Wristband Accelerometers to motiVate arm Exercise after Stroke (WAVES)

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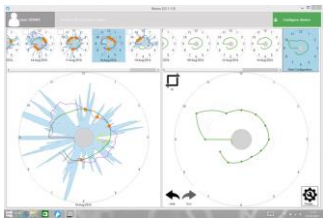
The problem being addressed

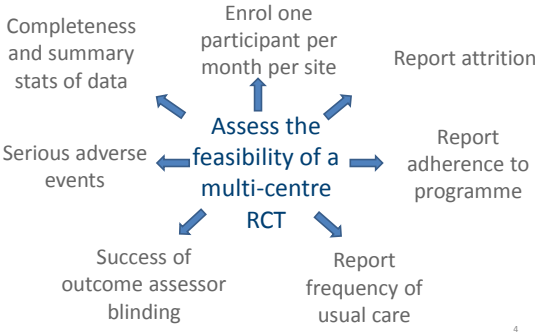
- 69% will have reduced function in arm
- Only 5-20% will make a full recovery
- High doses of therapy required
- Inattention and cognitive deficits impact on self-directed practice

The solution? ……the CueS device



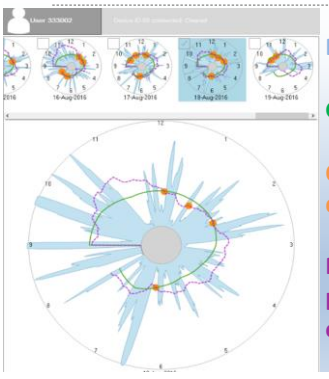
Open Lab at Newcastle University

Study aims and objectives



WAVES: a self-directed intervention

Example of one days data



Blue = arm activity

Green = threshold

Orange = prompt delivered

Magenta = median of previous 60 seconds of activity

Pilot Randomised Controlled Trial

Control	Intervention
Therapy programme	Therapy programme
Sham device	CueS device
No Data report	Data report viewing
No Prompts	Prompts set

Gateshead	North Tees
Northumbria	Newcastle

Recruitment and retention results

Control n=19

- Male 7 (37%)
- Age 69 (65-80)
- Time post-stroke 26 days (18-33)
- ARAT 15 [2-35]
- MAL (AoU) 0.3 [0.1-1.3]
- Pain (Numeric rating) 0 [0-4]
- Fatigue (Numeric rating) 7 [5-9]

Intervention n=14

- Male 6 (43%)
- Age 73 (61-80)
- Time post stroke 27 days (13-48)
- ARAT 37 [16-45]
- MAL (AoU) 1.4 [0.5-2.6]
- Pain (Numeric rating) 0 [0-3]
- Fatigue (Numeric rating) 6 [5-7]

Results: Compliance with programme

- 67% recorded usual care
- 99% days wore the device
- 79.4% wear time per day
- 1 incident of unblinding
- 8 SAEs reported – non related to study

Clinical outcomes

Outcome measure	Scores at 4 weeks		Scores at 8 weeks	
	Intervention group	Control group	Intervention group	Control group
ARAT total score Median [IQR] Range 0-57	44 [29, 57] (n=12)	35 [15, 52] (n=14)	54 [37, 57] (n=10)	31 [21, 55] (n=13)
Motor Activity Log (AoU) Median [IQR] Range 0-5	3.8 [2.0, 4.5] (n=12)	1.1 [0.3, 2.9] (n=15)	4.2 [2.1, 4.3] (n=10)	1.2 [0.7, 2.9] (n=14)
Pain Numeric rating scale 1-10 Median [IQR]	0 [0, 4] (n=12)	1 [0, 8] (n=16]	0 [0, 5] (n=10)	5 [0, 8] (n=14)
Fatigue Numeric rating scale 1-10 Median [IQR]	2 [2, 5] (n=12)	5 [2, 8] (n=16)	5 [2, 5] (n=10)	7 [5, 8] (n=14)

Effect of prompts on activity data

- 7 prompts delivered per day [IQR: 6, 8]
- 66.5% of prompts led to increase in activity
- Prompt increase of 16.6% (p = 0.002)

Comparison of CPM between groups

Table 1: CPM median [IQR] at each outcome interval.

	Baseline CPM	Endpoint CPM	4 week CPM	8 week CPM
Control	499 [359, 714] n=17	550 [444, 990] n=15	574 [516, 891] n=13	428 [288, 712] n=11
Intervention	683 [487, 1298] n=14	907 [516, 1696] n=14	916 [617, 1675] n=11	1317 [656, 1395] n=11
Control vs Intervention p-value	p=0.100	p=0.134	p=0.063	p=0.003

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Participants feedback

Summary

- Wrist-worn monitoring and cueing is safe and feasible
- Activity in stroke arm increased following prompts
- Arm activity continued post intervention
- Clinical trial of efficacy is required

Acknlowedgements

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