Workshop wearables Hersenletsel Congres

MAKING SENSE SENSOR DATA FOR PERSONALIZED HEALTH CARE

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NeLL
UNCZH

Disclosure

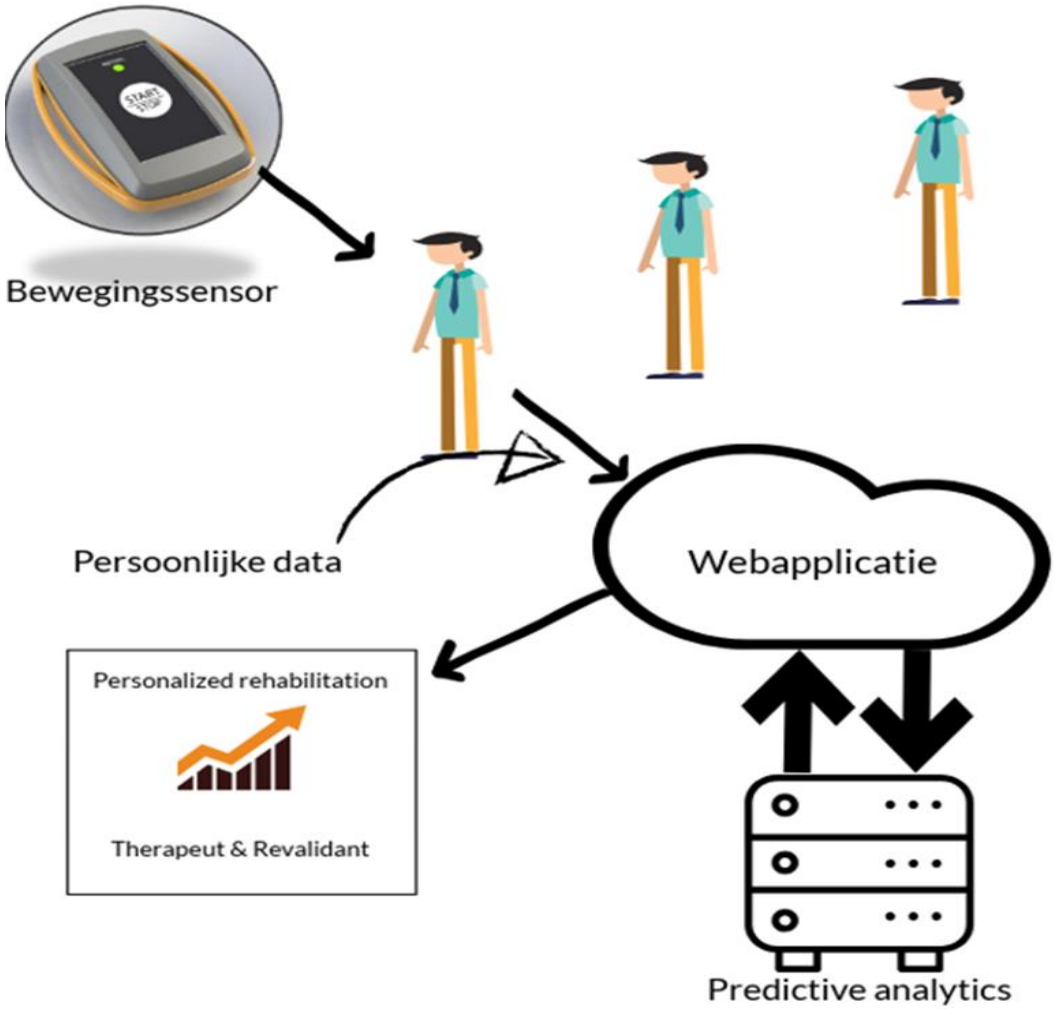
None

Intro

Wie zit er in de zaal?

Welke wearables ken je, welke gebruik je? Wat zijn je ervaringen?

Making sense of sensordata



Doelen Making sense

- Voorspellen functioneel herstel na 6 maanden
- Voorspellen vallen eerste 6 maanden
- Klinisch nut balansmeting, loopmeting en fysieke activiteit meting

