ADDRESSING THE CHALLENGES OF HEART FAILURE MANAGEMENT
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Relationships with commercial interests:
► Grants/Research Support: None Applicable

Potential for conflict(s) of interest:
► Servier Canada / Novartis Pharma / Bayer Pharma / Medtronic
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Relationships with commercial interests:
► Grants/Research Support: none

Potential for conflict(s) of interest:
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► All the recommendations involving clinical medicine are based on evidence that is accepted within the profession.
► All scientific research referred to, reported, or used is in the support or justification of patient care.
► Recommendations conform to the generally accepted standards.
► The presentation will mitigate potential bias by ensuring that data and recommendations are presented in a fair and balanced way.
► Potential bias will be mitigated by presenting a full range of products that can be used in this therapeutic area.
► Information of the history, development, funding, and the sponsoring organizations of the disclosure presented will be discussed.
Addressing the Challenges of Heart Failure Management

Stuart J. Smith MD FRCP©
and
Maureen Leyser RNEC, BScN, MN
I. Session Objectives

► Brief overview of the classification of heart failure, epidemiology, treatment and prognosis.

► Review factors that lead to good and poor long-term outcomes for the patient diagnosed with “heart failure”

► Consider strategies to maximize good outcomes with the goals of improving quality of life, decreasing hospitalization and possibly affecting prognosis.

► Introduce participants to new topics in heart failure relevant to the general physician.
Available Heart Failure Guidelines

www.hfsa.org
“Comprehensive”

New heart failure guidelines stress early diagnosis and treatment

“Practical, widely applicable”

“Practical Tips; Multidisciplinary Approach”
Heart failure: the epidemic

- Over 500,000 Canadians are living with HF
- • 50,000 new cases are diagnosed each year
- 19,396 heart failure hospitalizations in Ontario each year
- • $167 M for heart failure alone
- • Highest readmissions within 30 days (21%) = total acute inpatient cost of $38 M
Heart Failure

Clinical Presentation

7 year Hx of recurrent HF on meds

Previous MI 3 years ago. 1st visit with HF
Family Hx

Suspected heart failure

- Clinical history
  - Symptoms
  - Functional limitation
  - Prior cardiac disease
  - Risk factors
  - Exacerbating factors
  - Comorbidities
  - Drugs

- Physical examination
  - Vital signs
  - Weight
  - Volume status
  - Heart
  - Lung
  - Abdomen
  - Vascular

Initial investigations
- Chest radiograph
- Electrocardiogram
- B-type natriuretic peptides
- Lab work (CBC, electrolytes, renal function, urinalysis, glucose, thyroid function)

Assessment of ventricular function
- Echocardiogram

Diagnosis excluded

- Normal
- Abnormal

Inconclusive

Pathology excluded

- Additional diagnostic investigations
  - Radionuclide imaging
  - Cardiac catheterization
  - Cardiopulmonary exercise testing
  - Others (magnetic resonance imaging, CT scan, endomyocardial biopsy)

Pathology confirmed

No heart failure

Heart failure

CCS 2012 Heart Failure Guidelines

Updated Approach to Diagnosis of Heart Failure

- INR
- Serial Troponins
- Ferritin

Canadian Journal of Cardiology 2013 29, 168-181
Heart Failure Management

Goals of Treatment

1) Reduce symptoms
2) Prevent hospitalization
3) Improve quality of life
4) Slow the progression of the disease
5) Improve survival (where possible)
   a. Decrease death due to progressive pump failure
   b. Decrease Sudden Cardiac Death
Target Doses for Heart Failure Medications (ESC 2012)

<table>
<thead>
<tr>
<th>Medication</th>
<th>Starting dose (mg)</th>
<th>Target dose (mg)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ACE inhibitor</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Captopril</td>
<td>6.25 t.i.d.</td>
<td>50 t.i.d.</td>
</tr>
<tr>
<td>Enalapril</td>
<td>2.5 b.i.d.</td>
<td>10–20 b.i.d.</td>
</tr>
<tr>
<td>Lisinopril</td>
<td>2.5–5.0 o.d.</td>
<td>20–35 o.d.</td>
</tr>
<tr>
<td>Ramipril</td>
<td>2.5 o.d.</td>
<td>5 b.i.d. (10 hs)</td>
</tr>
<tr>
<td>Perindopril</td>
<td>2 mg hs</td>
<td>8 mg hs</td>
</tr>
<tr>
<td><strong>Beta-blocker</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bisoprolol</td>
<td>1.25 o.d.</td>
<td>10 o.d.</td>
</tr>
<tr>
<td>Carvedilol</td>
<td>3.125 b.i.d.</td>
<td>25–50 b.i.d.</td>
</tr>
<tr>
<td>Metoprolol succinate (CR/XL)</td>
<td>12.5/25 o.d.</td>
<td>200 o.d.</td>
</tr>
<tr>
<td>Nebivolol</td>
<td>1.25 o.d.</td>
<td>10 o.d.</td>
</tr>
<tr>
<td><strong>ARB</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Candesartan</td>
<td>4 or 8 o.d.</td>
<td>32 o.d.</td>
</tr>
<tr>
<td>Valsartan</td>
<td>40 b.i.d.</td>
<td>160 b.i.d.</td>
</tr>
<tr>
<td>Losartan</td>
<td>50 o.d.</td>
<td>150 o.d.</td>
</tr>
<tr>
<td><strong>MRA</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Eplerenone</td>
<td>25 o.d.</td>
<td>50 o.d.</td>
</tr>
<tr>
<td>Spironolactone</td>
<td>25 o.d.</td>
<td>25–50 o.d.</td>
</tr>
</tbody>
</table>
Bottom Line – Population Medicine

- All the listed ACEi and Beta-blockers have been shown to decrease mortality and hospitalization.

