Clinical Policy Title: Treatment of leg length discrepancy

Clinical Policy Number: 14.03.03

Effective Date: January 1, 2016
Initial Review Date: August 19, 2015
Most Recent Review Date: January 18, 2017
Next Review Date: January 2018

About this policy: AmeriHealth Caritas Pennsylvania has developed clinical policies to assist with making coverage determinations. AmeriHealth Caritas Pennsylvania’s clinical policies are based on guidelines from established industry sources, such as the Centers for Medicare & Medicaid Services (CMS), state regulatory agencies, the American Medical Association (AMA), medical specialty professional societies, and peer-reviewed professional literature. These clinical policies along with other sources, such as plan benefits and state and federal laws and regulatory requirements, including any state- or plan-specific definition of “medically necessary,” and the specific facts of the particular situation are considered by AmeriHealth Caritas Pennsylvania when making coverage determinations. In the event of conflict between this clinical policy and plan benefits and/or state or federal laws and/or regulatory requirements, the plan benefits and/or state and federal laws and/or regulatory requirements shall control. AmeriHealth Caritas Pennsylvania’s clinical policies are for informational purposes only and not intended as medical advice or to direct treatment. Physicians and other health care providers are solely responsible for the treatment decisions for their patients. AmeriHealth Caritas Pennsylvania’s clinical policies are reflective of evidence-based medicine at the time of review. As medical science evolves, AmeriHealth Caritas Pennsylvania will update its clinical policies as necessary. AmeriHealth Caritas Pennsylvania’s clinical policies are not guarantees of payment.

Coverage policy

AmeriHealth Caritas Pennsylvania considers the use of surgical management of leg length discrepancies to be clinically proven and, therefore, medically necessary when the following criteria are met:

- Leg length discrepancy of 4 cm or more, or of 4% of total leg length. —OR—
- Angular or rotational deformity resulting in functional impairment not responding to non-surgical treatment.

Limitations:

AmeriHealth Caritas Pennsylvania considers surgical management of leg length discrepancies of less than 4 cm or less than 4% of total leg length not to be clinically proven as effective and therefore not medically necessary. Treatment with surgery or with customized orthotics to achieve a desired height is considered cosmetic and not a covered benefit.

Alternative covered services:

- Leg Length Discrepancy Treatment
- Ilizarov method distraction osteosynthesis
Treatment with customized orthotics and by an orthopedic surgeon.

Background

Leg length discrepancy (LLD), or leg length inequality, is estimated to be present in 3 — 15 percent of the general population. Clinically significant LLD usually appears in childhood. Unequalized LLD is associated with posture deformation, gait asymmetry, and low back pain. Radiographically LLD causes pelvic obliquity in the frontal plane and lumbar scoliosis with convexity towards the shorter extremity. If left untreated LLD can contribute to other serious orthopedic problems, such as stress fractures, degenerative arthritis and discopathy.

Treatment of clinically significant LLD varies from conservative measures such as shoe lifts to eliminate minor length discrepancies to open surgical implantation of extendable long-bone prosthetics. The most common treatment for discrepancies in leg length is the use of an orthopedic shoe lift, which can be placed within or added to the exterior of nearly any type of shoe. Shoe lifts are inexpensive and can be removed if they are not effective.

There is substantial literature available on invasive methods of lengthening such as external fixation and pinning (e.g., the Ilizarov device), a method of lengthening often complicated by muscle contracture, joint stiffness, osteomyelitis from pin infection, and prolonged immobility. There are also several fully implantable surgical leg-lengthening devices (e.g., Fitbone®) in use in clinical practice.

Finally, epiphyseal growth blockade, subtrochanteric osteotomy and intramedullary shortening of long bone have been advanced as measures to diminish LLD, but timing of these interventions to avoid creating inequality in the still-growing contralateral extremity is difficult in the pediatric age group where this condition is typically found.

Searches

AmeriHealth Caritas Pennsylvania searched PubMed and the databases of:
- UK National Health Services Centre for Reviews and Dissemination.
- Agency for Healthcare Research and Quality’s National Guideline Clearinghouse and other evidence-based practice centers.
- The Centers for Medicare & Medicaid Services (CMS).

We conducted searches on November 14, 2016. Searched terms were: "leg length discrepancy (MeSH)" , "LLD (MeSH)" and "treatment of LLD."

We included:
- Systematic reviews, which pool results from multiple studies to achieve larger sample sizes and greater precision of effect estimation than in smaller primary studies. Systematic reviews use
predetermined transparent methods to minimize bias, effectively treating the review as a scientific endeavor, and are thus rated highest in evidence-grading hierarchies.

- **Guidelines based on systematic reviews.**
- **Economic analyses**, such as cost-effectiveness, and benefit or utility studies (but not simple cost studies), reporting both costs and outcomes — sometimes referred to as efficiency studies — which also rank near the top of evidence hierarchies.

