Non-Pharmacological Treatment of Heart Failure

Dr. Tobias Höfflinghaus
Cardiology
Alumnus of 1st PCHF
Conflict of Interest

• Astra Zeneca – consultant
• Institut für Hausarztmedizin, Universität Zürich – consultant
The diversity of non-pharmacological therapy

Nutrition  Fluid management  Devices
Education  Salt intake  Interventions/ Surgery
Lifestyle  Transplantation  Telemonitoring
Management programs  Ultrafiltration
Exercise and rehabilitation  Sleep apnea
Comorbidities  Frailty
Heart failure therapy in 1919

„...Some patients never come under treatment; the first are the final symptoms...“

- **General recommendations:**
  - Rest: 7 to 10 days, later gradual exercise
  - Diet: Fluid restriction 1500cc, small amounts of food at short intervals
  - Venesection, e.g. in heart dilatation
  - Depletion through the bowels

- **Specific treatment:**
  - Digitalis: best in auricular fibrillation
  - Strophantin
  - Dyspnea: Bed rest, Opium, Nitrates

---

Osler and McCrae, The Principles and Practice of Medicine, 9th ed., 1919, Appleton
The diversity of non-pharmacological therapy

**Nutrition**
- Fluid management

**Education**
- Salt intake

**Lifestyle**
- Transplantation
- Ultrafiltration

**Management programs**
- Comorbidities
- Frailty

**Exercise and rehabilitation**
- Sleep apnea

**Devices**
- Interventions/Surgery

**Telemonitoring**
Malnutrition

• Malnutrition is common in
  – Chronic diseases like CHF, cancer, CKD
  – Geriatric population
  – Hospitalized patients

• HF patients more prone to malnutrition
  – Symptomatic anorexia
  – Less appetite (ascites/ hepatic congestion)
  – Medical side effects
  – Psychological factors (e.g. depression)

Cardiac energy harvesting

Heart is effective converter of chemical into mechanical energy through

- Oxidative phosphorylization of fatty acids
- Metabolism of carbohydrates

$\rightarrow$ ATP generation

Macronutrients
Fatty acids, carbohydrates

Micronutrients
Coenzyme Q 10, L-carnitine, thiamine, taurine

ATP

Proteins
$\text{Ca}^{2+}$-homeostasis

Soukoulis V et al. Micronutrient Deficiencies – an Unmet Need in Heart Failure. JACC 2009;54,1660-1673
Lack of micronutrients in heart failure

- Coenzyme Q 10
  - Malnutrition
  - HMG-CoA-Reductase Inhibition

- Low Vitamin levels
  - Malnutrition
  - Loop diuretics (Vitamin B1, 2, 6)

- Impairment of cardiac metabolism
  - Lack of substrates
  - Inability to metabolize substrates

Soukoulis V et al. Micronutrient Deficiencies – an Unmet Need in Heart Failure. JACC 2009;54,1660-1673
Nutritional supplements
Q-SYMBIO trial

- Q-SYMBIO trial
  - 420 pts., 93% HFREF, OMT
  - 3 x 100mg Q10 vs. placebo
  - 2y follow-up

- NYHA improved
- Less hosp.
- Less deaths

Mortensen SA et al. The Effect of Coenzyme Q 10 on Morbidity and Mortality in Chronic Heart Failure. JACC HF 2014;2:641-649

MACE: HF hosp, death, transplantation, mechanical support
Nutritional supplements
GISSI-HF trial

Tavazzi et al. Effects of n-3 polyunsaturated fatty acids in patients with chronic heart failure (the GISSI-HF trial): a randomised double-blind, placebo-controlled trial

AHA 2013
7.3.2.8.3. Omega-3 Fatty Acids: Recommendation
Class IIa

1. Omega-3 polyunsaturated fatty acid (PUFA) supplementation is reasonable to use as adjunctive therapy in patients with NYHA class II–IV symptoms and HFrEF or HFpEF, unless contraindicated, to reduce mortality and cardiovascular hospitalizations.539,540
(Level of Evidence: B)
Nutrition

- Recommendations

• ESC (2016)
  – Monitor body weight and prevent malnutrition
  – Eat healthily and maintain a healthy body weight

• AHA (2013)
  – PUFA supplementation: Class II a LoE B
  – Nutritional supplement (Q 10 included) for HFPEF and HFREF: Class III (no benefit)
The diversity of non-pharmacological therapy

Nutrition
- Fluid management

Education
- Salt intake

Lifestyle
- Transplantation
- Ultrafiltration

Management programs

Exercise and rehabilitation
- Sleep apnea

Devices
- Interventions/Surgery

Telemonitoring
- Comorbidities
- Frailty
Fluid management

- Few studies with evaluation of fluid restriction alone

- **Holst M et al.**: Liberal (30ml/kg) vs. restricted fluid intake (1.5L/d)
  - No difference in hospitalization, QoL, physical capacity
  - But less thirst with liberal intake