  - Decision as to which agent based upon:
    - Comorbid illness eg Diabetes, COPD, hypertension
    - Compliance: once/day vs twice /day
    - Ease of use, personal experience with use of drug
    - Cost

  - In the end, the most important issue is to ensure patients get on a Beta-Blocker and an ACE inhibitor/ARB and that doses are up-titrated to target doses.
Simplified Algorithm for Heart Failure Management

**Treatment of heart failure (HF)**

If symptoms severe, refer to specialist: acute to ER, chronic to HF clinic
If HF symptoms but LVEF >40%, treat cause (eg, hypertension, ischemia)
If systolic HF LVEF <40%

For all symptomatic patients with systolic HF:
- Education
- Aggressive risk factor reduction
- Lifestyle modifications
- Salt/fluid vigilance
- Tailored diuretic Rx

ACEI + beta-blocker → Prescribe ARB

Tritrate to target doses

Intolerance → Prescribe ARB
Consider nitrates/hydralazine

Clinically stable
Persistent symptoms

NYHA class III
Class IIB-IV

If LVEF <30%, consider ICD referral
If QRS >120 ms, consider CRT referral
If refractory, consider transplant

Continue Rx
Add ARB
Digoxin ± nitrates
Comb. diuretics
Spironolactone
The Vicious Cycle of Heart Failure

- **Diurese & home**
- **IV Lasix or Admit**

**Chronic HF**

**MD’s Office**
- • SOB
- • Weight Gain

**Emergency Room**

**Hospitalization**

**PO Lasix**
Relief from dyspnea can’t come soon enough

- Should (?) be on the EBM therapies
- “Volume management” becomes the mainstay of therapy in these patients
Renal Dysfunction

GFR 60→45
GFR 30→<15
The Ugly Truth about Readmissions for Heart Failure...
The Course of Heart Failure

- Mortality ↑ when EF ≤ 30-35%
- Modes of Death: Sudden Death (electrical) ~50% vs Pump Failure ~ 50%

Transition to Advanced Heart Failure:
- Oral therapies failing
- A time for many major decisions
- Consider MCS and/or transplantation, if eligible
- Consider inversion of care plan to one dominated by a palliative approach, which may involve formal hospice
## American College of Cardiology and American Heart Association (ACC/AHA) Stages

### At Risk for Heart Failure

<table>
<thead>
<tr>
<th>Stage</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stage A</td>
<td>At high risk for heart failure but without structural changes or symptoms</td>
</tr>
<tr>
<td>Stage B</td>
<td>Structural heart disease but without signs or symptoms of heart failure</td>
</tr>
</tbody>
</table>

### Heart Failure

| Stage C | Structural heart disease with prior or current symptoms of heart failure |
| Stage D | Refractory heart failure including specialized interventions |
Case Scenario

Mr HP is an 72 yr old black male who comes to your office for follow-up after admission to hospital for 4 days.

He gives you a printed preliminary discharge summary that indicates that he was discharged with a diagnosis of CHF. Advised up-titration of medications as tolerated.

PMHx positive for hypertension, type II DM on oral meds and previous right hip replacement 3 years ago. No known previous cardiac history.
Currently breathing better but feeling very weak and unwell. He thinks it may be the medications.

Admits that he has been more short of breath on exertion for several months. More recently has felt better with his head a bit raised.

Previous echo from preop hip surgery showed normal LV function with LVH; impaired relaxation.
Current Medications

- ECASA 81 mg OD
- Ramipril 5 mg qhs
- Metoprolol 75 mg BID
- Furosemide 80 mg OD
- Spironolactone 12.5 mg OD
- Metformin 1000 mg BID
- Diamicron MR 60 mg OD
EKG in Hospital
Hospital Investigations (from Discharge Summary)

- Na 133
- K 3.5
- Chloride 94
- HCO3 22
- BUN 12
- Crt 140
- Hb 105
- INR 1.2
- CXR – attached
- ECG – attached
- ECHO – not done. Previous echo normal LV fct with LVH.
Physical Exam

- Ht 5ft 6 in    Wt 140 lb
- HR 50 /min   BP 90/65
- Looks unwell
- Chest – small right pleural effusion
- JVP 3 , HJR (+)ve
- S4  S1 S2 no murmur

Office Lab:

- Na 133
- K 3.4
- BUN 16
- Crt 189
- Hb 110
Discussion:

What would you do?
A Practical Everyday "Clinical Definition" of Heart Failure

1. Symptoms of heart failure (at rest or during exercise)
   AND
2. Objective of evidence { preferably by echocardiography } of cardiac dysfunction { systolic or diastolic } { at rest } and { in cases where the diagnosis is in doubt }
   AND
3. Response to treatment directed towards heart failure.

Criteria 1 and 2 should be fulfilled in all cases

European Society of Cardiology 2005
How Does the ECHO make a Difference?

► LV Size, function & Ejection Fraction
## Heart Failure

**Systolic HF (HF<sub>rEF</sub>) vs HF with Preserved LV Function (HF<sub>pEF</sub>)**

<table>
<thead>
<tr>
<th>The diagnosis of HF-REF requires three conditions to be satisfied:</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Symptoms typical of HF</td>
</tr>
<tr>
<td>2. Signs typical of HF&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
<tr>
<td>3. Reduced LVEF</td>
</tr>
</tbody>
</table>

**HF-rEF**

( EF < 40% )

<table>
<thead>
<tr>
<th>The diagnosis of HF-PEF requires four conditions to be satisfied:</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Symptoms typical of HF</td>
</tr>
<tr>
<td>2. Signs typical of HF&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
<tr>
<td>3. Normal or only mildly reduced LVEF and LV not dilated</td>
</tr>
<tr>
<td>4. Relevant structural heart disease (LV hypertrophy/LA enlargement) and/or diastolic dysfunction (see Section 4.1.2)</td>
</tr>
</tbody>
</table>

**HF-pEF**

( EF > 40% - 50 %)
ECHO findings consistent with Cardiac Amyloidosis
5 Things we know about TTR Cardiac Amyloidosis

1. TTR amyloid is the most common form of CA.
2. TTR cardiac amyloid is an under-appreciated cause of HFpEF
3. An EKG is not a good screening test for TTR amyloidosis
4. Clues to TTR Cardiac Amyloidosis are available
5. Non-invasive bone scintigraphy is highly specific for TTR amyloid
Stages in the Development of Heart Failure and Recommended Therapy by Stage.

