

Joint Programming Neurodegenerative Disease

Joint Transnational Call for Proposals

**European research projects for the evaluation of health care policies,
strategies and interventions for Neurodegenerative Diseases**

Final Report

Please submit electronically to:

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JPND Joint Call Secretariat
Dr. Vera Mönter-Telgen
DLR Project Management Agency
German Aerospace Center
Health Research

I General Information

1. Acronym of the collaborative project:

CLaSP

2. Full Title of the project:

Care of Late Stage Parkinsonism

3. Project Runtime:

60 months

4. Project Coordinator:

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6. Amendments in the budget of the project:

Please mention any amendments in the budget of the project.

No amendments requested

7 Amendments in the composition of the consortia:

Please mention any amendments in the composition of the consortia during the project. Are some partners added in the consortia or did partners leave the consortia? If so, please indicate which partner left/ was added. Please also indicate the reasons and rationale for change in the composition of the consortia.

The composition of the individuals participating as PIs in the consortium remained the same throughout the study duration. However the investigator based at Marburg relocated institution, necessitating the set-up of a new site, Essen in Germany, from where data collection was then undertaken in addition to the original site Marburg in Germany.

II. Lay Abstract of the project and its achievements (200-400 words)

Please briefly summarize the project including its achievements and main conclusions in lay speech. **This abstract will be published online and may be used for the JPND webpage as well as for webpages of the JPND joint call partner organisations.**

Whilst the clinical problems, treatment and care needs of people with Parkinson's disease in the early stages are increasingly well known, there is little information on those in the late stages who have the greatest needs. This project aimed to assess the clinical problems and impact of late stage Parkinsonism on patients and their carers, examine what their medical and social needs are, as well as their use, costs and impact of health-care in six European countries.

These aims were achieved through the following tasks: a full systematic review of the existing literature; qualitative interviews were conducted with people with late stage parkinsonism and with carers, and in-depth assessments were performed in a large, representative number of 692 individuals affected by late stage parkinsonism and their carers. We also conducted a randomised trial examining the impact of a specialist review and recommendations to the primary physician. The study also examined the usefulness of existing assessment tools in the population of patients with late stage parkinsonism.

Bringing together the information from these different work streams, we identified the key problems encountered by people with late stage parkinsonism and their carers, including a range of motor and non-motor problems, of which Off-periods, autonomic features, cognitive impairment and neuropsychiatric features such as delusions, hallucinations, apathy, depression and dementia were most frequent and severe. These were common in patients at home but particularly in those in nursing homes, who were often given other treatments for these problems in addition to the antiparkinsonian medications. The qualitative interviews provided information on what support and care needs exist from patients' and carers' points of view. In addition to the clinical problems, and access to treatments for these, the interviews revealed that the complex needs of this populations require a more flexible and personalised service than is currently received. It was also found that support for patients in their own homes and positive relationships with healthcare providers help those with Parkinson's keep independent and maintain a sense of themselves, and that the provision of information helps them maintain some control and stay at home. Family caregivers were the main coordinators and monitors of care delivery, with significant impact on their own lives, demonstrated in the analysis of qualitative and quantitative data. The treatment trial identified deficiencies in the current model of management in this disease stage in the traditional secondary care model, including the difficulties in providing information and advice that is translated into management changes, but showed that specialist input, despite the limitations in implementation, improves quality of life in late stage parkinsonism. Taking the information from the literature reviews and the quantitative and qualitative studies, we devised a new tool to assess patients with late stage parkinsonism in any setting to provide the most appropriate care for patients in this complex late disease stage. Further data analysis is ongoing on longitudinal changes.

Our data will provide the basis for better provision of treatment and care of this underserved population and support care for this severely affected patient group.

III. Description of the project and its results

This section is for internal use by the JPND joint call partner organisations. Please also describe potential problems and highlights so we can shape our future call scheme. This information will not be published.

1. Structure of the project

1.1. Work packages of the project

Please allocate the work packages/tasks of the projects to partners involved. When referring to your partners, please use the numbering applied in section I. "General information" (e.g. "partner 1" or "P1")

WP	Title (subtitles, if applicable)	Partner N°
WP1	Multicentre cohort study of patients with late stage Parkinsonism and their carers at baseline and in person, assessment over one year, with telephone follow-up at 6 months and at 18 months in a proportion of participants	All collaborator sites, led by A. Schrag (1) and R Dodel (2)
WP2	Assessment of disability, palliative and social care needs and provision in late stage Parkinsonism, including health-care and social care predictors of outcome	All collaborator sites, led by S. Lorenzl (6) and W. Meissner (7)
WP3	Examination of resource utilization in late stage Parkinsonism and calculation of direct and indirect costs	R. Dodel (2)
WP4	Testing the usefulness and psychometric properties of PD outcome measures in late stage Parkinsonism	A. Schrag (1)
WP5	Set up and management of database	R.Dodel (2) & KKS
WP6	Systematic review of the efficacy of therapeutic interventions in late stage Parkinsonism	J Ferreira (3)
WP7	Evaluation of the impact of a specialist review on outcome	B Bloem (5)
WP8	Development of guidelines for management of late stage Parkinsonism based on results of this study and the systematic review, and provision of a platform for evaluation of medical and social needs and care provision for patients with late stage Parkinsonism	P Odin (4)

Add lines as appropriate

1.2. Project report of goals, tasks and milestones (3 pages max)

Please describe the initially planned goals, tasks and milestones for each work package and for the overall project. Please indicate the respective partners involved by using the numbering applied in section I. General information (e.g. "partner 1" or "P1").

The *overall aim of the project* was to assess the clinical problems and impact of late stage Parkinsonism on patients and their carers, examine what their medical and social needs are, as well as their use, costs and impact of health-care in six European countries. In addition, the impact of specialist review with management recommendations on outcome was assessed.

The tasks for each WP are outlined in the following, with the following deliverables for the overall project:

- Summary of identified problems and needs of patients with late stage Parkinsonism
- Summary of identified problems and needs of carers of patients with late stage Parkinsonism
- Summary of identified country-specific unmet needs
- Country-specific summary of health-care utilisation with direct and indirect costs
- Summary of disability and health-related quality of life in patients and carers
- Predictors of these outcomes, including health-care and social care aspects
- Mortality and change of outcome measures over one year
- Summary of psychometric properties of outcome measures in Late Stage Parkinsonism
- Interventions associated with improved outcomes in cross-sectional and longitudinal observation
- Statistical analysis of change of outcomes following intervention
- Platform for evaluation of patients with late stage Parkinsonism including provision of formal care and medication and guidelines for management of late stage Parkinsonism

Workpackage 1: Cross-sectional and longitudinal assessment of disability, current treatment, and prognosis of late stage Parkinsonism, and of predictors of outcome, including disease-, health-care- and social care-related factors of late stage Parkinsonism, of needs and use of health-care resources in patients and carers

All collaborators, led by partners 1 & 2.

Design: A longitudinal, multi-centric, observational cohort study in six European countries with different healthcare and social care models.

Eligibility:

Patients who are suffering from late-stage Parkinsonism classified according to Hoehn and Yahr stage (HY) IV or V in the "On"-state or have developed significant disability (Schwab and England stage 50% or less) in "On", and (2) their informal carers.

