Modified Box and Blocks Test With Motion Analysis

Rachel Smith & Craig Chapman
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Introduction

(Ziegler-Graham, MacKenzie, Ephraim, Travison, & Brookmeyer, 2008)
Introduction

26%

23%

(Biddiss & Chau, 2007a)
"There is a need for a 'standards' for outcome measures in upper limb prosthetics."

(Hill et al., 2009, p77)
The Box and Blocks Test

(Mathiowetz, et al., 1985)
The Box and Blocks Test

- No normative data
- Faster results may not necessarily mean fewer compensatory movements

(Hebert & Lewicke, 2012)
Fig. 1. Torso right side bending of one subject from each group while opening a door.

Carey, Highsmith, Maitland, & Dubey, 2008, p 1132
The Box and Blocks Test

- No normative data
- Faster results may not necessarily mean fewer compensatory movements (Hebert & Lewicke, 2012)
- No standardized finishing position (Hebert & Lewicke, 2012)
- Too many patterns to analyze with motion tracking
Purpose

1. Simplify the Box and Blocks Test so it is more appropriate for motion analysis
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2. Compare movement parameters of the trunk, shoulders, elbow, wrist, and hand in individuals performing the Box and Blocks test with and without a brace
Bracing

- The brace is expected to mimic the effect of a prosthetic limb by restricting wrist movement
Fig. 1. Torso right side bending of one subject from each group while opening a door.

Carey, Highsmith, Maitland, & Dubey, 2008, p 1132
Hypothesis

- Predicted increase in degrees of movement with brace
- Predicted decrease in degrees of movement with brace
Participants

- 16 Right-handed men and women
  - 11 participants’ data used in analysis
- No upper extremity injuries
- Ethics approval from the Research Ethics Board 2 at the University of Alberta
- Signed consent form from participants
Design

Random Assignment (n = 16)

- Brace (n = 8)
  - Box and Blocks
  - No Brace
  - Box and Blocks

- No Brace (n = 8)
  - Box and Blocks
  - Brace
  - Box and Blocks
Design

Box and Blocks

Trials
- 10 Practice
- 110 Test

Configurations
- 1 Block x 4
- 2 Blocks x 6
- 4 Blocks x 1
Reach to block:
Top View

Move block to target:
Behind view

Return to start:
Top View
Reach to block:
Top View
Conclusion

- Simplified the Box and Blocks Test
- Compared movement parameters of the finger
- Further analysis of the wrist, elbow, shoulders, and torso required
- Repeat study and involve individuals with upper extremity prosthetics (Carey et al., 2008)
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Questions?
References