Frailty and Sarcopenia
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Careyn Utrecht

Board members of the Dutch association for Geriatric  
Physical Therapists (NVFG)  
Members of the International association for Physical  
Therapists working with Older People (IPTOP)
9:00 Opening.
9:10 Healthy Ageing and the importance of physical activity.
10:00 Differences between countries
11:00 Coffee
11:15 Exercise programs, practicing the Otago Program
12:30 Lunch
13:30 Tertiary prevention (real patient)
14:30 Fall prevention
15:00 Frailty / sarcopenia and training principles
16:00 The end!
Frailty

No consensus:
- Increased risk on adverse health outcomes
- It is Dynamic and can be influenced by interventions
- A relative small event can lead towards a disproportional chance in health status.
Figure 1  Vulnerability of frail elderly people to a sudden change in health status after a minor illness  The green line represents a fit elderly individual who, after a minor stressor event such as an infection, has a small deterioration in function. The red line is the same minor illness in a frail elderly.

Andrew Clegg, John Young, Steve Illife, Marcel Olde Rikkert, Kenneth Rockwood

Frailty in elderly people

The Lancet Volume 381, Issue 9868 2013 752 - 762

http://dx.doi.org/10.1016/S0140-6736(12)62167-9
Medical syndrome

Frailty is multi-dimensional

Interactive

A diversity of the expression of frailty

Frailty is dynamic

Risk Factor Approach

Frailty

- Physical Factors (muscle strength, mobility, physical activity, nutritional status)
- Personal factors (Age, education)
- Psycho-social factors (social support, mood, loneliness)
- Cognitive factors (memory, orientation, dementia)
- External factors (living situation, financial situation)
- Health status (comorbidity/multimorbidity, drug use)

Frailty is dynamic

A diversity of the expression of frailty
Model of Gobbens 2011

Age

Health promotion and prevention

Age

Prevent/Delay frailty

Diminish frailty

Prevent /Delay adverse outcomes

Life-course determinants
- age
- education
- income
- sex
- ethnicity
- marital status
- living environment
- lifestyle
- life events
- biological (including genetic)

Disease(s)
Decline in physiologic reserve

Physical frailty
Decline in:
- nutrition
- mobility
- physical activity
- strength
- endurance
- balance
- sensory functions

Psychological frailty
Decline in:
- cognition
- mood
- coping

Social frailty
Decline in:
- social relations
- social support

Adverse outcomes
Disability
Health care utilization
Death
## Frailty- models

**Table 2: Spectrum of Frailty Models**

| Common features: Age-related vulnerability to stressors, clinically identifiable, multisystem impairment |
|---|---|
| **Medical syndrome** | **Risk factor approach** |
| • Hypothesis-driven | • Variable pathway and pathophysiology |
| • Limited number of components linked to defined underlying biologic/physiologic pathway | • Unlimited number of deficits |
| • Medical syndrome: aggregate of Sx and signs associated with morbid process constituting picture | • Geriatric syndrome: accumulated effects of impairments in multiple domains resulting in a particular adverse outcome: falls |
What do you think?

- A: Medical syndrom
- B: Accumulation of deficits
Prevalence frailty

‘Kwetsbare Ouderen’, Sociaal Cultureel Planbureau, 2011
Survival probability

Fysiotherapie en dementie

05-11-2014

Fysiotherapie en dementie
Sarcopenia

- Sarcopenia; a decrease of muscle mass
- A decrease of muscle mass leads to a decrease of muscle strength
- And this will lead eventually to a decrease of function and mobility and an increased risk for falling
Age-related changes in muscle mass in thigh cross-sectional area of two people with similar BMI
Shift of type 1 fast twitch towards type II
Lang et al 2010

A decrease in the muscle strength to stand up from a chair, walking stairs and balance
• 0.5-1% loss of muscle mass per year, starting from 40th lifeyear
• Prevalence; 9-18% in 65+ with an increase to 30% above 80
• Multiple factors involved in this decrease; Inactivity (lifestyle) biological (inflammation) and clinical factors (diseases)
• Risk on disability in men larger than in women (OR resp. 3.5 and 1.5)
• Include sarcopenia in your problem analysis in all 65+ patient

• A good indication of general strength is hand grip force as measured by a Handheld Dynamometer (HHD)
To increase aerobic capacity; each day 30 to 60 minutes with moderate intensity
To increase force; at least 2 times a week with weights and functional (staircase), moderate severe intensity
To increase flexibility at least 2 minutes a day → active stretching exercises
Table 1
Categories of exercise intensity and the subjective and objective measures [both absolute and relative] accompanying each category. The relative intensity measures such as % HR\text{max}, %HRR [heart rate reserve = HR\text{max} – resting HR] and %VO\text{2max} [maximal oxygen uptake] will not always correspond to the same RPE among individuals nor will the ability of clients to exercise for a specific duration at each intensity since this varies depending on training status and other personal characteristics. Subjective measures are from Borg’s RPE scales where C = category scale [6–20] and C-R = category-ratio scale [0–10] [7].

