Cardiac Rehabilitation and Completion after Left Ventricular Assist Device (LVAD) implantation: The impact of education for local cardiac rehabilitation teams.

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Heartmate II Left Ventricular Assist Device
Background

• LVADs implanted at UHSM since 2010
• Expanding LVAD programme
• Initially community cardiac rehabilitation referrals were declined
• Audit showing weight gain of LVAD group
• Challenge - keeping pool of LVAD recipients fit for transplantation
The importance of cardiac rehabilitation after LVAD

LVAD recipients

- Increase peak VO2 from 1 to 6 months (p=0.01) but still have reduced peak VO2 compared to controls or HT recipients (Kugler et al. 2011a)
- Sedentary individuals - steps-per-day remain way below that of general population (Hu et al., 2010; Hu et al., 2013; Jakovljevic et al., 2012; Tegtbur et al., 2012)

Cardiac rehabilitation after LVAD

- Improves exercise capacity (Kugler et al 2011b)
- Prevents weight gain (alongside dietary advice and psychosocial support) (Kugler et al 2011b)
- Trends have been shown towards enhancing functional peak VO2, functional capacity and QOL (Hayes et al., 2012)
Introduction of multidisciplinary LVAD education programme

• 3 cardiac rehab teams invited for ½ day training with LVAD team
• Feedback excellent and teams keen to accept rehab referrals
• Patient uptake of rehabilitation improved
• Joint training sessions established with LVAD nurse and specialist physiotherapist
• 18 teams trained to date

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Cardiac Rehabilitation – Points to consider

- **Exercise Testing**
  - May not be possible if severe neuropathy/neurological event (Fabien et al., 2011).
  - Exercise should be based on symptoms of exercise intolerance and RPE.
  - Method based on post-op recovery and/or patient/clinician preference.
  - Treadmill, static bike and walk tests have all been used safely in literature.

- **Drive Line**
  - Exercise contraindicated during drive line infection.
  - Exercise specifically targeting the abdominals should be avoided.

- **Lack of pulsatile flow**
  - Heart rate no longer useful for prescribing intensity or progression.

- **Hydration**
  - Sufficient fluids must be consumed to maintain circulating volume and pump flows.

- **LVAD equipment**
  - Spare system controller and batteries available.

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Aim of Session

Gain an overview of the following;

1. LVAD Background
2. Structure and Function of an LVAD
3. Components of an LVAD
4. Challenges to Rehabilitation
5. CR Evidence Base
6. Contraindications and Safety
Audit of cardiac rehabilitation attendance 2010 - 2014

<table>
<thead>
<tr>
<th>Number of LVADs implanted</th>
<th>38</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean age (SD)</td>
<td>47.7 (14.4)</td>
</tr>
<tr>
<td>Survived to discharge</td>
<td>34 (89%)</td>
</tr>
<tr>
<td>Fit for cardiac rehabilitation</td>
<td>28</td>
</tr>
<tr>
<td>Attended initial assessment</td>
<td>16 (57% of those fit)</td>
</tr>
</tbody>
</table>
Number of LVADs Implanted

- 2010: 5
- 2011: 2
- 2012: 11
- 2013: 10
- 2014: 10
- 2015: 8
Patients fit for and attending cardiac rehabilitation assessment

<table>
<thead>
<tr>
<th>Year</th>
<th>Number fit for initial Ax</th>
<th>Number attending initial Ax</th>
</tr>
</thead>
<tbody>
<tr>
<td>2010</td>
<td>4</td>
<td>0</td>
</tr>
<tr>
<td>2011</td>
<td>0</td>
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<tr>
<td>2012</td>
<td>7</td>
<td>4</td>
</tr>
<tr>
<td>2013</td>
<td>9</td>
<td>7</td>
</tr>
<tr>
<td>2014</td>
<td>7</td>
<td>5</td>
</tr>
</tbody>
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Reasons individuals were not fit for rehabilitation
- Right heart failure
- Cancer
- Neurological incident
- LVAD related problems
Time to initial cardiac rehabilitation assessment

Mean days from hospital discharge to assessment

Days from d/c to assessment

- 2012: 172 days
- 2013: 165 days
- 2014: 100 days
Time to Initial CR Assessment

- Mean days until CR assessment in 2014 = 100.
- No guidance from literature regarding optimum time to begin rehabilitation
- Benefit to period of adjustment to life with LVAD?
- Most likely due to time taken to arrange and train CR team
- Reducing as more teams familiar with LVAD recipients
Adherence to cardiac rehabilitation programme

- Number of patients completing programme (8 or more sessions) = 10 (37% of those fit to attend)
- Mean number of sessions attended = 16 (Range 1-46)
Why aren’t we achieving higher rates of attendance?

- Centre won’t accept referral
  - Lack of knowledge of LVAD
  - Lack of HF rehab programme
  - Unable to release staff to attend training

- Medical problems
  - Re-admissions
  - Listing for urgent HTx
  - Co-morbidities (eg Ca, CVA)

- Patient “choice”
  - Referrals declined
  - Anecdotally classes “too easy”
  - Age of patient affecting adherence
“Cardiac rehabilitation should be designed with the specific device, underlying heart disease and individual patient in mind” (Ueno and Tomizawa, 2009)
Bibliography


NHS Organ Donor Register
donorcard
I want to help others to live after my death