Exercise Testing: Current Trends and Sport-Specific Examples

Madi Currie
Introduction

• Madi Currie, RA at Lakeshore Foundation
• Graduate of Samford University, Class of 2019
• PhD student at University of Alabama at Birmingham
Overview of Topics

• Current trends of exercise testing
• Comparing and contrasting current field-based and lab-based exercise tests
• Disability-specific characteristics for disabled athletes and adapted sports
• Implementation of sport-specific characteristics
• University setting availability for laboratory testing
Defining Assessments:

- Body Composition: measurements of physical proportions and areas of improvement
- Cardiovascular: ability to use large muscle groups to perform dynamic exercise at moderate to high intensities
- Musculoskeletal: tests both strength and endurance
- Balance: tests functional ability and base balance level
- Flexibility: tests and measures range of motion in functional muscles
Testing Timelines:

Pre-Season:
• Before any training adaptations have taken place

During Season:
• To track any adaptations to fitness-related components

Post-Season:
• Following competition and training season
When to test?
How to test?
<table>
<thead>
<tr>
<th>What are you testing?</th>
<th>Field-Based:</th>
<th>Lab-Based:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Body Composition</td>
<td>Circumference Measures</td>
<td>DXA Scanner</td>
</tr>
<tr>
<td>Cardio</td>
<td>12-Minute Push Test</td>
<td>Arm Crank VO$_{2\text{max}}$</td>
</tr>
<tr>
<td>Muscular Endurance</td>
<td>Push Up Test</td>
<td>Arm Crank Wingate Test</td>
</tr>
<tr>
<td>Muscular Strength</td>
<td>Medicine Ball Throw</td>
<td>Biodex System3 5RM</td>
</tr>
<tr>
<td>Flexibility</td>
<td>Back Scratch Test</td>
<td>AROM and PROM</td>
</tr>
</tbody>
</table>
Specific Lab-Based Exercise Testing
<table>
<thead>
<tr>
<th>Body Composition</th>
<th>Cardio Fitness</th>
<th>Muscular Endurance</th>
<th>Muscular Strength</th>
<th>Balance</th>
<th>Flexibility</th>
</tr>
</thead>
<tbody>
<tr>
<td>DXA</td>
<td>VO_{2\text{max}}</td>
<td>VO_{2\text{max}}</td>
<td>Biodex</td>
<td>Biodex</td>
<td>AROM</td>
</tr>
<tr>
<td>BIA</td>
<td>METs</td>
<td>Arm Ergometer</td>
<td>Dynamometer</td>
<td>STAR Test</td>
<td>PROM</td>
</tr>
</tbody>
</table>
Efficiency of Existing Test Batteries

- Energy:
  - Physically demanding tests
    - $\text{VO}_{2\text{max}}$
    - Muscular endurance
      - Large muscle groups
    - Muscular strength
      - Fine muscle movements

- Time:
  - Time consuming tests
    - Cardio
    - Balance
      - Dynamic cool down
    - Flexibility
      - Full-body cool down
Efficacy of Exercise Testing

Body Composition:
- DXA
- BIA

Cardiovascular Fitness:
- VO$_{2\text{max}}$
- HRR

Muscular Endurance:
- Subjective

Muscular Strength:
- 1-RM
- Biodex

Balance:
- Biodex

Flexibility:
- Range of Motion, A/P
Disability Specific Characteristics Using Fitness Components and Sport-Specific Examples
Wheelchair Rugby
Wheelchair Tennis
Wheelchair Basketball
Power Soccer
Implementation
Practice to Play

• Athletes:
  • Focus on the adaptive principles of exercise training
  • According to Team USA:
    • Individuality
    • Specificity
    • Progression
    • Overload
    • Adaptation
    • Recovery
    • Reversibility

• Staff:
  • Practice reproducibility, reliability, validity, and consistency
University Involvement

- Body Composition Assessments
- Cardiorespiratory Fitness Assessments
- Anaerobic Fitness Assessments
- Fitness and Wellness Packages
Conclusions

• Evidence-based practices for exercise testing
• Maintain consistency during testing timelines
• Consider subjectivity across both athletes and sports
• Focus on both efficiency and efficacy when testing
• Remember sport-related disability characteristics
• Take advantage of universities for exercise testing
QUESTIONS