**Stage A**
- At high risk for HF but without structural heart disease or symptoms of HF
- Examples of patients with:
  - HTN
  - Atherosclerotic disease
  - DM
  - Obesity
  - Metabolic syndrome
  - Use of cardioxins
  - Family history of cardiomyopathy

**Stage B**
- Structural heart disease but without signs or symptoms of HF
- Examples of patients with:
  - Previous MI
  - LV remodeling including LVH and low EF
  - Asymptomatic valvular disease

**Stage C**
- Structural heart disease with prior or current symptoms of HF
- Examples of patients with:
  - Known structural heart disease
  - HF signs and symptoms

**Stage D**
- Refractory HF
- Examples of patients with:
  - Marked HF symptoms at rest
  - Recurrent hospitalizations despite GDMT

**Therapy Goals**
- Heart healthy lifestyle
- Prevent vascular, coronary disease
- Prevent LV structural abnormalities

**Drugs**
- ACEI or ARB as appropriate
- Beta blockers as appropriate

**In selected patients**
- ICD
- Revascularization or valvular surgery as appropriate

**HFpEF**
- Control symptoms
- Improve HRQOL
- Prevent hospitalization
- Prevent mortality

**Drugs for routine use**
- Diuretics for fluid retention
- ACEI or ARB
- Beta blockers
- Aldosterone antagonists

**HF/EF**
- Control symptoms
- Patient education
- Prevent hospitalization
- Prevent mortality

**Drugs for use in selected patients**
- Hydralazine-isosorbide dinitrate
- ACEI and ARB
- Digitalis

**Options**
- Advanced care measures
- Heart transplant
- Chronic injectors
- Temporary or permanent MCS
- Experimental surgery or drugs
- Palliative care and hospice
- ICD deactivation

Clyde W.
Yancy et al.
Circulation.
2013;128:e240-e327
Case Scenario

Mrs PH 75 yr old woman with history recurrent admissions to local rural hospital for either acute heart failure or acute kidney injury (AKI). She is following up after his last admission. Discharged 5 days ago.

Last echo showed preserved LV function (EF ~ 65%), severe mitral annular calcification, moderate MR, moderate-severe TR and severe pulmonary hypertension.

Has sleep apnea on CPAP, morbid obesity, COPD hypertension, Afib, type II DM on insulin.
Clinical Scenario (continued)

► She is feeling better but has noticed that her weight can fluctuate by as much as 5 lb overnite ..... if she is not careful with her diet. She is dependent on a niece to help make her food.

► Today feels a bit bloated. Some mild worsening of her peripheral edema but still able to get around. Denies significant orthopnea, etc.

► States that she is taking her meds as prescribed and using her CPAP. Her weight is up 3 lb since discharge.
Current Medications

- Apixiban 2.5 mg BID
- Perindopril 8 mg qhs
- Bisoprolol 10 mg OD
- Digoxin 0.125 mg OD
- Spironolactone 25 mg OD
- Ventolin 2 puffs BID
- Flovent Inhaler 2 puff OD
- Spiriva 18ug OD
- Lantus insulin 24 unit qhs
- Humulin regular TID
- CPAP at night
- Furosemide 80 mg OD
- L-Thyroxine 100 ug OD
Physical Exam

- Looks comfortable but somewhat volume overloaded
- Weight 200 lb; Afib 70/min; BP 140/80 mmHg
- Chest – clear
- JVP ~ 8 cm with obvious V wave; HJR to angle of jaw
- Soft S1. Grade 2/6 murmur of TR along LLSB
- Liver edge 1 ½ fb bcm and pulsatile.
- Mild peripheral edema. Evidence of previous venous stasis.
Office Bloodwork:

- Na 133
- K 3.3
- HCO3 21
- BUN 8
- Crt 140
- Hb 120
- INR 1.4
Discussion

► When you see this type of patient on a regular basis, what is your clinical approach?

► How are you going to manage this patient:
  ▪ Today in office?
  ▪ Over the longterm?

► When will you see her again?
Assessing the Outpatient for “Volume Overload”

- Change in Exercise Tolerance?
- Hx of orthopnea /PND?
- Hx of abdominal bloating with weight gain?
- Worsening peripheral edema?
- Weight gain on Home Scale including “range“?
- NSAID use, diet indiscretion, medication compliance, etc
- Evidence of infection, anemia, arrhythmia?

- Office Weight
- BP, HR, (+/- O₂ Sat)
- Lung fields
- JVP, HJR, External Jugular
- Distended liver BCM
- Edema (legs, back)
- [heart sounds, murmurs]
Tool to help Assess “Volume Status” in a Difficult to Manage HF Patient

What if you could have...
a tool in the palm of your hand
### 3 Elements of Self Care

<table>
<thead>
<tr>
<th>Self-care terms</th>
<th>Self-care activities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maintenance</td>
<td>Behaviours to reduce risk factors, improve health, and adhere to recommendations (eg, follow dietary restrictions, take medications as prescribed, exercise regularly)</td>
</tr>
<tr>
<td>Monitoring</td>
<td>Routine daily monitoring/vigilance to HF symptoms (eg, daily weights, checking for edema) and recognize a change when it occurs</td>
</tr>
<tr>
<td>Management</td>
<td>Evaluate a change in symptoms and determine what action is needed (eg, do nothing, call a health care provider). Evaluate the effectiveness of the action</td>
</tr>
</tbody>
</table>

HF, heart failure.
The Sodium Restricted Diet (< 2-3 gram /24 hr )

- Do not add any salt to your food from the shaker
- Try not to add salt while cooking. Use herbs and spices for flavouring.
- Limit snack, convenience, canned and processed foods
- Use salt substitutes **only** if approved by your Doctor.
- Read labels carefully – beware “low sodium” and “sodium reduced”
- Sodium content per serving or % of daily recommended intake
Weight gain and swelling are signs that HF patients are retaining fluid.

Checking for weight gain is important. The patient can gain weight without any obvious swelling.

The average person can hold approx. 8 pounds of fluid before developing swelling.

One of the best ways to watch for fluid build up is to weigh the patient daily!
Tips for Monitoring Daily Weights

► Learn your patient’s “target weight”.
► Always weigh on the SAME SCALE!
► Weigh first thing in the am, before breakfast and after bladder emptied.
► Have patient keep record of weights.
► Compare their weight to the target weight AND to the weight from the day before
**Target Weight 195 pounds**  
**Furosemide 80 mg OD**

<table>
<thead>
<tr>
<th>Weight</th>
<th>Furosemide Dose</th>
</tr>
</thead>
<tbody>
<tr>
<td>192 lbs or less</td>
<td>Furosemide 40 mg po once daily</td>
</tr>
<tr>
<td>193 - 195lb -197lb</td>
<td>Furosemide 80 mg po once daily</td>
</tr>
<tr>
<td>198 lbs</td>
<td>Furosemide 80 mg po BID</td>
</tr>
<tr>
<td>199 lb or more</td>
<td>Furosemide 120 mg po BID <strong>call HFC after 3 days</strong></td>
</tr>
</tbody>
</table>
Weights can be tricky!

