The initial care and management of patients admitted to RCHT with a Ventricular Assist Device (VAD).

V2.0

October 2016
Summary.

Start

Patient with VAD admitted to RCHT

Immediately Inform the on call Cardiologist about the admission (via RCHT switchboard ‘0’)

Accountability lies with: Admitting physician

Ensure the VAD is attached to a mains power source (see appendix 4)

Accountability lies with: Nurse in charge of patients’ care

Inform the heart function service about the admission

- in hours on bleep 3045
- out of hours via MAXIMS internal referrals

Accountability lies with: Admitting physician

Arrange transfer to Coronary Care – (unless the patients presenting condition dictates management by critical care eg. Ventilation)

- Inform the nurse in charge on Coronary care via extension 2630/2648
- In hours (Mon to Sun) contact Cardiology bed co-ordinators 07833201879
- Out of hours – site co-ordinator on bleep 3502

Accountability lies with: Nurse in charge of patients’ care

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Following transfer to Coronary Care / Critical care
- Check on call Cardiologist & heart function service are aware of admission
- Ensure VAD attached to a mains power source
- Commence VAD monitoring (see appendix 5)

Accountability lies with: Nurse in charge of patients’ care

Inform implanting centre of admission episode
- List of contacts on Coronary care

Accountability lies with: Nurse in charge of patients’ care

End
1. **Introduction**

1.1. Ventricular Assist Devices (VADs) are currently licenced in the UK for use as a bridge to transplant, providing mechanical support for the Left Ventricle in patients who have Left Ventricular Systolic Dysfunction. At the time of writing there are 3 patients in Cornwall who have one of these devices in situ, each of them have the Thoratec Heartmate II® in situ.

1.2. This version supersedes any previous versions of this document.

2. **Purpose of this Policy/Procedure**

2.1. A VAD is implanted in a patient to support their Left Ventricular function. This intervention is required because the patient’s intrinsic cardiac function can no longer meet their physiological needs. There are a number of important clinical idiosyncrasies for patients supported by a VAD. Incorrect management of these patients can lead to irreversible damage to the VAD and cessation of cardio-vascular support. This document provides information regarding the clinical management of these patients on admission to the Royal Cornwall Hospital NHS Trust (RCHT).

3. **Scope**

3.1. This procedure applies to any clinical area to which this group of patients may be admitted within RCHT.

4. **Definitions / Glossary**

4.1. **VAD** Ventricular Assist Device

4.2. **LVAD** Left Ventricular Assist Device

4.3. **LVSD** Left Ventricular Systolic Dysfunction

4.4. **RCHT** Royal Cornwall Hospitals NHS Trust

4.5. **CPR** Cardio Pulmonary Resuscitation

5. **Ownership and Responsibilities**

5.1. **Role of the Medicine, ED and WCH Divisional Management Team**

The Medicine, ED and WCH Divisional Management Team is responsible for:

- Ensuring this procedure is cascaded to relevant members of their team

5.2. **Role of the Heart Failure MDT**

The Heart Failure MDT is responsible for:

- Ensuring this document is up to date.
- Monitoring compliance and effectiveness of this procedure when a VAD patient is admitted to RCHT.
- Ensuring any RCHT patient with a VAD in situ is ‘flagged’ in their medical notes and on PAS.
- Ensure the list of implant centres and relevant contacts is kept up to date (held on the Coronary Care Unit).
5.3. Role of Admitting Physician
The admitting Physician (e.g. Surgical Receiving Unit, Medical Admissions Unit and Emergency Department) is responsible for:

- Ensuring the On Call Cardiologist is immediately informed of the admission.
- Ensuring the Heart Failure Specialist Nursing Team has been informed of the admission as soon as possible
- Initiating the 10 step ‘admission pathway’ (6.1) outlined in this document.