- **Travers B et al.**: Free fluid intake vs. fluid restriction (1L/d)
  - No difference in time to stability, duration/ dose IV therapy, weight loss/ kidney function

Fluid management
- Recommendations

• ESC (2016)
  – Avoid excessive fluid intake
  – Recognize need for altered fluid intake such as:
    - *Increase intake* during periods of high heat and humidity, nausea/ vomiting
    - *Fluid restriction* (1.5 – 2.0L/d) may be considered in patients with severe HF to relieve symptoms and congestion

• AHA (2013)
  – Fluid restriction (1.5 – 2.0L/d) is reasonable in stage D, especially in patients with *hyponatremia*, to relieve congestive symptoms. Class II a, LoE C
The diversity of non-pharmacological therapy

- Nutrition
- Fluid management
- Devices

- Education
- Salt intake
- Interventions/ Surgery

- Lifestyle
- Transplantation
- Telemonitoring
- Ultrafiltration
- Comorbidities
- Frailty

- Management programs

- Exercise and rehabilitation
- Sleep apnea
Salt intake

- Controversial data

Doukky R et al. Impact of Dietary Sodium Restriction On Heart Failure Outcomes. JACC HF 2016;4,24-35
Lennie T et al. Three gram sodium intake is associated with longer event free survival only in patients with advanced heart failure. J Card Fail 2011;17,325-330
Gupta D et al. Dietary Sodium Intake in Heart Failure. Circulation 2012;126,479-485
Salt intake
- Recommendations

• ESC (2016)
  – Eat healthily and avoid excessive salt intake (> 6g/day)

• AHA (2013)
  – Sodium restriction is reasonable for patients with symptomatic heart failure to reduce congestive symptoms. Class II a, LoE C
Stronger diuresis by hypertonic saline and furosemide in decompensated HF

Okuhara Y et al. Intravenous Salt Supplementation With Low-dose Furosemide for Treatment of Acute decompensated Heart Failure. J Cardiac Fail 2014;20,295-301

Methodological issues!
# The diversity of non-pharmacological therapy

<table>
<thead>
<tr>
<th>Nutrition</th>
<th>Fluid management</th>
<th>Devices</th>
</tr>
</thead>
<tbody>
<tr>
<td>Education</td>
<td>Salt intake</td>
<td>Interventions/ Surgery</td>
</tr>
<tr>
<td>Lifestyle</td>
<td>Transplantation</td>
<td>Telemonitoring</td>
</tr>
<tr>
<td>Management programs</td>
<td>Ultrafiltration</td>
<td></td>
</tr>
<tr>
<td>Exercise and rehabilitation</td>
<td>Sleep apnea</td>
<td></td>
</tr>
<tr>
<td>Comorbidities</td>
<td>Frailty</td>
<td></td>
</tr>
</tbody>
</table>
Exercise

Exercise training (HFREF)
- Some prognostic benefit (HF-Action 2009)
- Better 6MWT, exercise time, VO2max compared to usual care

And HFPEF?

Exercise training in HFPEF

Kitzman D et al. Effect Of Caloric Restriction or Aerobic Exercise Training on Peak Oxygene Consumption and Quality of Life in Obese Older Patients With Heart Failure With Preserved Ejection Fraction. JAMA 2016;315,36-46.

92 HFPEF patients randomized to 4 groups (diet, exercise, diet + exercise, control), NYHA II-III, follow-up 20 weeks

Diet and exercise had additive effect
• + 2.5ml/kg VO2 max
Compliance with non-pharmacological recommendations? What is the impact on survival?

**Figure 1** Survival curves for time to primary endpoint (mortality or readmission for HF) (adjusted for age, NYHA functional class, stroke, diabetes, coronary artery disease, and previous HF admission).

- **HR 1.40 (1.03–1.82); P = 0.01**
- Mostly driven by readmission

**Figure 3** Survival curves for time to primary endpoint (mortality or readmission for heart failure) for compliance with daily weighing (A), compliance with diet (B), compliance with fluid restriction (C), and compliance with exercise (D) (adjusted for age, NYHA functional class, stroke, diabetes, coronary artery disease, and previous heart failure admission).

- **HR 1.48; P = 0.002**

Van der Wal M et al. Compliance with non-pharmacologic recommendations and outcome in heart failure patients. Eur H J 2010, 31; 1486-1493
Non-pharmacological therapy

Conclusions

• More properly designed studies needed!