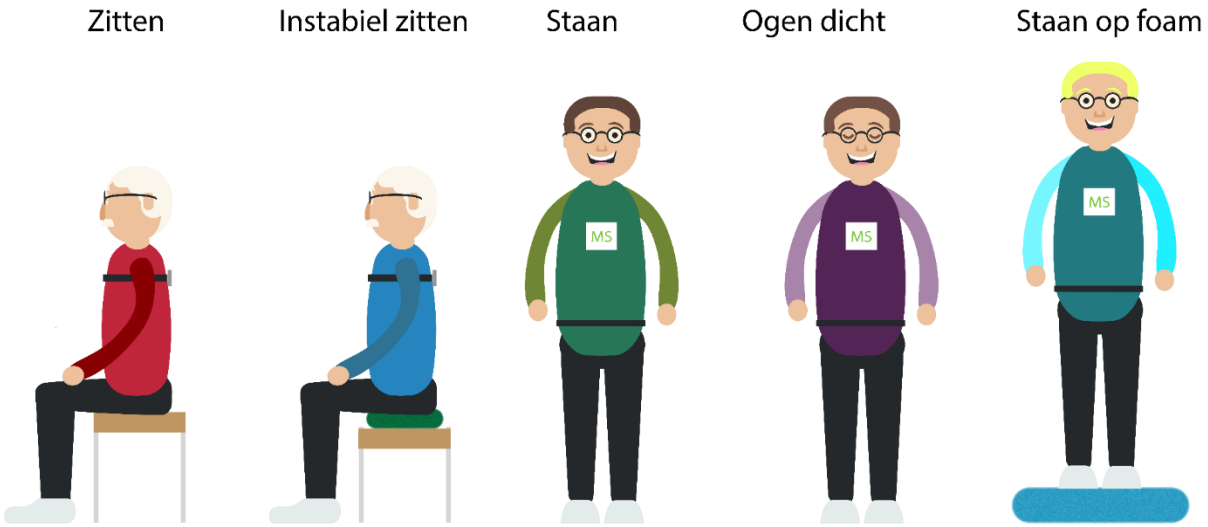
Sensor

Accelerometer
Gyroscoop

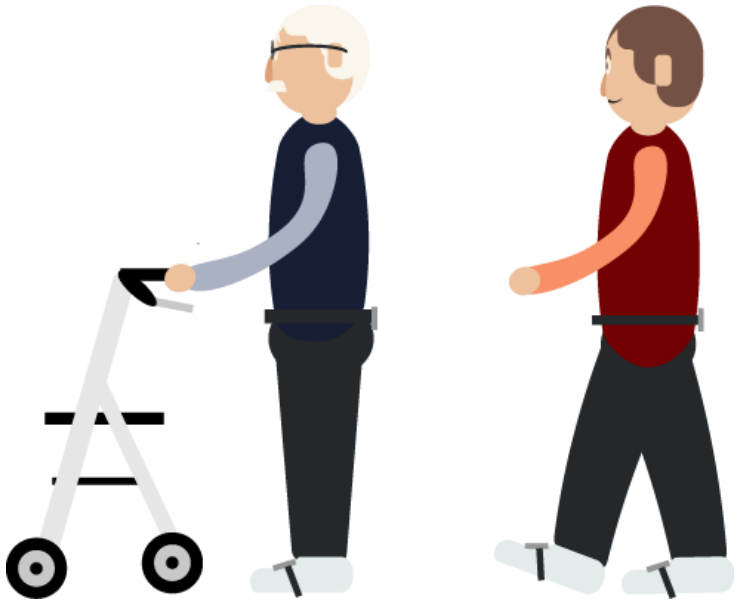
Manufactured by Aemics B.V. Oldenzaal, The Netherlands.

Sampling rate of 104 samples per second. The range of the accelerometer and gyroscope were set to 4g and 500 degree/s, respectively.

Data verzameling



Balansmeting



2mWT

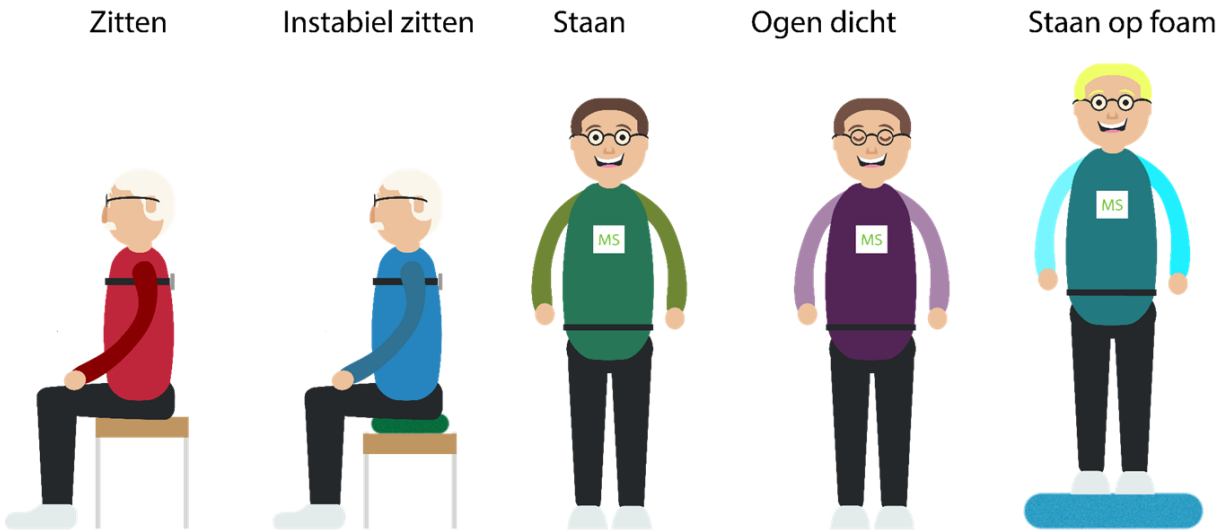
Fysieke activiteit
48 uur

Bij wie?

