Characteristics of patients with late-stage Parkinsonism who are nursing home residents compared to those living at home

Abstract

Objectives: To determine clinical characteristics and treatment complications of patients with late stage Parkinsonism living in nursing homes compared to those living at home.

Design: Cross-sectional analysis.

Setting and Participants: This study is an analysis of 692 patients with late stage Parkinsonism recruited to an in-depth international study, CLaSP.

Measures: Sociodemographic characteristics were compared between patients who were living in a nursing home (n=194) and those living at home (n=498). Clinical assessments included the Unified Parkinson's Disease Rating Scale (UPDRS), the non-motor symptom scale (NMSS), the neuropsychiatric inventory (NPI), and a structured interview of patients and carers. Predictors of nursing home status were determined in a multivariate analysis.

Results: Nursing home placement was strongly associated with more severe cognitive impairment, worse UPDRS motor scores and disability, and with being unmarried and older. Although nursing home residents had significantly higher axial scores, falls were less common. Despite similar levodopa equivalence doses, they had less dyskinesia. Non-motor symptom burden, particularly delusion, hallucination and depression scores were higher in nursing home residents, and they were more frequently on psychotropic medication. They had lower rates of dopamine agonist use and lower rates of impulse control disorders. In multivariate analysis, being unmarried, presence of cognitive impairment, worse disease severity as assessed on the UPDRS part II and III, severity

of delusions, and lower rate of dyskinesia were associated with nursing home placement.

Conclusions and Implications: These clinical characteristics suggest that in patients with Parkinsonsim who are nursing home residents presence of cognitive impairment and delusions particularly add to the higher overall symptom burden, and more often require specific treatments, including clozapine. Despite similar LEDD, motor severity is higher and dyskinesias, indicative of a response to levodopa, are less common. Falls however also occur less commonly, and dopamine agonists are less frequently used, with lower rates of ICD.

Introduction

The global burden of Parkinson disease (PD) has more than doubled over the past generation, and as populations age the number of people with late stage PD will continue to increase.[1] As many as 48 percent of those with late stage PD reside in institutions.[2] This has economic as well as social consequences; a study in the UK found that those with late-stage PD who reside in nursing homes are the most expensive group to treat, and that accommodation in a nursing home costs approximately four times more than living in one's own home.[3] Clinical features and healthcare needs may vary considerably in this population from those of patients living at home. However, relatively little is known on the clinical features and complications of late-stage PD to guide management and address the care needs of this population.

Current data on PD patients in nursing homes is country-specific. A study of Medicare records in the US showed PD patients in nursing homes are more likely to be female, have dementia, and be of Afro-Caribbean race.[4] A prospective study in Norway found age, dependence, dementia, and hallucinations assessed on the UPDRS to be predictors of nursing home admission.[5] This is in keeping with studies reporting hallucinations to be the main predictor of nursing home placement in the US.[6] However, a study in Northumberland, UK found the same rate of hallucinations among those living in nursing homes and those living in their own homes.[7]

We used data from a large multinational study on the care of late stage Parkinsonism (the CLaSP study) to examine the socio-demographic and clinical data associated with residence in nursing homes. These data may be useful to better address the needs of this population and to improve management guidelines.

Methods

The CLaSP study includes 692 people with Parkinsonism in the late stage of the disease (defined as a disease duration of at least 7 years and Hoehn and Yahr stage IV or V in the "On" state or Schwab and England stage 50% or less) recruited by eight centers across six European countries (UK, Germany, Portugal, Sweden, The Netherlands and France). Patients were excluded if: dementia had clearly preceded the onset of motor symptoms; if they were in stages I-III in the "On" state and had Schwab and England 50% or greater; or if they had a diagnosis of potentially reversible Parkinsonism such as normal pressure hydrocephalus or drug-induced Parkinsonism, except if persisting following discontinuation of the causative drug. Further study details were previously reported.[8] In order to include patients not under regular follow up in specialist centers, patients were recruited from specialist and non-specialist settings, including general practitioners, hospitals, nursing homes, patient advocate groups as well as self-help groups. Data were collected in face-to-face interviews with participants and their caregiver. Interviewers attempted to minimize curtailed interviews and missing data by providing appropriate breaks and undertaking repeat visits if required.

