Level of SB Function

CERVICAL REGION

C1
C2
C3
C4
C5 Elbow flexors: Partial upper extremity function
C6 Wrist extensors: Standing with stander/orthotics
C7 Elbow extensors
C8 Finger flexors

THORACIC REGION

T1
T2 Complete upper extremity function
T3–T8 Standing with stander/orthotics
T4 Possible exercise ambulation
T5
T6
T7 Partial function of trunk muscles
T8
T9–T12 Exercise ambulation
T10–L2 Bladder: Sympathetic input from hypogastric nerve
T11 Some function of trunk muscles
T12–S5 Sexual function varies

LUMBAR REGION

L1 Complete trunk function: exercise ambulation, sometimes household ambulation
L2 Hip flexor muscles present: exercise ambulation, household ambulation
L3 Knee extensors or Quadriceps muscles present: household ambulation, possible community ambulation
L4 Medial knee flexors present. Ankle dorsiflexors, 3/5 strength
L4–S5 Community ambulation
L5 May walk with or without crutches in home

SACRAL REGION

S1 Hip abductors, 3/5 strength
S2 Hip extensors, 4/5 strength. Ankle, plantarflexors, 3/5 strength. May walk with or without crutches
S2–S4 Bowel and bladder function varies. Bladder: parasympathetic input from the pelvic nerve. Somatic input from pudendal nerve to urethral sphincter
S3 All muscle activity may be within normal limits
S4
S5 and above Be aware of signs and symptoms of shunt malfunction and tethered spinal cord
<table>
<thead>
<tr>
<th>Spine Level</th>
<th>Possible Muscle Function</th>
<th>Possible Orthopaedic Concerns</th>
<th>Possible Orthotics Needed</th>
<th>Possible Equipment for Functional Mobility</th>
<th>Possible Cognition, Executive Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>T6-9</td>
<td>Upper trunk (abdominals) No LE function Abdominals + paraspinals = some pelvic control Complete trunk function Lower trunk (abdominals) Hip flexors (weak) 2/5</td>
<td>Kyphoscoliosis, Lumbar hyperlordosis Coxa valga–hip dislocation Decreased bone density Fractures</td>
<td>TLSO Night splints: body, hip abduction, KAF, AFO Early: Parapodium, (10 months of age and up to 2 years) Later: stander, RGO, HKAFO, KAFO Caution: Preserve UE function with level transfers, stable seated posture. Maintain strength + flexibility of shoulders/arms</td>
<td>Community: Wheelchair/ wheelchair cushion, transfer board Home: Walker/Crutches (for household or exercise walking), Raised, padded commode seat. Bath bench Mirror for skin checks Stand: 1 hour/day minimum starting at 10-12 months of age. Driving with hand controls Learn public transportation</td>
<td>Executive function impairments can impact educational, social and self help skills.</td>
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<td>T9-12</td>
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<tr>
<td>L1</td>
<td>Hip flexors 3/5 Hip adductors 3/5 Knee extensors 3/5</td>
<td>Scoliosis, Overuse of UE’s Lumbar hyperlordosis Hip subluxation Coxa valga–hip dislocation Decreased bone density Fractures</td>
<td>Night hip abduction splint Early: Parapodium (10 months of age up to 2 years) Later: Standar, RGO, HKAFO, KAFO (if quads are less than 3/5 strength) L3-5 May be temporarily addressed by twister cables and/or rotations straps</td>
<td>Community: wheelchair + cushion Home: Standar: 1 hour/day minimum Early: use walker or crutches Later: wheelchair in home</td>
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<tr>
<td>L2</td>
<td>Hip flexors 3/5 Hip adductors 3/5 Knee extensors 3/5</td>
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<tr>
<td>L3</td>
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<tr>
<td>L5</td>
<td>Medial knee flexors 3/5 Ankle dorsiflexor 3/5 Hip abductors (weak) 2/5 Lateral knee flexors 3/5 Ankle invertors 3/5 Long toe extensors (palpate at ankle)</td>
<td>Lumbar hyperlordosis Coxa valga</td>
<td>Night hip abduction splint Early: Parapodium</td>
<td>Community: wheelchair, walker, crutches, cane Strong medial hamstring needed for community gait Home: early on may need no support Later: may require UE support</td>
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<tr>
<td>S1</td>
<td>Hip abductors 3/5 Hip extensors (weak) 2/5 Plantar flexors (weak) 2/5 Hip extensors 4/5 Plantar flexors 3/5 Toe flexors 3/5</td>
<td>Monitor hips closely</td>
<td>AFO, SMO (supra malleolar orthotics), shoe inserts or no orthotics S1-2 Toeing out gait Use of crutches may decrease the valgus forces at the knee and also improve endurance</td>
<td>Community: walking with walker, crutches, cane. Gluteus lurch/Trendelenburg gait aided by cane or crutches. Long distance alternative: light weight wheelchair, bike, scooter Home: May need no support.</td>
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<tr>
<td>S2</td>
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<tr>
<td>S3-5</td>
<td>All muscle activity + bowel/bladder function may be normal</td>
<td>None</td>
<td>None or shoe inserts</td>
<td>None</td>
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</tr>
</tbody>
</table>

**Shunt malfunction and/or tethered cord:** May cause deterioration of daily living skills, progressive weakness, muscle contractures or orthopaedic deformities of the legs, scoliosis, back pain at the site of closure, deterioration of gait, changes in bowel and/or bladder function.

**Muscle grades:**

- 5 = normal
- 4 = good
- 3 = fair
- 2 = poor
- 1 = trace

**Flexion** = bend

**Extension** = straighten

**Adduction** = bring toward

**Abduction** = take away

**Invert** = move in

**Evert** = move out

**Medial** = inner

**Lateral** = outer

**T** = thoracic

**L** = lumbar

**S** = sacral

**O** = orthosis

**RGO** = reciprocating gait orthosis

**H** = hip

**K** = knee

**A** = ankle

**F** = foot

**CC** = crouch control

**Gait** = walking style

**Coxa** = hip

**Calcaneus** = heel bone

**Talus** = ankle bone

**Executive Function**

- 5 = normal
- 4 = good
- 3 = fair
- 2 = poor
- 1 = trace

**LE** = lower extremities/legs

**UE** = upper extremities/arms

**Contributing Editors**

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This information does not constitute medical advice for any individual. As specific cases may vary from the general information presented here, SBA advises readers to consult a qualified medical or other professional on an individual basis.

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