What’s new in Heart Failure care?

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Professor of Primary Care Cardiology Durham University
Acting Chair CVGP
ESC guidelines for the diagnosis and treatment of chronic heart failure – update 2012

www.escardio.org
BNP: Quantitative Marker of HF

Increased natriuresis
Suppression of renin-angiotensin and endothelin
Decreased peripheral vascular resistance (decreased blood pressure)
Increased natriuresis

Volume □
Pressure □

ANP

Suppression of renin-angiotensin and endothelin

BNP =

CNP

LV Diastolic Dysfunction +
LV Systolic Dysfunction +
Valvular Dysfunction +
RV Dysfunction

Iwanaga Y. et al. JACC 2006; 47: 742-748
BNP and NT-proBNP: Not the same

- BNP and NT-proBNP are two different molecules.
- Both have the indications for diagnosis of HF and risk stratification for ACS patients.
- BNP and NT-proBNP are different and values should not be directly compared.
- Differences between molecules generated from genesis of BNP and NT-proBNP.
PATIENT WITH SUSPECTED HF* (non-acute onset)

ASSESSMENT OF HF PROBABILITY

1. Clinical history:
   - History of CAD (MI, revascularization)
   - History of arterial hypertension
   - Exposition to cardiotoxic drug/radiation
   - Use of diuretics
   - Orthopnoea / paroxysmal nocturnal dyspnoea

2. Physical examination:
   - Rales
   - Bilateral ankle oedema
   - Heart murmur
   - Jugular venous dilatation
   - Laterally displaced/broadened apical beat

3. ECG:
   - Any abnormality

≥1 present

All absent

Assessment of natriuretic peptides not routinely done in clinical practice

NATRIURETIC PEPTIDES

- NT-proBNP ≥125 pg/mL
- BNP ≥35 pg/mL

No

Yes

ECHOCARDIOGRAPHY

Normal

If HF confirmed (based on all available data): determine aetiology and start appropriate treatment

HF unlikely: consider other diagnosis
## NT proBNP Age Dependent Thresholds

Based on Hildebrandt P, Collinson P, Fuat A et al EHJ 2010;31:1881-1889

<table>
<thead>
<tr>
<th></th>
<th>Age &lt; 60 years</th>
<th>Age 60-74 years</th>
<th>Age &gt; 75 years</th>
</tr>
</thead>
<tbody>
<tr>
<td>Raised levels</td>
<td>&gt;50pg/ml</td>
<td>&gt;100pg/ml</td>
<td>&gt;250pg/ml</td>
</tr>
<tr>
<td>High levels</td>
<td>&gt;450pg/ml</td>
<td>&gt;900pg/ml</td>
<td>&gt;1800pg/ml</td>
</tr>
</tbody>
</table>
Primary Care Presentation

- Symptoms suggestive of HF
- History and examination
- Previous MI: Refer to HF clinic
- ECG and routine bloods
Primary Care Presentation

- Symptoms suggestive of HF
- History and examination
- No previous MI
- Arrange BNP, ECG and routine bloods
Primary Care Presentation

BNP high
> 400ng/l

Refer to HF clinic

BNP raised
100-400ng/l

Refer to HF clinic

BNP normal
<100ng/l

Good clinical signs 
 +/- abnormal ECG&BNP 35-100

Refer for open access echo

Urgent appointment if available

Routine appointment
HF clinic new referrals

New presentation to Heart Failure clinic: 319

- HFREF: 180 (56%)
- HFPEF: 35 (11%)
- HFNMSD: 14 (4%)
- HF Alt Cause: 13 (4%)
- Not HF: 71 (22%)

3 patients had right heart failure
3 patients had data missing
819 COPD patients in Scotland
(B Lipworth et al BMJ 2011)
Visits to A+E for asthma and COPD patients given beta-blockers

Brooks TW., Pharmacotherapy 2007

- Retrospective Observational cohort study
- 11,592 patients

Asthma +/- COPD

- Cardioselective BB 0.89 risk of admission; 1.40 for A+E visits
- Non-selective BB - 2.47 Hosp Adm. 1.21 A+E
MRAs Beneficial in HFrEF and Post-MI LVD

**RALES** (Severe HFrEF)

- 30% Risk Reduction

  - RR = 0.70
  - P < 0.001

**EPHESUS** (Post-MI)

- 15% Risk Reduction

  - RR = 0.85
  - P < 0.008

**EMPHASIS** (Mild HFrEF)

- 22% Risk Reduction

  - RR = 0.78
  - P = 0.014

Reviews of Mechanisms: Pitt Heart Fail Rev 2012; Kamalov, ..., Weber JCV Pharm 2013