- A weight gain of 3 pounds overnight or 5 pounds in one week is considered fluid weight.
- Patients with advanced heart failure are unlikely to gain meaningful body weight but often lose body weight/replace with fluid weight.
- Meaningful or body weight is slow weight gain of 1-2 pounds per week.
Diuretic Dosing

A. Home Furosemide protocol
   - For patients whose goals of care are to avoid hospitalization and invasive testing and monitoring
   - Can work with CCAC to develop a home based protocol

B. Other Options Depending on Situation……..
   - Add in Thiazide Diuretic ( eg Metalazone 2.5 – 5 mg prn according to weight).
   - Periodic IV lasix at home via PICC line through CCAC
   - Occasionally – Ultrafiltration by Nephro if resistant
Change in Patient Symptoms/Signs
- Dyspnea
- Orthopnea
- Edema
- Weight gain

**ASSESSMENT**
- On history ask about:
  - Medication non-adherence
  - High salt
  - Infection
  - NSAIDs
- On exam:
  - Increased JVP
  - Increased ‘crackles’
  - Increased peripheral edema
  - PICC line

Heart Failure Decompensation
- Leave protocol: No
- Initiate RN daily monitoring x 7 days: Yes
- Uncertain

**MANAGEMENT**
1. Order RN to monitor symptoms, vitals, ± weight, and call MD daily x 7 days (see order template link)
2. Consider: Labwork, dietary counseling, Foley catheter, IV line, IV supplies
3. Escalate diuresis: See next step for outline, page 2 for details
4. Consider: Call to cardiologist to inform

**Escalation of Oral Therapy**
- Consider escalation of oral therapy if:
  - Success with previous oral escalation
  - Patient preference
  - Bridging to delivery of intravenous therapy

**Initiate Intravenous Therapy**
- Consider IV if:
  - Unresponsive to previous oral escalation
  - Already on high dose therapy (>200 mg/day)
  - Known resistance to diuretics
  - Renal insufficiency
  - Shortness of breath at rest

**Oral escalation guidelines - See next page**
**4-day IV dosing guidelines - See next page**

Based on Goals of Care consider:
- Reassessment in HF clinic
- ED/Inpatient management
- Transition of therapy to end-of-life pathway

**Symptom improvement**
- No
- Yes

- Supplement K
- Resume previous PO flurosemide dose
- Consider increasing PO flurosemide dose
- PICC line if anticipate recurrence
Clinical Case

► Mrs B is a 72 y/o woman presenting for follow-up her FMD. She has a hx of HF$_{\text{RE}}$F (EF ~ 25%)
► Hx of CABG 10 yrs ago and no further revascularization options. ICD was inserted 2 years ago but “did not really notice any change”.
► Currently functioning at AHA Stage C, NYHA Fc III
► She follows a Low Salt Diet and does weigh herself daily
► Her symptoms seem to have worsened over the past year. She is worried and ask about any other options
Current Medications

- Current medications:
  - ASA 80mg qd,
  - Bisoprolol 10mg qd,
  - Perindopril 8 mg hs,
  - Spironolactone 25mg qd,
  - Furosemide 80mg bid
Physical Exam

**Physical examination:**
- Office Weight: 128 lb
- Well perfused, very thin
- Pulse 80 (NSR)
- BP 115/80 mmHg
- Previous sternotomy.
- Normal S1; paradoxical accentuated S2
- No obvious murmur heard
- JVP 12 (V wave peak)
- Clear lung fields
- Mild peripheral edema
Most Recent ECG:
Recent Investigations on File:

- **Recent Lab Values**
  - Stable Hb 130g/L
  - Na 133
  - K 4.0 mEq/L
  - Chloride 96
  - HCO3 25
  - Creatinine 120umol/L
  - Serum Urate 320
**Last ECHO Report** (6 months ago ago)

- Moderately dilated LV with LVEF ~ 25%
- Severe MR with malcoaptation of MV leaflets
- Mod-Severe TR
- Moderately elevated RAP~ 12 -15
- RVSP ~ 50 mmHg
Discussion Questions:

► The patient appears to be on appropriate medications. Do you have an approach to help answer her question?

► Are you aware of further options (ie above and beyond usual care) for this patient?

► What would you do?
I. Potential TARGETS to Optimize Heart Failure Management

- Self Care and Lifestyle Education?
- Requires more intense diuretic strategy (e.g., add Metalazone)?
- Further Optimization of Heart Failure Medications?
- Consider for CRT-D / CRT-P / [ICD] / Other
- Treatment of Anemia / Fe Deficiency without Overt Anemia?
- Arrhythmia Consult: if difficult to Manage Afib, etc?
- Consider need for increased Social Support?
II. Potential Treatment Considerations for Advanced Heart Failure

☑ Design more intense Fluid/Volume Strategy (eg IV loop diuretics at home via PICC Line, etc)

☑ Is patient a potential candidate for Cardiac Transplantation / Other? (applies to small % of patients)

☑ Consider referral to Palliative Care / Supportive Care?
There Are “Evidence Based” Options ………

► Old Options
  ▪ Optimization of fluid status (diuretics)
  ▪ Digoxin
  ▪ Cardiac Resynchronization Therapy (CRT)

► New Options
  ▪ [Ivabradine]
  ▪ Sacubitril-Valsartan BID
The Effect of Digoxin on Mortality and Morbidity in Patients with Heart Failure

The Digitalis Investigation Group*


All Cause Mortality

Death or HOSPITALIZATION Due to Worsening HF

Digoxin

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).
Cardiac Resynchronization Therapy (CRT)
COMPANION Trial
Consideration for Upgrade of ICD to CRT-D (2012 CCS Guidelines)
Optimal pharmacological therapy for HF
Expected survival with good functional status > 1 year with CRT