**Findings:**

There is a paucity of evidence regarding the degree of LLD that is considered clinically significant. Some series proclaim near-ubiquity of LLD in the general population (Knutson 2005) with inequalities <2 cm likely inconsequential to ambulatory function. The Pediatric Orthopedics Society of North American (POSNA) recently concluded that LLD ≥2 cm is a significant impairment to gait and well-being (POSNA 2015). Others emphasize the simplicity of LLD treatment and its substantial success rates at eliminating the discomfort of scoliosis (Raczkowski 2010) as justification for seeking and treating this condition vigorously.

Common methods of detecting LLD include direct measure (e.g., by tape), indirect radiologic evaluation (e.g., assessment of pelvic leveling by drawing a line between iliac crests on anterior-posterior view of the pelvis), and computerized tomographic (CT) scanogram of the lower extremities in lateral view (Sabharwal 2008). There are potential sources of error with tape measurements related to differences in leg circumference, angular deformities, joint contractures and difficulty in accurately palpating bony prominences. Radiographic assessment of LLD, first garnering recommendation nearly a quarter of a century ago (McGraw 1991), remains the gold standard for accurately and reproducibly establishing the magnitude and results of treatment for leg length inequality.

A clinical trial in reducing low back pain using orthotic lifts to equalize a scoliosis attributed to LLD (Brady 2003) suggested that lift therapy helps correct scoliosis and that the degree of scoliosis was related to the magnitude of the LLD. Giles and Taylor (1981) suggested that the spine is more supple in younger patients as compared to older patients, and that scoliosis associated with a limb length inequality may be reversible in younger individuals with limb length inequality correction.

Baumgart (1997) reported successful surgical implantation of an extendable nail (Fitbone®) and outcomes with no major complications in 12 adult patients operated on for limb lengthening and bone transport. Baumgart continued to report his positive experience with the device for the next 20 years (Baumgart 2005). Krieg (2007) published a clinical trial of eight adolescent patients who underwent leg lengthening with a motorized intramedullary lengthening device. The study focused on leg length achieved, time of rehabilitation, and rate of complications. The authors concluded that difficulties commonly associated with external fixators can be reduced with this method, and that short time of hospitalization and rehabilitation make it a promising procedure for limb lengthening.

POSNA (2015) found that percutaneous epiphysodeis is most often performed to equalize or reduce leg length discrepancy. POSNA noted that angular deformity can complicate an imperfectly performed epiphysodeis. Several techniques from open subtrochanteric osteotomy to closed intramedullary shortening have also been described. Unfortunately, only up to 10% of the length of a bone can be acutely...
shortened without unacceptable muscle weakness following the procedure.

**Policy updates:**

There is moderate quality evidence from a systematic review (Jauregui 2016) of low intensity pulsed ultrasound (LIPUS) or pulsed electromagnetic fields (PEMF) effects on regenerative bone growth that the treatment time in limb lengthening is reduced when these modalities are part of the post-operative rehabilitative program.