Pitt NEJM 1999

Pitt NEJM 2003

Zannad NEJM 2011
EMPHASIS-HF Study
SUMMARY

• The addition of eplerenone to recommended treatment resulted in a
  – 37% reduction in the rate of the composite outcome of death from cardiovascular causes or hospitalization for heart failure.
  – 24% reduction in the rate of death from any cause
  – 23% reduction in the rate of hospitalization from any cause
  – 42% reduction in the rate of hospitalization for heart failure
• The effect of eplerenone on the primary outcome was consistent across all prespecified subgroups.
Drugs That Reduce Mortality in Heart Failure With Reduced Ejection Fraction

Based on results of SOLVD-Treatment, CHARM-Alternative, COPERNICUS, MERIT-HF, CIBIS II, RALES and EMPHASIS-HF
Ivabradine is indicated in chronic heart failure NYHA II to IV class with systolic dysfunction,
in patients in sinus rhythm and whose heart rate is ≥ 75 bpm,
in combination with standard therapy including beta-blocker therapy or when beta-blocker therapy is contraindicated or not tolerated.
SHIFT Study
Primary endpoint

Placebo n = 937 (29%, 17.7% PY)
Ivabradine n = 793 (24%, 14.5% PY) HR = 0.82  p < 0.0001  NNT Y1 = 26

Primary Endpoint a composite of:
• Cardiovascular Death
• Hospitalisation for worsening Heart Failure

Swedberg K, et al. Lancet. 2010; online August 29
Neprilysin Inhibition Potentiates Actions of Endogenous Vasoactive Peptides That Counter Maladaptive Mechanisms in Heart Failure

Endogenous vasoactive peptides
(natriuretic peptides, adrenomedullin, bradykinin, substance P, calcitonin gene-related peptide)

- Neurohormonal activation
- Vascular tone
- Cardiac fibrosis, hypertrophy
- Sodium retention

Neprilysin inhibition

Inactive metabolites
Prospective comparison of ARNI with ACEI to Determine Impact on Global Mortality and morbidity in Heart Failure trial (PARADIGM-HF)

Aim of the PARADIGM-HF Trial

LCZ696 400 mg daily

Enalapril 20 mg daily

specifically designed to replace current use of ACE inhibitors and angiotensin receptor blockers as the cornerstone of the treatment of heart failure
PARADIGM-HF: Study Design

Randomization

Single-blind run-in period

- Enalapril 10 mg BID
- 2 weeks
- 1-2 weeks

- LCZ696 200 mg BID
- 2-4 weeks

Double-blind period

(1:1 randomization)

- LCZ696 200 mg BID
- Enalapril 10 mg BID
PARADIGM-HF: Cardiovascular Death or Heart Failure Hospitalization (Primary Endpoint)

Kaplan-Meier Estimate of Cumulative Rates (%)

Enalapril (n=4212)

LCZ696 (n=4187)

HR = 0.80 (0.73-0.87)

P = 0.0000002

Number needed to treat = 21

Patients at Risk

<table>
<thead>
<tr>
<th></th>
<th>LCZ696</th>
<th>Enalapril</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>4187</td>
<td>4212</td>
</tr>
<tr>
<td>180</td>
<td>3922</td>
<td>3883</td>
</tr>
<tr>
<td>360</td>
<td>3663</td>
<td>3579</td>
</tr>
<tr>
<td>540</td>
<td>3018</td>
<td>2922</td>
</tr>
<tr>
<td>720</td>
<td>2257</td>
<td>2123</td>
</tr>
<tr>
<td>900</td>
<td>1544</td>
<td>1488</td>
</tr>
<tr>
<td>1080</td>
<td>896</td>
<td>853</td>
</tr>
<tr>
<td>1260</td>
<td>249</td>
<td>236</td>
</tr>
</tbody>
</table>
Angiotensin Neprilysin Inhibition With LCZ696 Doubles Effect on Cardiovascular Death of Current Inhibitors of the Renin-Angiotensin System

Effect of ARB vs placebo derived from CHARM-Alternative trial
Effect of ACE inhibitor vs placebo derived from SOLVD-Treatment trial
Effect of LCZ696 vs ACE inhibitor derived from PARADIGM-HF trial
Biventricular pacing to restore ventricular synchrony
Ventricular dysynchrony

- Abnormal ventricular conduction resulting in a regional mechanical delay
  - Wide QRS (IVCD); typically LBBB morphology
  - Poor and in coordinate systolic function
  - Impaired and in coordinate diastolic function
  - Mitral regurgitation
  - Low arterial pressure
  - Poor prognosis