- Mostly in sinus rhythm
  - NYHA III-IV
    - LVEF ≤35%
      - LBBB QRS ≥120 ms
        - CRT-P or CRT-D
          - Reduce mortality and HF hospitalization
            - Class I, LOE A
      - Non-LBBB QRS ≥150 ms
        - CRT-P or CRT-D
          - Reduce mortality and HF hospitalization
            - Class IIa, LOE A
    - NYHA II
      - LVEF ≤30%
      - LBBB QRS ≥130 ms
        - CRT-D
          - Reduce mortality and HF hospitalization
            - Class I, LOE A
      - Non-LBBB QRS ≥150 ms
        - CRT-P or CRT-D
          - Reduce HF progression
            - Class IIb, LOE C
  - Permanent AF

Conventional PM indication with none of the CRT indications above
- Need for pacing due to slow ventricular rate
- PM dependency due to AV node ablation
- V rate ≤60 bpm at rest and ≤90 bpm during exercise

- NYHA III-IV
  - LVEF ≤35%
    - CRT-P
      - Reduce HF progression
        - Class IIb, LOE C
  - NYHA II
    - LVEF ≤35%
      - CRT-P
        - Reduce HF progression
          - Class IIb, LOE C
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
SHIFT Study
Ivabradine added to Beta-Blockade in Patients with HF_{R}EF, Sinus Rhythm & Heart Rate > 70 BPM
# 2016 European Society of Cardiology Heart Failure Guidelines

## Digoxin

<table>
<thead>
<tr>
<th>Level</th>
<th>Recommendation</th>
</tr>
</thead>
<tbody>
<tr>
<td>IIb</td>
<td>B</td>
</tr>
</tbody>
</table>

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).

## If-channel inhibitor

<table>
<thead>
<tr>
<th>Level</th>
<th>Recommendation</th>
</tr>
</thead>
<tbody>
<tr>
<td>IIA</td>
<td>B</td>
</tr>
<tr>
<td>IIA</td>
<td>C</td>
</tr>
</tbody>
</table>

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).

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).
Decline In Systolic Function Leads To Activation Of THREE Major Neuro-hormonal Systems

Natriuretic peptide system

Vasodilation
Natriuresis/diuresis

Blood pressure
Sympathetic tone
Vasopressin
Aldosterone
Fibrosis
Hypertrophy

HF SYMPTOMS & PROGRESSION

Sympathetic nervous system

Epinephrine
Norepinephrine
\(\alpha_1, \beta_1, \beta_2\) receptors

Vasoconstriction
RAAS activity
Vasopressin
Heart rate
Contractility

Renin angiotensin aldosterone system

Ang=angiotensin; AT1R=angiotensin II type 1 receptor; HF=heart failure;
NPs=natriuretic peptides; NPRs=natriuretic peptide receptors;
RAAS=renin-angiotensin-aldosterone system

Kemp & Conte. Cardiovascular Pathology 2012;365–371;
Natriuretic Peptide (NP) System

- ↑ atrial NP (ANP)
- ↑ brain/B-type NP (BNP)
- ↑ C-type NP (CNP)

Heart Failure

- ↓ Cardiac Output
- ↑ LV filling pressure
- ↑ Volumes
- ↑ atrial filling pressure

Renin – Angiotensin Aldosterone System (RAAS)

- ↑ Renin production

ATGN ➔ AG I

AG II

AT₁ receptor
AT₂ receptor

[ Sacubitril + Valsartan ]
(pro-drug)

LBQ657
(active)

- Vasodilatation
- ↑ Naturesis
- ↑ diuresis
- ↓ renin release
- ↓ LV remodeling

Neprilysin

Inactive NPs

Vasodilatation
- ↑ aldosterone
- ↑ BP

Valsartan

ACE

AT2 receptor

Vasodilatation
- ↑ naturesis
- ↓ BP
Clinical Case: Follow-Up 2 Weeks Later

- Furosemide and spironolactone increased
  - Weight down by 5 lb.
  - Improved symptoms the following week
- Patient refused digoxin as she had been on it before and became very nauseated
- Creatinine up to 142umol/L.

**Action:** Patient referred to a Heart Failure Program. Unfortunately the nearest program is 4 hours away.
Clinical Scenario:

I. Follow-Up with FMD 6 Weeks Later

Mrs B is a 72 yr old woman who is following up with her FMD after a consultation with a Heart Function Clinic.

Now functioning at AHA Stage C, NYHA FC 2-3; feels a bit better.

Following a Flexible Diuretic regimen and adjusting her diuretic doses based on her weight.

Awaiting a surgical date for her ICD to be upgraded to an ICD-CRT (CRT-D) device.
Clinical Scenario:

II. Follow-Up with FMD 6 Weeks Later

The Heart Function Program as suggested that Mrs B might benefit from coming off her Perindopril and going on the new med, Entresto (Sacubitril – Valsartan). However, when she was seen her BP was a bit soft.

You are asked to recheck her bloodwork and BP. If BP > 100 mmHg consider Entresto at lowest dose to start and then up-titrate.
Current Medications

Current medications:

- ASA 80mg qd,
- Bisoprolol 10mg qd,
- Perindopril 8 mg hs,
- Spironolactone 25mg qd,
- Furosemide 80mg bid using flexible diuretic scale based on Target Weight = 126 lb
Patient Examination

Physical examination:
- Office Weight 124 lb
- Well perfused, very thin
- Pulse 77 (NSR)
- BP 120/70 mmHg
- JVP 7 (V wave peak),
- Clear lungs
- Trace peripheral edema

Recent Lab Values
- Stable Hb 135 g/L
- Na 135
- K 4.0 mEq/L
- Chloride 94
- HCO3  28
- Creatinine 125umol/L
- Urate 520
I. Discussion Questions

- What would you do?

- Is this patient a candidate for Entresto?

- It doesn’t seem ethical to take her off an ACE inh/ARB? Is this correct?