- Volwassenen na recent CVA, bij opname in MSR of GRZ
- Zitbalans 1 minuut (soms later inclusie)
- In staat opdrachten te begrijpen
- Voldoende belastbaar (soms later inclusie)

Filmpje Making sense

Sensor balans onderzoek: slim idee:



Zitten	Instabiel zitten	Staan	Ogen dicht	Staan op foam
1 min	1 min	1 min	30 sec	30 sec

Wat betekenen de sensormaten?

Bekend:

- Postural sway meting
- Stroke meer sway dan gezonde controls (1)
- Meer sway, minder balanscontrole (1,2)

- 1. Halmi Z, Stone TW, Dinya E, Mály J. Postural instability years after stroke. J Stroke Cerebrovasc Dis. 2020 Sep 1;29(9):105038. . DOI: 10.1016/J.JSTROKECEREBROVASDIS.2020.105038
- 2. Cho K, Lee K, Lee B, Lee H, Lee W. Relationship between Postural Sway and Dynamic Balance in StrokePatients. J Phys Ther Sci [Internet]. 2014 [cited 2022 Jul 29];26(12):1989. Available from: /pmc/articles/PMC4273074/. DOI: 10.1589/JPTS.26.1989

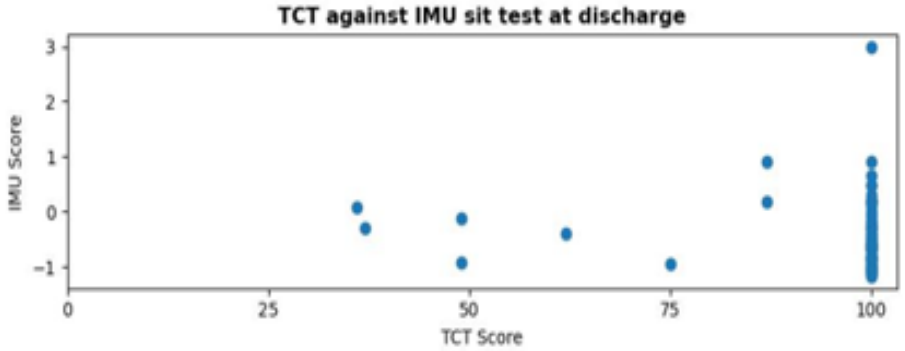
dataverzameling en analyse:

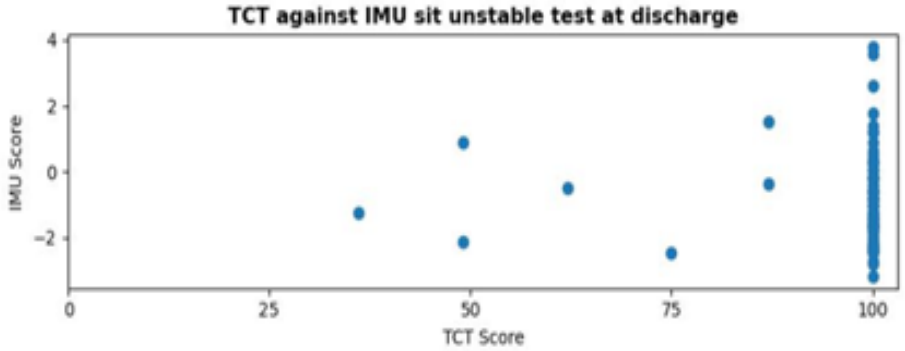
- T opname en ontslag
- Sensor balans meting
- TCT, BBS en MiniBESTest (bij BBS>45)
- Plafond/vloereffecten
- Relatie tussen sensor en TCT, BBS, MiniBESTest

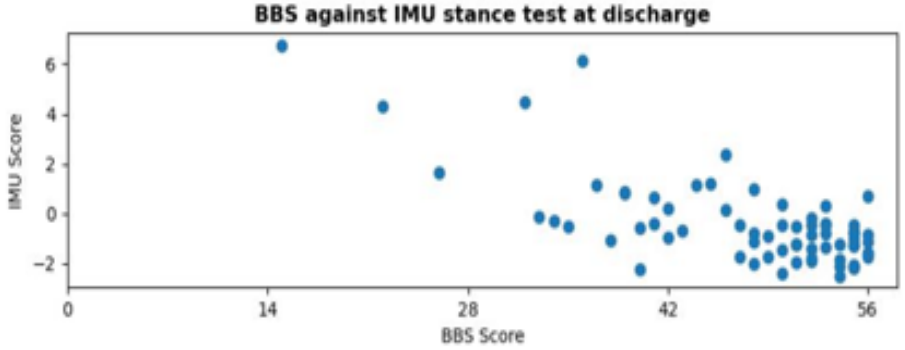
Resultaten:

