

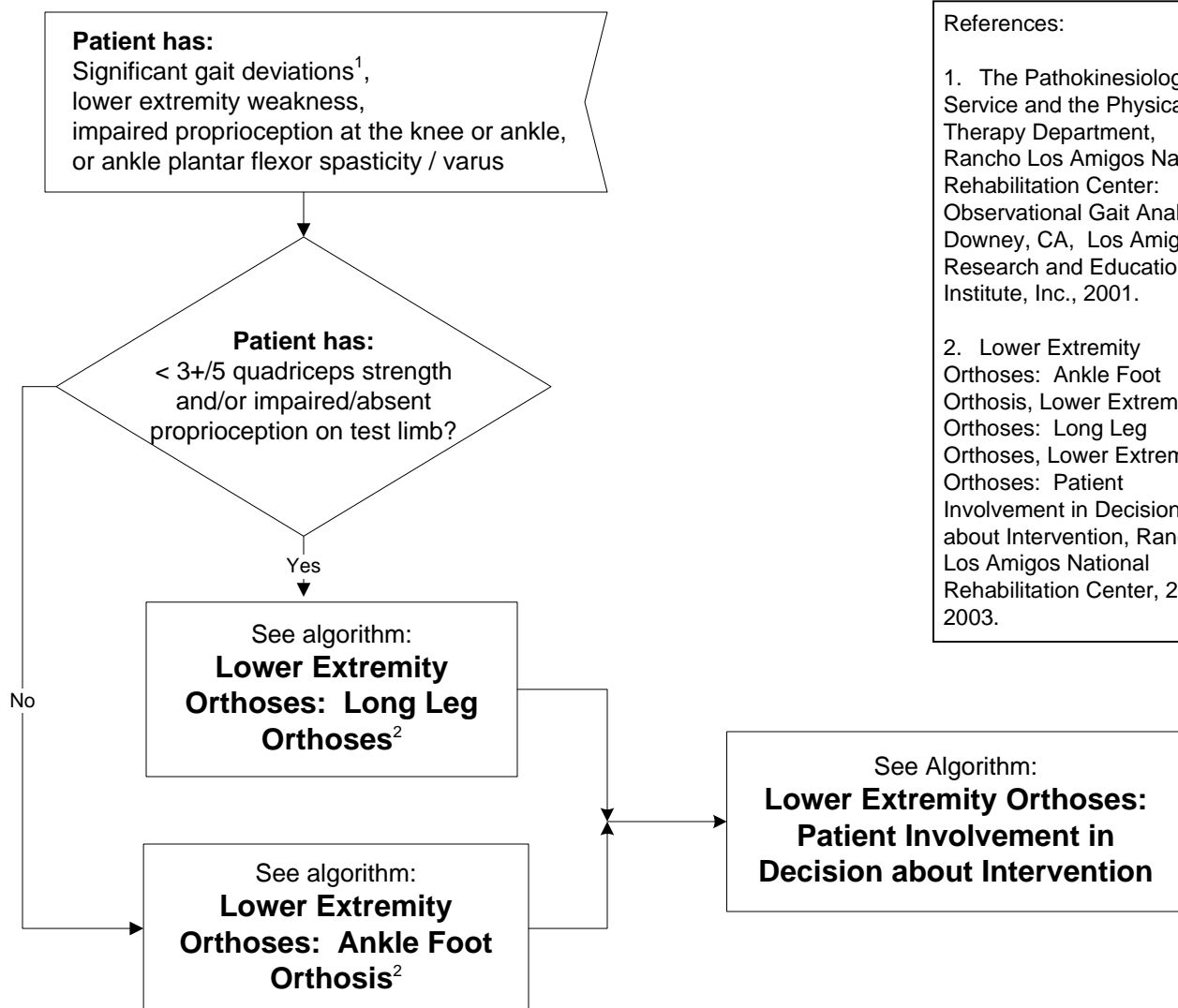
## Lower Extremity Orthoses: Overview

**Goal:** Choose appropriate orthosis given patient's clinical picture and/or impairments.

**Patient Population:** Persons with neurological impairments who require orthoses to ambulate or to perform upright functional activities

In addition to the impairments indicated, before ordering orthoses, factors should be considered such as whether the patient has:

- Sufficient ROM in Lower Extremity joints to align segments
- The ability (including cognition) and desire to meet ambulation goals
- Adequate cardiovascular endurance and adequate Upper Extremity (UE) and Lower Extremity (LE) strength for the intended activity, i.e. ambulation
- Sufficient strength to advance the limb



**DISCLAIMER STATEMENT**

"The algorithm/care described in this document does not represent the only medically acceptable approach. Each clinician caring for the patient is responsible for determining the most appropriate care."

