>
<tr>
<td>• Hypertensive crisis</td>
</tr>
<tr>
<td>• Cardiac tamponade</td>
</tr>
<tr>
<td>• Aortic dissection</td>
</tr>
<tr>
<td>• Surgery and perioperative problems</td>
</tr>
<tr>
<td>• Peripartum cardiomyopathy</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Events usually leading to less rapid deterioration</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Infection (including infective endocarditis)</td>
</tr>
<tr>
<td>• Exacerbation of COPD/asthma</td>
</tr>
<tr>
<td>• Anaemia</td>
</tr>
<tr>
<td>• Kidney dysfunction</td>
</tr>
<tr>
<td>• Non-adherence to diet/drug therapy</td>
</tr>
<tr>
<td>• Iatrogenic causes (e.g. prescription of an NSAID or corticosteroid; drug interactions)</td>
</tr>
<tr>
<td>• Arrhythmias, bradycardia, and conduction disturbances not leading to sudden, severe change in heart rate</td>
</tr>
<tr>
<td>• Uncontrolled hypertension</td>
</tr>
<tr>
<td>• Hypothyroidism or hyperthyroidism</td>
</tr>
<tr>
<td>• Alcohol and drug abuse</td>
</tr>
</tbody>
</table>

AHF = acute heart failure; COPD = chronic obstructive pulmonary disease; NSAID = non-steroidal anti-inflammatory drug.
Initial Assessment Of Patient With Suspected Acute Heart Failure

ESC guidelines 2012

Suspected acute heart failure

History/examination (including blood pressure and respiratory rate)
- Chest X-ray
- Echocardiogram or NP (or both)
- Blood chemistry

Simultaneously assess for:
- Ventilation/systemic oxygenation inadequate
- Life-threatening arrhythmia/bradycardia
- Blood pressure <85 mmHg or shock
- Acute coronary syndrome
- Acute mechanical cause/severe valvular disease

Urgent action if present:
- Oxygen/NIV
- ETT and invasive ventilation
- Electrical cardioversion/Pacing
- Inotrope/vasopressor
- Mechanical circulatory support (e.g. IABP)
- Coronary reperfusion/Antithrombotic therapy
- Echocardiography/Surgical/percutaneous intervention

ECG (Electrocardiogram); ETT (Endotracheal Tube); IABP (Intra-aortic Balloon Pump); NIV (Non-invasive Ventilation); NP (Natriuretic Peptide)
### Drugs Used To Treat Acute Heart Failure That Are Positive Inotropes Or Vasopressors Or Both

(ESC Guidelines 2012)

<table>
<thead>
<tr>
<th>Drug</th>
<th>Bolus</th>
<th>Infusion rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dobutamine</td>
<td>No</td>
<td>2–20 µg/kg/min (β+)</td>
</tr>
<tr>
<td>Dopamine</td>
<td>No</td>
<td>&lt;3 µg/kg/min: renal effect (δ+)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3–5 µg/kg/min; inotropic (β+)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>&gt;5 µg/kg/min: (β+), vasopressor (α+)</td>
</tr>
<tr>
<td>Milrinone</td>
<td>25–75 µg/kg over 10–20 min</td>
<td>0.375–0.75 µg/kg/min</td>
</tr>
<tr>
<td>Enoximone</td>
<td>0.5–1.0 mg/kg over 5–10 min</td>
<td>5–20 µg/kg/min</td>
</tr>
<tr>
<td>Levosimendan*</td>
<td>12 µg/kg over 10 min (optional)*</td>
<td>0.1 µg/kg/min, which can be decreased to 0.05 or increased to 0.2 µg/kg/min</td>
</tr>
<tr>
<td>Norepinephrine</td>
<td>No</td>
<td>0.2–1.0 µg/kg/min</td>
</tr>
<tr>
<td>Epinephrine</td>
<td>Bolus: 1 mg can be given i.v. during resuscitation, repeated every 3–5 min</td>
<td>0.05–0.5 µg/kg/min</td>
</tr>
</tbody>
</table>

*a Also a vasodilator.

* B Bolus not recommended in hypotensive patients (systolic blood pressure <90 mmHg).

α = alpha adrenoceptor; β = beta adrenoceptor; δ = dopamine receptor.
<table>
<thead>
<tr>
<th>LEVEL A</th>
<th>LEVEL B</th>
<th>LEVEL C</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Multiple populations evaluated</strong>&lt;br&gt;Data derived from multiple randomized clinical trials or meta-analyses&lt;br&gt;Recommendation that procedure or treatment is useful/effective&lt;br&gt;Sufficient evidence from multiple randomized trials or meta-analyses</td>
<td><strong>Limited populations evaluated</strong>&lt;br&gt;Data derived from a single randomized trial or nonrandomized studies&lt;br&gt;Recommendation that procedure or treatment is useful/effective&lt;br&gt;Evidence from single randomized trial or nonrandomized studies</td>
<td><strong>Very limited populations evaluated</strong>&lt;br&gt;Only consensus opinion of experts, case studies, or standard of care&lt;br&gt;Recommendation that procedure or treatment is useful/effective&lt;br&gt;Only expert opinion, case studies, or standard of care</td>
</tr>
</tbody>
</table>