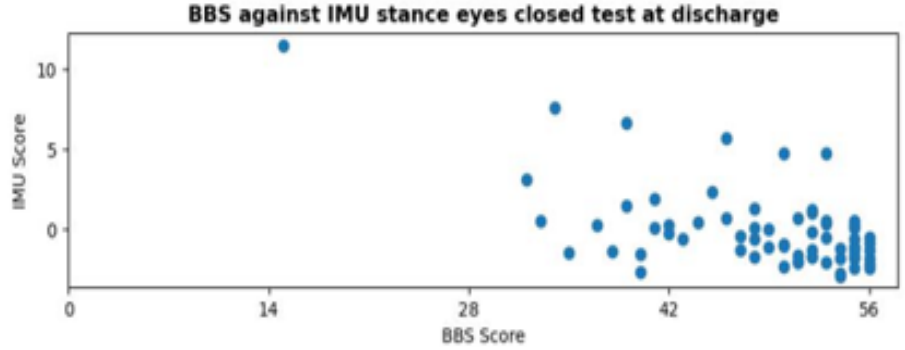
Characteristics	All participants Admission (n=105)	All participants Discharge (n=90)
Demographics		
Age (years)	72.7 (12.2) [28-99]	72.6 (12.3) [28-99]
Sex (female/male) n (%)	51/54 (48.6/51.4%)	45/45 (50/50%)
Body mass index (kg/m^2)	26.0 (5.3) [10.3.4-45.4]	26.3 (5.5) [10.3-45.4]
Stroke characteristics		
Ischaemic n (%)	82 (78%)	71 (78.9%)
Haemorrhagic n (%)	18 (17.1%)	16 (17.8%)
SAH n (%)	5 (4.8%)	3 (3.3%)
Time since stroke (weeks)	2.2 (2.2) [0.7-13.7]	8.9(4.7) [3.0-21.0]
Barthel Index (0-20) (n = 101/77)	13.0 (4.9) [0-20]	17.7 (4.0) [1-20]
MRS (0-5) (n = 72/62)	3.5 (0.8) [2-5]	2.4 (0.9) [1-4]
NIHSS (0-34) (n = 70/59)	4.5 (3.5) [0-18]	1.9 (2.6) [0-13]
Motor performance		
MI LE L (0-100) (n = 93/75)	87.1(22.5) [0-100]	89.4 (19.6) [9-100]
MI LE R (0-100) (n = 92/75)	90.0 (18.6) [0-100]	95.5 (13.0) [34-100]
FMA-LE score (0-34) (n = 47/48)	26.8 (8.8) [4-34]	30.0 (6.7) [8-34]
Balance performance		
TCT (0-100) (n = 103/85)	87.6 (22.8) [12-100]	96.3 (18,1) [36-100]
BBS (0-56) (n = 100/80)	34.7 (17.2) [3-56]	46.1 (11.9) [4-56]
MiniBESTest (0-28) (n = 23/28)	20.8 (4.0) [14-27]	22.1 (5.1) [8-28]

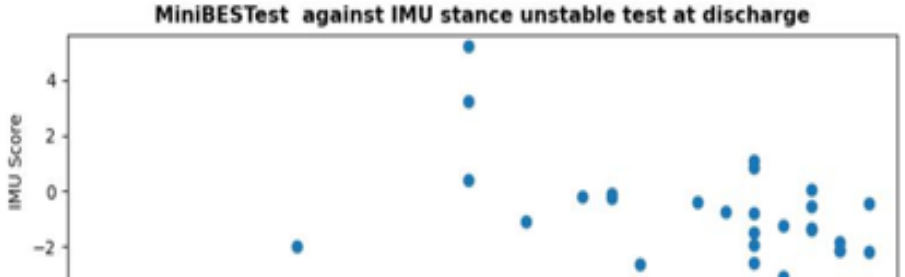
Geen plafond/vloer effecten, correlatie zittesten laag, statesten -0.4 tot -0.7





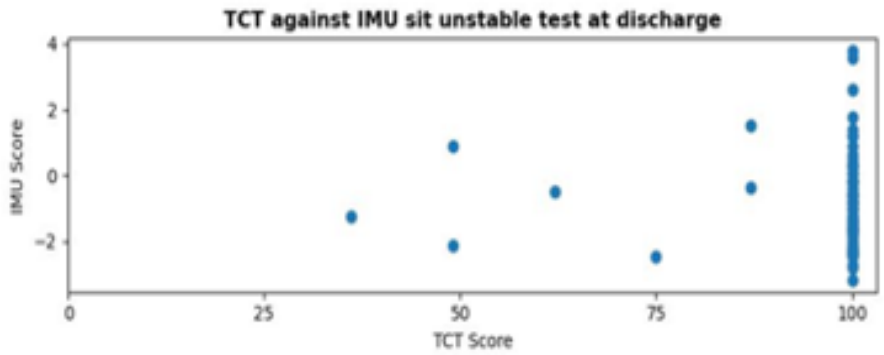






Wat betekent dit:

- **Sensor zit testen en TCT-> meten iets anders**

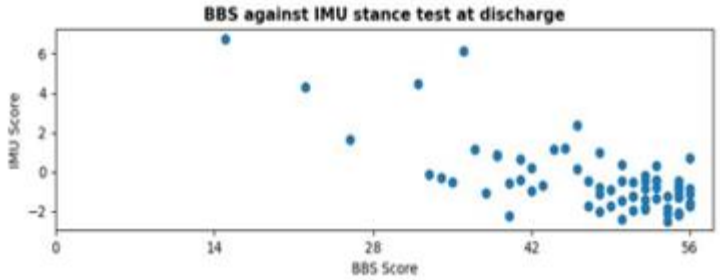


- **Staan EO/EC en BBS -> meten voor 16-49 % hetzelfde**

- **Staan foam en miniBESTest-> 19%**

Wat weten we nu en wat niet

- Meestal lagere de sway score bij hogere conventionele test score



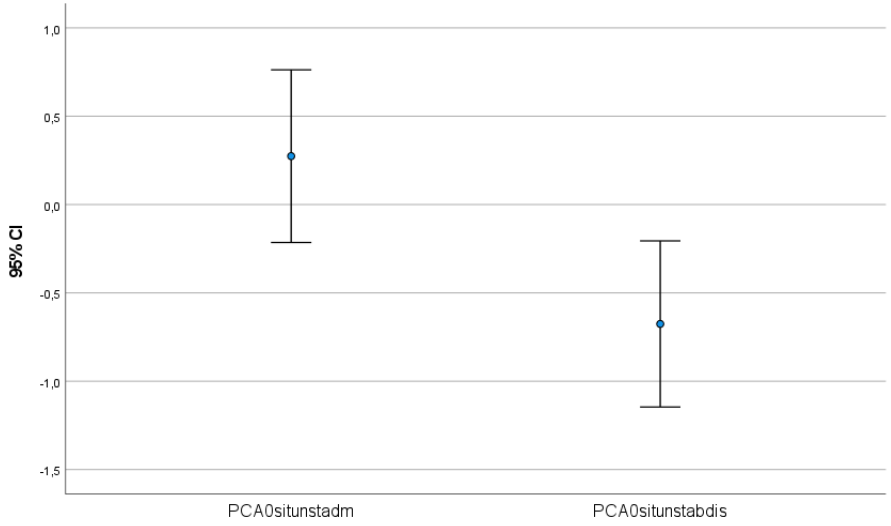
- Sensor meet deels iets anders, maar wat? Nuttig?

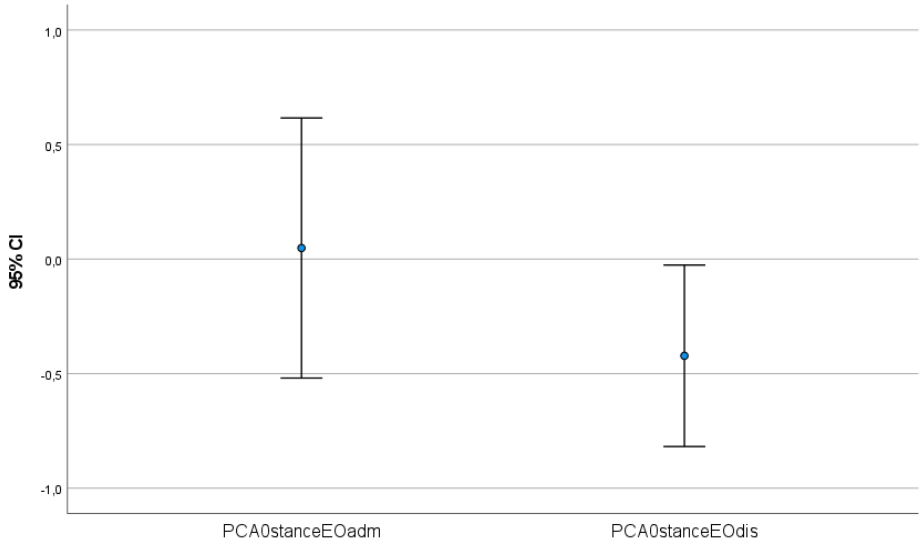
- Sensor is minder gevoelig voor plafond/vloer effecten->kan progressie wellicht beter meten

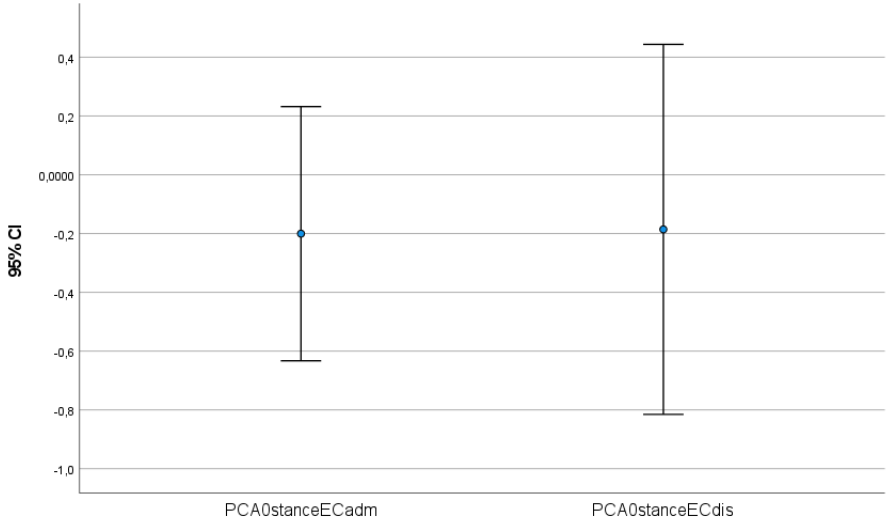
- Als pt verbetert-> moeilijker sensor taak nodig.