Assessments

A battery of tests were administered to participants, detailed elsewhere.[8] We calculated the Charlson Comorbidity index, a measure of 16 comorbidities (including dementia) adjusted for age, which is correlated to life expectancy.[9] The levodopa equivalent daily dose (LEDD) was calculated from dopaminergic medications.[10] Motor features and complications were assessed using the Unified Parkinson's Disease Rating Scale (UPDRS) on-state part III and part IV. Activities of daily living were assessed using UPDRS part II and the Schwab and England scale. Dopamine dysregulation syndrome/impulse control disorder was assessed by the relevant question from the

MDS-UPDRS.[11] Non-motor symptoms were assessed with the non-motor symptom scale (NMSS).[12] Neuropsychiatric symptoms were assessed using the neuropsychiatric inventory (NPI).[13] Participants were asked to rate how satisfied they were with their overall care on a Likert scale, with 1 corresponding to “very satisfied” and 5 to “very dissatisfied”. The ESAS-PD questionnaire, which aims to form a holistic picture of a patient, was used to assess overall late stage symptom burden.[14]

Cognitive impairment was assessed in several ways, including presence of an existing diagnosis of dementia, and the mini mental state examination (MMSE), with <24 as a cut-off for cognitive impairment. Additionally, we calculated the level 1 Movement Disorder Society definition of PDD, using MMSE<26, lexical fluency test, and the pill questionnaire were used.[15] We excluded those with a score of 4 on the UPDRS question on depression as severe depression precludes a diagnosis of dementia in these criteria). As well as the raw MMSE score, most centers recorded how many questions a participant was able to attempt (given other non-cognitive comorbidities). In the 627 cases where this information was available, we calculated how many mistakes a participant had made. Therefore, in the calculation of the MDS-PDD criteria, those with greater than 4 mistakes were counted as equivalent to having MMSE<26. If the number of questions attempted was not available (n=65), we used the raw MMSE score.

Statistical analysis

Differences in continuous variables were analysed by ANOVA or, for non-normally distributed data, the Mann-Whitney U test. Normality was assessed visually. Differences in categorical variables were analysed by the chi-square test. For the univariate analysis, missing data were excluded; we report the numbers of missing data for each variable. One site did not collect comorbidity data.

One important difference between patients from different sites was whether participants had idiopathic or atypical Parkinsonism. Some sites recruited specifically from units that focussed on atypical Parkinsonsim, and at one site (Lisbon) 53.2% of participants had atypical Parkinsonism. We therefore performed a sensitivity analysis for the univariate analysis, including only patients with idiopathic PD.

A logistic regression model was then built using backward stepwise selection, with residential status as dependent variable, and potential contributors to nursing home placement with $p<0.1$ in univariate analysis as independent variables. Medications were not included in this model, as they may be outcomes rather than predictors of residential status. Similarly, impulse control disorders were not included, as they are likely an outcome of medication use. Comorbidities were not entered as they were not consistently collected at all sites. We did not include the sexual function domain of the NMSS as sexual performance was often not applicable to patients with very severe disease (the relevant NMSS item was then recorded as 0). We imputed missing data using multivariate imputation in chained equations (MICE).[16] Statistical analyses were performed using R.[17]

Results

All 692 participants fulfilling inclusion criteria had data on current residence. The baseline characteristics of the cohort across sites are shown in the supplementary data. Table 1 shows differences in participant characteristics between those living in their own homes and in nursing homes. Those in nursing homes were significantly less likely to be married, slightly older, and less likely to have idiopathic PD. There was a trend towards a higher comorbidity burden on the Charlson comorbidity index.

Motor problems and disability

Table 1 shows differences in disease characteristics between groups. Those in nursing homes had significantly worse motor function and activities of daily living scores. Amongst individual items of the UPDRS part III (data not shown), the greatest difference was seen amongst the items that are important for safe standing, e.g. leg agility, arising from chair, postural instability and gait (all $p<0.001$). Nevertheless, nursing homes residents experienced fewer falls than those in their own homes, as assessed on question 13 of the UPDRS. Those with greater disability (Schwab and England score <50%) in the overall group were less likely to fall ($p=0.001$).

Patients in nursing homes reported spending slightly more time in off-periods (supplementary table 2) with no difference in the rate of early morning dystonia. Nursing home residents also had fewer dyskinesias, and found dyskinesias less disabling and less painful.

Dementia

Nursing home residents were more likely to have an existing diagnosis of dementia (table 1), had worse MMSE scores, and were more likely to meet the criteria for MDS-PDD. Forty-eight participants with a diagnosis of dementia did not meet the MDS-PDD criteria; three of these had severe depression. Conversely, 70 of those who met the MDS criteria did not have a diagnosis of dementia.