To have disease duration of more than 7 years

Those with PD in Hoehn and Yahr stages I-III, and those with drug induced Parkinsonism will be excluded.

Recruitment:

Through hospital departments, nursing homes and community practices of general practitioners and office-based neurologists, care of the elderly and primary care registers in the participating areas.

Eligible patients are selected based on their medical records and invited for participation by a letter from their clinician.

Assessments:

Baseline and face-to face and telephone follow-up assessments (T1 to T4) of:

Primary Endpoint

UPDRS-ADL. The UPDRS is the primary outcome measure of disability in the context of PD, with established psychometrics used in a large number of previous studies in PD.

Secondary Endpoints

Satisfaction with care and use of health-care resources

Quality of life, assessed by EQ-5D, and PDQ-8

Mental health, assessed with MMSE and NPI

Disease severity and disability

Non-motor symptoms scale score

Carer burden

Occurrence of disability and disease severity milestones (psychosis, dementia, falls, wheelchair-bound, institutionalisation and death).

Socio-demographic variables: age, gender, marital status, education, residential setting, relationship to carer, number of carers.

Workpackage 2: Assessment of Disability, Palliative and Social Aspects that affect patient outcome

All collaborators, led by partners 6 & 7.

Evaluated using the following measures:

Primary disability outcome measure:

UPDRS-ADL disability measure

Quality of life:

Patients' and carers' quality of life

Patients' and carers' satisfaction with care

Meaning in Life Evaluation (SMiLE)

Other palliative care aspects:

Symptom burden in late stage Parkinsonism

Carer burden

Palliative care status:

Nursing home placement/institutionalisation

Resources use and availability:

Availability and use of health-care resources for patients, e.g. Parkinson's disease specialist nurses, neurology/care of the elderly specialist review, allied health-care intervention (physiotherapy, occupational therapy, speech therapy), psychological interventions, hospital and outpatient rehabilitation unit interventions) and medications

Availability and use of social care resources and informal support

Mortality, Predictors, Place of death

Confounders will be considered including disease severity, socio-demographic variables: age, gender, marital status, education, residential setting, relationship to carer, number of carers.

Semi-structured interviews undertaken at four sites, with both patients and carers, enquiring about health status, needs and experiences, perception of service use and barriers to healthcare. All interviews will be digitally recorded, transcribed, and subject to thematic analysis with the aid of NVIVO programme.

Workpackage 3: Examination of resource utilisation in late stage Parkinsonism and calculation of direct and indirect costs.

Led by Partner 2.

Differences between health and social care settings across countries, and the impact of identified health services over the investigational period, will be explored using PD specific 'resource use' questionnaire for patients and their carers. This will enable a detailed evaluation

of resource use and costs in the late stage of the disease in order to determine the actual costs associated with late stage PD and to predict the economic burden of this disease for the next 10 years.

Workpackage 4: Validation of outcome measures in late stage Parkinsonism

Led by Partner 1

Results from baseline and follow-up assessments of the large cohort will be used to test the psychometric properties (acceptability, feasibility, reliability, validity and responsiveness) of the health-related quality of life measures PDQ-8, EQ-5D, and DEMQOL-PROXY and generic measures of handicap and palliative outcome (ESAS-PD) against a disease-specific measures of disability with extensive available data (UPDRS-ADL) and other measures of disease severity (UPDRS motor part, and Non-motor symptom scale).

Feasibility and acceptability will be examined in terms of response and completion rates and score distributions.

Reliability will be assessed through internal consistency.

Validity, the instruments will be examined through correlations with related scales and comparison of known group differences. The standard error of measurement (SEM) will be calculated for precision.

For responsiveness of scales, health changes since baseline will be captured using a CGI (clinical global impression). Change over time will be measured using change scores, the standardised response mean (SRM) and effect sizes.

Workpage 5: Set up and management of database

Partner 2 (and the Co-ordinating Centre for Clinical Trials (KKS), University Marburg)

A computerized central data collection and patient monitoring system will be implemented in order to facilitate electronic capture, management and plausibility checks of all source data.

A secure pseudonymised patient ID system will be developed and utilised, incorporating an audit trail, and electronic data capture system will be in compliance against FDA, GCP and European legislation. Relevant members of the research team will be trained in data entry and management.

Workpackage 6: Systematic review of the efficacy of therapeutic interventions in late stage Parkinsonism

Partner 3

A systematic review will be carried out according to 2009 PRISMA guidelines on therapeutic interventions in the late stage of Parkinsonism, including MESH terms for parkinsonism and its various underlying pathologies as well as specific medical, surgical and non-pharmacological interventions.

Workpackage 7: Evaluation of the impact of a specialist review on outcome.

Partner 5

To test the hypothesis that specialist input in the late stage of Parkinsonism provides better outcomes than standard care.

Primary and secondary outcome measures: as documented for earlier WP.

Open-label trial design:

An evaluation of the impact of specialist review with management recommendations, guidance and availability of telephone assistance on outcome at baseline and following the intervention.

3:1 randomised allocation to intervention with a quarter of randomly selected individuals not receiving the intervention, except where it is felt to be an urgent medical need, e.g. contraindicated medications.

Intervention: Management suggestions to the primary care clinician by the senior researcher at baseline following assessment by the study researcher and discussion with the senior researcher, taking into account current and previous disease factors, review of medications and current medical and social care arrangements. The suggestions may include recommendations on medication changes and referrals for assessment by health-care services such as physiotherapist or other medical specialties, and social care services. Primary and secondary outcomes will be compared between baseline and follow-up after intervention.

Workpackage 8. Development of guidelines for management of late stage Parkinsonism based on results of this study and the systematic review, and provision of a platform for evaluation of medical and social needs and care provision for patients with late stage Parkinsonism.

Partner 4

The aim of the workpackage is to translate the study findings into clinical tools. The evidence extracted from the systematic review, the cross-sectional and longitudinal assessments, interviews with patients, and the trial will form the basis of a guideline aimed at policy makers, clinicians, social care providers and health-care workers. The research database will be converted from a research tool into a user-friendly Microsoft Excel based tool for use in the assessment of needs of patients with late stage Parkinsonism, independent of their care setting and health-care system, including a checklist of issues highlighted in the guidelines and the ability to be adapted to local settings and be linked with cost calculations.

The workpackage also includes the dissemination of the findings and tools resulting from this study, through publications, interaction with policy makers and national patient organisations and will be done in collaboration with EPDA and national patient organisations.

2. Delivery of the project

2.1. Major achievements of each work package and of the overall project

WP1 & 2: We successfully completed a large, multinational cross-sectional study assessing in depth the needs and use of health care resources of patients with late stage parkinsonism in Europe. In a multi-centric, observational cohort study in six European countries with different healthcare and social care models, patients who are suffering from late-stage Parkinsonism were included. Eligibility criteria were: Hoehn and Yahr stage (HY) IV or V in the “On”-state or significant disability (Schwab and England stage 50% or less) in “On” and a disease duration of more than 7 years. Those with secondary Parkinsonism were excluded.

Participants were recruited through hospital departments, nursing homes and community practices of general practitioners and office-based neurologists, care of the elderly and primary care registers in the participating areas. Eligible patients were selected based on their medical records and invited for participation by a letter from their clinician.