**CLASS I**<br>Benefit >> Risk<br>Procedure/Treatment SHOULD be performed/administered

**CLASS IIa**<br>Benefit >> Risk<br>Additional studies with focused objectives needed<br>IT IS REASONABLE to perform procedure/administer treatment

**CLASS IIb**<br>Benefit ≥ Risk<br>Additional studies with broad objectives needed; additional registry data would be helpful<br>Procedure/Treatment MAY BE CONSIDERED

**CLASS III**<br>Risk ≥ Benefit<br>Procedure/Treatment should NOT be performed/administered since it is NOT HELPFUL AND MAY BE HARMFUL
<table>
<thead>
<tr>
<th>Recommendations</th>
<th>Class</th>
<th>Level</th>
<th>Ref</th>
</tr>
</thead>
<tbody>
<tr>
<td>Immediate primary PCI (or CABG in selected cases) is recommended if there is an ST elevation or a new LBBB ACS in order to reduce the extent of myocyte necrosis and reduce the risk of premature death.</td>
<td>I</td>
<td>A</td>
<td>221</td>
</tr>
</tbody>
</table>
| Alternative to PCI or CABG:  
  Intravenous thrombolytic therapy is recommended, if PCI/CABG cannot be performed, if there is ST-segment elevation or new LBBB, to reduce the extent of myocyte necrosis and reduce the risk of premature death. | I     | A     | 222  |
| Early PCI (or CABG in selected patients) is recommended if there is non-ST elevation ACS in order to reduce the risk of recurrent ACS. Urgent revascularization is recommended if the patient is haemodynamically unstable. | I     | A     | 221  |
| Eplerenone is recommended to reduce the risk of death and subsequent cardiovascular hospitalization in patients with an EF ≤40%. | I     | B     | 107  |

ACE = angiotensin-converting enzyme; ACS = acute coronary syndrome; AF = atrial fibrillation; ARB = angiotensin receptor blocker; CABG = coronary artery bypass graft; CPAP = continuous positive airway pressure; ECG = electrocardiogram; EF = ejection fraction; HF = heart failure; i.v. = intravenous; LBBB = left bundle branch block; LMWH = low molecular weight heparin; LV = left ventricular; PaO₂ = partial pressure of oxygen; PCI = percutaneous coronary intervention; TOE = transoesophageal echocardiography.

*a*Class of recommendation.  
*b*Level of evidence.  
*c*References.
Algorithm For Management Of Acute Pulmonary Oedema/Congestion.

(ESC Guidelines 201)

Acute pulmonary oedema/congestion

Intravenous bolus of loop diuretic\(^1\)

Hypoxaemia\(^2\)

Yes → Oxygen\(^3\)

No → Severe anxiety/distress

Yes → Consider i.v. opiate\(^4\)

No → Measure systolic blood pressure

SBP < 85 mmHg or shock\(^5\)

Add non-vasodilating inotrope\(^6\)

SBP 85–110 mmHg

No additional therapy until response assessed\(^7\)

SBP > 110 mmHg

Consider vasodilator (e.g., NTG)\(^8\)

Adequate response to treatment\(^9\)

Yes → Continue present treatment\(^10\)

No → Re-evaluation of patient's clinical status\(^11\)

SBP < 85 mmHg\(^1\)

Yes → Stop vasodilator
- Stop beta-blocker if hypoperfused
- Consider non-vasodilating inotrope or vasopressor
- Consider right-heart catheterization\(^11\)
- Consider mechanical circulatory support\(^11\)

SpO\(_2\) < 90%

No → Oxygen\(^3\)
- Consider NIV\(^15\)
- Consider ETT and invasive ventilation\(^16\)

Urine output < 20 mL/h\(^12\)

Yes → Bladder catheterization to confirm
- Increase dose of diuretic or use combination of diuretics\(^17\)
- Consider low-dose dopamine\(^18\)
- Consider right-heart catheterization\(^11\)
- Consider ultrafiltration\(^11\)
Recommendations For The Treatment Of Patients With Acute Heart Failure  
(Cont.)  (ESC Guidelines 201)