<table>
<thead>
<tr>
<th>Intensity category</th>
<th>Objective measures</th>
<th>Subjective measures</th>
<th>Descriptive measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>SEDENTARY</td>
<td>&lt; 1.6 METs</td>
<td>RPE (C): &lt; 8</td>
<td>• activities that usually involve sitting or lying and that have little additional movement and a low energy requirement</td>
</tr>
<tr>
<td></td>
<td>&lt; 40% HR\text{max}</td>
<td>RPE (C-R): &lt; 1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>&lt; 20% HRR</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>&lt; 20% VO\text{2max}</td>
<td></td>
<td></td>
</tr>
<tr>
<td>LIGHT</td>
<td>1.6 &lt; 3 METs</td>
<td>RPE (C): 8-10</td>
<td>• an aerobic activity that does not cause a noticeable change in breathing rate</td>
</tr>
<tr>
<td></td>
<td>40 &lt; 55% HR\text{max}</td>
<td>RPE (C-R): 1-2</td>
<td>• an intensity that can be sustained for at least 60 minutes</td>
</tr>
<tr>
<td></td>
<td>20 &lt; 40% HRR</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>20 &lt; 40% VO\text{2max}</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MODERATE</td>
<td>3 &lt; 6 METs</td>
<td>RPE (C): 11-13</td>
<td>• an aerobic activity that is able to be conducted whilst maintaining a conversation uninterrupted</td>
</tr>
<tr>
<td></td>
<td>55 &lt; 70% HR\text{max}</td>
<td>RPE (C-R): 3-4</td>
<td>• an intensity that may last between 30 and 60 minutes</td>
</tr>
<tr>
<td></td>
<td>40 &lt; 60% HRR</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>40 &lt; 60% VO\text{2max}</td>
<td></td>
<td></td>
</tr>
<tr>
<td>VIGOROUS</td>
<td>6 &lt; 9 METs</td>
<td>RPE (C): 14-16</td>
<td>• an aerobic activity in which a conversation generally cannot be maintained uninterrupted</td>
</tr>
<tr>
<td></td>
<td>70 &lt; 90% HR\text{max}</td>
<td>RPE (C-R): 5-6</td>
<td>• an intensity that may last up to about 30 minutes</td>
</tr>
<tr>
<td></td>
<td>60 &lt; 85% HRR</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>60 &lt; 85% VO\text{2max}</td>
<td></td>
<td></td>
</tr>
<tr>
<td>HIGH</td>
<td>≥ 9 METs</td>
<td>RPE (C): ≥ 17</td>
<td>• an intensity that generally cannot be sustained for longer than about 10 minutes</td>
</tr>
<tr>
<td></td>
<td>≥ 90% HR\text{max}</td>
<td>RPE (C-R): ≥ 7</td>
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</tr>
<tr>
<td></td>
<td>≥ 85% HRR</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>≥ 85% VO\text{2max}</td>
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<td></td>
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</tbody>
</table>
Activity norm values

- Dutch: 30 minutes moderate severe physical active 5 days a week (preferably 7)
- Fitnorm: at least 3 x a week een vigorous physical activity
- Nursinghome residents: every day 15-30 minutes moderate severe physical active in several bouts (daily activity can be moderate severe allready).
- ACSM: 150 minutes a week (30 min. a day, 5 days a week) moderate severe. At least 10 minutes without a break, (ADL and other daily activities not included).
Test uw kennis

What percentage of age 75+ is in compliance with the Dutch Norm.

- A: 10%
- B: 20%
- C: 30%
- D: >40%
### Percentage inactive/active adults in the Netherlands

<table>
<thead>
<tr>
<th>Leeftijd</th>
<th>inactive</th>
<th>Dutch norm</th>
<th>Fitnorm</th>
<th>Combinorm</th>
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</thead>
<tbody>
<tr>
<td>18-34</td>
<td>2.7</td>
<td>59.1</td>
<td>27.0</td>
<td>68.1</td>
</tr>
<tr>
<td>35-54</td>
<td>4.2</td>
<td>63.4</td>
<td>21.7</td>
<td>69.5</td>
</tr>
<tr>
<td>55-64</td>
<td>4.0</td>
<td>59.1</td>
<td>19.3</td>
<td>66.9</td>
</tr>
<tr>
<td>65-74</td>
<td>6.4</td>
<td>56.4</td>
<td>13.4</td>
<td>62.5</td>
</tr>
<tr>
<td>75+</td>
<td>21.2</td>
<td>46.3</td>
<td>5.6</td>
<td>51.8</td>
</tr>
</tbody>
</table>
A training program for frail elderly

- Just frail: strength, endurance, walking speed. Start easy and build up progressively
- Severe frail: strength, endurance, walking speed. Start easy and build up slowly with attention for ADL, flexibility and functional mobility
- Circuit training to adapt individually
Strenght

- Main muscle groups
- 2-3 trainingsession a week (with home training program)
- Build up, up to 80% 1RM
Endurance

- 2-3 training session a week
- Build up, up to 80% HRR Or 12-16 on Borgscale
Thank you for your attention!
And success in your further career

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Thank you