5.4. Role of On Call Cardiologist
The On Call Cardiologist is responsible for:

- Providing a Clinical and Nursing management plan, where appropriate
- Facilitating the rapid transfer of the patient to the Coronary Care Unit
- Ensuring this procedure is followed when a patient with a VAD is admitted to RCHT
- If the patient is admitted ‘out of hours’ and if necessary, inform the implanting centre of the admission. A list of contacts will be kept on the Coronary Care Unit
- Liaising with the Heart Failure Specialist Nursing team.

5.5. Role of Heart Function Specialist Nursing team
The Heart Failure Specialist Nursing Team is responsible for:

- Providing a Clinical and Nursing management plan, where appropriate
- Facilitating the rapid transfer of the patient to the Coronary Care Unit
- Ensuring this procedure is followed when a patient with a VAD is admitted to RCHT
- Ensure the implanting centre has been informed of the patients’ admission during normal working hours. A list of contacts will be kept on the Coronary Care Unit
- Liaising with the On Call Cardiologist.
- Facilitating the rapid transfer of the patient to the Coronary Care Unit

5.6. Role of Nurse in Charge of the Coronary Care Unit
The Nurse in charge of the Coronary Care Unit is responsible for:

- Facilitating the rapid transfer of the patient to the Coronary Care Unit
- Initiating the ‘following transfer to CCU pathway’ (6.3) outlined in this document

5.7. Role of the Cardiology bed co-ordinator / Duty Site Co-ordinator
The Cardiology bed co-ordinator (Mon to Sun 07:30 ‘til 18:00) or Duty Site Co-ordinator (out of hours) is responsible for:

- Facilitating the rapid transfer of the patient to the Coronary Care Unit

5.8. Role of the Clinical Leaders
Line managers (e.g Ward Sisters/Charge Nurses and Consultant Speciality leads) are responsible for:

- Ensuring this procedure is cascaded to relevant members of their team
- Ensuring this procedure is followed when a patient with a VAD is admitted to RCHT

**5.9. Role of Individual Staff**

All staff members are responsible for:

- Ensuring they are up to date with this procedure
- Ensuring this procedure is followed when a patient with a VAD is admitted to RCHT

**6. Standards and Practice**

6.1. The Heart Failure MDT is responsible for ensuring any RCHT patient with a VAD in situ is ‘flagged’ in their medical notes and on PAS

6.2. When a patient with a VAD is admitted to RCHT;
   6.2.1. The patient may not have a palpable pulse (VAD flow is continuous not pulsatile).
   6.2.2. CPR can dislodge the VAD cannulae (apical or aorta) so should only be commenced if all other possible causes of no flow are excluded (see appendix 4)
   6.2.3. Obtaining a blood pressure is challenging due to the absence of pulsatile flow. Mean Arterial Pressure can be obtained using an electronic blood pressure monitor, or by utilising a manual sphygmomanometer and Doppler ultrasound.
   6.2.4. The On Call Cardiologist Should be informed immediately (via RCHT switchboard)
   6.2.5. DO NOT stop the patients anticoagulation unless requested by a consultant Cardiologist.
   6.2.6. Ensure the VAD is attached to a mains power source (see Appendix 4)
   6.2.7. The Heart Failure Specialist Nursing team should be informed as soon as possible (via RCHT switchboard)
   6.2.8. The Nurse in charge of the Coronary Care Unit should be informed as soon as possible and a bed requested (Ext 2630 / 2648)
   6.2.9. The Duty Site co-ordinator should be informed as soon as possible
   6.2.10. The patient should be transferred to the Coronary Care Unit as a clinical priority, unless their presenting condition dictates management by critical care (for example patients requiring ventilation)

**6.3. Following transfer to Coronary Care Unit;**

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6.3.1. Check on call Cardiologist & heart function service are aware of admission

6.3.2. Ensure VAD attached to a mains power source

6.3.3. Commence VAD monitoring (see appendix 5)

6.3.4. Inform implanting centre of admission episode

7. Dissemination and Implementation

7.1. This document will be disseminated electronically to all relevant stakeholders once published. It will also be available via the RCHT document library. There are no previous versions of this document to archive.