ECG depicting interventricular conduction delay
CARE-HF primary endpoint
(All-cause mortality or unplanned hosp. for major CVS event)

Event-free survival

Days

Event-free survival

Number at risk

<table>
<thead>
<tr>
<th></th>
<th>CRT</th>
<th>Medical therapy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number at risk</td>
<td>409</td>
<td>404</td>
</tr>
<tr>
<td>Days</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>500</td>
<td>500</td>
</tr>
<tr>
<td></td>
<td>1000</td>
<td>1000</td>
</tr>
<tr>
<td></td>
<td>1500</td>
<td>1500</td>
</tr>
</tbody>
</table>

HR 0.63 (95% CI 0.51 to 0.77)

P < .0001
CRT – D or P

• CRT – D includes a defibrillator
  • Improves function / QOL in 2/3 patients
  • Improves prognosis

• CRT – P only provides CRT
  • Improves function / QOL in 2/3 patients
  • Improves prognosis (to a lesser extent)
  • Cheaper
  • Some patients don’t want ICD
  • Avoid ICD if NYHA IV
Table 1: Treatment options with ICD or CRT for people with heart failure who have left ventricular dysfunction with an LVEF of 35% (according to NYHA class, QRS duration and presence of LBBB)

<table>
<thead>
<tr>
<th>QRS interval</th>
<th>NYHA class</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>I</td>
</tr>
<tr>
<td>&lt;120 milliseconds</td>
<td>ICD</td>
</tr>
<tr>
<td>120–149 milliseconds without LBBB</td>
<td>ICD</td>
</tr>
<tr>
<td>120–149 milliseconds with LBBB</td>
<td>ICD</td>
</tr>
<tr>
<td>≥150 milliseconds without LBBB</td>
<td>CRT-D</td>
</tr>
<tr>
<td>≥150 milliseconds with LBBB</td>
<td>CRT-D</td>
</tr>
</tbody>
</table>

LBBB, left bundle branch block
Remote monitoring

- Using implanted device
- No implanted device

“The optimum approach to non-invasive remote monitoring is uncertain, and RCTs performed to date have given inconsistent results and do not yet support a guideline recommendation.”

Serial monitoring of natriuretic peptides

“..several RCTs that evaluated NP-guided treatment (intensifying treatment in order to lower peptide levels) have given conflicting results. It is uncertain whether outcome is better using this approach than by simply optimising treatment according to guidelines.”
Treatments not recommended (believed to cause harm) ESC 2012

- **Thiazolidinediones (Glitazones)** should not be used as they cause worsening heart failure and increase the risk of HF hospitalisations.

- Most **Calcium Channel Blockers** (with the exception of amlodipine and felodipine) should not be used as they have a negative inotropic effect and can cause worsening HF.

- **NSAIDs and COX-2 inhibitors** should be avoided if possible as they may cause sodium and water retention, worsening renal function and worsening HF.

- The **addition of an ARB** (or renin inhibitor) to the **combination of an ACE inhibitor AND a MRA** is NOT recommended because of the risk of renal dysfunction and hyperkalaemia.
Therapeutic Algorithm for a patient with symptomatic heart failure with reduced ejection fraction

Ref 1: European Heart Journal doi:10.1093/eurheartj/ehw128

Procoralan is indicated in patients with NYHA Class II-IV and heart rate ≥ 75bpm
Other pharmacological treatments recommended in selected patients with symptomatic (NYHA Class II-IV) heart failure with reduced ejection fraction