Vervolg onderzoek: kan de sensor verschil over de tijd meten?

Eerste inzichten:







Fysieke activiteit en sedentair gedrag in de geriatrische revalidatie

Jules Kraaijkamp, verpleegkundig specialist en junior onderzoeker

Leonoor van Dam van Isselt
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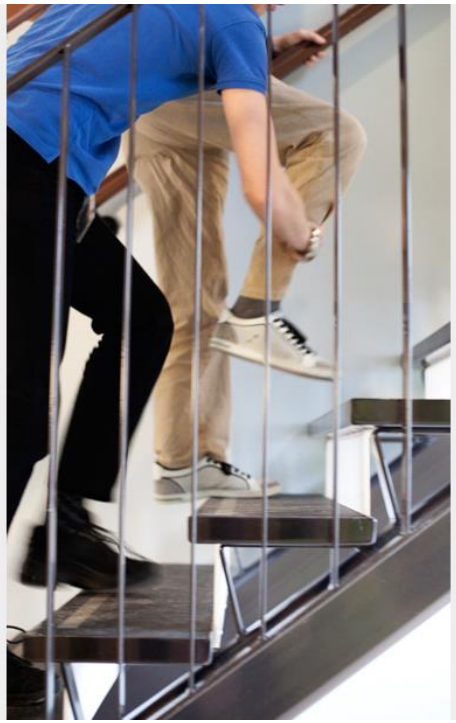
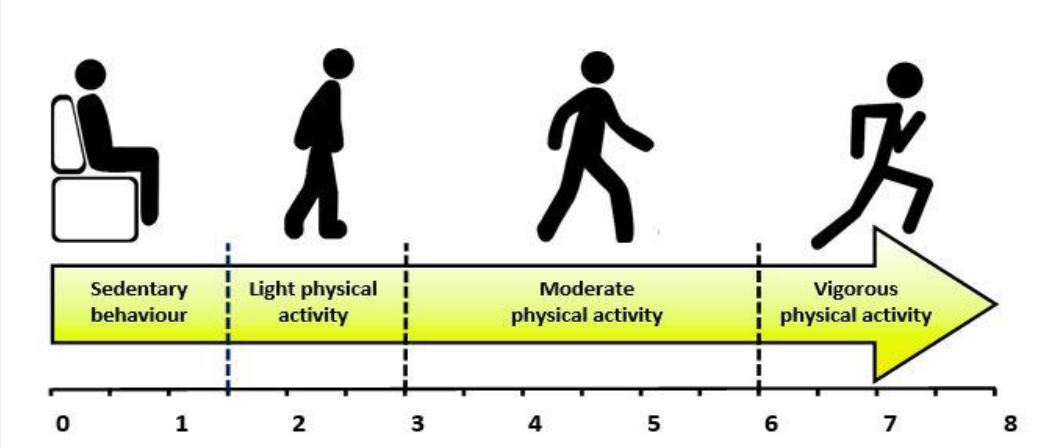
LUMC (PHEG)
Nationaal eHealth Living Lab (NeLL)
Universitair Kennisnetwerk Ouderenzorg Nijmegen (UKON)
ZZG Zorggroep

SAMEN KENNIS maken, delen en toepassen

De praktijk



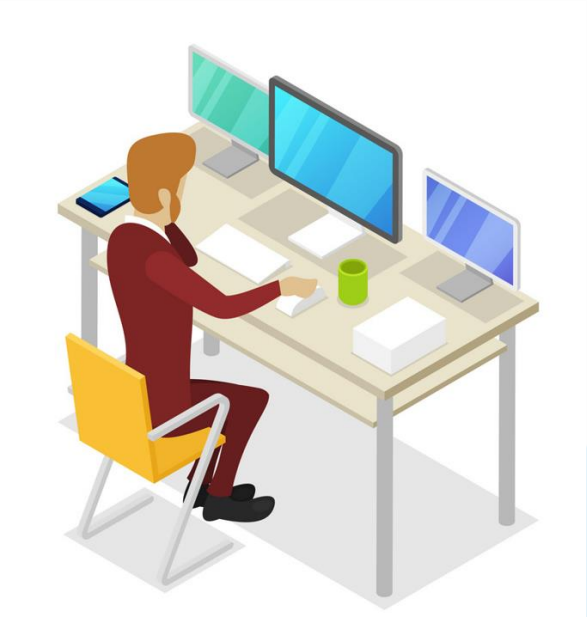
Fysieke activiteit: spectrum van intensiteit



