Jarvik 2000 VAD

By Tracy Sanderson, RN, EMTP and Kelly Curren, EMTP, RT
The Pump

• An axial flow blood pump that uses electrical power to rotate a vained impeller—its only moving part
• The device is 2.5 cm wide, 5.5 cm long, and weighs 85 grams.
• A small cable, which exits the body through the abdominal wall or behind the ear, delivers power to the impeller
• The normal operating range for the control system is 8,000 to 12,000 revolutions per minute, which will generate an average pump flow rate of 5 liters per minute.
The Control System

- The pump speed is controlled by the FlowMaker, an analog system controller.
- The pump speed can be manually adjusted from 8,000 to 12,000 rpm in increments of 1000.
- The control unit monitors the pump function and the remaining power in the batteries. Audible and visual alerts notify the user of any problems.
How it Works

• The Jarvik 2000 pump does not "beat."
• It uses a spinning rotor to propel blood from the left ventricle into the aorta
• But the natural heart continues to contract and relax, and the volume of blood moved by the spinning rotor rhythmically increases and decreases in synchrony with those contractions.
• *Jarvik 2000 patients do, therefore, retain a pulse*
Things to Know

- Green Arrow
  - Post auricle connection
- Blue Arrow
  - Tunneled internal cable
- Grey Arrow
  - Portable battery
- Yellow Arrow
  - Controller
Components

• This equipment includes the external controller, two different types of batteries (Lithium Ion - Portable, Lead Acid – Reserve batteries), and various cables and connectors.

• Depending on whether the pump is implanted for temporary or permanent use, the power cable exits the patient's body either through the abdominal wall or through a connector mounted on the head, behind the ear.
Continued

- The Jarvik 2000 FlowMaker® can run for 8-10 hours on a single, portable, Lithium-ion battery
- The total weight of the battery pack, controller, and cables is less than three pounds.
Manual control

• The Jarvik 2000 pump is monitored and its output adjusted manually by each patient according to his or her circumstances and needs.

• Using a dial numbered from 1 to 5, the patient manually adjusts the rate at which the Jarvik 2000 pumps blood to suit his or her level of activity
  – (turning it up when exercising and down to go to sleep)
• The patient should have a card with the VAD coordinator name and number

• The Jarvik 2000 Heart never runs from wall power even if the reserve battery charger is plugged into the wall.

• At all times, the pump is only run from batteries

• The Jarvik 2000 Heart is designed to act as a true booster pump and permits your natural heart to do as much of the pumping work as possible.
Flowmaker Controller
This represents only the flow through the Jarvik 2000 Heart

- Setting Number Pump Speed Approximate Flow

<table>
<thead>
<tr>
<th>Pump Speed Setting</th>
<th>RPM</th>
<th>Approximate Flow Rate (L/min)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>8000</td>
<td>1-2</td>
</tr>
<tr>
<td>2</td>
<td>9000</td>
<td>2-4</td>
</tr>
<tr>
<td>3</td>
<td>10000</td>
<td>3-5</td>
</tr>
<tr>
<td>4</td>
<td>11000</td>
<td>4-6</td>
</tr>
<tr>
<td>5</td>
<td>12000</td>
<td>5-7</td>
</tr>
</tbody>
</table>
Alarms

• Alarms are communicated to the user by both a visual indicator and an audible alarm.

• All alarms require immediate attention.
You need to know

- Faint or no palpable pulse
  Weak intrinsic heart (More support through VAD)
- Faint or no palpable BP
  May need to use doppler
  MAP 65-80 mmHg
  Narrow or no pulse pressure
- Hypertension
  Impairs output due to high systemic vascular resistance
- Hypotension
  Suck-down if speed is too high
- Auscultate VAD as part of your assessment
Emergency Procedures

• No need to disconnect power / controller to defibrillate
• CPR: chest compressions as last resort
• Notify VAD team for any change in status