<table>
<thead>
<tr>
<th>Recommendations</th>
<th>Class a</th>
<th>Level b</th>
<th>Ref c</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patients with hypotension, hypoperfusion or shock</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Electrical cardioversion is recommended if an atrial or ventricular arrhythmia is thought to be contributing to the patient's haemodynamic compromise in order to restore sinus rhythm and improve the patient's clinical condition.</td>
<td>I</td>
<td>C</td>
<td>–</td>
</tr>
<tr>
<td>An i.v. infusion of an inotrope (e.g. dobutamine) should be considered in patients with hypotension (systolic blood pressure &lt;85 mmHg) and/or hypoperfusion to increase cardiac output, increase blood pressure, and improve peripheral perfusion. The ECG should be monitored continuously because inotropic agents can cause arrhythmias and myocardial ischaemia.</td>
<td>IIa</td>
<td>C</td>
<td>–</td>
</tr>
<tr>
<td>Short-term mechanical circulatory support should be considered (as a 'bridge to recovery') in patients remaining severely hypoperfused despite inotropic therapy and with a potentially reversible cause (e.g. viral myocarditis) or a potentially surgically correctable cause (e.g. acute interventricular septal rupture).</td>
<td>IIb</td>
<td>C</td>
<td>–</td>
</tr>
<tr>
<td>An i.v. infusion of levosimendan (or a phosphodiesterase inhibitor) may be considered to reverse the effect of beta-blockade if beta-blockade is thought to be contributing to hypoperfusion. The ECG should be monitored continuously because inotropic agents can cause arrhythmias and myocardial ischaemia, and, as these agents are also vasodilators, blood pressure should be monitored carefully.</td>
<td>IIb</td>
<td>C</td>
<td>–</td>
</tr>
<tr>
<td>A vasopressor (e.g. dopamine or norepinephrine) may be considered in patients who have cardiogenic shock, despite treatment with an inotrope, to increase blood pressure and vital organ perfusion. The ECG should be monitored as these agents can cause arrhythmias and/or myocardial ischaemia. Intra-arterial blood pressure measurement should be considered.</td>
<td>IIb</td>
<td>C</td>
<td>–</td>
</tr>
<tr>
<td>Short-term mechanical circulatory support may be considered (as a 'bridge to decision') in patients deteriorating rapidly before a full diagnostic and clinical evaluation can be made.</td>
<td>IIb</td>
<td>C</td>
<td>–</td>
</tr>
</tbody>
</table>

ACE = angiotensin-converting enzyme; ACS = acute coronary syndrome; AF = atrial fibrillation; ARB = angiotensin receptor blocker; CABG = coronary artery bypass graft; CPAP = continuous positive airway pressure; ECG = electrocardiogram; EF = ejection fraction; HF = heart failure; i.v. = intravenous; LBBB = left bundle branch block; LMWH = low molecular weight heparin; LV = left ventricular; PaO₂ = partial pressure of oxygen; PCI = percutaneous coronary intervention; TOE = transoesophageal echocardiography.

aClass of recommendation.
bLevel of evidence.
cReferences.
<table>
<thead>
<tr>
<th>Vasodilator</th>
<th>Dosing</th>
<th>Main side effects</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nitroglycerine</td>
<td>Start with 10–20 µg/min, increase up to 200 µg/min</td>
<td>Hypotension, headache</td>
<td>Tolerance on continuous use</td>
</tr>
<tr>
<td>Isosorbide dinitrate</td>
<td>Start with 1 mg/h, increase up to 10 mg/h</td>
<td>Hypotension, headache</td>
<td>Tolerance on continuous use</td>
</tr>
<tr>
<td>Nitroprusside</td>
<td>Start with 0.3 µg/kg/min and increase up to 5 µg/kg/min</td>
<td>Hypotension, isocyanate toxicity</td>
<td>Light sensitive</td>
</tr>
<tr>
<td>Nesiritide</td>
<td>Bolus 2 µg/kg + infusion 0.01 µg/kg/min</td>
<td>Hypotension</td>
<td></td>
</tr>
</tbody>
</table>

*aNot available in many European Society of Cardiology countries.*
Lecture 2:
UPDATE ON ACUTE HEART FAILURE

• Background Information
• 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: peripheral oedema, ascites
- Chest signs: inspiratory crackles, pleural effusion
- Signs of heart disease: tachycardia, displaced apex beat, cool peripheries, presence of cardiac murmur

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

www.hefssa.org

Suspected Heart Failure / LV Dysfunction because of signs and symptoms

Assess presence of cardiac disease by ECG, CRP and/or NortedBNP / BNP

Any abnormalities

Imaging by Echocardiography

Any abnormalities

Assess aetiology, precipitating factor/s and NYHA functional class

Choose THERAPY

Additional diagnostic tests in selected cases

HF-REF unlikely

Normal

HF-REF unlikely

Normal

Pharmacological Management in patients with HF / Reduced ejection fraction

Mortality
- ACE-I
- B Blocker
- Aldosterone antagonist
- Hydralazine + Nitrate
- Biventricular pacing + ICD (CRT-P / CRT-D)

Hospitalisation
- ARB
- Irinoteradine
- Diuretics

Symptoms
- Diuretics
- Valvular intervention
- LV assist device

Surgical

Precipitating Factors
- Mandatory: U & E, Glucose, TSH
- Possible: LFT, Ferritin, Calcium, haemoprotein T (Table 6 ESC guidelines)

Special consideration
- Hydralazine + Nitrates (Black African patients)
- Digoxin (AF, resistant symptomatic heart failure)
- Warfarin (AF, LV clot)
- Amiloradone (to sustain Sinus Rhythm)
- Aldosterone antagonist (Early post-MI heart failure)
- ACE-I + ARB if Aldosterone antagonist cannot be used