All selected measures and assessment tools were successfully administered at baseline and follow up visits across all sites, and analysis undertaken to assess problems and needs of patients with late stage Parkinsonism, and those of carers of patients with late stage Parkinsonism across participating countries. Furthermore, specific information was collected on overall disability and health-related quality of life in patients and carers. A range of potential

predictors and confounders of these outcomes, including health-care and social care aspects, were also assessed.

At all sites, all baseline and follow-up visits were successfully completed and data entered to the study specific electronic database (e-CRF) (n= 692). Quality control processes were applied to data by the centre coordinating electronic data collection and local queries resolved producing a complete dataset for analysis.

Successful face-to-face consortium meetings took place throughout the project, with interim TC's and email correspondence as required.

Table 1. Characteristics of the sample of late-stage Parkinsonism patients (n=692)

Variable / Instrument	Value
Recruitment	
Country, number (%)	
United Kingdom	123 (17.8)
Germany (2 sites)	217 (31.4)
France	76 (11.0)
Sweden	107 (15.5)
the Netherlands	85 (12.3)
Portugal	84 (12.1)
Inclusion criteria	
Hoehn and Yahr score, number (%)	
Stage 2	5 (0.7)
Stage 2.5	14 (2.0)
Stage 3	33 (4.8)
Stage 4	411 (59.4)
Stage 5	229 (33.1)
Disease duration in years, median (min-max)	14 (0-62)
Schwab and England score, median (min-max)	30 (0-80)
Demographics	
Gender, number (%) women	319 (46.1)
Age, median (min-max)	77 (24-96)
Years of education, median (min-max)	9 (0-25)

The results have been analysed for publications which are being submitted on the following topics:

Manuscript 1: Late Stage Parkinsonism: motor and non-motor complications in a large European population

Background: There is little information on the late stages of parkinsonism and the prevalence of its motor and non-motor complications. **Methods:** We conducted a large multicentre study in 692 patients with late stage parkinsonism in six European countries. Inclusion criteria were disease duration of ≥ 7 years and Hoehn and Yahr stage ≥ 4 or Schwab and England score of 50 or less. Patients were recruited through multiple sources to ensure patients no longer attending specialist centres are represented. Participants were assessed in their homes or health care centres using a range of clinical scales as well as patient and carer reports. **Results:** Average disease duration was 15.4 (SD 7.7) years and 54% were male. Fifty-nine percent were in Hoehn and Yahr stage 4 and 33% in stage 5. Dementia according to MDS-criteria was present in 37% of patients. Mean total UPDRS score was 82.7 (SD 22.4). Mean levodopa equivalence dose was 874.1 (SD 591.1) mg/d. Falls were occurring in 82% which were frequent in 26%, either related (16%) or unrelated to freezing (21%) or both. Moderate-severe difficulties turning in bed were reported by 51%, moderate-severe speech impairment by 43% and moderate-severe swallowing problems by 16%. Off periods occurred in 68% and were present at least 50% of the day in 13%, with morning dystonia occurring in 35%. Moderate-severe tremor was reported by 11%, and dyskinesias by 45% but were moderate or severe only in 7%. At least one moderate-severe non-motor problem on the non-motor symptoms scale was reported by 99% of patients, and moderate-severe fatigue, constipation, urinary urgency and nocturia, difficulties concentrating and forgetting events by more than half of participants. Hallucinations (44%) or delusions (25%) were present in 62.5% and were moderate-severe in 15%. There was no association with age of onset in this population. **Conclusions:** Moderate to severe motor and non-motor problems, particularly off-periods, autonomic features, cognitive impairment and psychiatric features are frequent and commonly moderate to severe in late stage parkinsonism despite relatively high medication doses. These data suggest that current treatment of late stage parkinsonism in the community remains insufficiently effective to alleviate moderate-severe symptoms and disability in many patients.

Table 2. Prevalence of motor problems in late stage parkinsonism

Motor feature	UPDRS item	Sample size	Prevalence of any symptoms (UPDRS item severity score ≥ 1), number (%)	Prevalence of moderate or severe problems (UPDRS item severity score ≥ 3), number (%)
Speech problems	UPDRS-2 item 5	688	637 (92.6)	298 (43.3)
Swallowing problems	UPDRS-2 item 7	689	432 (62.7)	108 (15.7)
Falls unrelated to Freezing (frequency)	UPDRS-2 item 13	681	519 (76.2)	142 (20.9)
Symptomatic tremor	UPDRS-2 item 16	689	428 (62.1)	73 (10.6)
Dyskinesia (duration)	UPDRS-4 item 32	688	310 (45.1)	51 (7.4)
Disabling Dyskinesia	UPDRS-4 item 33	687	201 (29.0)	52 (7.5)
Off-time (duration)	UPDRS-4 item 39	682	462 (67.7)	87 (12.8)
Morning dystonia	UPDRS-4 item 35	688	241 (35.0)	NA

NA = not applicable, as item is yes/no question

Table 3. Prevalence of non-motor problems in late stage parkinsonism

Non-motor symptoms as assessed on the Nonmotor symptoms scale	Sample size	Prevalence of any symptoms (NMSs severity score ≥ 1), number (%)	Prevalence of moderate or severe symptoms (NMSs severity score ≥ 2), number (%)	Sum score (Frequency x Severity score), mean (SD)
1. light-headedness	656	331 (50.4)	209 (31.4)	2.6 (3.6)
2. fainting	657	99 (15.1)	80 (12.2)	0.8 (2.3)
3. daytime sleepiness	661	439 (66.4)	237 (35.9)	3.6 (3.9)
4. fatigue	658	520 (79.0)	396 (60.2)	5.5 (4.4)
5. difficulties falling asleep	659	305 (46.3)	219 (33.2)	3.4 (4.6)
6. restless legs	655	252(38.5)	171 (26.1)	2.4 (3.8)
7. losing interest in surroundings	659	335 (50.8)	250 (37.9)	3.4 (4.3)
8. lack of motivation	658	385 (58.5)	290 (44.1)	4.2 (4.6)
9.nervousness	658	317 (48.2)	215 (32.7)	2.6 (3.7)
10. feeling sad	659	435 (66.0)	307 (46.6)	3.7 (4.0)
11. flat mood	657	312 (47.5)	174 (26.5)	2.5 (3.6)
12. anhedonia	658	273 (41.5)	199 (30.2)	2.8 (4.2)
13. hallucination	659	287 (43.6)	172 (26.1)	2.4 (3.8)
14. delusion	659	167 (25.3)	123 (18.7)	1.5 (3.2)
15. double vision	654	207 (31.7)	142 (21.7)	2.0 (3.6)
16. difficulty concentrating	660	455 (68.9)	337 (51.1)	4.9 (4.6)
17. forgetting events	659	481 (73.0)	342 (51.9)	5.0 (4.6)
18. forgetting actions	655	433 (66.1)	317 (48.4)	4.8 (4.8)
19. hypersalivation	661	430 (65.1)	300 (45.4)	4.4 (4.4)
20. difficulty swallowing	661	360 (54.5)	222 (33.6)	3.0 (3.9)
21. constipation	658	415 (63.1)	340 (51.7)	4.4 (4.5)
22. urgency	654	448 (68.5)	390 (59.6)	6.0 (5.1)
23. frequency	651	395 (60.7)	319 (49.0)	5.0 (5.0)
24. nocturia	650	458 (70.5)	356 (54.8)	5.9 (5.0)
25. losing interest in sex	634	273 (43.1)	229 (36.1)	4.1 (5.2)
26. sexual dysfunction	621	331 (53.3)	304 (49.0)	5.3 (5.5)
27. pain	656	332 (50.6)	260 (39.6)	3.6 (4.4)
28. anosmia	653	348 (53.3)	268 (41.0)	4.4 (4.9)
29. weight loss	657	263 (40.0)	174 (26.5)	2.4 (3.8)
30. excessive sweating	659	231 (35.1)	161 (24.4)	2.1 (3.6)
Impulse control disorders*	599	99 (16.5%)	27 (4.5%)	

