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Inactivity/Activity

- Inactivity affects 60–70% of the adult population (90%): more people than obesity, alcohol misuse and smoking combined.
- 10.4% of all premature deaths prevented if everyone inactive person became active
- Increases the risk of developing more than six major diseases
- Physical activity tends to decline with age, but decline is not inevitable.
- The potential benefits of physical activity to health are huge. If a medication existed which had a similar effect, it would be regarded as a **‘wonder drug’ or ‘miracle cure’**.

Moving to Nature's cure' Chief medical officer Annual report 2009 - 2010

Inactivity cost

In addition to individual, family and society cost

Estimated cost to the English economy per year

£8.3 billion

Estimated cost to the NHS per year

£1–1.8 billion

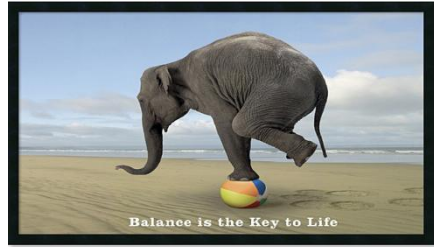
Moving to Nature's cure' Chief medical officer Annual report 2009

Physical activity and Exercise

- Physical Activity: Is a broad term that encompasses anything that involves movement, from participating in sport, through paid work, to washing up or making the beds.
- Exercise: Is physical activity that is planned and structured and targets one or more aspects of fitness.
- Fitness can be maintained and improved through physical activity and specific aspects targeted through exercise programmes.

What is fitness

Balance/coordination



Flexibility



Strength



Fitness

Speed



Endurance



UK Government Guidelines and ACSM position statement

"The Recommended Quantity and Quality of Exercise for Developing and Maintaining Cardiorespiratory and Muscular Fitness, and Flexibility in Healthy Adults." 2011

Dose

- **Moderate-intensity cardiorespiratory exercise training** for ≥ 30 min.d on ≥ 5 d.wk for a total of ≥ 150 min.wk
- **vigorous-intensity cardiorespiratory exercise training** for ≥ 20 min.d on ≥ 3 d.wk (≥ 75 min.wk),
- **or a combination of moderate- and vigorous-intensity exercise** total energy expenditure $\geq 500-1000$ MET.min.wk
- **Resistance exercises** for each of the major muscle groups, and neuromotor exercise (balance, agility, and coordination) **2-3 d.wk**
- **Flexibility exercises** for each the major muscle-tendon groups (total 60 s per exercise) on ≥ 2 d.wk

So what is different about exercise prescription in people with Parkinson's disease

- **Condition progression**
 - Deteriorating disorder (slow /fast)
- **Neurological symptoms**
 - Spasticity
 - Reduced Exercise Capacity
 - Weakness
 - Variability through day
 - Fatigue
 - Altered movement skill and cost of moving – neural and muscular
 - Reduced motor learning
 - Sensory
 - Autonomic dysfunction
 - Cognitive
 - Emotional
 - Non motor symptoms
- **Likelihood of secondary conditions** 28 participants in recent study a number of co-morbidities including: epilepsy (2), osteoporosis (3), asthma (3), heart disease (2), arthritis (6), cancer (2) and stroke and brain injury (2).

PD- LIFE Study RCT

- Thirty-nine people with PD (neurologist diagnosed BBC) were included: 20 exercise 19 control. (able to stand and transfer)
- Sixty five per cent of the study group were fatigued at baseline (n=24, mean 4.02, sd 1.48). – FSS ≥ 4
- Self determined community exercise in IFI gyms 12 week (gym membership, fitness professional, paid travel to the gym and supported with information and practical advice from a physiotherapist. Exercise sessions lasted ~ 30-45 minutes; included 15-20 minutes of cardiovascular fitness , muscle strength and flexibility components.
- Increased fatigue was associated with lower mobility and activity (p<0.05).

PD- LIFE

- Participants attended a mean of 15 exercise sessions (median 12.5, range 1-31) with 55% completing one or more sessions a week for the 12 weeks
 - Nine non-fatigued participants and two fatigued participants completed weekly (11 or more) sessions
 - Compares favourably to primary care exercise referral schemes in the exercise centres (42% completion of weekly twelve week scheme)
- No adverse events
- No increase in overall activity. Possibly individuals adapted to the scheme by reducing physical activity in other areas of their weekly routine - trend to reduce step counts.
- No significant change in mobility, wellbeing, physical activity or fatigue, after exercise ($p \geq 0.05$). trends

People with PD and exercise

- Benefit from regular appropriate exercise/physical activity in short term
- Want to be active and gain associated health and wellbeing benefits
- Would like to be able to be active in their locality using local resources
- Physical activity levels remains low
- Perceive barriers
 - Access – travel, cost, time, disability access
 - Knowledge – condition and exercise for each condition
 - Awareness – condition symptoms

Life Study: Dr Karen Barker, Dr Helen Dawes, Patrick Esser, Ms Jane Freebody, Dr D. Hilton-Jones, Charmaine Meek , Catherine Minns Lowe, Mrs Sandra Paget, Richard Parnell, Prof. Cath Sackley, Dr Andy Soudy, Jane Stein, Prof. D Wade, Ms Charlie Winward

People with PD and exercise

Whilst current ACSM guidance encourages more frequent exercise (three aerobic exercise sessions a week and two strengthening),

We observed that limited number achieve this level

Only one other short-term programme has shown effect over six weeks with weekly sessions in people with later stages of PD

Twice weekly short-term exercise programmes have been shown to be effective.

