Developing Gait Analysis as Part of Astronaut Fitness Assessment

Presented by: Andrew Winnard
I have no financial relationships to disclose.

I will not discuss off-label use and/or investigational use in my presentation.
Astronaut Fitness Assessment
Gait Analysis
Definition of an Outcome Measure:

A measure of change, from one point in time, (before an intervention) to another point in time (after an intervention). Used to see any change in health status is attributable to the intervention.
<table>
<thead>
<tr>
<th>Evidence</th>
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<tbody>
<tr>
<td><strong>Chuck Layne NASA studies</strong></td>
<td>Decreased stride length</td>
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<td>(study groups of 6-7 astronauts)</td>
<td>Increased base of support</td>
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<td>(Mostly EMG &amp; Kinematic studies)</td>
<td>Decreased ankle dorsiflexion</td>
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<td><strong>Bloomberg Review</strong></td>
<td>Oscilopsia</td>
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<tr>
<td>(Reviewed kinematic studies)</td>
<td>Maintain stationary head</td>
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<tr>
<td>(Not systematic review)</td>
<td>Shock absorbing gait</td>
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</table>
Gait Analysis

- Stride length/width
- Ankle Angles
- Knee Flexion/Extension
- Hip Flexion/Extension
- Pelvic Stability
Parallax

Locations

Marker placement

Long setup

What can go wrong?
Study

Pilot Study

- 3 Participants
- JSC & EAC
- 12 weeks
- All angles
- No change?
Results

Significant (P<0.05) variation in all 3 participants
Variation in Anterior Pelvic Tilt EAC vs JSC
Ideas

Accelerometer

Gyro

3D

Magnetic
Gait Analysis

Justified

Reliability Issue

Consider marker device or no marker system

& 3D analysis

CSP (2012). Outcome Measures *UK Chartered Society of Physiotherapy* [online]


LAYNE Charles S. et al. (2004). Alterations in Human Neuromuscular Activation During Overground Locomotion after Long-Duration Spaceflight *Journal of Gravitational Physiology* **11** (3) 1-16