8. Monitoring compliance and effectiveness

<table>
<thead>
<tr>
<th>Element to be monitored</th>
<th>Whether this procedure is followed when a patient with a VAD presents non-electively to RCH</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lead</td>
<td>The Clinical Nurse Specialist, Heart Failure</td>
</tr>
<tr>
<td>Tool</td>
<td>‘Priorities of care for VAD patients’ mapping tool (appendix 6)</td>
</tr>
<tr>
<td>Frequency</td>
<td>This will be monitored each time a patient with a VAD is admitted to RCHT and a report compiled.</td>
</tr>
<tr>
<td>Reporting arrangements</td>
<td>This report will be interrogated by the Cardiologist clinical lead for Heart Failure.</td>
</tr>
<tr>
<td></td>
<td>This report will be reviewed at the Cardiology Speciality meeting with arising actions minuted.</td>
</tr>
<tr>
<td>Acting on recommendations and Lead(s)</td>
<td>The heart failure multidisciplinary team will undertake subsequent recommendations and action planning for any or all deficiencies and recommendations within reasonable timeframes.</td>
</tr>
<tr>
<td>Change in practice and lessons to be shared</td>
<td>Required changes to practice will be identified and action will commence within 1 week of report review. A lead member of the heart failure multidisciplinary team will be identified to take each change forward where appropriate. Lessons will be shared with all the relevant stakeholders via the Cardiology speciality meeting.</td>
</tr>
</tbody>
</table>
9. Updating and Review

9.1. This document will be updated by the Clinical Nurse Specialist, Heart Function every 3 years.

9.2. Currently the VAD of choice across the UK is the Thoratec Heartmate II®. Should this change, appendices 4 and 5 of this document will be updated earlier than 3 years to reflect differing user guides or monitoring values.

9.3. Revisions can be made ahead of the review date when the procedural document requires updating. Where the revisions are significant and the overall policy is changed, the author should ensure the revised document is taken through the standard consultation, approval and dissemination processes.

9.4. Where the revisions are minor, e.g. amended job titles or changes in the organisational structure, approval can be sought from the Executive Director responsible for signatory approval, and can be re-published accordingly without having gone through the full consultation and ratification process.

9.5. Any revision activity is to be recorded in the Version Control Table as part of the document control process.

10. Equality and Diversity

10.1. This document complies with the Royal Cornwall Hospitals NHS Trust service Equality and Diversity statement.

This document complies with the Royal Cornwall Hospitals NHS Trust service Equality and Diversity statement which can be found in the ‘Equality, Diversity & Human Rights Policy’ or the Equality and Diversity website.

10.2. Equality Impact Assessment

The Initial Equality Impact Assessment Screening Form is at Appendix 2.
### Appendix 1. Governance Information