  *(most new therapies are IN ADDITION to standard therapy)*
II. Discussion Questions

- How would you initiate LCZ696?
- What would be the initial dose?
- What factors would you take into consideration?
- What would you take into consideration in regard to monitoring?
- How often would you titrate?
PARADIGM-HF: Entry Criteria

- NYHA class II-IV heart failure
- LV ejection fraction $\leq 40\%$ $\geq 35\%$
- Any use of ACE inhibitor or ARB, but able to tolerate stable dose equivalent to at least enalapril 10 mg daily for at least 4 weeks
- Guideline-recommended use of beta-blockers and mineralocorticoid receptor antagonists
- Systolic BP $\geq 95$ mm Hg, eGFR $\geq 30$ ml/min/1.73 m$^2$ and serum K $\leq 5.4$ mEq/L at randomization
<table>
<thead>
<tr>
<th></th>
<th>LCZ696 (n=4187)</th>
<th>Enalapril (n=4212)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (years)</td>
<td>63.8 ± 11.5</td>
<td>63.8 ± 11.3</td>
</tr>
<tr>
<td>Women (%)</td>
<td>21.0%</td>
<td>22.6%</td>
</tr>
<tr>
<td>Ischemic cardiomyopathy (%)</td>
<td>59.9%</td>
<td>60.1%</td>
</tr>
<tr>
<td>LV ejection fraction (%)</td>
<td>29.6 ± 6.1</td>
<td>29.4 ± 6.3</td>
</tr>
<tr>
<td>NYHA functional class II / III (%)</td>
<td>71.6% / 23.1%</td>
<td>69.4% / 24.9%</td>
</tr>
<tr>
<td>Systolic blood pressure (mm Hg)</td>
<td>122 ± 15</td>
<td>121 ± 15</td>
</tr>
<tr>
<td>Heart rate (beats/min)</td>
<td>72 ± 12</td>
<td>73 ± 12</td>
</tr>
<tr>
<td>N-terminal pro-BNP (pg/ml)</td>
<td>1631 (885-3154)</td>
<td>1594 (886-3305)</td>
</tr>
<tr>
<td>B-type natriuretic peptide (pg/ml)</td>
<td>255 (155-474)</td>
<td>251 (153-465)</td>
</tr>
<tr>
<td>History of diabetes</td>
<td>35%</td>
<td>35%</td>
</tr>
<tr>
<td>Digitalis</td>
<td>29.3%</td>
<td>31.2%</td>
</tr>
<tr>
<td>Beta-adrenergic blockers</td>
<td>93.1%</td>
<td>92.9%</td>
</tr>
<tr>
<td>Mineralocorticoid antagonists</td>
<td>54.2%</td>
<td>57.0%</td>
</tr>
<tr>
<td>ICD and/or CRT</td>
<td>16.5%</td>
<td>16.3%</td>
</tr>
</tbody>
</table>
LCZ696 Simultaneously Inhibits NEP (via LBQ657) And Blocks The AT1 Receptor (via valsartan)

Natriuretic and other vasoactive peptides*

Enhancing:
- Vasorelaxation
- Blood pressure
- Sympathetic tone
- Aldosterone levels
- Fibrosis
- Hypertrophy
- Natriuresis/diuresis

Inactive fragments

RAAS
- Angiotensinogen (liver secretion)
  - Ang I
  - Ang II
  - AT1 Receptor

IOH

LCZ696

Sacubitril
(AHU377; pro-drug)

LBQ657
(NEP inhibitor)

Valsartan

Nepriyisin substrates listed in order of relative affinity for NEP: ANP, CNP, Ang II, Ang I, adrenomedullin, substance P, bradykinin, endothelin-1, BNP

Inhibiting:
- Vasoconstriction
- Blood pressure
- Sympathetic tone
- Aldosterone
- Fibrosis
- Hypertrophy
## PARADIGM-HF: Adverse Events

<table>
<thead>
<tr>
<th>Prospectively identified adverse events</th>
<th>LCZ696 (n=4187)</th>
<th>Enalapril (n=4212)</th>
<th>P Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Symptomatic hypotension</td>
<td>588</td>
<td>388</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>Serum potassium &gt; 6.0 mmol/l</td>
<td>181</td>
<td>236</td>
<td>0.007</td>
</tr>
<tr>
<td>Serum creatinine ≥ 2.5 mg/dl</td>
<td>139</td>
<td>188</td>
<td>0.007</td>
</tr>
<tr>
<td>Cough</td>
<td>474</td>
<td>601</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>Discontinuation for adverse event</td>
<td>449</td>
<td>516</td>
<td>0.02</td>
</tr>
<tr>
<td>Discontinuation for hypotension</td>
<td>36</td>
<td>29</td>
<td>NS</td>
</tr>
<tr>
<td>Discontinuation for hyperkalemia</td>
<td>11</td>
<td>15</td>
<td>NS</td>
</tr>
<tr>
<td>Discontinuation for renal impairment</td>
<td>29</td>
<td>59</td>
<td>0.001</td>
</tr>
<tr>
<td>Angioedema (adjudicated)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Medications, no hospitalization</td>
<td>16</td>
<td>9</td>
<td>NS</td>
</tr>
<tr>
<td>Hospitalized; no airway compromise</td>
<td>3</td>
<td>1</td>
<td>NS</td>
</tr>
<tr>
<td>Airway compromise</td>
<td>0</td>
<td>0</td>
<td>----</td>
</tr>
</tbody>
</table>
Entresto Dosing
1 tab twice daily

LCZ696 (molecule) = [Sacubitril + Valsartan] Combo Pill = ENTRESTO © Trade Name

a) Entresto 50 mg = 24.3 mg sacubitril / 25.7 mg valsartan
b) Entresto 100 mg = 48.6 mg sacubitril / 51.4 mg valsartan
c) Entresto 200 mg = 97.2 mg sacubitril / 102.8 mg valsartan

**The LCZ696 200 dose ~ equivalent to Valsartan 160 mg**
ACE Inhibitor Washout:
Need for a minimum of a 36 hr washout of the ACE inh but depends on the $T_{1/2}$ of the ACE inhibitor used
eg Enalapril ~ 36 hour ; Perindopril ~ 4 days.

Dose Titration Schedule:
- Previously on ACE inh/ARB: Initiate at equivalent of LCZ696 50 -100 BID dose and consider doubling after 4-6 weeks
- If ACE in /ARB "naive" : start at equivalent of LCZ696 50 BID
*GDMT= Guideline Directed Medical Therapy

My Approach to Initiating LCZ696

Patient with HFrEF

ACEI or ARB, beta-blocker at stable dose*, +/- mineralocorticoid receptor antagonist (GDMT)

LVEF ≤ 40%?

Yes

NYHA-FC II-IV?

