Wearable technology in Parkinson’s disease: design of the Parkinson’s KinetiGraph Registry (PKGReg)

Mubasher Qamar1,2, Aleksandra Podlewsk2,3, Valentina Leta2,3, Dhaval Trivedi3, Alexandra Rizos3; Daniel J van Wamelen2,3, K Ray Chaudhuri2,3

1. Queen Elizabeth Queen Mother Hospital, East Kent Hospitals NHS Trust; 2. King’s College London, department of neurosciences, Institute of Psychiatry, Psychology & Neuroscience, De Crespigny Park, London, SE5 8AF, United Kingdom; 3. Parkinson Foundation Centre of Excellence, King’s College Hospital, Denmark Hill, London, SE5 9RS

Objective

A observational-based registry, attempting to correlate the Parkinson’s KinetoGraph (PKG) parameters with the outcomes of validated scales and questionnaires in Parkinson’s Disease (PD).

Background

• Objective monitoring already exists in neurological disorders.
• The PKG is a validated wrist-worn device which objectively measures different motor states of PD patients when worn.
• It uses sophisticated algorithms to produce data which translates data on the patients movements, medication response and more.
• This allows clinicians to better understand a patients PD motor symptoms, and non motor symptoms, alongside their response to medication, by looking at the objective data the PKG provides.
• Our observational-based registry collects standard clinical scales and questionnaires (subjective measurements) and PKG recordings (objective measurements) from our large database of PD patients.
• This registry will allow us see if there are any correlations between the objective measurements provided by the PKG and the subjective measurements we collet using our scales and questionnaires.

Methods

• The only requirements for patients to participate in this registry is the ability to complete scales and wear a wrist-watch on their hand.
• As PKG has been part of normal clinical practice at King’s College Hospital, Centre of Excellence in Parkinson’s Disease, we can collect retrospective data and prospective data provided the patient has consented to take part.
• Table 1 and 2 outline the data we will collect for the registry from each patient.
• King’s College Hospital is the host site, there are 13 UK and 20 Non-UK sites.

Table 1: Objective Measurements

<table>
<thead>
<tr>
<th>Scores</th>
<th>Graphs and summary tables</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bradykinesia score (IBS) Dyskinesia score (DYS) Fluctuation score (POS) Percent time immobile (PTI) Percent time tremor (PTT)</td>
<td>Bradykinesia and dyskinesia daily and summary plots and variability percentage summary Off wrist summary Immobility summary Tremor summary Button pressing</td>
</tr>
</tbody>
</table>

Table 2: Subjective Measurements

- Wearing Off Questionnaire-9-symptoms (WOQ-9)(25)
- Epworth Sleepiness Scale (ESS)(11)
- PD Sleep Scale 2 (PDSS 2)(13)
- Munch PD Impulsive-Compulsive Disorders Questionnaire (QUIP)(13)
- PD Questionnaire-8 (PDQ-8)(13)
- Hoehn and Yahr staging (HY)(1)
- Unified PD Rating Scale part III (UPDRS III)(13)
- Non-Motor Symptoms Scale (NMS)(13)
- Mini-Mental State Examination(1)

Impact on activities of daily living questions: Where do you live: at home alone, at home with a spouse/relative, with relatives, nursing home home for the elderly? How often are you visited at home by a PD nurse daily, every other day, once per week, once per month, as needed?

Current medication: Levodopa equivalent daily dose (LEDD)(9)

Acknowledgements: This article presents work funded by King’s College Hospital and King’s College London, alongside a donation from Britannia Pharmaceuticals. The views expressed are those of the authors and not necessarily those of the NHS, the NIHR or the Department of Health. This project also had contributions from all part of the King’s Parkinson’s Research Centre based at King’s College Hospital and run by Professor K Ray Chaudhuri.