

**eTable 1.**

Indications for Ventricular Assist Device (VAD) Implantation<sup>a</sup>

<b>Indication</b>	<b>Frequency</b>	<b>Definition</b>
Bridge to transplantation	40%–45%	Prevent other organ dysfunction due to heart failure while VAD recipient is waiting for heart transplant
Bridge to candidacy	43%	Prevent other organ dysfunction due to heart failure while VAD/transplant team addresses transplant exclusion criteria (eg, improving renal function, weight loss, increasing exercise capacity)
Destination therapy	15%	VAD support for an individual who has end-stage heart failure and is not a candidate for heart transplantation
Bridge to recovery	5%	VAD support for a reversible condition followed by VAD explanation

<sup>a</sup> Modified from Leitz,<sup>8</sup> Kirklin et al,<sup>17</sup> and Feller.<sup>18</sup>

## Physical Therapist Management of Patients With Ventricular Assist Devices

**eTable 2.**

Recommended Functional Testing for Ventricular Assist Device (VAD) Candidates and VAD Recipients<sup>a</sup>

Test	Test Purpose and Score Interpretation
Six-Minute Walk Test (6MWT) <sup>40</sup>	<b>Purpose:</b> measure of gait speed and endurance
	<b>Reference equations:</b> Predictive value of 6MWT Male = $(7.57 \times \text{height}_{(\text{cm})}) - (5.02 \times \text{age}) - (1.76 \times \text{weight}_{(\text{kg})}) - 309$ m Female = $(2.11 \times \text{height}_{(\text{cm})}) - (2.29 \times \text{weight}_{(\text{kg})}) - (5.87 \times \text{age}) + 667$ m Percent of predicted: actual distance/predictive value
10-Meter Walk Test <sup>13</sup>	<b>Purpose:</b> measure of gait speed
	<b>Reference:</b> ≤0.4 m/s: household ambulation, dependent with ADLs/IADLs, likely needs placement, likely to have a fall event 0.4–0.8 m/s: limited community ambulation, assistance with ADLs/IADLs, likely home management, likely to have a fall event 0.8 to 1.2 m/s: community ambulation, minimal to no assistance with ADLs/IADLs, fall event unlikely ≥1.2 m/s: normal walking, independent with ADLs/IADLs, fall event unlikely
Dynamic Gait Index <sup>41</sup>	<b>Purpose:</b> measure of risk of falls
	<b>Reference:</b> <19/24: risk of falls >22/24: safe ambulator
5-Sit-to-Stand Test <sup>42</sup>	<b>Purpose:</b> measure lower-extremity strength and balance
	<b>Reference:</b> means 11.4 seconds: 60–69 years of age 12.6 seconds: 70–79 years of age 14.8 seconds: 80–89 years of age
Timed “Up & Go” Test <sup>43</sup>	<b>Purpose:</b> measure of mobility, balance, and locomotion ability
	<b>Reference:</b> means 8.1 seconds: 60–69 years of age 9.2 seconds: 70–79 years of age 11.3 seconds: 80–89 years of age ≥14 seconds: predictive of falls
Berg Balance Scale <sup>44</sup>	<b>Purpose:</b> measure of balance
	<b>Reference:</b> >45/56: safe ambulator
National Institutes Health Stroke Scale <sup>44</sup>	<b>Purpose:</b> quantitative measure of stroke-related neurologic deficits
	<b>Reference:</b> 0: no stroke 1–4: minor stroke 5–15: moderate stroke 15–20: moderate/severe stroke 21–42: severe stroke

<sup>a</sup> Modified from Fritz and Lusardi,<sup>13</sup> Jette et al,<sup>16</sup> StrokEDGE taskforce report,<sup>27</sup> Shumway-Cook et al,<sup>41</sup> and Hayes and Johnson.<sup>44</sup> ADLs=activities of daily living, IADLs=instrumental activities of daily living.