<table>
<thead>
<tr>
<th>Document Title</th>
<th>The initial care and management of patients admitted to RCHT with a Ventricular Assist Device (VAD).</th>
</tr>
</thead>
<tbody>
<tr>
<td>Date Issued/Approved:</td>
<td>21 October 2016</td>
</tr>
<tr>
<td>Date Valid From:</td>
<td>21 October 2016</td>
</tr>
<tr>
<td>Date Valid To:</td>
<td>21 October 2019</td>
</tr>
<tr>
<td>Directorate / Department responsible (author/owner):</td>
<td>Medical Services – Cardiology and Respiratory Directorate Joanna Davies, Clinical Nurse Specialist, Heart Function</td>
</tr>
<tr>
<td>Contact details:</td>
<td>01872 255076</td>
</tr>
<tr>
<td>Brief summary of contents</td>
<td>Pathway for initial clinical management of patients admitted to RCHT with a Ventricular Assist Device in situ</td>
</tr>
<tr>
<td>Suggested Keywords:</td>
<td>Cardiology Heart Failure Left Ventricular Systolic Dysfunction (LVSD) Ventricular Assist Device (VAD) Heart Transplant.</td>
</tr>
<tr>
<td>Target Audience</td>
<td>RCHT</td>
</tr>
<tr>
<td>Executive Director responsible for Policy:</td>
<td>Medical Director</td>
</tr>
<tr>
<td>Date revised:</td>
<td>Reviewed 19/10/16 in line with</td>
</tr>
<tr>
<td>This document replaces (exact title of previous version):</td>
<td>Priorities of care for the management of patients with a Ventricular Assist Device (VAD)</td>
</tr>
<tr>
<td>Approval route (names of committees)/consultation:</td>
<td>Medical Services Governance and Quality Board</td>
</tr>
<tr>
<td>Divisional Manager confirming approval processes</td>
<td>Sheena Wallace Medical Services Associate Director</td>
</tr>
<tr>
<td>Name and Post Title of additional signatories</td>
<td>‘Not Required’</td>
</tr>
<tr>
<td>Name and Signature of Divisional/Directorate Governance Lead confirming approval by specialty and divisional management meetings</td>
<td>{Original Copy Signed} Name: Alistair Slade, Clinical Director Cardiology and Respiratory Directorate</td>
</tr>
</tbody>
</table>
The initial care and management of patients admitted to RCHT with a Ventricular Assist Device (VAD).

Version Control Table

<table>
<thead>
<tr>
<th>Date</th>
<th>Version No</th>
<th>Summary of Changes</th>
<th>Changes Made by (Name and Job Title)</th>
</tr>
</thead>
<tbody>
<tr>
<td>10/05/13</td>
<td>V1.0</td>
<td>Initial Issue</td>
<td>Joanna Davies Clinical Nurse Specialist, Heart Failure</td>
</tr>
<tr>
<td>19/10/16</td>
<td>V2.0</td>
<td>Planned review. Update only of job titles and process for arranging a Cardiology bed during 'working hours'</td>
<td>Joanna Davies Clinical Nurse Specialist, Heart Function</td>
</tr>
</tbody>
</table>

All or part of this document can be released under the Freedom of Information Act 2000

This document is to be retained for 10 years from the date of expiry.

This document is only valid on the day of printing

Controlled Document
This document has been created following the Royal Cornwall Hospitals NHS Trust Policy on Document Production. It should not be altered in any way without the express permission of the author or their Line Manager.
## Appendix 2. Initial Equality Impact Assessment Form

<table>
<thead>
<tr>
<th>Name of the strategy / policy / proposal / service function to be assessed (hereafter referred to as policy)</th>
<th>The initial care and management of patients admitted to RCHT with a Ventricular Assist Device (VAD).</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Directorate and service area:</strong></td>
<td><strong>Is this a new or existing Policy?</strong></td>
</tr>
<tr>
<td>Cardiology Respiratory</td>
<td>Existing</td>
</tr>
<tr>
<td><strong>Name of individual completing assessment:</strong></td>
<td><strong>Telephone:</strong> 01872255076</td>
</tr>
<tr>
<td>Joanna Davies</td>
<td></td>
</tr>
</tbody>
</table>

### 1. Policy Aim*

**Who is the strategy / policy / proposal / service function aimed at?**

To improve the initial clinical management of patients with a VAD who are acutely admitted to the Royal Cornwall Hospital, reducing the risk of adverse events for this group of patients who have complex clinical management requirements.

### 2. Policy Objectives*

**To provide a clear, speciality agreed, pathway for the initial clinical management of patients with a Ventricular Assist Device on admission to the Royal Cornwall Hospital**

### 3. Policy – intended Outcomes*

Availability of a robust, measureable, Speciality agreed pathway for the initial management of patients with a VAD.

### 4. *How will you measure the outcome?*

Outlined in section 8 of this document. Utilising Appendix 7 ‘Priorities of care for VAD patients’ mapping tool

### 5. Who is intended to benefit from the policy?

Patients with a VAD, acutely admitted to RCHT and those members of the MDT caring for them.