<table>
<thead>
<tr>
<th>Recommendations</th>
<th>Class</th>
<th>Level</th>
<th>Ref</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Diuretics</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Diuretics are recommended in order to improve symptoms and exercise capacity in patients with signs and/or symptoms of congestion.</td>
<td>I</td>
<td>B</td>
<td>178, 179</td>
</tr>
<tr>
<td>Diuretics should be considered to reduce the risk of HF hospitalization in patients with signs and/or symptoms of congestion.</td>
<td>IIa</td>
<td>B</td>
<td>178, 179</td>
</tr>
<tr>
<td><strong>Angiotensin receptor neprilysin inhibitor</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sacubitril/valsartan is recommended as a replacement for an ACE-I to further reduce the risk of HF hospitalization and death in ambulatory patients with HFrEF who remain symptomatic despite optimal treatment with an ACE-I, a beta-blocker and an MRA.</td>
<td>I</td>
<td>B</td>
<td>162</td>
</tr>
<tr>
<td><strong>I f-channel inhibitor</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ivabradine should be considered to reduce the risk of HF hospitalization and cardiovascular death in symptomatic patients with LVEF ≤35%, in sinus rhythm and a resting heart rate ≥70 bpm despite treatment with an evidence-based dose of beta-blocker (or maximum tolerated dose below that), ACE-I (or ARB), and an MRA (or ARB).</td>
<td>IIa</td>
<td>B</td>
<td>180</td>
</tr>
<tr>
<td>Ivabradine should be considered to reduce the risk of HF hospitalization and cardiovascular death in symptomatic patients with LVEF ≤35%, in sinus rhythm and a resting heart rate ≥70 bpm who are unable to tolerate or have contra-indications for a beta-blocker. Patients should also receive an ACE-I (or ARB) and an MRA (or ARB).</td>
<td>IIa</td>
<td>C</td>
<td>181</td>
</tr>
<tr>
<td><strong>ARB</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>An ARB is recommended to reduce the risk of HF hospitalization and cardiovascular death in symptomatic patients unable to tolerate an ACE-I (patients should also receive a beta-blocker and an MRA).</td>
<td>I</td>
<td>B</td>
<td>182</td>
</tr>
<tr>
<td>An ARB may be considered to reduce the risk of HF hospitalization and death in patients who are symptomatic despite treatment with a beta-blocker who are unable to tolerate an MRA.</td>
<td>IIb</td>
<td>C</td>
<td>-</td>
</tr>
<tr>
<td><strong>Hydralazine and isosorbide dinitrate</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hydralazine and isosorbide dinitrate should be considered in self-identified black patients with LVEF ≤35% or with an LVEF &lt;45% combined with a dilated LV in NYHA Class III-IV despite treatment with an ACE-I a beta-blocker and an MRA to reduce the risk of HF hospitalization and death.</td>
<td>IIa</td>
<td>B</td>
<td>183</td>
</tr>
<tr>
<td>Hydralazine and isosorbide dinitrate may be considered in symptomatic patients with HFrEF who can tolerate neither an ACE-I nor an ARB (or they are contra-indicated) to reduce the risk of death.</td>
<td>IIb</td>
<td>B</td>
<td>184</td>
</tr>
<tr>
<td><strong>Other treatments with less certain benefits</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Digoxin</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Digoxin may be considered in symptomatic patients in sinus rhythm despite treatment with an ACE-I (or ARB), a beta-blocker and an MRA to reduce the risk of hospitalization (both all-cause and HF-hospitalizations).</td>
<td>IIb</td>
<td>B</td>
<td>185</td>
</tr>
<tr>
<td><strong>N-3 PUFA</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>An n-3 PUFA preparation may be considered in symptomatic HF patients to reduce the risk of cardiovascular hospitalization and cardiovascular death.</td>
<td>IIb</td>
<td>B</td>
<td>186</td>
</tr>
</tbody>
</table>

Ref 1: European Heart Journal doi:10.1093/eurheartj/ehw128
Recommendations for the treatment of stable angina pectoris with symptomatic (NYHA Class II-IV) heart failure with reduced ejection fraction

