How Does Wheelchair Set-up Effect Fatigue Development?

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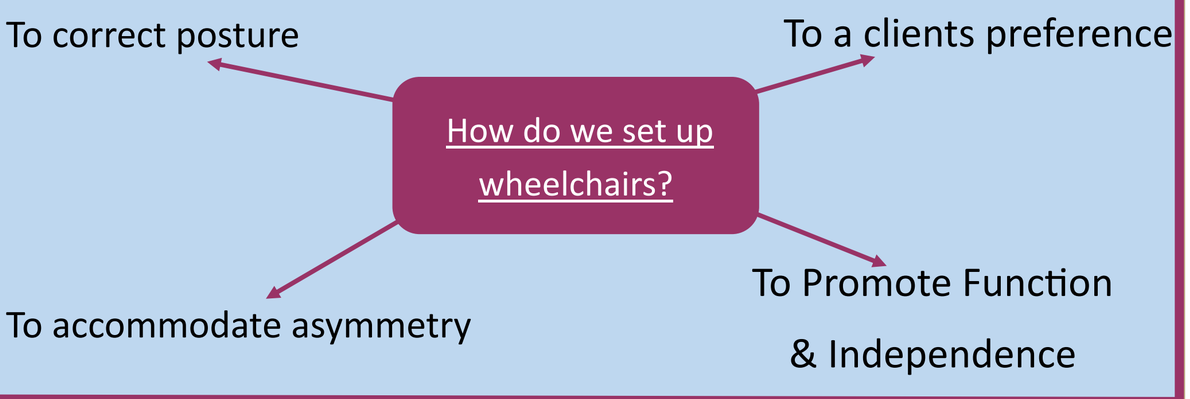
SCAN ME

Introduction



Possibly gap in the literature:

One all encompassing step by step gold standard guide for wheelchair set up, irrespective of client condition, substantiated by quantitative re-search

Aims and Objectives

Hypothesis:

Improper wheelchair set up leads to increased fatigue development.

Project aims:

1) Investigate which aspects of wheelchair setup affect fatigue development rate
2) Develop quantitative reasoning to inform wheelchair setup.

Methodology

The wheelchair was set up to its most 'ideal' positions—middle finger nearest to the axel

Participants self propelled for 3 minutes, for 3 repetitions

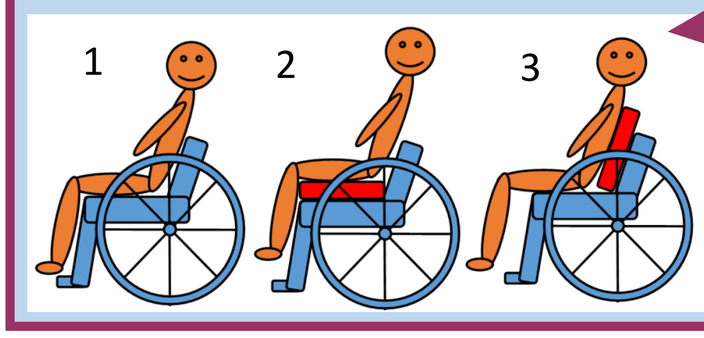
- Heart Rate and Distance Travelled were recorded

Participants were staff from BCUHB PAMS

- No guidance given on self propulsion technique, this was to avoid influencing the results
- Participants were given the freedom to propel at their own pace

The trial was repeated with an altered set up:

- Seat Depth and vertical displacement were studied



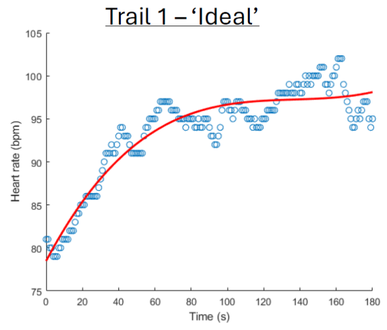
Set up visualisation

1) 'Ideal'
2) Vertical displacement by insertion of a 4 inch foam cushion
1) Horizontal displacement by insertion of a 4 inch foam cushion

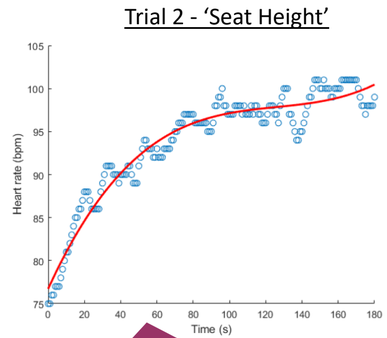
Results

Participant	Peak heart rate	Distance Travelled (m)	Average Velocity (m/s)
P1	89 / 88 / 90	1500	2.78
P2	102 / 101 / 109	2040	3.78
P3	85 / 88 / 95	2131	3.95
P4	85 / 84 / 86	1600	2.96
P5	122 / 129 / 134	2325	4.31
P6	88 / 93 / 103	2500	4.63

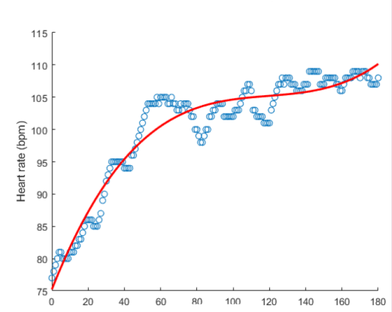
Trail 1 – 'Ideal'



Trial 2 - 'Seat Height'



Trail 3 – 'seat Depth'

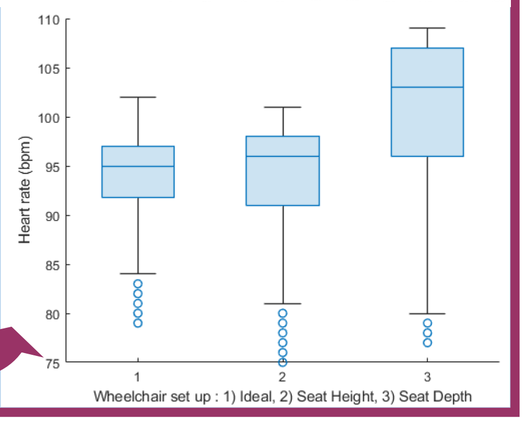


Example Participant

Raw data presented above as Heart Rate Vs Time

- The red line is a best fit line to track the trend

Box plot to show the shift in mean Heart Rate and wide range of values recorded



Conclusions

1) 12 trials of varied wheelchair setup (6 participants x 2 varied set-ups)

- 11 showed statistical difference in the Heart Rate traces when compared to their respective ideal set-up trials 92%

2) From the extensive literature review, there didn't seem to be a conclusive evidence-based guide to wheelchair set up

3) The science of wheelchair set up is extremely complex and nuanced - never the less it requires some quantitative research to substantiate best practice.

Future Work

Alteration to the study design to improve applicability:

Randomise trial and participant order
Repeat trials over multiple weeks
Client based study

Further studies:

Development of a sensitivity index between finger/axel distance and cardio vascular load

Asses other aspects of wheelchair set on their cardiovascular impact

- i.e. Does changing rake angle have a greater affect that the variables investigated in the project?

References & Contact Details

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References available on request

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