P1752.2
Cardiorespiratory Subgroup Teleconference

Working Group Sponsored by IEEE Engineering in Medicine & Biology Standards Committee

December 15, 2022
17:00 UTC
Consider approval of minutes from Nov 17, 2022
Prior slides / submitted for posting

Discussion:
- Presentation: *Multiscale/multivariate data/metadata schema considerations*
- Use cases: Health -> Aging and “pre”-disease -> Disease
- Value statement document for key stakeholders & collaborators

Other business
- Schema timeline / initial draft target
- Next meeting: 3rd or 4th Thursday each month *at what time?*
Physical Activity / Exercise
Cardiorespiratory

Intensity
- Movement
- Light Activity
- Aerobic Exercise
- Vigorous Exercise
- Recovery
- Rest State

General Classifications
- Cardiovascular
- Strength
- Flexibility
- Balance

Variables of Interest*
- Hemodynamics
  - BP, P, TPR, Q
- Respiratory
  - BP, P, TPR, Q
- Gas Exchange
  - RR, TV, Ventilation
- Autonomics
  - HR, HRV metrics
- Symptoms
  - Rate perceived exertion

* Examples
Physical Activity

Overview

1. What happens during physical activity?
2. What happens during recovery from physical activity?
3. What are we capturing with mobile health?

Example:

AHA & PAA : HL7 FHIR

“Physical Activity Implementation Guide”

- Fitness assessment as ‘vital sign’
- P1752.2 schema component metrics

https://build.fhir.org/ig/HL7/physical-activity/measures.html#base
# Physical Activity Trajectories and Mortality

<table>
<thead>
<tr>
<th>Physical activity trajectory</th>
<th>Baseline PAEE (SD)</th>
<th>Most recent PAEE (SD)</th>
<th>No</th>
<th>Person years</th>
<th>Deaths</th>
<th>Adjusted mortality rate</th>
<th>Potential deaths averted (%)</th>
<th>Hazard ratio (95% CI)</th>
<th>Hazard ratio (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Low</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maintain</td>
<td>0 (0)</td>
<td>0 (0.4)</td>
<td>2207</td>
<td>23,613</td>
<td>842</td>
<td>2433</td>
<td>Reference</td>
<td>1.00</td>
<td></td>
</tr>
<tr>
<td>Increase</td>
<td>0 (0)</td>
<td>6.4 (3.2)</td>
<td>1127</td>
<td>13,270</td>
<td>210</td>
<td>1905</td>
<td>70 (10)</td>
<td>0.76 (0.65 to 0.88)</td>
<td></td>
</tr>
<tr>
<td><strong>Medium</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Decrease</td>
<td>5.5 (1.6)</td>
<td>1.0 (1.9)</td>
<td>2606</td>
<td>29,727</td>
<td>709</td>
<td>2270</td>
<td>48 (7)</td>
<td>0.90 (0.81 to 1.00)</td>
<td></td>
</tr>
<tr>
<td>Maintain</td>
<td>5.5 (1.6)</td>
<td>5.3 (1.8)</td>
<td>1923</td>
<td>23,032</td>
<td>290</td>
<td>1811</td>
<td>143 (21)</td>
<td>0.72 (0.62 to 0.82)</td>
<td></td>
</tr>
<tr>
<td>Increase</td>
<td>5.5 (1.6)</td>
<td>10.0 (3.0)</td>
<td>1631</td>
<td>19,852</td>
<td>206</td>
<td>1583</td>
<td>169 (25)</td>
<td>0.62 (0.53 to 0.72)</td>
<td></td>
</tr>
<tr>
<td><strong>High</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Decrease</td>
<td>11.9 (2.8)</td>
<td>5.0 (3.8)</td>
<td>2482</td>
<td>29,605</td>
<td>452</td>
<td>2081</td>
<td>104 (15)</td>
<td>0.80 (0.71 to 0.91)</td>
<td></td>
</tr>
<tr>
<td>Maintain</td>
<td>11.9 (2.8)</td>
<td>11.0 (2.7)</td>
<td>818</td>
<td>9,987</td>
<td>81</td>
<td>1678</td>
<td>75 (11)</td>
<td>0.67 (0.53 to 0.84)</td>
<td></td>
</tr>
<tr>
<td>Increase</td>
<td>11.9 (2.8)</td>
<td>14.4 (3.1)</td>
<td>566</td>
<td>6,988</td>
<td>50</td>
<td>1439</td>
<td>69 (10)</td>
<td>0.58 (0.43 to 0.78)</td>
<td></td>
</tr>
</tbody>
</table>

WHO minimum physical activity (PA) guidelines: (150 mins/week of moderate-intensity PA) = PAEE of 5 kJ/kg/day

WHO recommendations for additional health benefits: (300 mins/week of moderate-intensity PA) = PAEE of 10 kJ/kg/day

BMJ 2019; 365 doi: https://doi.org/10.1136/bmj.l2323 (Published 26 June 2019)
Emphasis 2: Utility

Physical Activity Trajectories and Mortality

The metrics used to measure and characterize health also provide for key context for measuring and characterizing disease...
Physical Activity Metrics

- Fitness & performance
- Health maintenance & wellness
- Chronic disease...

Example:
Cardiomyopathy
& heart failure
(Metric deviations)
Timeline / Stakeholder Engagement

- MedTech Industry
- Data Industry
- Advocacy Organizations
- Professional Organizations

ACC Scientific Sessions (March 4-6, 2023, in New Orleans)
EHRA Scientific Sessions (April 16-18, 2023, in Barcelona)
HRS Scientific Sessions (May 19-21, 2023, in New Orleans)
IEEE EMBS Conference (July 24-28, 2023, in Sydney)
ESC Congress (August 25-28, 2023, in Amsterdam)
**HRX Conference** (September 21-23, 2023, in Seattle)
AHA Scientific Sessions (November 11-13, 2023, in Philadelphia)
Next meeting:
January 2023

...3rd vs 4th Thursday of the month - (17:00 → 16:00 UTC)?