<table>
<thead>
<tr>
<th>Recommendations</th>
<th>Class</th>
<th>Level</th>
<th>Ref</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Step 1</strong> A beta-blocker (in an evidence-based dose or maximum tolerated) is recommended as the preferred first-line treatment to relieve angina because of the associated benefits of this treatment (reducing the risk of HF hospitalization and the risk of premature death).</td>
<td>I</td>
<td>A</td>
<td>167-173</td>
</tr>
<tr>
<td><strong>Step 2</strong>: on top of beta-blocker or if a beta-blocker is not tolerated</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ivabradine should be considered as an anti-anginal drug in suitable HF patients (sinus rhythm and HR ≥70 bpm) as per recommended HF management.</td>
<td>IIa</td>
<td>B</td>
<td>180,410,411</td>
</tr>
<tr>
<td><strong>Step 3</strong>: For additional angina symptom relief – except from any combination not recommended</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A short-acting oral or transcutaneous nitrate should be considered (effective anti-anginal treatment, safe in HF).</td>
<td>IIa</td>
<td>A</td>
<td>183,184,409</td>
</tr>
<tr>
<td>A long acting oral or transcutaneous nitrate should be considered (effective anti-anginal treatment, not extensively studied in HF).</td>
<td>IIa</td>
<td>B</td>
<td>183,184</td>
</tr>
<tr>
<td>Trimetazidine may be considered when angina persists despite treatment with a beta-blocker (or alternative) to relieve angina (effective anti-anginal treatment, safe in HF).</td>
<td>IIb</td>
<td>A</td>
<td>400-403</td>
</tr>
<tr>
<td>Amiodipine may be considered in patients unable to tolerate a beta-blocker to relieve angina (effective anti-anginal treatment, safe in HF).</td>
<td>IIb</td>
<td>B</td>
<td>215,407</td>
</tr>
<tr>
<td>Nicorandil may be considered in patients unable to tolerate a beta-blocker to relieve angina (effective anti-anginal treatment, but safety in HF uncertain).</td>
<td>IIb</td>
<td>C</td>
<td></td>
</tr>
<tr>
<td>Ranolazine may be considered in patients unable to tolerate a beta-blocker to relieve angina (effective anti-anginal treatment, but safety in HF uncertain).</td>
<td>IIb</td>
<td>C</td>
<td></td>
</tr>
<tr>
<td><strong>Step 4</strong>: Myocardial revascularization</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Myocardial revascularization is recommended when angina persists despite treatment with anti-angina drugs.</td>
<td>I</td>
<td>A</td>
<td>385,412,413</td>
</tr>
<tr>
<td>Alternatives to myocardial revascularization: combination of ≥3 anti-anginal drugs (from those listed above) may be considered when angina persists despite treatment with beta-blocker, ivabradine and an extra anti-angina drug (excluding the combinations not recommended below).</td>
<td>IIb</td>
<td>C</td>
<td></td>
</tr>
<tr>
<td>The following are NOT recommended:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(1) Combination of any of ivabradine, ranolazine, and nicorandil because of unknown safety.</td>
<td>III</td>
<td>C</td>
<td></td>
</tr>
<tr>
<td>(2) Combination of nicorandil and a nitrate (because of lack of additional efficacy).</td>
<td>III</td>
<td>C</td>
<td></td>
</tr>
<tr>
<td>Diltiazem and verapamil are not recommended because of their negative inotropic action and risk of worsening HF</td>
<td>III</td>
<td>C</td>
<td>214</td>
</tr>
</tbody>
</table>

Ref 1: European Heart Journal doi:10.1093/eurheartj/ehw128

Ivabradine

Procoralan®
# Appendix E: Practical guidance on the use of mineralocorticoid receptor antagonists in patients with systolic heart failure

## WHY?
To improve symptoms, reduce the risk of HF hospitalization, and increase survival

## IN WHOM AND WHEN?
**Indications**
- Potentially all patients with persisting symptoms (NYHA Class II-IV) and an EF ≤35% despite treatment with an ACE inhibitor (or ARB) and beta-blocker

**Cautions/seek specialist advice**
- Significant hyperkalaemia (K⁺ >5.0 mmol/L)
- Significant renal dysfunction (creatinine >221 µmol/L [>2.5 mg/dL] or eGFR <30 mL/min/1.73 m²)

**Drug interactions to look out for**
- K⁺ supplements/ K⁺-sparing diuretics (e.g. amiloride and triamterene; beware combination preparations with furosemide)
- ACE inhibitors/ARBs/renin inhibitors
- NSAIDs
- Trimethoprim/trimethoprim-sulfamethoxazole
- ‘Low-salt’ substitutes with a high K⁺ content

**Contraindication**
- Eplerenone—strong CYP3A4 inhibitors, e.g. ketoconazole, itraconazole, nefazodone, telithromycin, clarithromycin, ritonavir, and nelfinavir

## WHERE?
- In the community or in the hospital
- Exceptions—see Cautions/seek specialist advice

## WHICH MRA AND WHAT DOSE? - see Table 14

## HOW TO USE?
- Check renal function and electrolytes (particularly K⁺)
- Start with a low dose (see above)
- Consider dose up-titration after 4–8 weeks
- Check blood chemistry at 1 and 4 weeks after starting/increasing dose and at 8 and 12 weeks; 6, 9, and 12 months; 4-monthly thereafter
- If K⁺ rises above 5.5 mmol/L or creatinine rises to 221 µmol/L (2.5 mg/dL)/eGFR <30 mL/min/1.73 m², halve dose and monitor blood chemistry closely
- If K⁺ rises to >6.0 mmol/L or creatinine to >310 µmol (3.5 mg/dL) eGFR <20 mL/min/1.73 m², stop MRA immediately and seek specialist advice
- A specialist HF nurse may assist with education of the patient, follow-up (in person or by telephone), biochemical monitoring, and dose up-titration

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[www.escardio.org](http://www.escardio.org)
What about HFPEF?
Epidemiological Aspects of Diastolic Heart Failure

Symptoms of heart failure with normal left ventricular function is synonymous with diastolic heart failure?