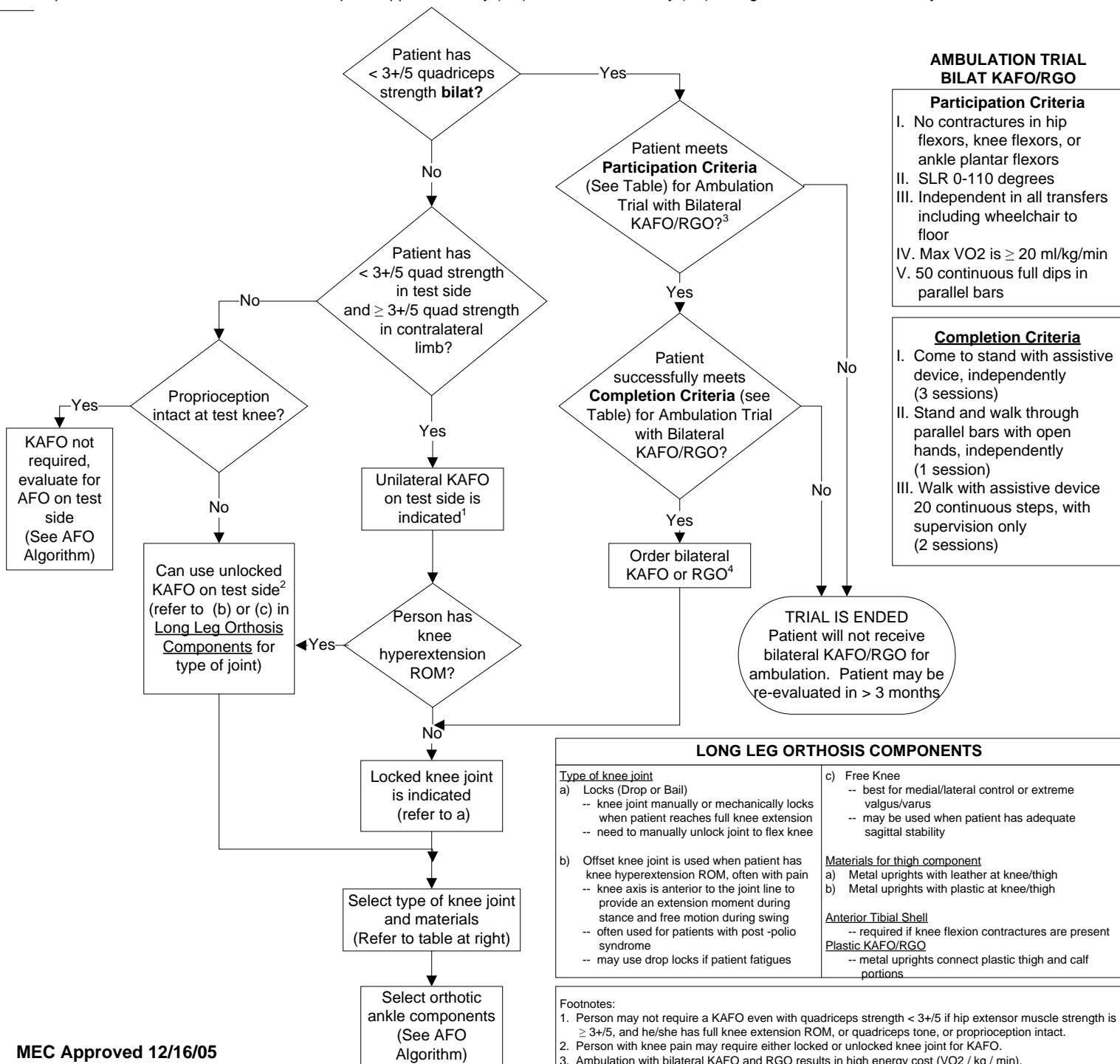
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**Goal:** Choose appropriate orthosis given patient's clinical picture and/or impairments.

