How to stay fit in a wheelchair?
Linda Valent

2 November, 2012, Noordwijk

Content boek
(Valent, Broeksteeg, 2012)
1) What are the effects of a SCI on fitness and health?
2) What options do you have to stay active?
3) Are your (sports)wheelchair and handcycle optimally adapted?
4) How to train and stay motivated?
5) How to prevent or overcome injuries?
6) How to remain on a healthy weight?

Persons in a wheelchair
are generally less active than ambulatory persons
- Only arms available (wheelchair dependent):
  
  * Arm muscle mass is generally smaller than leg muscle mass: not always!
  * VO2peak in arm work is generally lower than in leg work: not always!

The importance of activity
Inactivity ↔ weight gain
- fat mass ↑
- muscle mass ?
(Chapter 6, healthy weight)

Higher risk of CVD and other health problems

Why an active lifestyle?
Maintenance of improvement in:
- Fitness (endurance and strength)
- Performance of daily activities (making life easier)
- Participation in society
- Health and QOL

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However, for persons in a wheelchair (e.g. SCI)
- It may be difficult to maintain physical capacity in daily life
- Is it enough to be active in daily life?
  it depends on what you (can) do

For me, with my C7 lesion, it is quite an effort to bring my son to school and do shoppping, especially where I live (in the dunes). It keeps me in shape.

However, for persons in a wheelchair (e.g. SCI)
- Hand rim wheelchair propulsion is straining:
  > 50% overload injuries to arms (Curtis et al, Sie et al)
- Exercise options (sports) are generally not easy accessible.
  Barriers exist (Scelza et al, 2005):

Barriers for an active lifestyle

Sport options with arms
(endurance and/or strength training)

Fitness-training with arms

Circuit Resistance Training (CRT)
endurance and strength-training

What training options are available in daily life?

Berkelbike
Wheelchair
Indoor trainer
handbike
Strength training/ prevention of injuries (chapter 4/5)
Also possible at home!
Stretching

What is the most effective training option to improve fitness?

Dots are studies
(before hand cycling was available)

Sport participation in the Netherlands
75 persons with SCI do sports (5 yrs after discharge):

<table>
<thead>
<tr>
<th>Persons</th>
<th>hours/wk</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hand cycling</td>
<td>49</td>
</tr>
<tr>
<td>Fitness</td>
<td>23</td>
</tr>
<tr>
<td>Swimming</td>
<td>12</td>
</tr>
<tr>
<td>Wheelchair tennis</td>
<td>8</td>
</tr>
<tr>
<td>Wheelchair training</td>
<td>8</td>
</tr>
<tr>
<td>Wheelchair basketball</td>
<td>6</td>
</tr>
<tr>
<td>Wheelchair rugby</td>
<td>6</td>
</tr>
</tbody>
</table>

It makes sense to focus on HC during rehabilitation of wheelchair-bound persons

What explains popularity of hand cycling?
An EXERCISE and MOBILITY mode in daily life:
- “fun”, “good workout”, “I use it like my bike”
  – attachable to own wheelchair; no transfer needed
  – 2 to 3 times faster/longer distances (compared to wheelchair)
  – coupling hands is easy (compared to wheelchair)

Results thesis (2009)

- Improvements in Physical Capacity:
  - Peak Power Output: ($P_{peak}$)
  - Peak Oxygen Uptake: ($V_{O2peak}$)
- No over-use injuries after HC-training
  (ergonomics !)

Persons with PP and TP are well trainable
- with HC-training
- with interval-training

Compared to wheelchair propulsion, hand cycling appears to be less straining for shoulders
(Arnet, 2012)
early start is possible during rehabilitation!

prerequisite for safe HC:
- Optimal ergonomic set-up
- Low gears/ E-bike; low strain
- Training principles
- Additional strength training and stretching

Chapters 3, 4 en 5 (Valent, Broeksteeg, 2012)
How to motivate patients to adopt an active lifestyle

- What physical activity really suits you?
- How can you imply physical activity in daily life?
- How long does it take before you can expect improvements?
- Do you really know your (changed) body during exercise?
- What barriers do you expect (in future) that hinder you to stay active?
- What are your plans to solve expected problems?
- What will help you to stay motivated? TO SET GOALS

What to tell your patients:

- Absolute gains in fitness may be small but can make a difference (in daily life)!
- The higher the physical capacity (fitness), the lower the strain of daily activities
- A well-trained body is less vulnerable for overuse-injuries to muscles, tendons etc.
- Do not expect quick results: With a relatively low fitness-level (due to low active muscle-mass, age) a gradual long-term training period is required.
- Interval-training is safe; imply rest during training

Extreme goal Alpe d’Huez - project

What happens if persons with a paraplegia train to climb the Alpe d’Huez?

Results

All succeeded

A challenge for persons with SCI; handcycling the Alpe d’Huez

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- Research & Development, Helionare Rehabilitation Center, Hilvarenbeek, Netherlands
- Physical Therapy, Nykamp Rehabilitation Center, Rotterdam, Netherlands
- Chair of Rehabilitation at the Vrije Universiteit, Amsterdam, Netherlands

9 juli 2011

Heliomare handcycling team

Rijndam Racers

Alpe d’Huez

All succeeded

Handbike-battle juni 2013

The Kaunergletscherstrasse in Oostenrijk

http://www.handbikebattle.nl