Most certified prosthetists have a firm understanding of what is needed to achieve optimal outcomes for lower-limb prosthetics patients. We are skilled at recognizing muscle weakness and other issues that may hinder our patients’ proper ambulation. We know how to test their muscle strength and contracture levels and when to refer them to physical therapy to address deficiencies prior to prosthetics management. This is largely because the average prosthetist works with lower-limb prosthetics patients every day. Conversely, the average clinician treats only a few patients with upper-limb amputations per year, and even fewer who use myoelectric upper-limb prostheses. Therefore, the knowledge needed to treat these patients effectively may not be as common.

This article aims to provide clinicians with insight on how to properly evaluate and train upper-limb myoelectric device users to achieve optimum function of their prostheses. To evaluate and train a candidate for myoelectric control of a prosthesis, such as the RSL Steeper bebionic3 hand, the clinician will need a myoelectric testing device first and foremost. There are many types currently available from a variety of manufacturers. Some are standalone testers, like the Motion Control Myolab, which is a basic device with its own preamp electrodes. Other testers are integrated into the myoelectric arm’s software, such as RSL Steeper’s bebalance software for the bebionic3. With many software-integrated testers, the computer receives the signal from the electrodes, which are placed on the patient’s residual limb or mounted in the prosthetic test socket. Alternatively, the hand could be set up on a demonstration tower or jig during the patient’s testing and training.

Myoelectric testers, both standalone and software integrated, allow the clinician to view, evaluate and document the strength and quality of the EMG signal produced by the patient. This is a vital part of the documentation and justification process as it allows the clinician to track the patient’s ability to use the myoelectric arm and how he or she progresses in that use.

When using a myoelectric testing device, it is also important that the clinician knows and understands the signal requirements of the prosthesis that he or she plans to fit. Does the prosthesis have a full proportional control strategy or an alternate control strategy? Will the patient need to switch between devices, such as from a wrist to a terminal device, or to “trigger” different grip patterns? These factors may require patient control that exceeds a simple, short open/close signal.

A patient’s specific myoelectric signal quality and upper-body strength may seem adequate when operating the device during initial myoelectric testing and while seated at a table in the clinician’s facility. However, by evaluating the patient as he or she performs additional, more specific exercises, the clinician may discover muscle weaknesses and/or muscle or signal fatigue issues that were not realized during the initial testing. Continuing these exercises throughout the pre-prosthetic phase, between initial casting and final delivery of the prosthesis, has been shown to improve the user’s control and functional quality of the device.

There are specific occupational therapy exercises that are designed to help prepare patients for myoelectric prosthesis utilization. They focus on developing strong quality control of myoelectric signals throughout the patient’s full range of motion.