*individual question from the MDS-UPDRS (presence ≥ 1 , moderate or severe ≥ 3)

Manuscript 2: Neuropsychiatric complications in late stage parkinsonism: Prevalence and predictors

Background: Estimates of the prevalence of neuropsychiatric symptoms, e.g. psychosis, depression, anxiety and behavioral problems, in late-stage Parkinsonism are lacking, and it is currently unclear what determines the occurrence of these symptoms. Our objective was to determine prevalence and determinants of neuropsychiatric symptoms in late-stage Parkinsonism. **Methods:** Neuropsychiatric symptoms were assessed with the Neuropsychiatric Inventory, with frequency x severity score ≥ 4 indicating clinically relevant symptoms. Of the overall sample there were 625 participants in whom the carer-rated NPI could be completed. Determinants of neuropsychiatric symptoms analyzed were demographic characteristics, medication, and motor and non-motor symptoms. Univariate and multivariate logistic analysis was performed on determinants of clinical relevant neuropsychiatric symptoms. **Results:** In 95.4% (576/625) of patients at least one neuropsychiatric symptom was present and 75.5% (472/625) had ≥ 1 clinical relevant symptom. The most frequently clinical relevant symptoms were: apathy (n=242; 38.9%), depression (n=213; 34.5%) and anxiety (n=148; 23.8%). The determinant analysis revealed unique sets of determinants for each symptom, particularly the presence of other neuropsychiatric features. **Conclusion:** Neuropsychiatric symptoms are frequent in late-stage disease and the strongest determinants are other neuropsychiatric symptoms. Clinicians involved in the care for patients with late-stage Parkinsonism should be aware of these symptoms in this specific disease group and pro-actively explore other psychiatric comorbidities once a neuropsychiatric symptom is recognized.

Table 4. Prevalence of neuropsychiatric symptoms as assessed on the Neuropsychiatric Inventory

	Sample size	Prevalence of symptoms ($F \geq 1$), number (%)	Prevalence of clinically relevant symptoms ($F \times S \geq 4$), number (%)
Delusions	621	147 (23.7%)	88 (14.2%)
Hallucinations	623	257 (41.3%)	129 (20.7%)
Agitation/aggression	619	182 (29.4%)	82 (13.2%)
Depression/Dysphoria	618	372 (60.2%)	213 (34.5%)
Anxiety	621	274 (44.1%)	148 (23.8%)
Elation/euphoria	621	25 (4.0%)	9 (1.4%)
Apathy / indifference	622	309 (49.7%)	242 (38.9%)
Disinhibition	619	49 (7.9%)	26 (4.2%)
Irritability /lability	620	184 (29.7%)	80 (12.9%)
Aberrant motor behavior	614	153 (24.9%)	111 (18.1%)

In this study, we paid particular attention to the inclusion and assessment of patients who are not normally included in clinical studies, recruiting from multiple sources. As a result we included many patients from nursing homes and examined their characteristics in order to determine whether these have particularly characteristics that are associated with nursing home placement or require different management, and whether their treatment differs from those residing at home:

Manuscript 3: Differences in patients with late stage parkinsonism with nursing home placement and those remaining at home

Objective: To determine what distinguishes people with late stage parkinsonism who live in their own homes and those who live in nursing homes. **Methods:** Using data from a large, in-depth study of patients with late stage parkinsonism, we performed a cross-sectional comparison between those living in their own home (n=472) and those in nursing homes (n=190). An assessment battery including the Unified Parkinson's Disease Rating Scale (UPDRS), the non-motor symptom scale and the neuropsychiatric inventory (NPI) and a structured interview of patients and carers were used to assess disease-related and other characteristics. **Results:** Nursing home residents were less likely to be married, more likely to have a diagnosis of atypical parkinsonism and to have dementia (all $p < 0.001$). There were no associations with gender, disease duration or years of education. Although nursing home residents had higher motor scores, falls were less common. Non-motor symptom burden, particularly delusions, hallucinations, mood disorder and cognitive dysfunction was higher in nursing home residents. Levodopa equivalence doses and percent and severity of off periods were similar, but patients in nursing homes had lower frequency and severity of dyskinesias and lower dopamine dysregulation scores. Nursing home residents were more likely to have treatment with clozapine, anxiolytics and hypnotics. **Conclusion:** Patients in nursing homes had a higher overall symptom burden, particularly with respect to neuropsychiatric features, but fewer falls and dyskinesias, and whilst treatment with levodopa was similar, medications for non-motor symptoms were used differently in those living in their own homes.

Qualitative Interviews

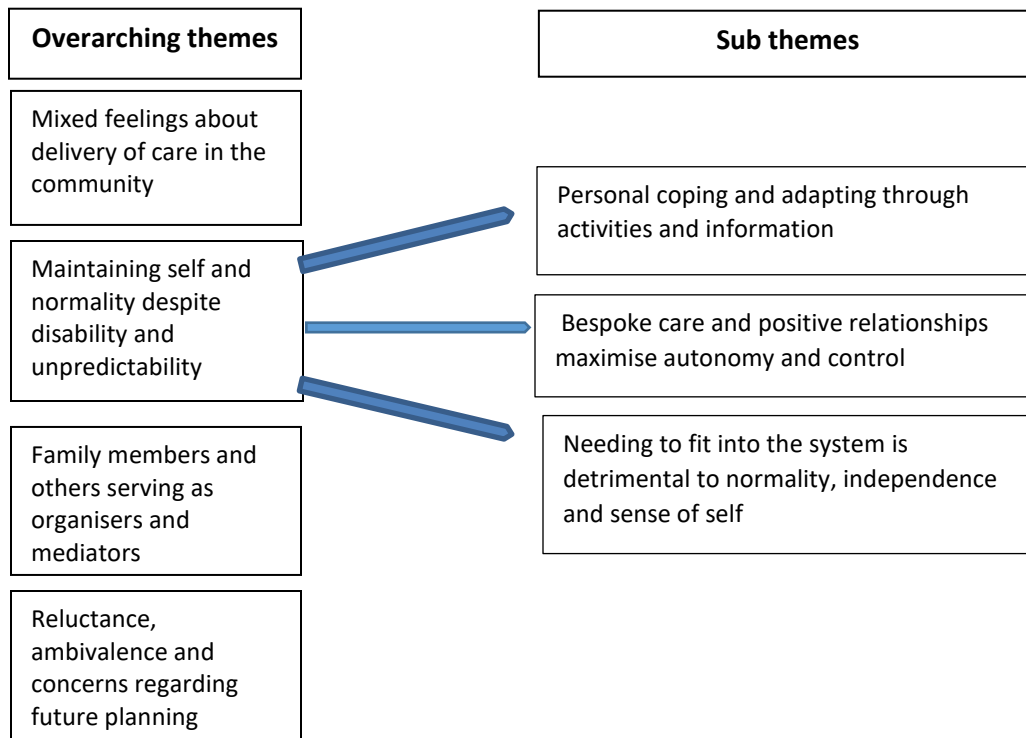
Semi-structured interviews (n=68) were completed in those three sites entering the sub-study, and anticipated recruitment numbers were attained. Findings from interviews identified perceived gaps in service provision, and the following manuscript is being submitted for publication:

Manuscript 4: Experiences and care of patients with late stage parkinsonism in the UK. A qualitative study

Aim: To explore experiences of health services and unmet care needs by people with late-stage Parkinsonism in the UK. **Method:** Ten participants, at Hoehn and Yahr stage 4 or 5, were interviewed using semi-structured open-ended questions. Data were analysed using qualitative thematic analysis. **Findings:** Participants reported that whilst under the treatment of specialist hospitals, the majority of care provision had shifted into the community, often because hospital-based services were felt to be difficult to access and have limited benefit to them. When using health-care services, participants frequently experienced having to 'fit-in' to service structures that did not always accommodate their complex needs. Despite high levels of disability, participants expressed their desire to maintain their identity, normality of interests and activities in their lives, including remaining in their own homes. This was facilitated by bespoke care and equipment, and positive relationships with care providers. Knowledge on disease management was a key factor in their perceived ability to remain in control. Family caregivers had a central role in facilitating care at home. There was uncertainty about and little planning for the future, and moving to a residential nursing home was perceived an undesirable but potentially necessary option for future care. **Conclusion:** Unmet care needs identified by people with late stage Parkinsonism in the UK include greater flexibility of healthcare structures and bespoke service provision, to accommodate their individual complex needs. Support in their own homes

and positive relationships with healthcare providers help People with Parkinson's (PwP) to maintain a degree of normality and identity, and provision of information help them maintain some control. There is a need for more informed discussions on future care planning for this specific population.

Figure 1: Themes and subthemes



Manuscript 5: Caregiver burden

We also investigated the impact of late stage parkinsonism on caregivers, including the amount of caregiving provided. **Aim:** to investigate the caregiver burden in patients with late stage parkinsonism and the factors this is associated with. **Patients and methods:** Five hundred and six patients and their caregivers from the CLaSP study were included. Caregiver's burden was assessed by the Zarit Burden Interview (ZBI). **Results:** The mean ZBI score was 31.34 ± 16.01 . Mean years of caregiving were $5.3 (\pm 4.8)$ years. The majority of caregivers were the spouse/life partner of the patient (57.7%). Regarding the amount of caregiving, 405 patients (80%) required help in daily life from caregiver. Caregivers spent on average $6.73 (\pm 6.63)$ hours per day and $23.08 (\pm 10.62)$ days per month assisting with tasks of daily living and $7.63 (\pm 8.24)$ hours per day supervising the patient. Approximately half of the carers (48.4%) did more than 40% of the care for the patient. Two hundred nineteen caregivers (43.3%) also had the assistance of another person. Eighty eight percent of the caregivers who did not live with the patient visited them at least once a week (often to several times a day) and were 5-24 hours a week in contact with them (personally or on the phone). ZBI scores correlated significantly with almost all domains of the NMS (cardiovascular symptoms/falls, sleep, mood/cognition, perceptual problems, attention and memory problems, gastrointestinal and urinary symptoms) and of the NPI (delusions, hallucinations, agitation/aggression, depression/dysphoria, anxiety, apathy, disinhibition, irritability/lability, aberrant motor behaviour, sleep and night-time behavior disorders (all $p < 0.05$).

Furthermore, ZBI scores correlated with the years of informal care, hours per day and days per month assisting the patient, as well as hours per day supervising the patient. ZBI and UPDRS total scores correlated only weakly ($r=0.16$, $p=0.000$) in this late stage population, and there was no correlation found with UPDRS III and UPDRS IV. Being the spouse, living with the patient and living at home were associated with increased ZBI ($p<0.05$). A stepwise multiple regression analysis with ZBI score as dependent variable showed that NPI total, NMS total, relationship of carer with the patient and hours per day assisting the patient could explain 30.8% of the total variance of the ZBI scores ($R^2=0.31$, $p=0.012$). The most important predictor of ZBI was the NPI total score, which explained 17.3% of the variance. **Conclusion:** The care of patients with parkinsonism in the late stages is associated with a very high caregiver burden and long hours of daily caregiving. Patient's non-motor and neuropsychiatric symptoms, being the spouse and time of caregiving were the most important contributors of caregiver's burden. Neuropsychiatric symptoms of patients were the most important patient-related determinants of the caregiver burden in this group of patients. Optimal management of these symptoms and support to reduce time of daily caregiving are important to alleviate caregivers' burden.

Additional publications are currently being prepared on the following topics:

- The perspective of carers on needs in late stage parkinsonism. A qualitative study
- Patient and carer interviews in patients with late stage parkinsonism in Portugal
- Patient and carer interviews in patients with late stage parkinsonism in Sweden
- Experiences of care in late stage parkinsonism across different European countries. A qualitative study
- Life satisfaction in late stage parkinsonism
- Palliative care needs in patients with late stage parkinsonism
- Recruitment of patients in the late stages of parkinsonism: Challenges and approaches

Further analyses are also being undertaken to assess progression over time.

WP3: The measurement tool for the assessment of resource utilization was successfully translated, adopted and administered across all sites in six countries at baseline and follow-up visits, and an analysis of health care utilization and direct and indirect costs across participating countries is being undertaken and the following paper is being prepared for publication:

- Health-care utilization and cost of late stage parkinsonism in 6 European countries

WP4: How appropriate and valid are the existing assessment tools in this population?

Results from baseline and follow-up assessments of the cohort are being used to test the psychometric properties (acceptability, feasibility, reliability, validity and responsiveness) of the health-related quality of life measures PDQ-8, EQ-5D, and DEMQOL-PROXY and generic measures of handicap and palliative outcome (ESAS-PD) against a disease-specific measures of disability with extensive available data (UPDRS-ADL) and other measures of disease severity (UPDRS motor part, and Non-motor symptom scale). For the psychometric properties, the following definitions were applied:

- Feasibility and acceptability: response and completion rates and score distributions.
- Reliability: internal consistency.
- Validity: correlations with related scales and comparison of known group differences.
- Precision: standard error of measurement (SEM).

- Responsiveness of scales: health changes since baseline will be captured using a CGI (clinical global impression). Change over time will be measured using change scores, the standardised response mean (SRM) and effect sizes.

Data collection has been completed and analysis is being undertaken with the following publication in preparation:

- Feasibility and validity valid of assessment tools for Parkinson's disease in late stage disease.

WP 5: A study-specific database was set up, providing high data security with data entry from local sites. All baseline and follow-up data was entered into this study-specific electronic data capture system. Quality control processes were undertaken and queries resolved with sites before closure of the database and release of data for analysis.

WP 6: Analysis and systematic review of publications on treatments for motor and non-motor symptoms of late stage Parkinsonism was completed and developed within the consortium. Abstracts were presented at International meetings and two papers are being prepared for submission:

- A systematic review of effectiveness of interventions for motor complications in late stage parkinsonism.
- A systematic review of effectiveness of interventions for non-motor complications in late stage parkinsonism.