Non motor symptoms

Nursing home residents had a significantly higher non-motor symptom burden, as assessed by the NMSS (table 2). They had significantly higher scores in the domains of

mood/cognition, perceptual problems/hallucinations, attention/memory, sexual function, and urinary symptoms.

Nursing home residents had significantly more neuropsychiatric symptoms as assessed on the NPI (table 2). They had a significantly higher rate of delusions, hallucinations, and depression, with similar findings as on the NMSS. In contrast, dopamine dysregulation syndrome was less common in nursing home residents. Those with impulse control disorders were much more likely to be on a dopamine agonist than those without, (59.2% vs 39.1%, p<0.001) and were younger (73.5yrs vs 76.6yrs, p<0.001) with no difference in overall LEDD.

The ESAS-PD scale assesses palliative symptom burden, with higher scores corresponding to worse feelings or situations. There was no difference in total symptom burden between those in their own home than nursing homes (42.3 vs 43.5, p=0.54), although in the domains of confusion (2.5 vs 3.5, p<0.001) and stiffness (4.5 vs 5.1, p=0.036), those in nursing homes had worse scores, corresponding to our other findings. Wellbeing was similar between the two groups (4.9 vs 4.4, p=0.048). There was no difference in satisfaction with care between those in nursing homes and their own homes on the Likert scale (2.1 vs 2.3, p=0.052).

Medications

There was no significant difference in LEDD between the two groups (table 3). Nursing home residents were less likely to be on dopamine agonists, but were more likely to be on hypnotics, anxiolytics, and antipsychotics. Those on hypnotics and anxiolytics were more depressed, with worse scores in the depression domain of the NPI(for hypnotics, 2.54 vs 3.38, p-0.013; for anxiolytics, 2.52 vs 4.31, p<0.001). Of those on antipsychotics, only three participants were not on quetiapine or clozapine: two on risperidone, one not

recorded. Those in nursing homes were 2.5 times more likely to be on clozapine. There was no difference in total NPI score or individual NPI domains between those on clozapine and those on quetiapine (19.2 vs 19.2, p=0.17), with variability in prescription rates between countries (see supplementary table 1).

Variations between countries

We compared markers of disease severity between nursing home residents in different countries (see supplementary table 3). Motor disease severity, Schwab and England scales, and the NMSS were worse in nursing home residents in all countries, although the size of these differences varies. CLaSP did not prospectively examine admission to nursing homes and these differences may reflect social and cultural differences between countries, or recruitment methods in different countries.

Sensitivity analysis

In a sensitivity analysis including only those with idiopathic PD (n=592, 85.1%), most of the results of the univariate analysis were unchanged. The difference in prescription rate of antipsychotics failed to reach significance (20.4% vs 25.0%, p=0.25) although rates of clozapine prescription remained significantly higher in nursing homes (6.5% vs 14.4%, p=0.003).

Multivariate analysis

The following factors were included as independent variables in the multivariate analysis: marital status, diagnosis of idiopathic PD, age, current diagnosis of dementia, MDS-PDD status, MMSE <24, UPDRS section 2 and 3, Hoehn and Yahr stage, NPI domains for delusions, hallucinations and dysphoria/depression; NMSS domains for

mood/cognition, perceptual problems/hallucinations, attention/memory, GI tract and urinary tract; and the UPDRS questions on dyskinesias, painful dyskinesias, and disabling dyskinesias.

The factors included in the model predicting nursing home status were marital status and presence of cognitive impairment as assessed by MMSE score <24, with risk also increased by severity of delusions on the NPI and worse motor function on the UPDRS part 3 motor and part 2 ADL score. Presence of painful and of disabling dyskinesias were negatively and independently associated with nursing home residence (table 4). Nagelkerke's R^2 showed the model accounted for 26.7% of the variability in place of residence.

Discussion

In this large study of a difficult-to-access group with late-stage Parkinsonism, we report significant differences in the clinical profile of those living in nursing homes and those residing at home, which we have summarised in table 5. These differences are in addition to marital status, a factor known to be a strong predictor of nursing home status in the general population.[18, 19, 20] WHO estimate that 40% of people with any form of dementia are cared for mainly by their spouse,[21] and when patients do not have a family to care for them, the role falls to institutions. In our study, those in nursing homes were slightly older but, in contrast to previous studies, gender was not a determining factor for nursing home placement, and differences in general medical comorbidities were less important than PD-related symptoms.