**Patient Population:** Persons with neurological impairments who require orthoses to ambulate or to perform upright functional activities

In addition to the impairments indicated, before ordering Knee Ankle Foot Orthoses (KAFO) or Reciprocating Gait Orthoses (RGO), other factors should be considered such as whether the patient has:

- Sufficient ROM in Lower Extremity joints to align segments
- The ability (including cognition) and desire to meet ambulation goals
- Adequate cardiovascular endurance and adequate Upper Extremity (UE) and Lower Extremity (LE) strength for the intended activity, i.e. ambulation



**AMBULATION TRIAL BILAT KAFO/RGO**

**Participation Criteria**

- I. No contractures in hip flexors, knee flexors, or ankle plantar flexors
- II. SLR 0-110 degrees
- III. Independent in all transfers including wheelchair to floor
- IV. Max VO<sub>2</sub> is  $\geq 20$  ml/kg/min
- V. 50 continuous full dips in parallel bars

**Completion Criteria**

- I. Come to stand with assistive device, independently (3 sessions)
- II. Stand and walk through parallel bars with open hands, independently (1 session)
- III. Walk with assistive device 20 continuous steps, with supervision only (2 sessions)

**LONG LEG ORTHOSIS COMPONENTS**

<p><u>Type of knee joint</u></p> <p>a) Locks (Drop or Bail)</p> <ul style="list-style-type: none"> <li>-- knee joint manually or mechanically locks when patient reaches full knee extension</li> <li>-- need to manually unlock joint to flex knee</li> </ul> <p>b) Offset knee joint is used when patient has knee hyperextension ROM, often with pain</p> <ul style="list-style-type: none"> <li>-- knee axis is anterior to the joint line to provide an extension moment during stance and free motion during swing</li> <li>-- often used for patients with post-polio syndrome</li> <li>-- may use drop locks if patient fatigues</li> </ul>	<p>c) Free Knee</p> <ul style="list-style-type: none"> <li>-- best for medial/lateral control or extreme valgus/varus</li> <li>-- may be used when patient has adequate sagittal stability</li> </ul> <p><u>Materials for thigh component</u></p> <p>a) Metal uprights with leather at knee/thigh</p> <p>b) Metal uprights with plastic at knee/thigh</p> <p><u>Anterior Tibial Shell</u></p> <ul style="list-style-type: none"> <li>-- required if knee flexion contractures are present</li> </ul> <p><u>Plastic KAFO/RGO</u></p> <ul style="list-style-type: none"> <li>-- metal uprights connect plastic thigh and calf portions.</li> </ul>
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**Footnotes:**

1. Person may not require a KAFO even with quadriceps strength  $< 3+/5$  if hip extensor muscle strength is  $\geq 3+/5$ , and he/she has full knee extension ROM, or quadriceps tone, or proprioception intact.
2. Person with knee pain may require either locked or unlocked knee joint for KAFO.
3. Ambulation with bilateral KAFO and RGO results in high energy cost (VO<sub>2</sub> / kg / min).
4. RGO is a linked bilateral KAFO system, consisting of an additional pelvic band and cables that allow a reciprocating gait pattern. Velocity may be slower than with unlinked bilateral KAFOs.

Note: Hip flexor muscle strength of  $> 2/5$  is required to advance the swing limb. Increased hip flexion muscle strength is needed to advance the leg with an orthosis. A 2# ankle weight can be used to simulate the weight of a polypropylene KAFO.

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**RANCHO LOS AMIGOS NATIONAL REHABILITATION CENTER**  
**RANCHO R.O.A.D.M.A.P.** **PHYSICAL THERAPY DEPARTMENT**  
 (Recommendations for Orthotic Assessment, Decision-Making, And Prescription)  
**Lower Extremity Orthoses: Ankle Foot Orthoses (AFO)**

**Goal:** Choose appropriate AFO given patient's clinical picture and/or impairments.

**Patient Population:** Persons with neurological impairments who require AFO to ambulate or to perform upright functional activities.

**In addition to the impairments indicated, other factors should be considered before ordering AFO:**

- 1) Sufficient ROM in LE joints to align lower extremity segments
- 2) Patient's ability (including cognition) and desire to meet goals
- 3) Adequate cardiovascular endurance and adequate UE/LE strength for the intended activity, (e.g., ambulation)

**See information on materials on attached sheet**

**GROUP A:**

1. Rigid polypropylene AFO
2. Metal AFO with double-adjustable ankle joint (DAAJ) and poly footplate, locked
3. Metal AFO with DAAJ, locked.