WP7: What is the impact of a specialist review with management recommendations, provision of guidance and access to telephone assistance?

A randomized controlled trial was undertaken with completion of recruitment and follow-up visits. **Method:** To address the research question, we included 91 patients with late-stage Parkinsonism considered undertreated in a pragmatic multi-center randomized-controlled trial with six-month follow-up. The primary physician of patients in the intervention group received a detailed letter with treatment recommendations based on an extensive clinical assessment, performed by a movement disorders specialist. The control group continued their usual care. The primary outcome measure was the Unified Parkinson Disease Rating Scale (UPDRS) part II - Activities of Daily Living scale. Secondary outcome measures included other clinical scales and the Parkinson's Disease Quality of Life Questionnaire – 8 items (PDQ-8) and Levodopa-Equivalent-Daily-Dose (LEDD). In addition to the intention-to-treat analyses, a per-protocol analysis was conducted only including those in whom recommendations was at least partially followed. **Results – recruitment:** Sample size calculation required 216 patients, but only 91 patients could be included. Whilst recruitment to the overall study was high and recruitment numbers were met, despite the recruitment strategy for the trial part of the study using a multi-faceted approach, the identification and recruitment of patients in the late-stage of Parkinsonism for the trial was slower and lower than expected. This was discussed across sites and catchment areas increased where necessary, and increased attention focused on recruiting this group. Participant recruitment increased but was lower than the planned recruitment numbers

resulting in a lower sample size in the trial part of the study than planned. **Results – impact:** Treating physicians followed recommendations at least partially in 37 (64%) patients. In the intention-to-treat analysis, there was no difference in the primary outcome measure (between-group difference = -1.2, $p = 0.45$), but there was greater improvement on the PDQ-8 in the intervention group (between-group difference = -3.7, $p=0.02$). The per-protocol analysis confirmed these findings, and there was additionally less deterioration on the UPDRS-part I, greater improvement on the UPDRS-total score and greater increase in LEDD in the intervention group. **Conclusion:** These findings suggest both benefit from treatment optimization and the need for better strategies to optimize treatment in late-stage disease.

The following publication is being submitted for publication:

- A pragmatic trial of management of late stage parkinsonism

Table 5. Characteristics of the trial participants

	Intervention (n=70)	Control (n=21)	P-value
Age, years, median (range)	80 (33)	84 (35)	0.15
Age of onset, years, mean (SD)	65.0 (10.3)	63.4 (13.1)	0.55
Disease duration, years, median (range)	14 (31)	16 (56)	0.13
Gender, n (% women)	36 (51)	6 (29)	0.07
Presence of dementia, n (% yes)	31 (44)	9 (43)	0.91
Living in nursing home, n (%)	42 (60)	12 (57)	0.82
Site, n (%)			
London	7 (10)	1 (5)	
Bordeaux	4 (6)	2 (10)	
Lund	42 (60)	13 (62)	
Nijmegen	17 (24)	5 (24)	
Hoehn and Yahr stage, n (%)			
Stage 3	4 (6)	0	0.52
Stage 4	39 (56)	13 (62)	
Stage 5	27 (39)	8 (38)	

WP8: An excel-based worksheet for use in the assessment of needs of patients with late stage Parkinsonism, independent of their care setting and health-care system has been created, based on the results of this study. This includes a checklist of issues and recommendations for patients in the late stages of parkinsonism and can be adapted to local settings and be linked with cost calculations. A decision toolkit is being developed which will undergo refinement and further funding will be sought to test the usefulness of these tools.

2.2. Highlights of the collaboration (scientific and structural)

Please briefly describe below highlights the consortium experienced during the project runtime with regard to (a) scientific aspects of the work plan and (b) the collaboration of the partners

This project to identify and address the needs of those in the late stages of parkinsonism across Europe and different settings has been challenging but extremely rewarding. The collaboration of researchers and clinicians from different countries and specialties has been harnessing the joint expertise and enthusiasm of key researchers in this field, overcoming the considerable challenges in studying this severely disabled population who often no longer access specialist centres. During the collaboration, the project brought together researchers who have formed an ongoing partnership driving forward the joint aim of better understanding and care provision for patients in the very advanced stages of the disease, seeking joint solutions to problem in research approaches, as well as introduced new research methods to several centres. As a result of the study, in addition to the multiple highlighted conclusion above, we have created a continuing collaboration and infrastructure between several of the centres, and are continuing collaborations on several projects. In addition, the study has provided the basis for at least two major interventional studies (see below, PD-Care, funded by the UK funding body NIHR, and PD-Pal funded by Horizon2020) which are being conducted in this patient group, addressing the needs identified in this study. Several of the consortium members have been invited to speak at conferences on this topic and increasing attention is being paid to this patient group in clinical care and research.

2.3. Overall conclusions

This project is the first and only large-scale analysis of clinical problems in patients in the late stages of Parkinsonism. It provides robust and unique data on the problems encountered by patients in this disease stage and their carers. The burden of disease is moderate to severe across a range of clinical features, particularly Off-periods, autonomic features, cognitive impairment and neuropsychiatric features, which are insufficiently addressed by current treatments. Particularly patients in nursing homes have frequent and severe neuropsychiatric features and these are major determinants of disability and caregiver burden together with overall disease severity. Family members are the key coordinators of care at this disease stage and provide long hours of care. Specialist recommendations provided by specialists can improve quality of life but implementation is limited in the current models of health care. Improved communication between health care providers, with more flexible, personalised care approaches, and efforts to maintain normality of patients' lives have the potential to dramatically improve management and quality of life in late stage parkinsonism.

2.4. Changes and amendments to the original work plan regarding each work package and the overall project and rationale for changes and amendments

None

2.5. Problems faced and their solutions (scientific and structural)

Please briefly describe problems the consortium encountered and their solutions during the project runtime with regard to scientific aspects of the work plan, and the collaboration of the partners.

The different requirements for ethics committees in the six participating countries meant that the protocol had to be amended slightly to address all queries raised, which delayed the final protocol and thereby commencement of the study and recruitment. Once all regulatory approvals were in place the study proceeded satisfactorily, however as a consequence of the delays in study commencement a cost-neutral extension was sought and granted.

The study specific database for electronic data collection required some minor alternations to optimise data entry, leading to a delay in availability for data entry in the first year of the study.

Whilst recruitment to the overall study was high and recruitment numbers were met, despite the recruitment strategy for the trial part of the study using a multifaceted approach, the identification and recruitment of patients in the late stage of PD with severe disability and no regular specialist input for WP7 was slower and lower than expected. This was discussed across sites and catchment areas increased where necessary, and increased attention focused on recruiting this group. Participant recruitment increased but was lower than the planned recruitment numbers resulting in a lower sample size in the trial part of the study than planned.

2.6. End-user engagement

Please briefly describe collaboration with end users (e.g., patients/patient groups, consumers, commercial companies and stakeholders). Has there been input from the end users? Yes/No. Please specify your answer.

On a European level, there has been a collaboration with patient organization European Parkinson's Disease Association (EPDA) on *My Patient Journey* project about access to care, which is in alignment with CLaSP aims. Several meetings to support and advise the EPDA in this project have taken place, and a presentation to members of the European Parliament in Brussels on the results of a survey on experience of people with PD and their carers was made by partner 1.