30 - 50% of patients with heart failure have normal systolic function

Strong Heart Study (Arizona). Am J Cardiol 2000
Framingham Offspring Study. J Am Coll Cardiol 1999
Hillingdon Study (UK). Eur Heart J 1999
Olmsted County (Minnesota). Circulation 1998
Terminology

- Diastolic Heart Failure
- Heart Failure with normal ejection fraction
- Heart Failure with preserved ejection fraction >50%
- Heart Failure with mid range ejection fraction 40-49%
- Heart Failure with reduced ejection fraction <40%

- Arguments re terminology have generated a great deal of heat but little light!
What is it and who has it?
The current criteria

Intense debate!

ESC criteria
- Symptoms or signs of heart failure
- LVEF > 50% and LVEDVI < 97ml/m²
- Evidence of diastolic dysfunction

Paulus et al Eur Heart J 2007; 28: 2359 – 2550

Typical patient:
  female
  elderly
  overweight
  systolic hypertension
Diagnostic flowchart on how to diagnose HF-PEF in a patient suspected of HF-PEF (ESC)

McMurray, J. et al. ESC Textbook of Cardiovascular Medicine
10.1093/med/9780199566990.003.023
Pathophysiology of resting LV diastolic dysfunction

- Impaired LV active relaxation
- Increased passive LV stiffness
  - Myocytehypertrophy
  - Fibrosis
  - Collagen cross linking
  - Titinisoform shift (to shorter less distensible form)
- Impaired atrial contraction (AF)
- PHYSIOLOGY = FAILURE TO FILL
  - Reduced cardiac output on exercise (Starling)
  - Increased LV end diastolic pressure
How do patients present

- Chronic breathlessness and fatigue (consider ‘angina equivalent’)
- Acute ‘flash’ pulmonary oedema – NB blood pressure typically high at presentation (consider RAS)
Diastolic Dysfunction: Major Underlying Diseases

- Hypertension
- Ischaemic heart disease
- Left ventricular hypertrophy
- Ageing
- Diabetes
- Cardiomyopathies
- Atrial fibrillation
Aetiology of cardiac dysfunction: systolic vs diastolic

- **Diastolic dysfunction**
  - Diminished compliance
  - Diastolic dysfunction >40%
  - Elderly females
  - Impaired compliance
  - Chamber narrowed
  - Concentric hypertrophy
  - Cardiomegaly absent
  - Hypertensive in nature
  - Audible S4

- **Systolic dysfunction**
  - Diminished inotropy
  - Ejection Fraction <40%
  - Males 50-70
  - Impaired contractility
  - Chamber dilated
  - Eccentric hypertrophy
  - Cardiomegaly noted
  - Ischaemic in nature
  - Audible S3

Levy, R., Michigan American College of Emergency Medicine Conference, 2004
Prognosis in Heart Failure

P = 0.003 (95.0% Confidence Interval 1.130 - 1.815)
<table>
<thead>
<tr>
<th>Treatment</th>
<th>Mortality</th>
<th>Admission to hospital</th>
<th>Symptom</th>
<th>Mortality</th>
<th>Admission to hospital</th>
<th>Symptom</th>
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</thead>
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<tr>
<td>ACE inhibitor</td>
<td>Substantial benefit</td>
<td>Substantial benefit</td>
<td>Marginal benefit</td>
<td>No benefit</td>
<td>Marginal or no benefit</td>
<td>No benefit</td>
</tr>
<tr>
<td>Angiotensin receptor blocker</td>
<td>Marginal benefit</td>
<td>Substantial benefit</td>
<td>Marginal benefit</td>
<td>No benefit</td>
<td>Marginal or no benefit</td>
<td>No benefit</td>
</tr>
<tr>
<td>B Blocker</td>
<td>Substantial benefit</td>
<td>Substantial benefit</td>
<td>Marginal benefit</td>
<td>No benefit</td>
<td>No benefit</td>
<td>Marginal or no benefit</td>
</tr>
<tr>
<td>Digitalis</td>
<td>No benefit</td>
<td>Substantial benefit</td>
<td>Marginal benefit</td>
<td>No benefit</td>
<td>No benefit</td>
<td>No data</td>
</tr>
<tr>
<td>Aldosterone antagonist</td>
<td>Substantial benefit</td>
<td>Substantial benefit</td>
<td>Marginal benefit</td>
<td>No data</td>
<td>No data</td>
<td>No data</td>
</tr>
<tr>
<td>Cardiac resynchronisation</td>
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<td>Substantial benefit</td>
<td>Marginal benefit</td>
<td>No data</td>
<td>No data</td>
<td>No data</td>
</tr>
<tr>
<td>Implantable cardioverter</td>
<td>Substantial benefit</td>
<td>No benefit</td>
<td>No benefit</td>
<td>No data</td>
<td>No data</td>
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</tr>
</tbody>
</table>

