Medical and Behavioral Health Policy Manual
Section: Allied Health
Policy: VII-16

MICROPROCESSOR-CONTROLLED PROSTHETIC KNEES

Description:

An amputee's underlying activity level determines the most appropriate design of a prosthetic knee. The requirements of a prosthetic knee in an elderly, largely homebound individual are different than the requirements for a younger, active person. Stability during both the stance and swing phase of the gait is a key element a prosthetic design. Prosthetic knees vary in their ability to alter the cadence of the gait, or the ability to walk on rough or uneven surfaces. In contrast to more simple designs, which are designed to function optimally at one walking cadence, fluid and hydraulic-controlled devices are designed to allow amputees to vary their walking speed by matching the movement of the shin portion of the prosthesis to the movement the upper leg. Hydraulic prostheses are heavier than other options and require gait training; for these reasons, these prostheses are generally prescribed for athletic or fit individuals. Other design features include multiple centers of rotation, referred to as "polycentric knees." The mechanical complexity of these devices allows engineers to optimize selected stance and swing-phase features.

Recently, **microprocessor**-controlled prosthetic knees have been developed, including the Intelligent Prosthesis (Blatchford, U.K.), the Adaptive (Endolite, England), the Rheo (Ossur, Iceland) and the C-Leg (Otto Bock Orthopedic Industry, Minneapolis, MN). These devices are equipped with a sensor that detects when the knee is in full extension and adjusts the swing phase automatically, permitting a more natural walking pattern of varying speeds. The prosthetist can specify several different optimal adjustments that the computer later selects and applies according to the pace of ambulation.

With the exception of the Intelligent Prosthesis, the devices use **microprocessor** control in both the swing and stance phases of gait. By improving stance control, they may provide increased safety, stability, and function; the sensors are designed to recognize a stumble and stiffen the knee, thus avoiding a fall. Other potential benefits of **microprocessor**-controlled knee prostheses are improved ability to navigate stairs, slopes, and uneven terrain, and reduction in energy expenditure and concentration required for ambulation.
Decisions about the potential benefits of **microprocessor**-knees involve multiple factors including activity levels as well as the patient's physical and cognitive ability. A patient's need for daily ambulation of at least 400 continuous yards, daily and frequent ambulation at variable cadence or on uneven terrain (e.g., gravel, grass, curbs), and daily and frequent use of ramps and/or stairs (especially stair descent) should be considered as part of the decision. Typically, daily and frequent need of two or more of these activities would be needed to show benefit.

For patients in whom the potential benefits of the **microprocessor** knees are uncertain, patients may first be fitted with a standard prosthesis to determine their level of function with the standard device.

The following are guidelines from the Veteran's Health Administration Prosthetic Clinical Management Program Clinical Practice Recommendations for **Microprocessor** Knees.

PATIENT SELECTION AND IDENTIFICATION

A. *Contraindications for use of the **microprocessor** knee should include* :

- Any condition which prevents socket fitting, such as a complicated wound or intractable pain which precludes socket wear.
- Inability to tolerate the weight of the prosthesis.
- Medicare Level K 0—no ability or potential to ambulate or transfer.
- Medicare Level K 1—limited ability to transfer or ambulate on level ground at fixed cadence.
- Medicare Level K 2—limited community ambulator that does not have the cardiovascular reserve,

strength, and balance to improved stability in stance to permit increased independence, less risk of falls, and potential to advance to a less-restrictive walking device.

- Inability to utilize swing and stance features of the knee unit.
- Poor balance or ataxia that limits ambulation.
- Significant hip flexion contracture (over 20 degrees).
- Significant deformity of remaining limb that would impair ability to stride.
- Limited cardiovascular and/or pulmonary reserve or profound weakness.
- Limited cognitive ability to understand gait sequencing or care requirements.
- Long distance or competitive running.
- Falls outside of recommended weight or height guidelines of manufacturer.
- Specific environmental factors—such as excessive moisture or dust, or inability to charge the prosthesis.
- Extremely rural conditions where maintenance ability is limited.

B. *Indications for use of the **microprocessor** knee should include* :

- Adequate cardiovascular and pulmonary reserve to ambulate at variable cadence .
- Adequate strength and balance to stride to activate the knee unit.
- Should not exceed the weight or height restrictions of the device.
- Adequate cognitive ability to master technology and gait requirements of device.
- Hemi-pelvectomy through knee-disarticulation level of amputation, including bilateral lower extremity amputees are candidates if they meet functional criteria as listed.
- Patient is an active walker and requires a device that reduces energy consumption to permit longer distances with less fatigue.
- Daily activities or job tasks that do not permit full focus of concentration on knee control and stability—such as uneven terrain, ramps, curbs, stairs, repetitive lifting and/or carrying.
- Medicare Level K 2—limited community ambulator,

but only if improved stability in stance permits increased independence, less risk of falls, and potential to advance to a less restrictive walking device, and patient has cardiovascular reserve, strength, and balance to utilize the prosthesis. *The **microprocessor** enables fine-tuning and adjustment of the hydraulic mechanism to accommodate the unique motor skills and demands of the functional level K2 ambulator.*

- Medicare Level K 3—unlimited community ambulator.
- Medicare Level K 4—active adult, athlete, who has the need to function as a K 3 level in daily activities.
- Potential to lessen back pain by providing more secure stance control, using less muscle control to keep knee stable.
- Potential to unload and decrease stress on remaining limb.
- Potential to return to an active lifestyle.

C. *Physical and Functional Fitting Criteria for New Amputees* :

- New amputees may be considered if they meet certain criteria as outlined above.
- Premorbid and current functional assessment important determinant.
- Requires stable wound and ability to fit socket.
- Immediate postoperative fit is possible.
- Must have potential to return to active lifestyle.

Policy:

The use of a **microprocessor**-controlled knee is considered **ACCEPTED MEDICAL PRACTICE** for amputees who meet the following criteria:

- Demonstrated need for long distance ambulation at variable rates (use of the limb in the home or for basic community ambulation is not sufficient to justify provision of the computerized limb over standard limb applications) **OR** demonstrated patient need for regular ambulation on uneven terrain or for regular use on stairs (use of the limb for limited stair climbing in the home or employment environment is not sufficient evidence for prescription of this device over

standard prosthetic application); **AND**

- Physical ability, including adequate cardiovascular and pulmonary reserve, for ambulation at faster than normal walking speed; **AND**
- Adequate cognitive ability to master use and care requirements for the technology.

A **microprocessor**-controlled knee is considered **NOT MEDICALLY NECESSARY** for individuals who do not meet these criteria.

Coverage: **PRIOR AUTHORIZATION IS RECOMMENDED.**

Coverage is subject to the member's contract benefits.

Coding: Codes specific to policy:
HCPCS: L5856 Addition to lower extremity prosthesis, endoskeletal knee-shin system, **microprocessor** control feature, swing & stance phase, includes electronic sensor(s), any type
L5857 Addition to lower extremity prosthesis, endoskeletal knee-shin system, **microprocessor** control feature, swing phase only, includes electronic sensor(s), any type
L5858 Addition to lower extremity prosthesis, endoskeletal knee-shin system, **microprocessor** control feature, stance phase only, includes electronic sensors(s), any type

Medical Policy Committee Review: Developed September 12, 2007

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Cross Reference: Durable Medical Equipment (DME), VII-07

Use.

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