In the UK, multiple presentations were made to PPI groups, who also reviewed the study materials, and patient organisations, including Parkinson's UK.

In Sweden, the CLaSP project was presented in several symposia including patients, caregivers and others:

Olle Enqvist Symposium, Lund University Hospital, 400 participants, Oct 2018

Olle Enqvist Symposium, Lund University Hospital, 500 participants, Oct 2015

World Parkinson day, Lund, 450 participants, April 2019

World Parkinson day, Varberg, 250 participants, April 2019

In addition to presentations, A popular science article was published in the popular science online journal on science and health: The CLaSP Project - general information about the study (Aktuellt om Vetenskap och Hälsa, 2016). <http://www.vetenskaphalsa.se/ny-europeisk-satsning-pa-de-svarast-parkinsonsjuka/>.

Recipient of Åke Ljungdahl's prize 2019 from the Swedish Parkinson Foundation (100 000 SEK) February 2019 (for work on the CLaSP project). <http://www.parkinsonfonden.se/forskning/ake-ljungdahls-pris/>

In the Netherlands, during the study period, two patient researchers from the Dutch Parkinson's Association, have been involved as advisors for the Dutch CLaSP research team. They reviewed the recruitment materials and we have involved them in the interpretation of the findings. The CLaSP study was also presented to numerous neurologists, general practitioners and physicians for the.

In France, the CLaSP project was discussed with the Regional Health Agency (ARS) of the Nouvelle Aquitaine region. As one outcome of this discussion, a pilot study will be conducted to assess the impact of the intervention of a specialized multidisciplinary team at the home of patients with late-stage PD.

In Germany, Partner 6 presented about Parkinson's and Palliative Care at multiple conferences meetings e.g. the DGN conferences 2016-2018 and the German/Scandinavian Parkinson Meeting. In addition, results of the study were presented to patient organisations for PD and PSP in Munich in June 2018 and Salzburg (November 2018). An information leaflet has been produced for the Deutsche PSP-Gesellschaft about "Palliative Care und die damit zusammenhängen Versorgungsformen (Palliativstation, Hospiz und Spezialisierte Ambulante Palliativversorgung). The working group for Palliative Care for the Movement Disorders Society was founded in 2017.

2.7. Patient and public involvement

Please briefly describe collaboration with intermediary target groups (e.g. care providers, policymakers, professional and sector organisations) Has there been input from intermediary target groups or their representatives? Yes/No. Please specify your answer.

As above.

3. Outputs from the project

3.1. Publications

*Please indicate THE NUMBER of publications and communications in which JPND support was **acknowledged**. Please do not mention publications anterior to the start of the project.*

Number of publications and communications

Type of publication	Total N°
Peer reviewed articles	6
Books or book's chapters	0
Reviews	1
Articles dedicated to general public	1
Communications in scientific congresses	2
Dissertations	5
Others	7

List of publications and communications

Please list the publications that result from the funded project. Please group them according to the categories presented in the table above. In column 1, please underline the name of the JPND-funded partners. In column 2, please point out the project partners involved by using the numbering applied in section I General information (e.g. partner 1 or P1).

Publication (authors, title, journal, year, issue, pp.)	Partner(s)	Impact factor
Balzer-Geldsetzer M, Ferreira J, Odin P, Bloem BR, Meissner WG, Lorenzl S, Wittenberg M, Dodel R, Schrag A. Study protocol: Care of Late-Stage Parkinsonism (CLaSP): a longitudinal cohort study. BMC Neurol. 2018 Nov 5;18(1):185. doi: 10.1186/s12883-018-1184-	All	2.17
Schrag A , Modi S, Hotham S, Merritt R, Khan K, Graham L; A on behalf of the European Parkinson's Disease Association. Patient experiences of receiving a diagnosis of Parkinson's disease. J Neurol. 2018 May;265(5):1151-1157.	1	3.8
Merritt R, Hotham S, Graham L, Schrag A . The subjective experience of Parkinson's disease: A qualitative study in 60 people with mild to moderate Parkinson's in 11 European countries European Journal for Person Centered Healthcare 2018 Vol 6 Issue 3 pp 447-453	1	
Rosqvist K, Horne M, Hagell P, Iwarsson S, Nilsson MH, Odin P . (2018) Levodopa Effect and Motor Function in Late Stage Parkinson's Disease. <i>J Parkinsons Dis</i> . 8(1) :59-70.	5	3.7
Rosqvist K, Odin P , Hagell P, Iwarsson S, Nilsson MH, Storch A. (2018) Dopaminergic effect on non-motor symptoms in late stage Parkinson's disease. <i>J Parkinsons Dis</i> . 8(3) : 409-20.	5	3.7
Lex KM, Larkin P, Osterbrink J, Lorenzl S. A Pilgrim's Journey-When Parkinson's Disease Comes to an End in Nursing Homes. Front Neurol. 2018 Dec 11;9:1068. doi: 10.3389/fneur.2018.01068. eCollection 2018. PMID: 30619034	6	2.6
Lex KM, Kundt FS, Lorenzl S. Using tube feeding and levodopa-carbidopa intestinal gel application in advanced Parkinson's disease. Br J Nurs. 2018 Mar 8;27(5):259-262. doi: 10.12968/bjon.2018.27.5.259.	6	2.4

<p>Eggers C, Dano R, Schill J, Fink GR, Timmermann L, Voltz R, Golla H, Lorenzl S. Access to End-of Life Parkinson's Disease Patients Through Patient-Centered Integrated Healthcare. Front Neurol. 2018 Jul 30;9:627. doi: 10.3389/fneur.2018.00627. eCollection 2018.</p> <p>PMID: 30105000</p>	6	2.6
<p>22nd International Congress of Parkinson's Disease and Movement Disorders (MDS), Hong Kong, 5-9 October 2018. Abstract number 44. Levodopa effect on non-motor symptoms in late stage Parkinson's disease. Rosqvist K, Odin P, Hagell P, Iwarsson S, Nilsson MN, Storch A.</p>		
<p>NorDoc, 2nd Nordic PhD Summit, Helsinki, 23-24 August 2018. Levodopa effect and motor function in late stage Parkinson's disease. Rosqvist K, Horne M, Hagell P, Iwarsson S, Nilsson MH, Odin, P. Abstract number 52.</p>		
<p>Abstract presented to Movement Disorders Society conference, 2018: Systematic review of Non Motor Symptoms in late stage PD</p>		
<p>Abstract presented to the 4th Congress of the European Academy of Neurologists, June 2018, Lisbon, Portugal: CLaSP protocol</p>		
<p>Abstract presented to the Association of British Neurologists Annual meeting, May 2018, Birmingham, England: UK patients qualitative data.</p>		
<p>Abstract/Poster presented at the International Congress of Parkinson's Disease and Movement Disorders, June 2017, Vancouver, Canada: Systematic review of Motor symptoms</p>		
<p>21st International Congress of Parkinson's Disease and Movement Disorders (MDS), Vancouver, 4-8 June 2017. Levodopa effect and motor function in late stage Parkinson's disease. Abstract number 1360. Rosqvist K, Horne M, Hagell P, Iwarsson S, Nilsson MH, Odin, P.</p>		

Add lines as appropriate

3.2. Research tools / methods / models / datasets

Please also indicate whether a laboratory centre or an organisation is to adopt the new knowledge, innovation or method or follow up the results of the project. Please mention also the name and type of the organisation and any impact arising. Please further indicate whether relevant databases have been informed and shared the results of the project (open access)? Yes/No. If yes, which databases? If no, why not?