Nursing home residents had more advanced motor disease severity. However, falls, a major motor complication in advanced disease, were less prevalent among those in

nursing homes. This may be due to the lower rate of mobilization due to severity of motor and non-motor problems in those in the most advanced stages, as well as appropriate supervision and protective measures being implemented more easily in a nursing home environment.

Despite worse motor disease scores and no difference in LEDD, nursing home residents had fewer, less disabling and less painful dyskinesias, and spent slightly more time in off periods. The non-motor side effect profile does not appear to be limiting L-dopa treatment; for example, those on a higher LEDD did not have higher scores in the hallucinations/delusions domain of the NMSS (5.16 for LEDD<600mg vs 6.18, p=0.093). One interpretation of these results is that this group of older patients with severe disease may be undertreated. There are other possible reasons for our findings: dyskinesias and motor fluctuations may be less prominent in this population with late-stage disease, there could be increasing unresponsiveness at the late disease stages, or the presence of other non-motor features may have necessitated cautious approaches to the treatment of motor problems.

As expected, nursing home residents were much more likely to have cognitive impairment. In addition, application of the MDS-PDD criteria in our cohort indicated that 70 participants (10.1%) with dementia in this cohort were previously undiagnosed with dementia. The MDS-PDD criteria have previously been found to be more sensitive than DSM IV criteria for patients with PDD.[22] Conversely, not all participants with an existing diagnosis of dementia fulfilled these criteria. Although we did not systematically collect information on how our participants received a diagnosis of dementia, and clinical diagnosis of dementia using different criteria or in-depth neuropsychological assessment

may provide different results from that using the MDS-PDD criteria, it is also possible that there is overdiagnosis of dementia in patients with severe disability due to other features of Parkinsonism in the very advanced stage.

Psychiatric complications were more prevalent in those in nursing homes. Goetz et al have previously found hallucinations/delusions, as measured by the thought-disorder question on the UPDRS, to be a predictor of nursing home admission in a case-control study in the US;[6] Aarsland et al echoed this finding in their prospective study in Norway.[5] Using the NPI, which allows assessment of neuropsychiatric features in greater depth, we found that delusions are more strongly associated with nursing home placement than hallucinations, a clinically important difference as delusions with firmly held beliefs may be more distressing than hallucinations, and may require more aggressive intervention. Correspondingly, antipsychotics were used more often in nursing homes (23.1% vs 31.4%, p=0.03), and in particular clozapine use was nearly 2.5 times higher in nursing homes. In Europe, clozapine is the most effective antipsychotic available for PD psychosis. Its efficacy has been demonstrated in placebo controlled trials.[23,24] However, because of monitoring requirements, clozapine is sometimes reserved for more severe cases of psychosis not responding to other strategies.[25] The differences we observed in prescribing patterns of clozapine may therefore either be due to greater severity of delusions in those in nursing homes, or greater monitoring ability in this setting. Prescription rates varied by country, with clozapine use highest in Portugal (20%) and the Netherlands (15%). In both countries, any doctor can prescribe clozapine and any pharmacist can dispense clozapine.[26] Clozapine use was lowest in the UK (2%), where clozapine can only be dispensed from registered pharmacies and prescribed by

registered prescribers, who are not typically involved in the care of patients with late-stage PD.

In the US, pimavanserin, an inverse agonist of the 5HT-2A receptor, is licensed for psychosis in PD; clozapine use for PD psychosis is off-label, although the Movement Disorder Society describe both clozapine and pimavanserin as efficacious.[23] There are no head-to-head trials of clozapine and pimavanserin, but pimavanserin does not require specialized monitoring, which may make it more appropriate for frail patients.[27] However, the manufacturer does not yet have European licence.

Nursing home residents had a lower rate of impulse control disorders than those residing at home. This is likely to primarily be related to their lower rate of dopamine agonist prescriptions,[28] although additional factors such as restricted access cannot be excluded and nursing home residents were also older.