**GROUP B:**

1. Polyarticulating AFO with dorsiflexion (DF) stop.
2. Metal AFO with DAAJ and poly footplate, DF stop.
3. Metal AFO with DAAJ, dorsiflexion stop

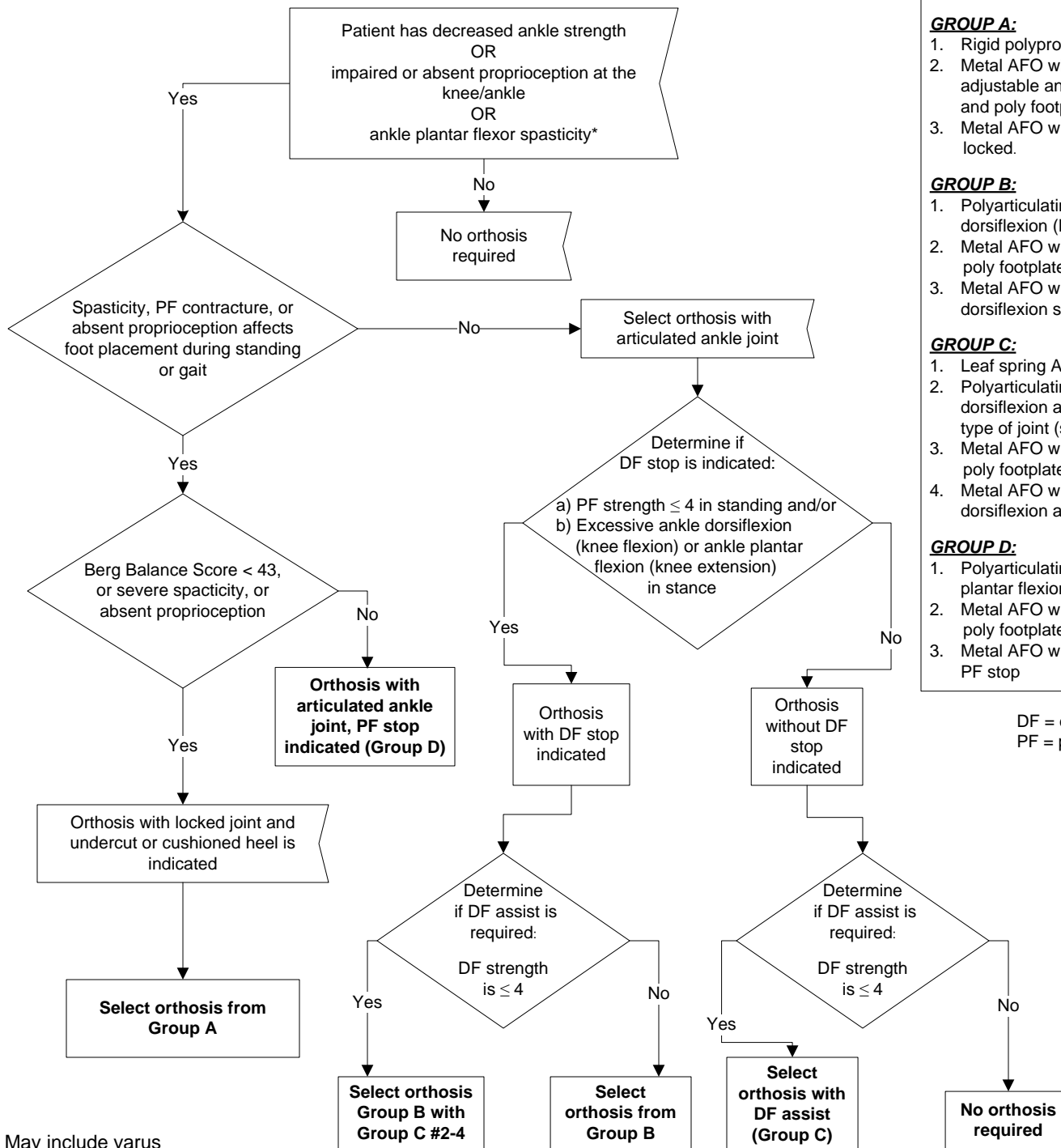
**GROUP C:**

1. Leaf spring AFO
2. Polyarticulating AFO with dorsiflexion assist. Select type of joint (see attached)
3. Metal AFO with DAAJ and poly footplate, DF assist
4. Metal AFO with DAAJ, dorsiflexion assist

**GROUP D:**

1. Polyarticulating AFO with plantar flexion (PF) stop.
2. Metal AFO with DAAJ and poly footplate, PF stop.
3. Metal AFO with DAAJ, PF stop

