BlueCross BlueShield of Nebraska

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VII.65 MICROPROCESSOR-CONTROLLED PROSTHETIC KNEES

DESCRIPTION:

There are over 100 different prosthetic knee designs that are currently available. The choice of the most appropriate design will depend on the patient's underlying activity level. For example, the requirements of a prosthetic knee in an elderly, largely homebound individual will be quite different than a younger, active subject. In general, key elements of a prosthetic design involve providing stability during both the stance and swing phase of the gait. Prosthetic knees also 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 the amputee to vary their walking speed by matching the movement of the shin portion of the prosthesis to the movement the upper leg. For example, the rate at which the knee flexes after "toe-off" and then extends before heel strike depends in part on the mechanical characteristics of the prosthetic knee joint. If the resistance to flexion and extension of the joint does not vary with gait speed, the prosthetic knee extends too quickly or too slowly relative to the heel strike if the cadence is altered. When properly controlled, hydraulic or pneumatic swing phase controls allow the amputee to set a pace from very slow to a race walking pace. Hydraulic prostheses are heavier than other options and require gait training; for these reasons these prostheses are generally prescribed to 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.

Most recently microprocessor controlled prosthetic knees have become available, include the Intelligent Prosthesis (Blatchford, United Kingdom) 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. For example, the prosthetist can specify several different optimal adjustments that the computer later selects and applied according to the pace of ambulation. The C-LEG is also designed to improve the stance control; for example, it may be possible for the sensors to recognize a stumble, stiffen the knee, and avoid a fall.

POLICY:
Microprocessor-controlled prosthetic knees are scientifically validated for individuals who have an above knee amputation and who meet the following criteria.

• Patients with adequate cardiovascular reserve and cognitive learning ability to master the higher level of technology and to allow for faster than normal walking speed;

• Patients must demonstrate the ability to ambulate at a faster than baseline rate using a standard prosthesis application with a swing and stance control knee;

• Demonstrated patient need for long distance ambulation at variable rates (>400 yards) on a daily basis. 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; and

• Demonstrated patient need for regular ambulation on uneven terrain or for regular use on stairs. Use of the limb or limited stair climbing in the home or employment environment is not sufficient evidence for prescription of this device over standard prosthetic application.

MEDICAL POLICY MANUAL
All other uses of microprocessor-controlled prosthetic knees are investigative.

Codes Number Description
ICD-9 Diagnosis 897 Traumatic amputation of leg code section
V43.65 Organ or tissue replaced by other means; knee
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