Light (<3.0 METs) Easy to talk & carry on conversation	Moderate (3.0-6.0 METs) Able to talk and hold short conversations	Vigorous (>6.0 METs) Difficult to speak more than a sentence
Walking – slowly	Walking – very brisk	Jogging/Hiking
Light household chores (cooking, washing dishes)	Moderate household chores (washing windows, vacuuming, mopping, mowing the lawn)	Challenging household chores (Shoveling, pushing furniture, climbing stairs)
Fishing	Bicycling – light	Bicycling – fast
Sitting at a desk	Sports (badminton, tennis doubles)	Sports (basketball, soccer, tennis singles)

*METs = Metabolic Equivalent *1 MET = the energy required to sit quietly

Fysieke activiteit vs sedentair gedrag

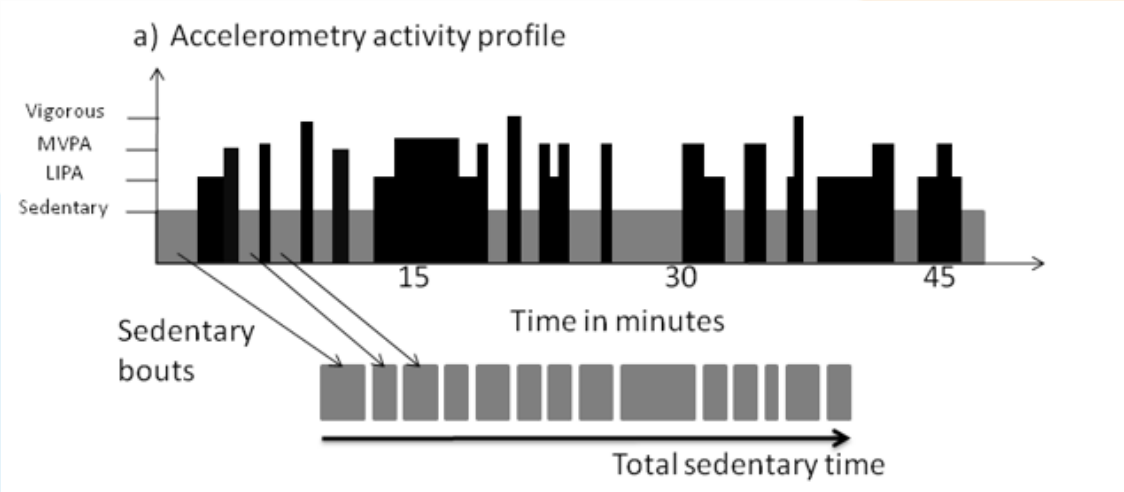


Sedentair gedrag (SB)

Totale sedentaie tijd

- Vermindering van spiermassa en spierkracht
- Risico op vallen
- Sterfte

Patroon van sedentair gedrag



Langdurig SB vormt een gezondheidsrisico onafhankelijk van de totale sedentaire tijd

Methods: Movement variables

Fysieke activiteit: spectrum van intensiteit

Variabels
Sedentary behaviour (mean hours / day)
Light activities (≤3 METs)
Moderate activities (3-6 METs)
Vigorous activities (≥6 METs)
Steps (mean steps / day)

Patroon van sedentair gedrag

Variables
Half bout duration (weigthed median bout duration)
Alpha (scaling parameter)