No

Continue GDMT

Yes

• NYHA II – III
• Systolic BP > 100

Discontinue ACEi or ARB and initiate Sacubitril/Valsartan after washout period

No

Continue GDMT

Yes
Clinical Scenario (continued)
Follow-Up with FMD 4 Weeks Later

- Mrs B is following up after receiving her CRT-D and starting the new medication, Entresto.
- Her weight has been stable running between 122-125 lb, usually only requiring Furosemide 80 mg OD.
- Her ICD was upgraded to a ICD-CRT (CRT-D) 2 weeks ago.
Clinical Scenario (continued)

Follow-Up with FMD 4 Weeks Later

► She has some mild orthostatic lightheadedness when she started the new medication but has resolved. Feels that her breathing is better.
► Clinically describes AHA Stage C, NYHA Fc 1-2.

You are going to recheck her bloodwork and BP. If BP > 100 mmHg consider uptitrating Entresto to the next dose.
Current Medication

Current medications:
- ASA 80mg qd,
- Bisoprolol 10mg qd,
- Entresto (24/26) 1 tab BID
- Spironolactone 25mg qd,
- Furosemide 80mg bid using flexible diuretic scale based on Target Weight = 126 lb
Patient Examination

Physical examination:
- Office Weight 123 lb
- Well perfused, very thin
- Pulse 70 (NSR)
- BP 110/75 mmHg
- JVP 5 (V wave peak),

Recent Lab Values
- Stable Hb 138 g/L
- Na 137
- K 4.0 mEq/L
- Chloride 94
- HCO3 28
- Creatinine 116 umol/L
- Urate 485

Plan: Uptitrate the Entresto to Entresto (49/51) 1 tab twice daily; repeat bloodwork in 7-10 days and follow-up in 4 – 6 weeks.
Heart failure: a state of "neurohumoral imbalance"

A paradigm shift: from "neurohumoral inhibition" to "neurohumoral modulation"

Vasoconstrictor/
anti-natriuretic
/pro-mitotic mediators

Vasodilator/
natriuretic/
anti-mitotic mediators

Vasoconstrictor/
anti-natriuretic
/pro-mitotic mediators

Vasodilator/
natriuretic/
anti-mitotic mediators

A PARADIGM SHIFT
CCS HF Algorithm: Therapeutic Approach To Patients With CHF And Reduced Ejection Fraction

Patient with LVEF <40%

Triple Therapy
ACEi (or ARB if ACEi intolerant), BB, MRA
Titrate to target doses or maximum tolerated evidence-based dose

Reassess Symptoms

NYHA I
Continue triple therapy

NYHA II-IV
SR, HR ≥70 bpm
ADD Ivabradine and SWITCH ACEi or ARB to LCZ696 for eligible patients

NYHA II-IV
SR with HR ≥70 bpm or AF or pacemaker
SWITCH ACEi or ARB to LCZ696 for eligible patients

Reassess Symptoms and LVEF

NYHA I or LVEF <35%
Continue present management

NYHA I-III and LVEF ≤35%
Refer to ICD/CRT algorithm

NYHA IV
Consider:
- Hydralazine/nitrates
- Referral for advanced HF therapy (mechanical circulatory support/transplant)
- Advance HF referral
Reassess as needed according to clinical status

Diuretics to relieve congestion
Titrated to minimum effective dose to maintain euvoemaia

Reassess every 1-3 years or with clinical status change

Reassess LVEF every 1-5 years

Consider LVEF reassessment every 1-5 years

Advance Care Plan and Documentation of Goals of Care

Non-pharmacologic therapies (teaching self care, exercise)
Case Scenario

82 yr male. Comes to you with his family member for follow-up after admission to hospital. Discharged with diagnosis of metastatic lung CA.

He has a history of an ischemic dilated CM (EF ~ 25%) with previous CABG 10 years ago. CHF symptoms started ~ 4 years ago. Under reasonable control but over last year increasing fatigue, occasional edema responsive to Lasix and losing weight. Feels a bit nauseated.

While in hospital, had lots of tests. Told by Oncologist that his prognosis is poor (maybe several months).
### Current Medical Treatment

- ASA 81 mg OD
- Furosemide 80 mg BID
- Bisoprolol 5 mg OD
- Quinapril 40 mg qhs
- Spironolactone 12.5 mg OD
- Rosuvastatin 10 mg qhs
- Allopurinol 100 mg OD
- Tamsulosin 0.4 mg OD
- L-Thyroxine 0.1 mg OD
- Amiodarone 200 mg OD
- Lantus insulin
- Medtronic ICD-D – last therapy ~ 6 months ago.
Physical Exam

- Appears frail and tired but alert. Bit SOB
- HR 57/min, sinus
- BP 95/65 mmHg
- JVP ~ 7 cm with “V wave
- II/VI MR murmur

- Liver palpable just at costal margin.
- Trace peripheral edema.
- No abdominal tenderness.
Investigations

- Na 133
- K 3.8
- BUN 12
- Crt 145
- Hb 90
- Urate 320
- INR 1.2
Discussion Questions

► What would you do?
► Regarding his cardiac issues, any specific things for your to consider?
Case Scenario (continued)

► You talk to him about his treatment wishes and concerns.

► Afterward you give him a Rx for an anxiety med and an anti-emetic. As well, you arrange for Palliative Care Team to come and see him. He is going to go home and consider your discussion.
Clinical Scenario  (continued)

- One week later you receive a call from the Palliative Care nurse telling you that he is very weak and taken a turn for the worse. The family would like to “turn off” the ICD. She also wonders if he need to take all his meds.

- What will you do?
30% of patients receive shock therapy from their device in the last 24 hours prior to death.

Source: Westerdahl, 2014

- Cohort of patients with DNR order, 65% still had “shock therapy programmed on at 24 hours prior to death and 51% until one hour before death.

- MADIT-2 Trial: 15% patients had their ICD programmed “off” anywhere from 0 -71 days prior to death while 37% of patients who requested DNR or hospice did NOT have it turned off.
Scope of the Problem …..

