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Background

Peripheral Arterial Disease (PAD)
- Narrowing of the vessels secondary to atherosclerotic plaque buildup
- Results in ischemia to extremities which can lead to:
  - Intermittent claudication
  - Decreased distal pulses
  - Impaired healing

Lower Extremity Amputation
- 54% of amputations in the USA are due to PAD, either alone or in conjunction with diabetes (Kalapatapau V. et al)
- Transtibial and transfemoral most common
- Best outcomes with multidisciplinary approach

Body Weight Support (BWS) Systems
- Commonly used in patients after stroke or incomplete spinal cord injury
- Methods: treadmill or over-ground
  - Over-ground allows for assistive device training and varying terrains
- Parameters: high-intensity, high-repetition, task-specific
- Lack of research investigating BWS systems after lower extremity amputations

Case Description

Patient History
- 66 year old male presented to skilled nursing facility one month following left transtibial amputation due to gangrene
- Co-morbidities: PAD, diabetes mellitus, CHF, COPD, HTN, kidney disease, metastatic lung and liver cancer
- Premorbid status: employed as town manager, community ambulator limited to 100-150 feet; utilized walking stick on uneven terrain

Systems Review
- Impaired musculoskeletal system (decreased strength)
- Impaired neuromuscular system (decreased balance and ability to ambulate)

Examination

<table>
<thead>
<tr>
<th>Measure</th>
<th>Minimum</th>
<th>Maximum</th>
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<tbody>
<tr>
<td>30 Second Chair Stand Test</td>
<td>14 x/30s</td>
<td>19 x/30s</td>
</tr>
<tr>
<td>50 Meter Walk Test</td>
<td>0.25 m/s</td>
<td>0.73 m/s</td>
</tr>
<tr>
<td>Left hip flexion</td>
<td>4+/5</td>
<td>5/5</td>
</tr>
<tr>
<td>Left knee flexion</td>
<td>5/5</td>
<td>5/5</td>
</tr>
<tr>
<td>Bed mobility</td>
<td>Modified Independent</td>
<td>Independent</td>
</tr>
<tr>
<td>Stairs ≥ 10 steps</td>
<td>Minimal Assist (Min A)</td>
<td>Independent</td>
</tr>
<tr>
<td>Wheelchair ≥ 15 feet</td>
<td>Minimal Assist (Min A)</td>
<td>Independent</td>
</tr>
<tr>
<td>Level of Assist</td>
<td>Contact Guard/Mn A</td>
<td>Supervision</td>
</tr>
<tr>
<td>Distance</td>
<td>12’ x 1 with walker</td>
<td>125’ x 2 with walker</td>
</tr>
</tbody>
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PT Diagnosis

Practice Pattern 4J
Impaired motor function, muscle performance, range of motion, gait, locomotion, and balance associated with amputation

Interventions

Time Dedicated to Interventions

Transfer Training
- ST to Stand
- Stand to ST
- Wheelchair to Bed
- Bed to Wheelchair

Therapeutic Exercise
- Seated bilateral leg exercises:
  - Right: marching, knee extension and flexion, dorsiflexion, plantar flexion
  - Left: marching, knee extension and flexion

Focus: ambulation distance and obstacle negotiation

Neuromuscular Re-Education
- Functional outcome measures indicated decreased fall risk and increased functional mobility.
- Use of over-ground BWS systems may be a safe and effective method for gait training in patients with lower extremity amputations.
- Future studies should be performed to determine the benefits and limitations of gait training using an over-ground BWS systems in individuals with lower extremity amputation.

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References