DF = dorsiflexion  
PF = plantar flexion



\* May include varus

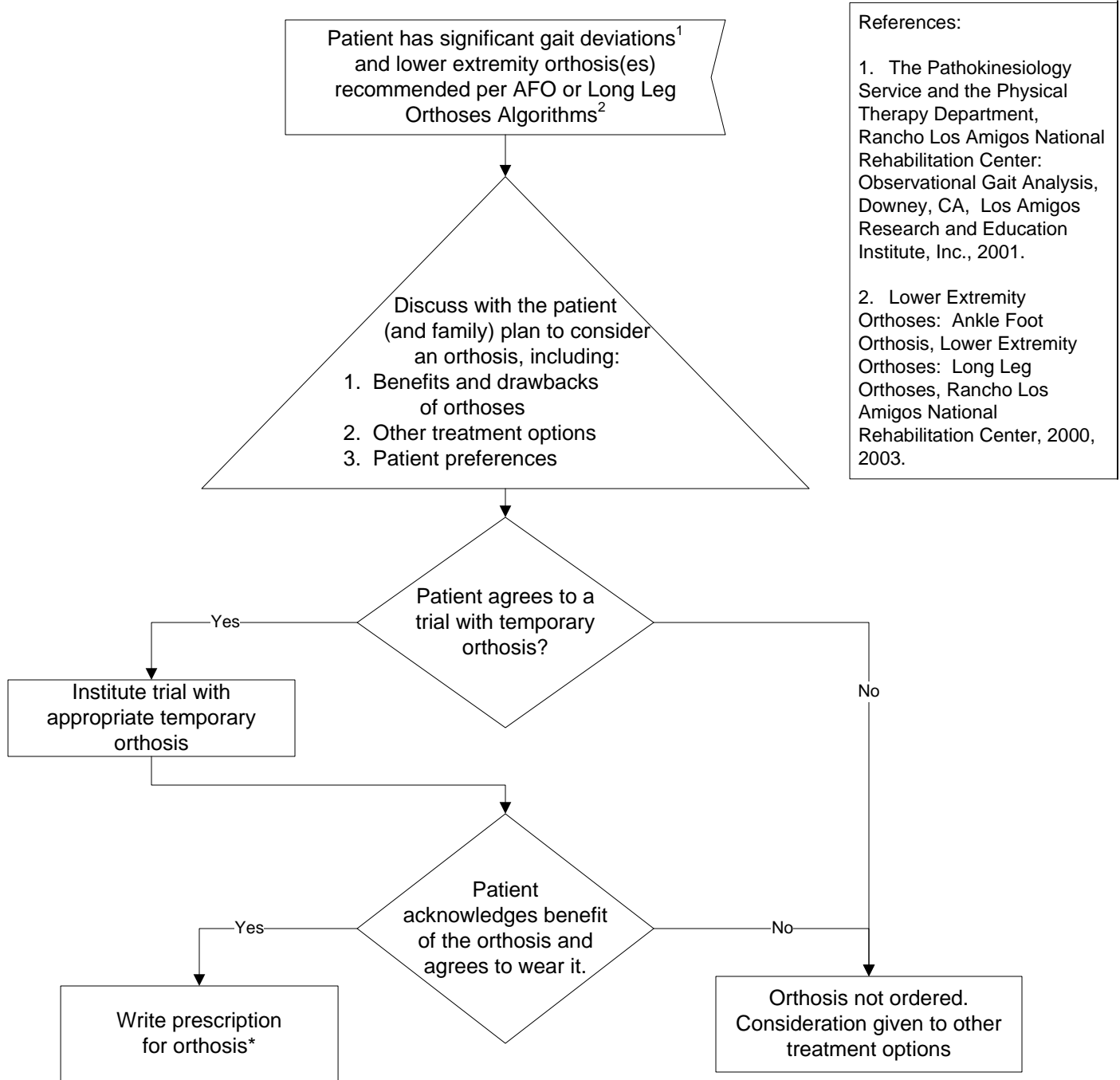
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**Lower Extremity Orthoses: Patient Involvement in Decision About Intervention**

Goal: Include patient in the decision about use of a lower extremity orthosis

Patient Population: Ambulatory adult patients at RLANRC



**References:**

1. The Pathokinesiology Service and the Physical Therapy Department, Rancho Los Amigos National Rehabilitation Center: Observational Gait Analysis, Downey, CA, Los Amigos Research and Education Institute, Inc., 2001.
2. Lower Extremity Orthoses: Ankle Foot Orthosis, Lower Extremity Orthoses: Long Leg Orthoses, Rancho Los Amigos National Rehabilitation Center, 2000, 2003.

\*Prescription is reviewed and initialed by clinical manager or designee.

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