Head-Up: co-designing novel neck orthosis for neck weakness in MND

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Motor Neurone Disease
Introduction
Introduction
Introduction
Introduction
Current Provision
Current Provision
Disease progression

Current Provision

Range of motion

Support
Project Plan

1. CO-DESIGN PROCESS
2. MANUFACTURING & CE MARKING
3. USER EVALUATION
4. FORWARD STRATEGY
5. IPR & COMMERCIAL FEASABILITY
6. PROJECT MANAGEMENT
Co-design
Comfort and pain means different things to different people.

How do we compare the subjective feedback from different people when you only have a small group of carers and patients?
Comfort Assessment
Comfort Assessment
Comfort Assessment

- No discomfort
- A little discomfort
- A little painful
- Very uncomfortable
- Very painful
- Extremely uncomfortable
- Severe Pain
Test Population

- Female
- Male

Comfort Assessment
Comfort Assessment

Normalised perceived discomfort for all four collars

- Aspen
- Philadelphia
- Headmaster
- Stro II

Increasing perceived discomfort

Time (hours)
Comfort Assessment

**Graph:**

Participants differing levels of agreement with various statements

- Strongly agree
- Agree
- Agree somewhat
- Disagree somewhat
- Disagree
- Strongly disagree

Statements:
- No restriction to breathing
- No difficulties eating
- No problems drinking
- No restriction to swallowing
- Offered support
- No perspiration
- Visually attractive
- Complete free movement
- Easy to fit
- No frustration

Legend:
- Aspen
- Philadelphia
- Headmaster
- Stro II
Comfort Assessment

Total levels of agreement

Legend:
- Aspen
- Philadelphia
- Headmaster
- Stro II
Results

Stro II

0 hrs ~ Time (hrs) ~ 5 hrs
Results

Philadelphia
Neck Weakness
Neck Weakness
D3PLOT: M1 + M2
Conclusions

• All collars increase discomfort against time
• Trade-off between movement and support
• Unintuitive fitting
Conclusions

- Developed 'empathetic' methodology
- Visual recording method for pain and discomfort
- Relating subjective user feedback to numerical models
“Although I cannot move and I have to speak through a computer, in my mind I am free.”

- Stephen Hawking
Thank you

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