Geographical Distribution of Patients in Ontario with an ICD

Reference: CCN (2016)
Methods for “Turning Off“ the ICD

Or

Programmer

Large Magnet
Trigger Points or Decision Points for Discussion about Possible ICD Deactivation

- Prior to implantation (informed consent)
- When requested by patient and/or family member
- During assessment for device (battery) replacement
- Multiple shocks in conjunction with deteriorating condition
- Change in clinical status – worsening (e.g., advanced malignancy)
- Repeated hospitalizations / ER visits for heart failure
- Deemed in eligible for advanced HF treatments
- Deteriorating quality of life
- Referred to a hospice / nursing facility
Deactivation of an ICD:

- Is completely painless;
- Will make no difference to how you feel, other than making sure that you do not receive shocks that may be painful;
- Will not cause death but in time allows a natural death - it simply means that as you reach the last stages of your illness you will remain free from shocks;

Is a reversible process and if the situation changes or you wish to change your mind it can be turned on again ("reactivated")
If ICD Deactivation is Needed Urgently, it can be Deactivated with a Large Magnet... 

This will stop the necessary to replace every 7 hours.
4 Days Later

You receive a call from the Palliative Care nurse. The patient apparently “passed away” ~ 30 minutes ago and she has come to declare him. She is concerned about taking the magnet off and him being shocked.
<table>
<thead>
<tr>
<th>MYTHS</th>
<th>CLARIFICATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>ICD deactivation is considered similar to Medical Assistance in Dying (MAID) or euthanasia.</td>
<td>The intent of device deactivation is not to hasten death, but rather, to avoid painful and unwanted shocks.</td>
</tr>
<tr>
<td>Patients often think they need the ICD in order to stay alive – that without it, their heart would stop.</td>
<td>For the vast majority of patients turning off the ICD will NOT cause immediate death or hasten death.</td>
</tr>
<tr>
<td></td>
<td>However, in situations when the ICD is actively delivering shocks for life-threatening arrhythmias, disabling the device may result in imminent death.</td>
</tr>
<tr>
<td>Deactivating an ICD requires surgery.</td>
<td>Deactivating an ICD is non-invasive. The ICD shock function is turned off using a manufacture’s specific programmer.</td>
</tr>
<tr>
<td>Turning off the device will be painful.</td>
<td>Turning off the ICD will not be painful.</td>
</tr>
<tr>
<td>MYTHS</td>
<td>CLARIFICATION</td>
</tr>
<tr>
<td>----------------------------------------------------------------------</td>
<td>--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>If the shock therapy is turned off, so will the pacemaker.</td>
<td>The shock and pacing functions are separate. There is no reason to turn off the pacing portion of the device when deactivating the shock function.</td>
</tr>
<tr>
<td>Touching a patient during shocks will also cause pain to that person.</td>
<td>Touching a patient receiving shocks will not result in harm or pain; however some discomfort is possible.</td>
</tr>
<tr>
<td>Turning off the shocks is permanent.</td>
<td>The shock functions can be re-enabled non-invasively at any time. This can be done using a manufacturer’s specific programmer.</td>
</tr>
<tr>
<td>Any magnet can be used for ICD deactivation.</td>
<td>A specific medical grade magnet must be used to deactivate the shock function of an ICD. Each hospital’s Emergency Room should have them easily accessible.</td>
</tr>
<tr>
<td>ICD deactivation can be done via the telephone.</td>
<td>The shock function of an ICD can only be disabled in person through the use of a programmer and experienced health care professional or temporarily with a magnet.</td>
</tr>
<tr>
<td>Once the magnet is applied, it can be removed and shock therapies are still turned off.</td>
<td>In most cases, shock therapy will resume when the magnet is removed. For specific instructions for magnet use by device manufacturer, please see Appendix F.</td>
</tr>
<tr>
<td>Treatment</td>
<td>Trial</td>
</tr>
<tr>
<td>----------------------------------------</td>
<td>----------------------------</td>
</tr>
<tr>
<td>[Ivabradine – I&lt;sub&gt;f&lt;/sub&gt; Inhibitor]</td>
<td>SHIFT</td>
</tr>
<tr>
<td>Heart Function Clinic</td>
<td>CCN / MOH</td>
</tr>
<tr>
<td>Eplerenone 25 – 50 mg OD</td>
<td>EMPHASIS, EPHESUS</td>
</tr>
<tr>
<td>Fe Replacement for HF</td>
<td>FAIR-HF, CONFIRM-HF</td>
</tr>
<tr>
<td>LVAD for Destination Therapy</td>
<td>OTHAC (Oct 2015)</td>
</tr>
<tr>
<td>Spironolactone for HFpEF</td>
<td>TOPCAT – Americas Analysis</td>
</tr>
<tr>
<td>Mitra Clip for HF</td>
<td>OTHAC 2015</td>
</tr>
</tbody>
</table>
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

Assessment of natriuretic peptides not routinely done in clinical practice

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

ECHOCARDIOGRAPHY

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

Therapy with ACE-I and beta-blocker (Up-titrate to maximum tolerated evidence-based doses)

Still symptomatic and LVEF ≤35%

No

Add MR antagonist (up-titrate to maximum tolerated evidence-based dose)

Yes

Still symptomatic and LVEF ≤35%

No

Able to tolerate ACEI (or ARB) and
Sinus rhythm, QRS duration ≥130 msec
Sinus rhythm, HR ≥70 bpm

ARNI to replace ACE-I
Evaluate need for CRT
Ivabradine

These above treatments may be combined if indicated

Resistant symptoms

Yes

Consider digoxin or H-ISDN or LVAD, or heart transplantation

No

No further action required
Consider reducing diuretic dose
Do the “simple things” well!
Thank you.
Common Questions

1. What is the important information I should be looking for when I read an ECHO report?
2. How should I manage an acute episode of gout?
3. Can heart failure medications ever be stopped? If so, which ones and when?
4. What do I need to know about new treatment options that may be available for my patient?
5. What should I tell my heart failure patient who asks me whether he/she should participate in a “clinical trial“?
6. When should I measure electrolytes, BUN and Creatinine?
Common Questions

7. Should I treat my heart failure patient to as specific heart rate or BP?
8. My heart failure patient is doing well on his current meds. Why does the specialist want to continue to up-titrate the medications?
9. If my HF patient has been started on an ACE inhibitor and a beta-blocker - assuming they are stable, which one should be up-titrated first?
10. If my HF patient has become “palliative”, should I stop their heart failure medications?
11. My patient is palliative and has an ICD. The family are afraid it might start to fire. What should I do?