We have observed that people with PD with less severe disease symptoms find fewer barriers to participating in community exercise facilities we thus propose to focus on early intervention in the primary care setting

Exercise-PD

We will determine in people with PD:

- The effect of longer-term exercise participation on motor symptoms
- The effect of longer-term exercise participation on non motor symptoms, fitness, health and wellbeing.
- Participants views of the process and sustainability of community provision of exercise over a longer period of time.

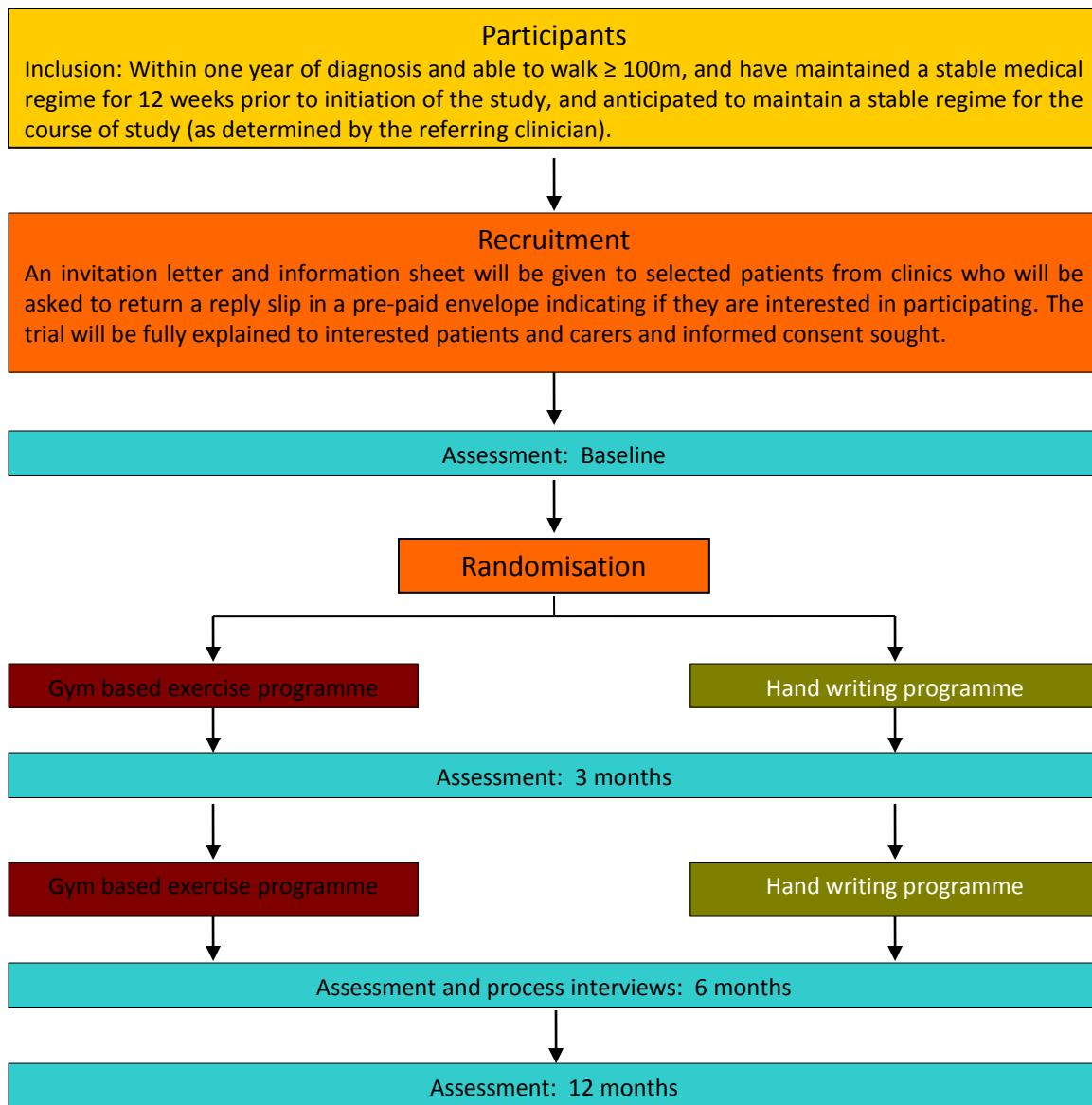
Method

Mixed methodology incorporating

- 1) a phase II randomised controlled trial with an intervention arm, an active comparator control group and blinded assessments and
- 2) process monitoring/evaluation using semi-structured interview techniques to explore participants views of the service and evaluation of the process.).