Limitations

The key limitation to our study is that participating sites were heterogeneous and participants were recruited in different ways in different sites and from different healthcare systems. However, we aimed to gain a comprehensive picture of patients with late-stage Parkinsonism across countries and included patients from various settings, reflective of clinical practice. In addition, we did not restrict our analysis to those with idiopathic PD as the clinical features and needs of patients with advanced stage parkinsonism are often similar. A sensitivity analysis restricted to those with idiopathic PD reflected the overall findings. Participants had significant disability and were not always able to complete all parts of the study, and there were therefore missing data in

some variables. We have imputed missing data in the multivariate model, but cannot eliminate bias in the pattern of missingness.

Conclusions and implications

Our analysis shows that PD patients in nursing homes have more severe motor symptoms, psychiatric symptoms, and higher rates of dementia. We may be undertreating the motor symptoms of those in nursing homes; conversely, psychiatric symptoms appear to be treated more appropriately in nursing homes. Nonetheless, nursing homes are safe places to live; participants living there had fewer falls, and participants had same satisfaction with care in and out of nursing homes..

Given that those living in nursing homes have more severe disease, are at greatest need, and are less likely to attend outpatient clinics or to have family input, efforts should be made to provide specialist input for these patients in their place of care.

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414 *Table 1: Participant demographics and disease characteristics by place of residence*

415 *(mean (SD) or n (%)).*

	Nursing home (N=194)	Own home (N=498)	Total (N=692)	Missing (n)	p value
Female	98 (50.5%)	221 (44.4%)	319 (46.1%)	0	**0.15**
Age	78.1 (7.6)	75.4 (8.5)	76.1 (8.4)	1	**< 0.001**
Married	80 (41.5%)	356 (71.9%)	436 (63.4%)	4	**< 0.001**
Years of education	9.9 (4.6)	10.0 (3.7)	10.0 (3.9)	24	**0.78**
Charlson comorbidity index	4.9 (1.3)	4.7 (1.5)	4.8 (1.4)	109	**0.09**
Idiopathic PD	146 (76.0%)	443 (89.0%)	589 (85.4%)	2	**<0.001**
Disease duration (years)	15.9 (8.3)	15.2 (7.4)	15.4 (7.7)	7	**0.28**
UPDRS II	29.6 (7.3)	26.4 (7.8)	27.3 (7.8)	3	**< 0.001**
UPDRS III	53.0 (16.4)	45.1 (15.6)	47.3 (16.2)	6	**< 0.001**
UPDRS IV	4.7 (3.2)	5.3 (3.7)	5.1 (3.5)	3	**0. 26**
Schwab and England	27.7 (14.1)	36.3 (16.1)	33.9 (16.0)	0	**< 0.001**
H&Y stage 5	109 (56.2%)	120 (24.1%)	229 (33.1%)	0	**< 0.001**
DDS/ICD	0.2 (0.7)	0.4 (0.9)	0.3 (0.8)	93	**0.002**
MMSE<24	111 (65.3%)	182 (39.1%)	293 (46.1%)	57	**< 0.001**
Dementia diagnosis	99 (51.0%)	156 (31.4%)	255 (36.9%)	1	**< 0.001**
MDSPDD	81 (47.9%)	152 (32.8%)	233 (36.9%)	60	**< 0.001**
Falls (any) (UPDRS item 13)	130 (68.8%)	389 (79.1%)	519 (76.2%)	11	**0.005**

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Table 2: Non-motor symptom scale domain scores and neuropsychiatric inventory domain scores (mean (SD))

