

## MECHANICAL CIRCULATORY SUPPORT DEVICES

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### INTRODUCTION

The advancement of mechanical circulatory support (MCS) technology has allowed for improved survival among patients with end-stage heart failure and acute cardiogenic shock. Many different devices exist, but all share a common purpose—to increase the delivery of oxygenated blood and improve end-organ function. They also require anticoagulation to prevent thrombosis, either systemically or in the device itself. Improvements in device design have reduced, but not completely alleviated, the need for anticoagulation. In addition, the devices themselves alter the patient's coagulation system, further complicating the prescribed anticoagulation regimen. Many patients on MCS will develop bleeding or thrombosis events despite careful monitoring and recommended treatments.

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### MECHANICAL SUPPORT DEVICES<sup>1-5</sup>

#### ***Diagnoses Requiring Mechanical Circulatory Support***

Mechanical circulatory support may be utilized either temporarily for acute management issues, or long term that may include permanent for life (see **Table 17-1**). Anticoagulation in many cases is required when these devices are in use.

**TABLE 17-1: Diagnoses Requiring Mechanical Circulatory Support**

<b>Temporary (Nondurable) Mechanical Circulatory Support</b>	<b>Long-Term (Durable) Mechanical Circulatory Support</b>
<ul style="list-style-type: none"> <li>• Acute cardiac failure</li> <li>• Acute myocardial infarction, high-risk coronary intervention</li> <li>• Acute myocarditis with shock</li> <li>• Acute rejection post-cardiac transplant with hemodynamic compromise</li> <li>• Bridge to decision in a patient with a relative contraindication to transplant or durable mechanical circulatory support</li> <li>• Cardiogenic shock</li> <li>• High-risk electrophysiologic ablations</li> <li>• Inability to wean from cardiopulmonary bypass</li> <li>• Need for right-sided failure refractory to maximal medical therapy following LVAD placement</li> <li>• Valvular failure such as acute mitral regurgitation</li> </ul>	<ul style="list-style-type: none"> <li>• Class IV heart failure with severe symptoms or refractory to optimal therapy</li> <li>• Dependence on intravenous inotropic support</li> </ul>

LVAD: left ventricular assist device

## **Indications for Mechanical Circulatory Support**

See **Table 17-2**.

- *Bridge to recovery (BTR)*: Patients who need short-term or temporary MCS and are expected to recover cardiac function.
- *Bridge to decision (BTD)*: Provide temporary circulatory support when a patient's neurologic status is unknown or they have undetermined durable VAD or transplant candidacy, allowing for time to potentially reverse organ dysfunction to appropriately assess the risks and benefits of durable options.
- *Destination therapy (DT)*: Patients who need long-term MCS and are not candidates for transplant.
- *Bridge to transplant (BTT)*: Patients awaiting transplantation who need MC to survive to transplant or to keep end-organ dysfunction from occurring while waiting for a donor organ to become available.
- *Bridge to transplant candidacy (BTC)*: Provide support to patients who have reversible risk factors for transplant. The goal is to eventually transition to bridge to transplant once the risk factors have been corrected.

## **ANTITHROMBOTIC MANAGEMENT CONSIDERATIONS**

Although guidelines for some devices exist, local practice varies widely.<sup>1</sup> Each hospital or health system should develop local protocols to guide therapy