*The treatment effects are summarised qualitatively on the basis of the totality of currently available evidence rather than data from individual trials.*
Managing HFPEF

- Control BP (systolic and diastolic)
- Address all CAD risk factors
- Restore SR in AF if possible
- Control ventricular rate in permanent AF
- Diuretics for pulmonary congestion or peripheral oedema
- Coronary revascularisation in symptomatic patients or where myocardial ischaemia affecting diastolic function
- No evidence base for ACEi/ARB/BB or AAs (use if other indications)
- The future? PARAGON-HF LCZ696 vs Valsartan in HFPEF
This Intelligence Pack has been compiled by GPs and nurses and pharmacists in the Primary Care CVD Leadership Forum in collaboration with the National Cardiovascular Intelligence Network

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Why Does Variation Matter?

The variation that exists between demographically similar CCGs and between practices illustrates the local potential to improve care and outcomes for our patients.

Benchmarking is helpful because it highlights variation.

Of course it has long been acknowledged that some variation is inevitable in the healthcare and outcomes experienced by patients. But John Wennberg, who has championed research into clinical variation over four decades and who founded the pioneering Dartmouth Atlas of Health Care, concluded that much variation is unwarranted – i.e. it cannot be explained on the basis of illness, medical evidence, or patient preference but is accounted for by the willingness and ability of doctors to offer treatment.

A key observation about benchmarking data is that it does not tell us why there is variation. Some of the variation may be explained by population or case mix and some may be unwarranted – we will not know unless we investigate.

Benchmarking may not be conclusive. Its strength lies not in the answers it provides but in the questions it generates for CCGs and practices. For example:
1. How much variation is there in detection, management, exception reporting and outcomes?
2. How many people would benefit if average performers improved to the level of the best performers?
3. How many people would benefit if the lowest performers matched the achievement of the average?
4. What are better performers doing differently in the way they provide services in order to achieve better outcomes?
5. How can the CCG support low and average performers to help them match the achievement of the best?
6. How can we build clinical leadership to drive quality improvement?

There are legitimate reasons for exception-reporting. But ……

Excepting patients from indicators puts them at risk of not receiving optimal care and of having worse outcomes. It is also likely to increase health inequalities. The substantial variation seen in exception reporting for some indicators suggests that some practices are more effective than others at reaching their whole population. Benchmarking exception reporting allows us to identify the practices that need support to implement the strategies adopted by low
Premature death and disability in people with CHD can be reduced significantly by systematic evidence based management in primary care.

Coronary Heart Disease is one of the principal causes of premature death and disability. The key elements of management for an individual who already has had a heart attack or angina are symptom control and secondary prevention of further cardiovascular events and premature mortality. There is robust evidence to support the use of anti-platelet treatment, statins, beta-blockers and angiotensin converting enzyme inhibitors or angiotensin receptor blockers. There is also robust evidence to support good control of blood pressure. Each of these interventions is incentivised in QOF but variation in achievement and exception reporting at practice level shows that there is often considerable potential for improving.

What questions should we ask in our CCG?
1. For each indicator how wide is the variation in achievement and exception reporting?
2. How many people would benefit if all practices performed as well as the best?
3. How can we support practices who are average and below average to perform as well as the best in:
   - More systematic delivery of evidence based care for people with CHD
   - Improved detection and management of heart failure

What might help
1. Roll out of GRASP-Heart Failure audit tool that identifies people with heart failure who are undiagnosed or under treated
2. Education for health professionals to promote evidence based management of CHD and high quality measurement of blood pressure
3. Education and training to support delivery of behaviour change interventions for CVD risk reduction in primary care
4. Ensure access to rapid access diagnostic clinics and specialist support for management of angina and heart failure
5. Ensure access to cardiac rehab for individuals with CHD and heart failure

Heart failure is a common and an important complication of coronary heart disease and other conditions. Again there is good evidence that appropriate treatment including up-titration of ace inhibitors and beta blockers in heart failure due to LVSD can significantly improve symptom control and quality of life, and improve outcomes for patients. Despite this, around a quarter of people with heart failure are undetected and untreated. And amongst those who are diagnosed, there is significant variation in the quality of care.
Heart failure prevalence by CCG