	Nursing home (N=194)	**Own home (N=498)**	**Total (N=692)**	**Missing (n)**	**p value**
Non-motor symptom scale					
D1 Cardiovascular	4.2 (6.1)	3.0 (4.6)	3.3 (5.1)	37	**0.21**
D2 Sleep/fatigue	14.7 (10.0)	14.9 (10.6)	14.8 (10.4)	40	**0.97**
D3 Mood/cognition	22.6 (18.2)	17.7 (16.3)	19.0 (17.0)	38	**0.002**
D4 Perceptual problems/hallucinations	7.1 (8.1)	5.3 (7.6)	5.8 (7.8)	39	**0.002**
D5 Attention/memory	17.4 (13.2)	13.5 (12.0)	14.6 (12.4)	38	**0.001**
D6 GI tract	12.6 (8.1)	11.5 (8.5)	11.8 (8.4)	34	**0.06**
D7 Urinary	19.3 (13.2)	16.2 (12.7)	17.0 (12.9)	45	**0.006**
D8 Sexual function	11.7 (10.0)	8.9 (10.1)	9.7 (10.1)	74	**<0.001**
D9 Miscellaneous	9.7 (8.0)	10.4 (8.6)	10.2 (8.4)	43	**0.46**
NMSS total	**118.2 (52.7)**	**102.3 (51.5)**	**106.4 (52.3)**	**100**	**0.001**
Neuropsychiatric inventory					
A: Delusions	1.6 (3.1)	0.9 (2.4)	1.2 (2.7)	73	**<0.001**
B: Hallucinations	2.2 (3.1)	1.6 (2.9)	1.8 (3.0)	70	**0.005**
C: Agitation/aggression	1.1 (2.5)	1.1 (2.3)	1.1 (2.3)	73	**0.23**
D: Dysphoria/depression	3.0 (3.4)	2.5 (3.3)	2.7 (3.3)	75	**0.03**
E: Anxiety	2.0 (3.2)	1.9 (2.9)	1.9 (3.0)	73	**0.92**
F: Euphoria/elation	0.2 (0.8)	0.1 (0.7)	0.1 (0.7)	70	**0.80**
G: Apathy/indifference	3.5 (4.3)	2.9 (3.9)	3.1 (4.0)	70	**0.19**
H: Disinhibition	0.3 (1.1)	0.4 (1.6)	0.3 (1.4)	74	**0.42**
I: Irritability/lability	1.1 (2.4)	1.0 (2.2)	1.1 (2.2)	72	**0.84**
J: Aberrant motor	1.6 (3.3)	1.3 (2.7)	1.4 (2.9)	76	**0.34**
K: Nighttime behaviour	2.0 (3.3)	2.3 (3.4)	2.2 (3.4)	83	**0.23**
L: Appetite/Eating	1.8 (3.1)	1.68(2.9)	1.8 (3.0)	81	**0.40**

Table 3: Medications in nursing home residents vs participants residing at home

	Nursing home (N=194)	Own home (N=498)	Total (N=692)	Missing (n)	p value
LD dose (mg)	749.8 (441.6)	711.1 (565.9)	722.0 (533.6)	15	**0.39**
LD dose >600mg	120 (62.5%)	271 (55.9%)	391 (57.8%)	15	**0.12**
On dopamine agonist	53 (28.0%)	224 (45.4%)	277 (40.6%)	10	**< 0.001**
On hypnotic	51 (27.0%)	79 (16.1%)	130 (19.1%)	13	**0.001**
On antipsychotic	59 (31.4%)	113 (23.1%)	172 (25.4%)	14	**0.026**
On antidepressant	81 (42.9%)	170 (34.6%)	251 (36.9%)	12	**0.046**
On anxiolytic	33 (17.5%)	37 (7.6%)	70 (10.3%)	13	**< 0.001**
On clozapine	34 (17.5%)	35 (7.0%)	69 (10.0%)		**< 0.001**
On quetiapine	23 (11.9%)	77 (15.5%)	100 (14.5%)		**0.23**

Table 4: Logistic regression of factors contributing to residential status, with backwards stepwise selection performed for model reduction. The model accounts for 26.7% of the variability in residential status (Nagelkerke's R^2).

	Odds ratio	2.5% confidence interval	97.5% confidence interval	p value
Unmarried	4.86	3.31	7.24	**<0.001**
MMSE<24	2.56	1.70	3.89	**<0.001**
UPDRS II	1.03	0.99	1.06	**0.13**
UPDRS III	1.02	1.00	1.03	**0.03**
NPI: delusions	1.08	1.01	1.15	**0.03**
Disabling dyskinesias	0.81	0.64	1.01	**0.06**
Painful dyskinesias	0.65	0.41	0.97	**0.05**

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Key findings:

- *Being older, unmarried and having worse cognition are associated with living in a nursing home in patients with PD*
- *Patients with PD in nursing homes have worse motor severity, but do not have worse dyskinesia and do not receive higher dopaminergic treatment.*
- *Those in nursing homes also have more hallucinations, delusions and depression and also have higher treatment rates with psychotropic medications, including clozapine.*
- *Falls are less common in patients with nursing homes*
- *Satisfaction with care was similar between those living at home and in nursing homes*

Implications for care:

- *The more severe motor disease of those in nursing homes may be undertreated.*
- *Psychiatric symptoms are also higher in those living in a nursing home but they are also more frequently treated than those living in their own homes.*
- *Nursing homes are safe places with lower rates of falls and satisfaction with care is similar in and out of nursing homes*
- *Efforts should be made to provide specialist input to patients, regardless of their place of care.*

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