3.3. Medical products, interventions, clinical testing

N/A

3.4. Software, devices, technical products

N/A

3.5. Intellectual Property and licensing

N/A

Number of patents and licences

Type of patent or licence	N° Submitted	N° Obtained
International patents		
EU patents		
National patents		
Licences (of exploitation/cession)		
Creation of firm (enterprise)		
Other (specify)		

Add lines as appropriate

List of patents

If details regarding patents need to be treated confidentially, please indicate as such.

In column 2, please point out the project partners involved by using the numbering applied in section I General information (e.g. partner 1 or P1)

Patent description	Partner(s) involved	Main partner (moderator)
N/A		

Add lines as appropriate

3.6. Collaborations/partnerships formed during the course of the project

Please list identity of collaboration/partnership, type (e.g., financial, in kind) and outputs/impact.

There has been a collaboration with the patient organization European Parkinson's Disease Association (EPDA) on *My Patient Journey* project about access to care, which is in alignment with CLaSP aims. Several meetings to support and advise the EPDA in this project have taken place, and a presentation to members of the European Parliament in Brussels on the results of a survey on experience of people with PD and their carers was made by partner 1. In addition, several publications were made jointly.

Partner 1 is chair for UK Parkinson's Excellence Network in North London, who work together to improve services, increase expertise and engage effectively with people affected by Parkinson's. Several presentations on the study and its results were made at the national meetings.

Partner 6 started new collaborations with the care institute of the university of Salzburg (Prof. Dr. Osterbrink and Prof. Carsten Eggers at the university of Marburg.

3.7. Further funding gained as a result of the project

Please mention from where and provide relevant details.

On the basis of this project, which identified a range of unmet needs and highlighted the need to develop better care models for patients at this stage of the disease, we have been able to obtain several major, collaborative studies. In the UK, we have obtained a 5-year programme grant to develop a facilitated self-management tool for patients and carers of patients with Parkinson's, the Personalised Care for people with Parkinson's Project (PD-Care), funded by the NIHR. In addition, the PD-Pal project, (including several partners of this consortium) which addresses the palliative care needs of this population in a randomised trial has been funded by a Horizon2020 grant and started in 2018 running for 4 years.

Partner 1:

1., In collaboration, a National Institute for Health Research (NIHR) programme grant was awarded to develop and evaluate a new and practical way of personalising and improving care for people with Parkinson's Disease living at home: *Personalised care for people with Parkinson's Disease (PD-Care)*.

2., Successful collaborative applicant for Horizon 2020 grant for the *Palliative care in Parkinson's disease (PD-Pal)* study which aims to integrate palliative care with traditional care for those with Parkinson's disease and suggest a new model of palliative care focused on the patient's quality of life along the entire course of disease.

Partner 4:

Swedish Parkinson foundation: 2015 500000 SEK
Swedish Parkinson foundation: 2016 500000 SEK
Swedish Parkinson foundation: 2017 500000 SEK
Swedish Parkinson foundation: 2018 495000 SEK
Swedish Parkinson foundation: 2019 application submitted
280 000 SEK /year 2015-2017
670 000 SEK /year 2018-2021

Partner 5:

Additional funding from SBOH and Stichting Groenhuysen for the CLaSP study ParkinsonSupport grant: Palliative care for patients with parkinson and their carers. Grant from ZonMw

Partner 6:

Additional funding fom Stifterverband Salzburg for investigation of palliative care needs in nursing homes

3.8. Policy influence

Results to be applied in policy such as use in decision making, rules applying to basic health insurance packages, use in advisory reports, use in health ministry or in policy memoranda issued by national (umbrella) organisations etc.

Please also point out the *project partners involved by using the numbering applied in section I General information (e.g. partner 1 or P1).*

Could impact be achieved (e.g., changes in healthcare provision, regulatory guidance, economic effectiveness, public attitudes etc.)

3.9. Capacity and skills development

– staff mobility, next destination, qualifications/recognition gained

Please list academic staff involved in the project. Please also list postdocs, PhD students, master students, undergrad students...

Furthermore, please indicate if lab visits or longer-term exchanges between partners happened based on JPND funding.

Partner #	Career stage	Academic dissertation (year, degree)	Name, Gender	Exchange from / to (country)	Duration of Exchange weeks / months
1	Junior researcher	Currently PhD student	M	From ... to ...	
1	Junior researcher	Currently PhD student	M		
1	Study coordinator	-	F		
5	Junior doctor	PhD student	M		
4	Junior researcher	PhD student	F		
6	Junior researcher	Masters degree in nursing studies	F		
6	Junior researcher	Doctoral dissertation in nursing studies	F		
6	Junior researcher	Doctoral dissertation in nursing studies	F		
	Junior researcher	Doctoral dissertation in nursing studies			

Add lines as appropriate

3.10. List of other outcomes

These may include results to be applied in practice, such as incorporation into guidelines, protocols, standards; changes in professional practice, incorporation into manuals, training modules etc.

- In column 2, please specify in which field the given outcome was / will be applied.
- In column 3, please point out the project partners involved by using the numbering applied in section I General information (e.g. partner 1 or P1).

Experiences from the CLASP project have been considered in the development of, and the newest versions of:

Outcome	Field in which the results will be	Partner(s)
PD guidelines from Swedish Movement Disorder Society (2019; www.swemodis.se).	Neurological practice	4
Swedish National Guidelines for PD (from the Board of Health and Welfare, published Dec 2016; https://www.socialstyrelsen.se/regler-och-riktlinjer/nationella-riktlinjer/slutliga-riktlinjer/ms-och-parkinsons-sjukdom/om-riktlinjerna/)	Neurological practice	4
Training video for health care professionals https://www.youtube.com/watch?v=9DBA5D5Mx74	Primary care and neurological practice	1
Teaching sessions for healthcare professionals who are involved in care for people with parkinson, in the ParkinsonNet network in the Netherlands	Health care professionals involved in the care of people with Parkinson's	5

Add lines as appropriate

4. Outreach

4.1. Public engagement activities

Please list type of engagement (presentation, media work, etc.), primary audience and any other relevant details.

We have presented the study at local and national meetings at the individual sites, including presentations to the public and key stakeholders. This includes presentations at workshops of the European Parkinson's disease Association at the European Parliament in Brussels, strategy meetings of the UK charity Parkinson's UK, and reports in the local press in the UK.

4.2. Materials made available to the research community and how

An excel-based worksheet for use in the assessment of needs of patients with late stage Parkinsonism, independent of their care setting and health-care system has been created, based on the results of this study. This includes a checklist of issues and recommendations for patients in the late stages of parkinsonism and can be adapted to local settings and be linked with cost calculations. A heuristic decision toolkit is being developed which will undergo refinement and further funding will be sought to test the usefulness of these tools.

IV. Recommendations

This section is for internal use by the JPND joint call partner organisations. Please also describe potential recommendations so we can shape our future call scheme. This information will not be published.

Describe any recommendations arising from this project.