**Summary of clinical evidence:**

<table>
<thead>
<tr>
<th>Citation</th>
<th>Content, Methods, Recommendations</th>
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<tbody>
<tr>
<td>Jauregui (2016)</td>
<td><strong>Key points:</strong></td>
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| Regenerate bone stimulation following limb lengthening: a meta-analysis. | • Systematic review of LIPUS or PEMF effects on regenerative bone growth and whether they affect the treatment time in limb lengthening.  
  • Differences in bone healing index with and without the use of regenerate bone stimulation were the primary outcome measures.  
  • A total of 7 studies inclusive of a cohort of 153 patients found the mean healing index was 11.7 days/cm faster when using bone stimulation than in the comparison cohorts (33.7 vs 45.4 day, standardized mean difference of 1.16; p = 0.003).  
  • The authors concluded that LIPUS and PEMF both decreased the time for bone healing (healing index in days/cm) of the newly formed regenerate bone in the cohort of patients that underwent limb lengthening. |
| POSNA (2015)              | **Key points:**                   |
| Leg Length Discrepancy 2-5 cms | • Significant LLD (≥2cm) has an untoward effect on gait and is not tolerated well by patients.  
  • Percutaneous epiphysodeis is most often performed, there are a number of current publications on the technique.  
  • Angular deformity can follow an imperfectly performed epiphysodeis.  
  • Bone shortening procedures can equalize or reduce leg length discrepancy.  
  • Several techniques from open subtrochanteric osteotomy to closed intramedullary shortening have been described.  
  • Only up to 10% of the length of a bone can be acutely shortened without unacceptable muscle weakness following. |
| Weber (2014)              | **Key Points:**                   |
| Fluoroscopy and imageless navigation enable an equivalent reconstruction of leg length and global and femoral offset in THA | • A clinical trial of LLD in 125 patients randomized to either navigation-guided or fluoroscopy-controlled total hip arthroplasty (THA).  
  • Analyzing the relative accuracy of leg length restoration resulted in a mean difference of 0.2 mm (95% CI, -1.0 to +1.4 mm; p = 0.729).  
  • The authors concluded that Intraoperative fluoroscopy and imageless navigation seem equivalent in accuracy and precision to reconstruct leg length and global and femoral offset during THA. |
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<thead>
<tr>
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| Raczkowski (2010)      | **Key points:**  
  - A clinical trial of 369 children aged 5 to 17 years (209 girls, 160 boys) with LLD-related scoliosis  
  - LLD of 0.5 cm was observed in 27, 1 cm in 329, 1.5 cm in 9 and 2 cm in 4 children  
  - During the first follow-up examination, within 2 weeks, the adjustment of the spine to new static conditions was noted and correction of the curve occurred in 316 examined children (83.7%)  
  - In 53 children (14.7%) the correction was observed later and was accompanied by slight low back pain  
  - The time needed for real equalization of the discrepancy was 11.3 months.  
  - Leg length discrepancy <2 cm is a static disorder  
  - Leg length discrepancy equalization can eliminate scoliosis |
| Sabharwal (2008)       | **Key points:**  
  - A systematic review of 42 articles dealing with various assessment tools for measuring LLD  
  - While using a tape measure is an easy, safe, and noninvasive means of assessing LLD, it is less reliable when compared to radiographic techniques such as a CT scanogram  
  - A scanogram is one of the most commonly used methods for assessing LLD and has excellent reliability and minimal, if any, magnification error  
  - Despite a 5% magnification “error” in the measurement of the entire length of the lower extremity, there is minimal effect on assessment of LLD |
| Krieg (2007)           | **Key points:**  
  - A clinical trial of eight adolescent patients who underwent leg lengthening with a motorized intramedullary lengthening device  
  - The study focused on leg length achieved, time of rehabilitation, and rate of complications  
  - The consolidation index averaged 26 days/cm (range, 19–41 days/cm)  
  - The average hospital stay was 9.6 days  
  - The authors concluded that difficulties commonly associated with external fixators can be reduced with this method, and that short time of hospitalization and rehabilitation make it a promising procedure for limb lengthening |
| Baumgart (2005)        | **Key points:**  
  - Case report of a patient with Ollier's disease refractory to three failed attempts at leg-lengthening by the Ilizarov method.  
  - Patient limb-length discrepancy of 17.4 cm, with a valgus deformity of the right knee and recurvatum of the femur of 23 degrees was documented prior to treatment with fully implanted lengthening nail (Fitbone®).  
  - The implanted device was able to achieve full correction of all the deformities without complications. |
Citation | Content, Methods, Recommendations
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Knutson (2005) | Key points:
| • A systematic review of studies of LLD conducted from 1970–2005
| • In a general population the prevalence of LLD was found to be 90%, the mean magnitude of anatomic inequality was 5.2 mm obtained by accurate and reliable x-ray methods
| • The authors concluded that anatomic leg-length inequality is near universal, but the average magnitude is small and not likely to be clinically significant until it reaches ≥2 cm

References

Professional society guidelines/other:


Peer-reviewed references:


**CMS National Coverage Determinations (NCDs):**

No NCDs identified as of the writing of this policy.

**Local Coverage Determinations (LCDs):**


**Commonly submitted codes**

Below are the most commonly submitted codes for the service(s)/item(s) subject to this policy. This is not an exhaustive list of codes. Providers are expected to consult the appropriate coding manuals and bill accordingly.

<table>
<thead>
<tr>
<th>CPT Code</th>
<th>Description</th>
<th>Comment</th>
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<tbody>
<tr>
<td>20690</td>
<td>Application of a uniplane (pins or wires in one plane), unilateral, external fixation system</td>
<td></td>
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<tr>
<td>20692</td>
<td>Application of a multiplane (pins or wires in more than one plane)</td>
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unilateral, external fixation system (e.g., Ilizarov, Monticelli type)

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<th>Code</th>
<th>Description</th>
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<td>20696</td>
<td>Application of multiplane (pins or wires in more than one plane), unilateral, external fixation with stereotactic computer-assisted adjustment (e.g., spatial frame), including imaging; initial and subsequent alignment(s), assessment(s), and computation(s) of adjustment schedule(s)</td>
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<tr>
<td>27465</td>
<td>Osteoplasty, femur; shortening (excluding 64876)</td>
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<th>ICD 10 Code</th>
<th>Description</th>
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<tr>
<td>M21.951-M21.959</td>
<td>Unspecified acquired deformity of thigh</td>
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<tr>
<td>M21.961-M21.969</td>
<td>Unspecified acquired deformity of lower leg</td>
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<tr>
<td>M21.751-M21.759</td>
<td>Unequal limb length (acquired), femur</td>
<td></td>
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<tr>
<td>M21.761-M21.769</td>
<td>Unequal limb length (acquired), tibia and fibula</td>
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<tr>
<td>Q72.811-Q72.819</td>
<td>Congenital shortening of lower limb</td>
<td></td>
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<tr>
<td>Q72.891-Q72.899</td>
<td>Other reduction defects of lower limb</td>
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<tr>
<td>Q72.90-Q72.93</td>
<td>Unspecified reduction defect of lower limb</td>
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