**eTable 3.**

Types of Ventricular Assist Devices (VADs)<sup>a</sup>

VAD	Type	Ventricle Supported	Indication	Duration (Pump Life) <sup>b</sup>	Maximal Pump Output Capacity (L/min) <sup>c</sup>	Home Discharge Permitted?
Thoratec pVAD <sup>d</sup>	Pulsatile	L, R, B	BTR, BTT	Medium	7.1	Yes
Berlin Heart <sup>e</sup>	Pulsatile	L, R, B	BTR, BTT	Medium	9.0	No
HeartMate XVE <sup>d</sup>	Pulsatile	L	BTT, DT	Long	10.0	Yes
Centrimag <sup>d</sup>	Nonpulsatile	L, R, B	BTR, BTC	Short	9.9	No
Impella 5.0 <sup>f</sup>	Nonpulsatile	L	BTR, BTC	Short	5.0	No
TandemHeart <sup>g</sup>	Nonpulsatile	L, R, B	BTR, BTC	Short	4.0	No
HeartMate II <sup>d</sup>	Nonpulsatile	L	BTT, DT	Long	10.0	Yes
HeartWare <sup>h</sup>	Nonpulsatile	L	BTT, DT	Long	9.9	Yes
Jarvik 2000 <sup>i</sup>	Nonpulsatile	L	BTT, DT	Long	6.0	Yes
VentrAssist <sup>j</sup>	Nonpulsatile	L	BTT, DT	Long	10.0	Yes

<sup>a</sup> L=left, R=right, B=biventricular, BTR=bridge to recovery, BTT=bridge to transplantation, BTC=bridge to candidacy, DT=destination therapy.

<sup>b</sup> Approximately maximal pump life: short=<1 month, medium=1–2 years, long=>2 years.

<sup>c</sup> Estimated or actual maximal capacity in liters per minute.

<sup>d</sup> Thoratec Corporation, Pleasanton, California.

<sup>e</sup> Berlin Heart GmbH, The Woodlands, Texas. Berlin Heart Excor has various sizes to meet the needs of the pediatric patient with a stroke volume that can vary from 10 to 60 cc and heart rate ranging from 30 to 150 bpm, therefore, providing a pump output from 0.3 to 9 L/min.

<sup>f</sup> Abiomed, Danvers, Massachusetts.

<sup>g</sup> Cardiac Assist Inc, Pittsburgh, Pennsylvania.

<sup>h</sup> HeartWare Inc, Framingham, Massachusetts.

<sup>i</sup> Jarvik Heart Inc, New York, New York.

<sup>j</sup> Ventracor Ltd, Chatswood, New South Wales, Australia.

**eTable 4.**  
General Parameters for Ventricular Assist Device (VAD) Management<sup>a</sup>

VAD	General Parameters
HeartMate II	Mean blood pressure: 70–85 mm Hg Typical speed: 8,800–9,600 rpm <sup>b</sup> Typical pulsatility index (pressure difference inside the pump during cardiac cycle): 3.0–6.0 Typical power: 3–6 W <sup>c</sup> Portable battery life: 3–4 h, Go Gear battery life: 8–10 h
HeartWare	Mean blood pressure: 70–85 mm Hg Typical speed: 2,400–3,200 rpm <sup>b</sup> Flow pulsatility (difference between minimal and maximal level of flow waveform): 2–4 L/min Typical power: 3–7 W <sup>c</sup> Typical hemocrit/viscosity setting: 2.4–3.0 (it is a conversion curve based on hemocrit to more accurately estimate pump output) Portable battery life: 4–6 h
Jarvik 2000	Mean blood pressure: 65–85 mm Hg Typical speed: 3–4 (10,000–11,000 rpm) <sup>b</sup> Typical power: 5–9 W <sup>c</sup> Portable battery life: 8–12 h Reserve battery life: >24 h
Centrimag	Mean blood pressure: 60–85 mm Hg VAD speed: range of 500–5,500 rpm (will vary based upon desired VAD output for either support or weaning) Primary console battery life: 1 h Secondary console battery life: 2 h (nonrechargeable)
Thoratec pVAD	Full fill and full empty Pump rate: 40–120 bpm Mean blood pressure: >60 mm Hg Ejection pressure: 190–240 mm Hg for left VAD; 130–180 mm Hg for right VAD Vacuum pressure (filling pressure): 50 mm Hg Pump output: >2.2 L/min for right VAD and 0.5 L/min for < left VAD Large console (dual drive console) battery life: 40 min Portable console (TLC): 60 min for VAD, 45 min for biventricular assist device Can hand pump the device in case of pump failure

<sup>a</sup> Modified from manufacturers' manuals from [www.thoratec.com](http://www.thoratec.com), [www.heartware.com](http://www.heartware.com), [www.jarvikheart.com](http://www.jarvikheart.com), [www.abiomed.com](http://www.abiomed.com), and clinical quick guides developed by the Superusers and bioengineers at the University of Maryland Medical Center. Refer to Table 3 for manufacturers of the VADs cited in the table.

<sup>b</sup> To achieve a sufficient cardiac index and no suckdown events or hemolysis.

<sup>c</sup> Will be dependent upon VAD speed and should remain at a consistent range for a given speed.