STructured Eating Plan (STEP) in Patients with Heart Failure (Pilot Study)

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Background

- Heart Failure (HF) is a significant burden on the US
- HF is associated with high morbidity and mortality
- HF outcomes are related to:
  - Patient compliance
  - Adherence to lifestyle and diet
  - Medication management
- Noncompliance with dietary guidelines is the cause of at least 20% preventable readmissions

Kollipara et al. (2008), Tsuyuki, et al. (2001), Fonarow, et al. (2008), etc
Background

- Excessive sodium intake is one of the factors associated with HF decompensation and overall morbidity

- Patients with HF have poor nutritional status

- Current recommendations for healthy diet and patients with heart failure are vague in regards to restriction of sodium intake

- Nutritional instructions are often presented as general guidelines rather than a structured, patient-specific meal strategy

Significance

- Patent-centered, structured, and individualized meal plan have a potential to:
  - Lead to better adherence to healthy diet
  - Better long-term clinical outcomes
  - Improve overall nutritional state
  - Improve quality of life
  - Improve functional capacity
Aims

Test the feasibility of a 3-month Structured Eating Plan (STEP)

Assess the effectiveness of the intervention by measuring the nutritional outcomes

Assess potential barriers to dietary behavior

Assess potential barriers to adherence to the intervention
Methods

• Prospective observational pilot study
• IRB approval and informed consent were obtained
• Patient population: veteran patients with HF from subspecialty HF clinic
• Duration of the intervention: 3 months

<table>
<thead>
<tr>
<th>Criteria for Inclusion</th>
<th>Criteria for Exclusion</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age over 18</td>
<td>Patients who reside in Skilled Nursing Facilities permanently</td>
</tr>
<tr>
<td>Able to speak, read, and write English</td>
<td>Life expectancy is less than 6 months.</td>
</tr>
<tr>
<td>Give informed consent to participate in the study</td>
<td>Patients who enrolled in a different lifestyle/diet modification program</td>
</tr>
<tr>
<td>NYHA class II, III, IV</td>
<td></td>
</tr>
</tbody>
</table>
Intervention: Assessment

- **Barrier to dietary behavior assessment**
  - Individual nutritional preferences
  - Social factors influencing dietary behavior
  - Access to healthy food
- **Meal planning assessment**
  - Where to shop
  - Available appliances and cookware
  - Food allergy
  - Personal food preference
  - Available spices, sauce or dressings at home
  - Affordable cost / week
- **3-day food records**
Intervention: STEP

- **STEP Individual Sessions (3 sessions)**

- Low sodium/heart healthy meal recipes
- Seasonal fruits and vegetables/grocery lists
- Individualized food preferences, availability, affordability
- Low sodium/heart healthy sauces/seasoning recipes
- Individualized meal plan

**Structured Eating Plan (STEP) for HF**
Intervention: STEP

- STEP Group Sessions (3 sessions)

- Virtual Grocery Store
- Recipe Sharing
- Reading Food Labels
- Experience Sharing
Data Analysis

Feasibility
- Recruitment
- Retention
- Adherence Rate

Effectiveness
- Nutrition outcomes pre and post intervention

Barriers to Dietary behavior

Feedback
- Topics and level of Details
- Information
- Satisfaction

Data Analysis

Percentage

Paired T-test

Semi-structured survey

Semi-structured survey
# Patient Characteristics

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>N=23</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Mean Age</strong> ± SD (range)</td>
<td>63.3 ± 10.96 (39~84)</td>
</tr>
<tr>
<td><strong>Gender, male (%)</strong></td>
<td>23 (100%)</td>
</tr>
<tr>
<td><strong>Ethnicity</strong></td>
<td></td>
</tr>
<tr>
<td>White</td>
<td>15 (65.2%)</td>
</tr>
<tr>
<td>Black</td>
<td>3 (13%)</td>
</tr>
<tr>
<td>Hispanic</td>
<td>5 (21.7%)</td>
</tr>
<tr>
<td><strong>Type of HF</strong></td>
<td></td>
</tr>
<tr>
<td>Reduced LVEF HF (&lt;40%)</td>
<td>17 (73.9%)</td>
</tr>
<tr>
<td>Preserved LVEF HF</td>
<td>6 (26.1%)</td>
</tr>
<tr>
<td><strong>NYHA Class</strong></td>
<td></td>
</tr>
<tr>
<td>II</td>
<td>11 (47.8%)</td>
</tr>
<tr>
<td>III</td>
<td>10 (43.5%)</td>
</tr>
<tr>
<td>IV</td>
<td>2 (8.7%)</td>
</tr>
<tr>
<td><strong>Living Status – Lives alone</strong></td>
<td>4 (17.4%)</td>
</tr>
<tr>
<td><strong>Perception of Financial Status affecting HF</strong></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>9 (39.15)</td>
</tr>
<tr>
<td>No</td>
<td>7 (30.4%)</td>
</tr>
<tr>
<td>Unsure</td>
<td>3 (13%)</td>
</tr>
</tbody>
</table>
Distribution of Comorbidities

Intervention (n=23)