### 6a) Is consultation required with the workforce, equality groups, local interest groups etc. around this policy?

Yes, Workforce

### 6b) If yes, have these *groups been consulted?*

Yes

### 6c) Please list any groups who have been consulted about this procedure.

- All Consultant Cardiologists
- Ward Sister Coronary Care Unit
- Medical Admissions Unit Consultant Physicians and Unit
- Clinical Matron, Medicine
- Cardiology Speciality Group

### 7. The Impact

Please complete the following table.

| Are there concerns that the policy **could** have differential impact on: |
| --- | --- | --- | |
| **Equality Strands:** | Yes | No |
| **Rationale for Assessment / Existing Evidence** | |

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<table>
<thead>
<tr>
<th></th>
<th>✓</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td></td>
</tr>
<tr>
<td>Sex (male, female, trans-/gender / gender reassignment)</td>
<td></td>
</tr>
<tr>
<td>Race / Ethnic communities / groups</td>
<td></td>
</tr>
<tr>
<td>Disability - Learning disability, physical disability, sensory impairment and mental health problems</td>
<td></td>
</tr>
<tr>
<td>Religion / other beliefs</td>
<td></td>
</tr>
<tr>
<td>Marriage and civil partnership</td>
<td></td>
</tr>
<tr>
<td>Pregnancy and maternity</td>
<td></td>
</tr>
<tr>
<td>Sexual Orientation, Bisexual, Gay, heterosexual, Lesbian</td>
<td></td>
</tr>
</tbody>
</table>

You will need to continue to a full Equality Impact Assessment if the following have been highlighted:
- You have ticked “Yes” in any column above and
- No consultation or evidence of there being consultation - this excludes any policies which have been identified as not requiring consultation. or
- Major service redesign or development

8. Please indicate if a full equality analysis is recommended.  Yes  No ✓

9. If you are not recommending a Full Impact assessment please explain why.

Nil criteria met for requirement.

Signature of policy developer / lead manager / director  J Davies  
Date of completion and submission  19 October 2016

Names and signatures of members carrying out the Screening Assessment  1.  2.

Keep one copy and send a copy to the Human Rights, Equality and Inclusion Lead, c/o Royal Cornwall Hospitals NHS Trust, Human Resources Department, Knowledge Spa, Truro, Cornwall, TR1 3HD

A summary of the results will be published on the Trust’s web site.

Signed __________________
Date __________________
Appendix 3. VAD Resuscitation guidelines

VAD PATIENTS DO NOT ALWAYS HAVE A PULSE, DO NOT IMMEDIATELY DO CARDIAC MASSAGE, FOLLOW THESE GUIDELINES:

Contact the Transplantation Emergency Line for guidance 07850 233730

Low Flow

URGENT

ASSESS PATIENT
- ABCDE
- Auscultate over pump pocket if running
- Doppler BP

POWER
- reading > 10 or a sudden increase of > 2 from usual amount

CHECK PUMP
- X2 viable power sources attached
- Drive line lead attached/damaged
- RECTIFY

Still No Flow

VT/VF

VT/VF

Investigation needed for thrombus. Contact QE Hospital Birmingham

Investigate
- RV Failure
- Tamponade

Defibrillate as per Resus Councils Guidelines

Defibrillate as per Resus Councils Guidelines

No Flow

Cardiac massage if no cardiac output

LVAD cannulae can be dislodged during CPR, commence CPR only when it is certain there is no signs of perfusion

No Flow

EMERGENCY

ASSESS PATIENT
- ABCDE
- Auscultate over pump pocket if running
- Doppler BP

FLUID
- Give colloid in 100ml increments. Contact QEHB

Investigate
- RV Failure
- Tamponade

No Flow

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Appendix 4. Attaching a VAD to a mains power supply
(Heartmate II®)

The VAD is implanted in the patient. All that is visible is the driveline, which usually exits the abdomen on the patients' left hand side.

The system controller is connected to the VAD via the driveline.