Comparison with CCGs in the SCN

- Prevalence of 1.04% in NHS Darlington CCG compared to 0.72% in England
Heart failure prevalence by CCG

Comparison with demographically similar CCGs

- NHS Durham Dales, Easington and Sedgefield CCG: 1.12%
- NHS St Helens CCG: 1.09%
- NHS Darlington CCG: 1.04%
- NHS Hardwick CCG: 0.99%
- NHS Chorley and South Ribble CCG: 0.94%
- NHS Bassetlaw CCG: 0.93%
- NHS Newark & Sherwood CCG: 0.84%
- NHS Warwickshire North CCG: 0.60%
- NHS Barnsley CCG: 0.78%
- NHS North Lincolnshire CCG: 0.73%
- NHS North East Lincolnshire CCG: 0.70%
Heart failure prevalence by GP practice

- 1,110 people with diagnosed heart failure in NHS Darlington CCG
- GP practice range: 0.8% to 2.2%
Percentage of patients with heart failure due to left ventricular systolic dysfunction (LVSD) who are treated with ACE-I / ARB by CCG

Comparison with CCGs in the SCN

- 613 people with heart failure* with LVSD in NHS Darlington CCG
- 521 (85%) people treated with ACE-I or ARB
- 91 (14.8%) people who are exceptions
- 1 (0.2%) additional people who are not treated with ACE-I or ARB

*Using the QOF clinical indicator HF003 denominator plus exceptions
Percentage of patients with heart failure due to left ventricular systolic dysfunction (LVSD) who are treated with ACE-I / ARB by CCG

Comparison with demographically similar CCGs

- NHS Warwickshire North CCG: 90.7%
- NHS Hardwick CCG: 88.9%
- NHS North Lincolnshire CCG: 87.6%
- NHS Barnsley CCG: 87.2%
- NHS Bassetlaw CCG: 86.9%
- NHS Durham Dales, Easington and Sedgefield CCG: 86.6%
- NHS Chorley and South Ribble CCG: 86.2%
- NHS North East Lincolnshire CCG: 86.2%
- NHS Newark & Sherwood CCG: 85.8%
- NHS Darlington CCG: 85.0%
- NHS St Helens CCG: 83.8%
Percentage of patients with heart failure due to left ventricular systolic dysfunction (LVSD) who are not treated with ACE-I / ARB by GP practice

- In total, including exceptions, there are 92 people who are not treated with ACE-I or ARB
- GP practice range: 5.3% to 24.5%
- If all practices were to achieve as well as the average of the best achieving practices, then an additional 32 people would be treated
Percentage of patients with heart failure due to left ventricular systolic dysfunction (LVSD) who are treated with ACE-I / ARB and BB by CCG

Comparison with CCGs in the SCN

- 517 people with heart failure* with LVSD treated with ACE-I/ARB in NHS Darlington CCG
- 463 (89.6%) people treated with ACE-I/ARB and BB
- 34 (6.6%) people who are exceptions
- 20 (3.9%) additional people who are not treated with ACE-I/ARB and BB

*Using the QOF clinical indicator HF004 denominator plus exceptions
Percentage of patients with heart failure due to left ventricular systolic dysfunction (LVSD) who are treated with ACE-I / ARB and BB by CCG
Comparison with demographically similar CCGs

- **NHS Darlington CCG**: 89.6%
- **NHS Durham Dales, Easington and Sedgefield CCG**: 84.3%
- **NHS Warwickshire North CCG**: 83.4%
- **NHS Chorley and South Ribble CCG**: 82.2%
- **NHS North East Lincolnshire CCG**: 81.3%
- **NHS Hardwick CCG**: 77.4%
- **NHS Newark & Sherwood CCG**: 76.7%
- **NHS Bassetlaw CCG**: 75.9%
- **NHS Barnsley CCG**: 75.2%
- **NHS St Helens CCG**: 71.4%
- **NHS North Lincolnshire CCG**: 69.9%
Percentage of patients with heart failure due to left ventricular systolic dysfunction (LVSD) who are not treated with ACE-I / ARB and BB by GP practice

- In total, including exceptions, there are 54 people who are not treated with ACE-I or ARB
- GP practice range: 2.4% to 23.5%
- If all practices were to achieve as well as the average of the best achieving practices, then an additional 29 people would be treated
Take home messages

- Accurate diagnosis
- Uptitrate medications wherever possible
- Dynamic diuretic dosing
- Regular review
- Use specialist HF nurses if available
- Consider Ivabradine or Entresto if no better on standard drugs
- Refer if deterioration ?CRT
- Review Local data to drive up standard
Any further questions...

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