Population

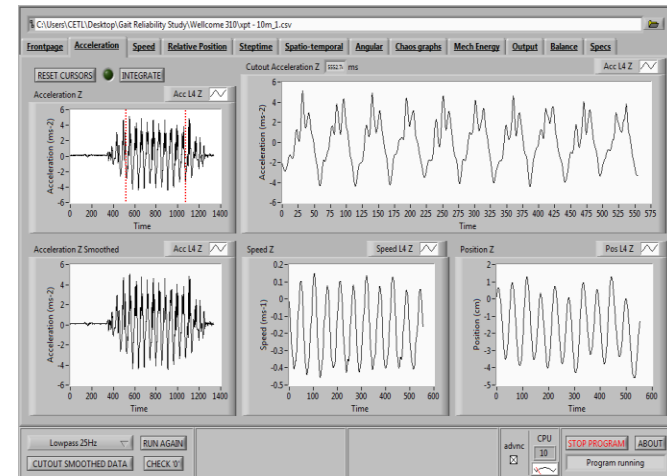
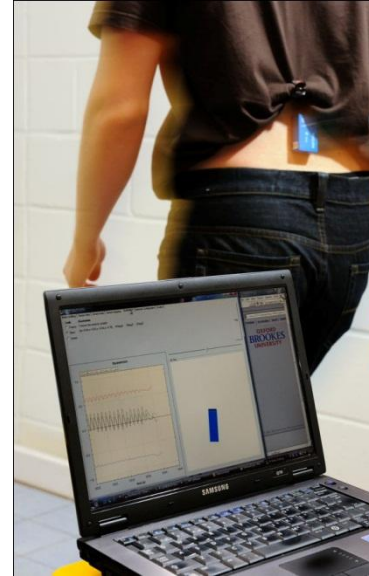
- We will recruit 100 individuals with idiopathic Parkinson's disease diagnosed by neurological examination; idiopathic PD defined by the UK Parkinson's Disease Society Brain Bank Criteria



Measures: 0, 3, 6 & 12 months

Primary outcome measure:

Two minute walk with biomechanical characteristics (i.e. temporal, spatial, balance, mechanical efficiency, symmetry and smoothness)



Secondary measures:

Motor symptoms:

Timed up and go (35) with biomechanical characteristics IMU (accelerometer/rate gyroscope and magnetometer) (Xsens, NL)
Nine hole peg test 36 and simultaneously measured using IMU accelerometer/rate gyroscope and magnetometer (Xsens, NL) placed on the hand (i.e. temporal/spatial, smoothness/ tremor components)

Health and wellbeing:

Health status measure (General Health Status questionnaire SF-12)
Quality of life measure EQ-5D
Prescribed medication use
Blood pressure mmHg
Body mass index [kg /(m2)]
Aerobic fitness test - an incremental cycle ergometer exercise test. (Heart rate, blood pressure, rating of perception of effort, rate of oxygen consumption (metabolism) from measures of expired air will be measured at the beginning, each increment and at the end of the test.
Anaerobic fitness component -Isometric leg power and grip strength
Disease status: Unified Parkinson's Disease Rating Scale (UPDRS)



0	Nothing at all
0.5	Extremely light (Just noticeable)
1	Very light
2	Light
3	Moderate
4	Somewhat hard
5	Hard
6	
7	Very hard
8	
9	
10	Extremely hard (almost maximal) Maximal



Secondary measures:

Non Motor symptoms:

Parkinson's Disease Non motor symptoms questionnaire

Physical activity levels/intervention compliance:

Attendance at exercise sessions and session content (HR, RPE, duration, speed, reps). Hand writing diary (control group)

Adverse events

Self reported activity in social, work and home domains (Physical Activity Questionnaire in the Elderly) (41)

Step Activity Monitor to measure activity (steps and intensity) over a seven day 24hour period (watch sized device worn on ankle) 21

Process evaluation:



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1	Very light
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10	Extremely hard (almost maximal)
.	Maximal



Intervention

Exercise Group

- 60 minutes twice a week for 24 weeks.
- Community Gym
- Aerobic training (30 minutes) performed on a treadmill. warm up (10 minutes), then heart rate (HR) in an aerobic training zone (55-85 percentage age predicted maximal heart rate (% APMHR))
- Anaerobic training (30 minutes)
- Controlled and recorded

Control Group

- Hand writing programme of temporal and spatial cues.
- 5 physiotherapy support sessions– at initiation and then
- Advice regarding handwriting and physical practice according to the PDS guidance information sheet for handwriting
- Handwriting programme home 60mins twice weekly
- Diaries will be used to record practice.

Acknowledgements

Sackley C

Barker K

Wade D

Izadi H

Hilton Jones D

Esser P

C. Winward

C. Meek

S. Patel

Elseworth C

Timms M

Paget S

Parnell R

Appleton C.

C Clarke

Life steering group

MSG user steering group

BSc and MSc students

DoH,

PD UK

Birmingham University

NIHR

**OXFORD
BROOKES
UNIVERSITY**

**Movement
Science Group**