There are 2 power source options for the VAD, either of which can be connected to the VAD via the system controller:

**Batteries:**
These batteries will last 8-10 hours depending on RPM setting.

**Or mains power via the power module:**
The power module has a built in battery which will last for 30 minutes if the mains power supply is interrupted.

Ensure the power module is plugged into the mains and connected to the patient’s system controller as soon as possible

A full, up to date operating manual can be accessed via the Internet – search for ‘Heartmate ii manual’.
Appendix 5. VAD monitoring (Heartmate II®)

VAD monitoring checklist

<table>
<thead>
<tr>
<th>Date</th>
<th>Time</th>
<th>RPM</th>
<th>Flow</th>
<th>Pulse Index</th>
<th>Power</th>
</tr>
</thead>
</table>

**Daily Checks**

- Power module self test
- System controller self test
- INR (target range 1.5 to 2.5)
- Dressing Check
- Dressing Change

Please note:

To reduce the risk of driveline infection, only the patient or their NOK (who has been trained by the implanting centre) should change drive-line dressings.
Daily checks:

Power Module Self-Test

1. Press and hold the Power Module’s (PM’s) Silence Alarm Button for five seconds.

2. Listen for 3 beeps to sound and watch the front of the PM to see if all the lights come on in sequence (i.e., one-at-a-time; not all at once).

3. If any of the following occurs, there may be a problem with the PM and you should change to battery power and contact Inplanting centre/Thoratec immediately:
   - No sound
   - Anything other than 3 beeps (such as continuous beeping or a broken tone)
   - All the lights come on at once
   - All the lights remain off
   - One of the lights does not come on

System Controller Self-Test

1. Press and hold the Test Select Button for three seconds.

After three seconds, the Red Heart, Red and Yellow Battery, Yellow Controller Cell Symbol, and Fuel Gauge lights will come on, along with a CONTINUOUS AUDIO TONE.

**Note**: Pressing the Test Select Button will have no effect when an alarm is active. A self-test can be performed only when there are...
no active alarms.

2. Look closely at the System Controller display panel. Make sure that all of the lights are on and the alarm is making a CONTINUOUS AUDIO TONE. If there is a problem with the audio alarm, it will beep once every two seconds instead of a continuous or steady tone.

3. Release the Test Select Button. All the lights should remain on and the alarm should sound a CONTINUOUS AUDIO TONE for an additional five seconds.

4. If all the alarms and lights come on as described above and then turn off five seconds after releasing the button, the System Controller has passed the self-test.

IF IT DOES NOT PASS THE SELF TEST, CONTACT implanting hospital /THORATEC IMMEDIATELY
## Appendix 6. ‘Priorities of care for VAD patients’ mapping tool

<table>
<thead>
<tr>
<th>Affix Patient ID label</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Date / Time of admission</td>
<td></td>
</tr>
<tr>
<td>Was the On call Cardiologist Informed of admission?</td>
<td>Yes</td>
</tr>
<tr>
<td>Was anticoagulation withheld/ altered?</td>
<td>Yes</td>
</tr>
<tr>
<td>Was the VAD connected to a mains power source?</td>
<td>Yes</td>
</tr>
<tr>
<td>Was the Heart Failure Specialist Nursing team informed of the patients admission?</td>
<td>Yes</td>
</tr>
<tr>
<td>Was the Nurse in charge of the Coronary Care Unit informed of the patients admission?</td>
<td>Yes</td>
</tr>
<tr>
<td>Was the Duty Site co-ordinator should be informed of the patients admission?</td>
<td>Yes</td>
</tr>
<tr>
<td>Was the patient transferred to the Coronary Care Unit / critical care as a clinical priority?</td>
<td>Yes</td>
</tr>
<tr>
<td>Date/Time of transfer to CCU/ critical care</td>
<td></td>
</tr>
<tr>
<td>Was CPR carried out on the patient at any time during their admission episode?</td>
<td>Yes</td>
</tr>
</tbody>
</table>

Mapping completed by (name and Job title)...........................................................................................................

Date of completion.............................................................................................................................................