P1752.2
Cardiorespiratory Subgroup Teleconference

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

November 17, 2022
17:00 UTC
P1752.2
Cardiorespiratory Subgroup

Agenda
Nov 17, 2022

Attendance
Consider approval of minutes from October 27, 2022
Prior minutes & slides / completed and posted

Discussion:
✓ Review
  ‣ Exercise physiology
  ‣ Other considerations about cardiorespiratory fitness (CRF)
  ‣ Health -> Aging and “pre”-disease -> Disease
✓ Use case example

Other business
✓ Collaborations / stakeholder engagements
✓ Next meeting : New proposal
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?

Variables of interest:

- Hemodynamics (Q, BP, HR, TPR)
- Respiratory (Respiration Rate, Tidal Volume, Ventilation)
- Gas Exchange (VO2, VCO2)
- Heart Rate Variability (HRV)
- Symptoms (Rating of Perceived Exertion, Dyspnea, Angina)
Physical Activity / Exercise

Cardiorespiratory

**Intensity**
- Movement
- Light Activity
- Aerobic Exercise
- Vigorous Exercise

**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 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>
</tr>
</thead>
<tbody>
<tr>
<td>Low</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<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>
</tr>
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<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>
</tr>
<tr>
<td>Medium</td>
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<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>
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<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>
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<tr>
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<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>
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<tr>
<td>High</td>
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<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>
</tr>
<tr>
<td>Maintain</td>
<td>11.9 (2.8)</td>
<td>11.0 (2.7)</td>
<td>818</td>
<td>9987</td>
<td>81</td>
<td>1678</td>
<td>75 (11)</td>
<td>0.67 (0.53 to 0.84)</td>
</tr>
<tr>
<td>Increase</td>
<td>11.9 (2.8)</td>
<td>14.4 (3.1)</td>
<td>566</td>
<td>6988</td>
<td>50</td>
<td>1439</td>
<td>69 (10)</td>
<td>0.58 (0.43 to 0.78)</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)
Use case paradigms for developing P1752.2 Cardiorespiratory Schemas

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

‘Partners’

Listing of key stakeholders in the “Athleticism” paradigm

Professional organization & industry

Other P1752.2
Open mHealth stakeholder entities
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/ACC

"Variety of exercise stress test protocols…"

- Prognostic assessment
- P1752.2 schema component metrics

https://build.fhir.org/ig/HL7/physical-activity/measures.html#base
Use case paradigms for developing P1752.2 Cardiorespiratory Schemas

Maintain alignment with existing “gold standard” clinical data landscape

DiMe Society Playbook:
- Clinical Research
- Clinical Care
- Public Health
Physical Activity Metrics

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

Example:

Impact of cardiomyopathy/ heart failure
(Metric deviations)
Physical Activity Trajectories and Mortality

The metrics used to measure and characterize health also provide for key context for measuring and characterizing disease...
Collaborations / Stakeholder Engagement

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

AHA Conference (Nov 5-7, 2022, Chicago, USA)
ACC Scientific sessions (March 2023)
HRS Scientific Sessions (May 2023)
Next meeting:
December 15, 2022 (17:00 UTC)

Changed to 3rd Thursday of the month (ongoing)