Tijdlijn

Werving & selectie
Karakterstitieken

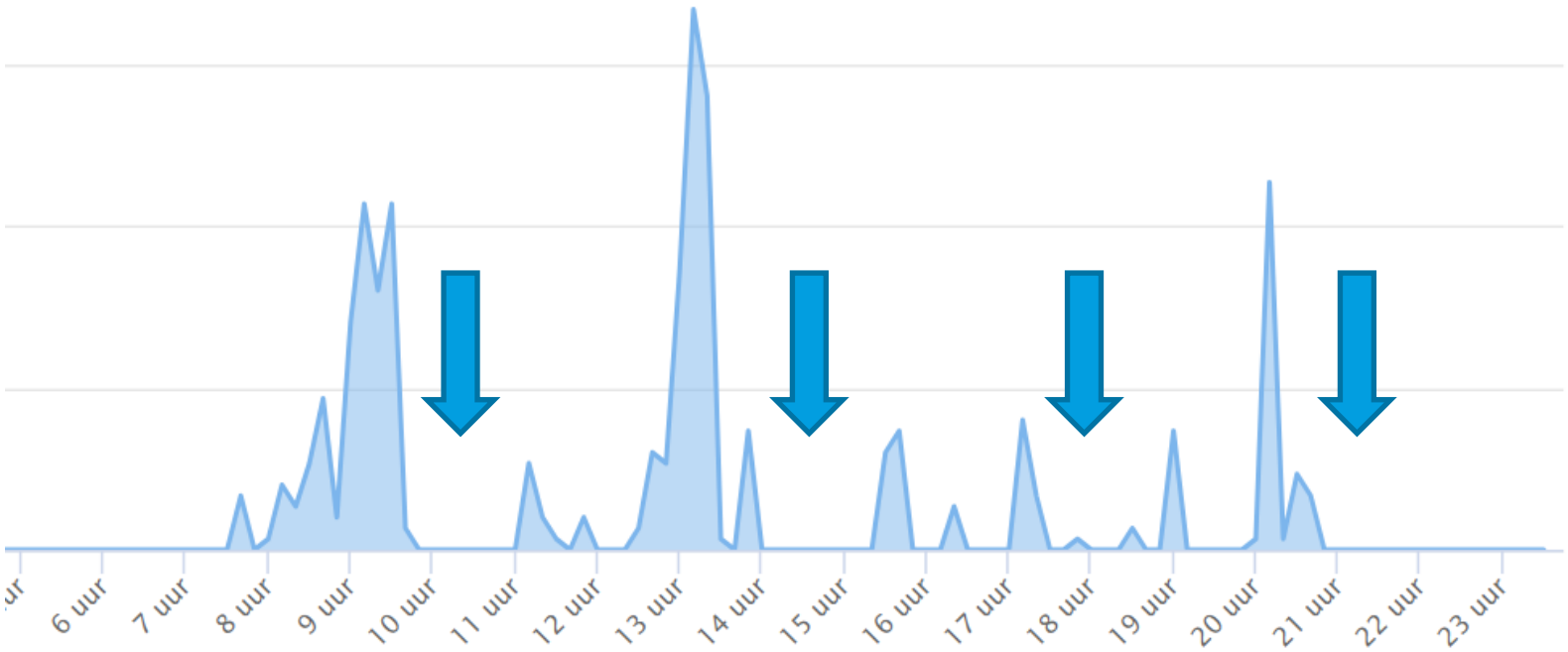
Fysieke activiteit &
sedentair gedrag

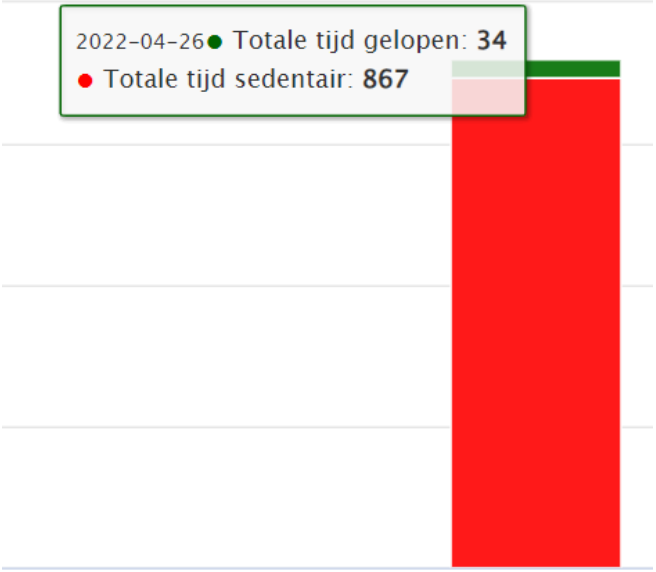
Opname — **Week 1** — **Iedere 2 weken** — **Ontslag**

Fysieke activiteit &
sedentair gedrag

Karakterstitieken
Fysieke activiteit &
sedentair gedrag

Sensordata gedurende de dag





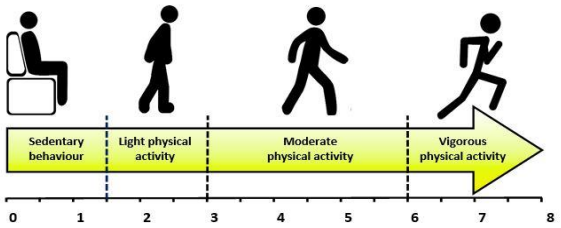
Opnamegegevens

Characteristics	N = 52
Age (years)	76
Sex, male (%)	38 (51%)
type of stroke	
Ischemic	42 (89%)
Hemorrhagic	10 (19%)
Subarachnoid	1 (2%)
Time since stroke (days)	16 (12 –25)
Barthel Index	12 ± 4.9
Berg Balance scale	33 (24 – 48)
Trunk Control Test	100 (75 – 100)
Functional Ambulation Classification	
Non ambulatory (FAC 0)	8 (15%)
Dependent (FAC 1-3)	22 (41%)
Independent (FAC 4-5)	20 (37%)
USER mobility baseline	16 ± 8.8
USER mobility discharge	31 (25 – 35)
USER Delta mobility	12.7 ± 7.2

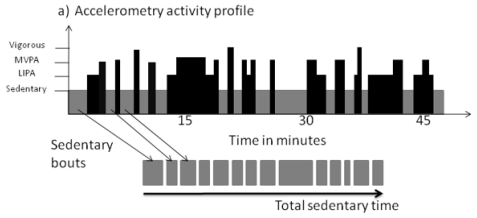
Verloop fysieke activiteit en sedentair gedrag

Results: Movement variables

Ranges of intensity



Pattern of SB



Conclusie?

- Oudere die herstellen na een CVA in GR en brengen langere perioden door in sedentair gedrag en zijn beperkt fysiek actief

- Gedurende de opname vindt er vrijwel geen verandering plaats in sedentair gedrag en fysieke activiteit

Universitair Netwerk
voor de Care sector
Zuid-Holland

Bedankt voor uw aandacht!

Meer info over het onderzoek?