• No general recommendation to limit fluid intake

• No general recommendation to restrict salt intake but avoid salt excess

• Avoid malnutrition

• Exercise and lose weight!
<table>
<thead>
<tr>
<th>Education topic</th>
<th>Patient skills</th>
<th>Professional behaviours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Symptom monitoring and self-care</td>
<td>• Monitor and recognize change in signs and symptoms.</td>
<td>• Provide individualized information to support self-management such as:</td>
</tr>
<tr>
<td></td>
<td>• Know how and when to contact a healthcare professional.</td>
<td>⇒ In the case of increasing dyspnoea or oedema or a sudden unexpected weight gain of ≥2 kg in 3 days, patients may increase their diuretic dose and/or alert their healthcare team.</td>
</tr>
<tr>
<td></td>
<td>• In line with professional advice, know when to self-manage diuretic therapy and fluid intake.</td>
<td>⇒ Use of flexible diuretic regime.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>⇒ Self-care support aids such as dosette box when appropriate.</td>
</tr>
<tr>
<td>Exercise</td>
<td>• Undertake regular exercise sufficient to provoke mild or moderate breathlessness.</td>
<td>• Advice on exercise that recognizes physical and functional limitations, such as frailty, comorbidities.</td>
</tr>
<tr>
<td>Diet and alcohol</td>
<td>• Avoid excessive fluid intake.</td>
<td>• Referral to exercise programme when appropriate.</td>
</tr>
<tr>
<td></td>
<td>• Recognize need for altered fluid intake such as:</td>
<td></td>
</tr>
<tr>
<td></td>
<td>⇒ Increase intake during periods of high heat and humidity, nausea/vomiting</td>
<td></td>
</tr>
<tr>
<td></td>
<td>⇒ Fluid restriction of 1.5–2 L/day may be considered in patients with severe HF to relieve symptoms and congestion.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Monitor body weight and prevent malnutrition.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Eat healthily, avoid excessive salt intake (&gt;6 g/day) and maintain a healthy body weight.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Abstain from or avoid excessive alcohol intake, especially for alcohol induced cardiomyopathy.</td>
<td></td>
</tr>
</tbody>
</table>
ESC Guidelines 2016
Management programs

Table 14.1  Characteristics and components of management programmes for patients with heart failure

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Components</th>
</tr>
</thead>
<tbody>
<tr>
<td>Should employ a multidisciplinary approach (cardiologists, primary care physicians, nurses, pharmacists, physiotherapists, dieticians, social workers, surgeons, psychologists, etc.).</td>
<td>Optimized medical and device management.</td>
</tr>
<tr>
<td>Should target high-risk symptomatic patients.</td>
<td>Adequate patient education, with special emphasis on adherence and self-care.</td>
</tr>
<tr>
<td>Should include competent and professionally educated staff.</td>
<td>Patient involvement in symptom monitoring and flexible diuretic use.</td>
</tr>
<tr>
<td></td>
<td>Follow-up after discharge (regular clinic and/or home-based visits; possibly telephone support or remote monitoring).</td>
</tr>
<tr>
<td></td>
<td>Increased access to healthcare (through in-person follow-up and by telephone contact, possibly through remote monitoring).</td>
</tr>
<tr>
<td></td>
<td>Facilitated access to care during episodes of decompensation.</td>
</tr>
<tr>
<td></td>
<td>Assessment of (and appropriate intervention in response to) an unexplained change in weight, nutritional status, functional status, quality of life, or laboratory findings.</td>
</tr>
<tr>
<td></td>
<td>Access to advanced treatment options.</td>
</tr>
<tr>
<td></td>
<td>Provision of psychosocial support to patients and family and/or caregivers.</td>
</tr>
</tbody>
</table>

Recommendations for exercise, multidisciplinary management and monitoring of patients with heart failure

<table>
<thead>
<tr>
<th>Recommendations</th>
<th>Class</th>
<th>Level</th>
<th>Ref</th>
</tr>
</thead>
<tbody>
<tr>
<td>It is recommended that regular aerobic exercise is encouraged in patients with HF to improve functional capacity and symptoms.</td>
<td>I</td>
<td>A</td>
<td>321, 618–621</td>
</tr>
<tr>
<td>It is recommended that regular aerobic exercise is encouraged in stable patients with HFrEF to reduce the risk of HF hospitalization.</td>
<td>I</td>
<td>A</td>
<td>618, 619</td>
</tr>
<tr>
<td>It is recommended that patients with HF are enrolled in a multidisciplinary care management programme to reduce the risk of HF hospitalization and mortality.</td>
<td>I</td>
<td>A</td>
<td>622–625</td>
</tr>
</tbody>
</table>