Results

• **Aim 1: Feasibility**
  - 32 patients were screened for recruitment and 23 patients agreed to participate. *(Recruitment rate: 72%)*
  - 8 patients withdrew before the intervention
    - Difficulty of transportation (n=2)
    - Lack of motivation (n=2)
    - Loss of contact (n=3)
    - Health status change (n=1)
  - 3 patients withdrew during the intervention
    - Job status change (n=1), Health status change (n=1), & family sickness (n=1)
  - **Retention rate: 52%, Adherence rate: 80%**
## Results

- **Aim 2: Nutritional outcomes**

<table>
<thead>
<tr>
<th>Lab value</th>
<th>Mean Δ</th>
<th>SD</th>
<th>95% CI</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>BNP (n=8)</td>
<td>128.3</td>
<td>136.7</td>
<td>14~242.5</td>
<td>0.033</td>
</tr>
<tr>
<td>Serum Cr (n=12)</td>
<td>-0.1</td>
<td>0.2</td>
<td>-0.19~-0.002</td>
<td><strong>0.046</strong>*</td>
</tr>
<tr>
<td>HbA1c (n=10)</td>
<td>0.12</td>
<td>0.6</td>
<td>-0.34~0.58</td>
<td>0.569</td>
</tr>
<tr>
<td>Vitamin B1 (n=6)</td>
<td>-40.2</td>
<td>35.6</td>
<td>-77.52~-2.82</td>
<td>0.040</td>
</tr>
<tr>
<td>Albumin (n=12)</td>
<td>-0.09</td>
<td>0.2</td>
<td>-0.15~0.13</td>
<td>0.900</td>
</tr>
<tr>
<td>Folate (n=8)</td>
<td>-265.3</td>
<td>369.5</td>
<td>-574.3~43.6</td>
<td>0.082</td>
</tr>
<tr>
<td>Vitamin B12 (n=9)</td>
<td>12.1</td>
<td>46.6</td>
<td>-23.7~47.9</td>
<td>0.458</td>
</tr>
<tr>
<td>Vitamin D (n=10)</td>
<td>3.98</td>
<td>7.7</td>
<td>-1.5~9.5</td>
<td>0.137</td>
</tr>
<tr>
<td>Total Cholesterol (n=10)</td>
<td>10.0</td>
<td>40.3</td>
<td>-18.8~38.8</td>
<td>0.453</td>
</tr>
<tr>
<td>Triglyceride (n=10)</td>
<td>21.1</td>
<td>39.4</td>
<td>-7.1~49.3</td>
<td>0.124</td>
</tr>
<tr>
<td>HDL (n=10)</td>
<td>21.1</td>
<td>8.24</td>
<td>-5.5~6.3</td>
<td>0.881</td>
</tr>
<tr>
<td>LDL (n=10)</td>
<td>5.3</td>
<td>29.32</td>
<td>-15.7~26.3</td>
<td>0.584</td>
</tr>
<tr>
<td>Urine sodium (n=5)</td>
<td>-15.0</td>
<td>105.6</td>
<td>-146.1~116</td>
<td>0.767</td>
</tr>
<tr>
<td>24 hr urine volume (n=5)</td>
<td>-48.4</td>
<td>676.5</td>
<td>-888.4~791.6</td>
<td>0.881</td>
</tr>
</tbody>
</table>
Results

• **Aim 3: Barriers to dietary behavior**
  - **Importance of personal preference factors:**
    - Taste of food: 65.2%
    - Nutrition value: 65.2%
    - Sodium: 34.7%
    - Cost: 39.1%
    - Cooking time: 30.4%
  - **Knowledge factors:**
    - 30.4% didn’t know what food to choose
    - 34.8% didn’t know how much food to eat
    - More than 50% didn’t think knowledge of how to cook or having adequate cookware improved dietary behavior
    - 68.8% knew where to shop healthy food
Results

• **Aim 3: Barriers to dietary behavior**
  - **Socioeconomic factors:**
    - 56.5% didn’t think stress affects dietary behavior
    - Lack of social support (56.2%), lack of family support (62.5%)
    - Living alone (43.7%)
    - Social events/friends (37.5%)
    - Cost of food (43.8%)
  - **Health factors:**
    - Side effects from medication (62.6%)
    - Other health problem (56.5%)
    - HF is out of control, whether they eat right or not (56.5%)
    - Don’t want to risk the HF worsening from eating (68.8%)
Feedback

- **Aim4: Barriers to adherence to the intervention**
  - Hard to find low-sodium items in grocery store (36%)
  - Cooking time (36%)
  - Lack of support (9.9%)
  - Taste (9.9%)
  - Cost of food (8%)
Feedback

• **Feedback survey results**

• 12/23 patients completed the feedback survey

  - 100% found the intervention was helpful and informative
  - 82% were satisfied with the amount of information, topics, and level of details
  - 100% were satisfied or extremely satisfied with their experience of the study
Recommendation

Nutritional, barrier assessment

Structured, patient-specific eating plan

- Feasible
- High patient satisfaction
- Further investigation
- Potential benefit
Future Direction

Multidisciplinary Approaches

Further Study

Technology

Support system
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References

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