



Diagnostic accuracy of Parkinson's disease and atypical parkinsonism in nursing homes



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ABSTRACT

Introduction: Management of Parkinson's disease (PD) and atypical parkinsonism in nursing homes depends on a timely and accurate diagnosis. However, little is known about the diagnostic accuracy of these parkinsonian syndromes in nursing homes. We examined this issue in a large group of Dutch nursing home residents.

Methods: Twelve large nursing home organizations in the Netherlands accounting for 100 nursing homes with a total population of 5480 residents participated. Residents with PD or atypical parkinsonism were identified according to their nursing home medical chart diagnosis. Additionally, local pharmacists provided a list of all residents using antiparkinson medication. We compared the admission diagnosis to a clinical diagnosis made in the study, based upon interview and detailed neurological examination by movement disorders experts. Diagnoses were based on accepted clinical criteria for PD and atypical parkinsonism.

Results: In the total population of 5480 residents, 258 had previously been diagnosed with a form of parkinsonism according to their medical record. In 53 of these residents (20.5%) we changed or rejected the diagnosis. Specifically, we found no parkinsonism in 22 of these 53 residents (8.5% of all patients with suspected parkinsonism). In the remaining 31 residents (12%), we established a new diagnosis within the parkinsonian spectrum.

Conclusions: In a large population of Dutch nursing home residents, 20% of diagnoses within the parkinsonian spectrum were inaccurate. Almost 9% of residents had inadvertently received a diagnosis of parkinsonism. Better recognition of parkinsonism in nursing homes is important, because of the consequences for management and prognosis.

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1. Introduction

Movement disorders are among the most common diagnoses in nursing homes [1]. The estimated prevalence of Parkinson's disease (PD) in nursing homes is about 5–7% [2,3]. However, PD diagnoses in prior studies were typically chart-based and were not confirmed

during physical examination by experts. Moreover, many patients received typical antipsychotics, obscuring a diagnosis of PD. One older study suggested that the diagnostic accuracy of PD among nursing home residents is suboptimal [4]. Surprisingly little has appeared in the literature since, despite great developments in the field of diagnosing PD and atypical parkinsonism. The prevalence and diagnostic accuracy of atypical parkinsonism in nursing homes has never been assessed systematically.

An accurate diagnosis is the starting point for optimal disease management. However, recent work showed that nursing home residents with PD are undertreated [5,6], conceivably in part due to an incorrect diagnosis. We addressed this issue of diagnostic

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accuracy in a large number of nursing homes ($n = 100$) in the Netherlands. Our specific aim was to investigate the agreement between the nursing home chart diagnosis and our clinical diagnosis after reviewing and examining the patients. In contrast to prior work, we certified all diagnoses based upon detailed physical examination by a movement disorders expert, and using the updated criteria for PD and atypical parkinsonism.

2. Methods

The study was performed in 100 nursing homes with both somatic and psychogeriatric wards in the Southeast of the Netherlands with a total of 5480 beds. This represents approximately 8% of all long-term care beds in our country. Apart from geographic selection, this sample is an unbiased representation of Dutch nursing home residents, and the included did not differ from other nursing homes in our country. Participants were recruited in two ways. First, nursing home physicians used the nursing home medical records to identify residents with a presumed diagnosis of PD or another form of parkinsonism. Second, local pharmacists provided a list with all residents using antiparkinson medication, as defined by the Anatomical Therapeutic Chemical (ATC) classification system. We excluded patients who used dopaminergic medication for other indications (e.g. restless legs syndrome) but who showed no signs of parkinsonism during physical examination. Subjects with drug-induced parkinsonism were excluded. Drugs that could potentially induce parkinsonism were defined according to an extensive review [7]. Residents who were recently or currently treated with (typical) antipsychotics or other offending drugs were excluded. An exception was made for patients in whom a diagnosis of PD or atypical parkinsonism had been made prior to start of the offending drug.

We subsequently performed an extensive review of the medical records of all residents. All primary and secondary diagnoses were recorded, including the diagnosis upon admission. For many subjects we were able to retrieve relevant information from the prior hospital outpatient files, e.g. ancillary investigations such as brain MRI, DAT-SPECT and response to dopaminergic medication.

All included residents were interviewed and examined. Current motor- and non-motor symptoms and signs were documented. A detailed neurological examination was performed by a physician with experience in movement disorders (NW). In cases with diagnostic uncertainty according to established criteria (20% of participants), residents were additionally examined by a second neurologist (GT or PP) with expertise in movement disorders. All residents received an MMSE.

The final diagnosis was based on a combination of the above information. Specifically, PD [8] Dementia with Lewy Bodies (DLB) [9] Multiple System Atrophy (MSA) [10], Progressive Nuclear Palsy (PSP) [11], Alzheimer's Disease (AD) [12] and vascular parkinsonism (VP) [13] were diagnosed according to accepted clinical criteria. Although this study was not primarily a prevalence study, we calculated prevalence figures for PD and parkinsonism including 95% confidence intervals (CI).

The study was approved by the Radboud University ethical committee. The management boards and elderly care physicians of all participating nursing homes agreed to participate. Collection of clinimetric test data and review of medical charts was explained to all residents. All of them agreed to participate and signed an informed consent form.

3. Results

In this total population of 5480 residents, 258 subjects had an admission diagnosis of PD or atypical parkinsonism. All these 258 residents were examined in detail. Our clinically based diagnosis was PD in 152 residents, DLB in 16, MSA in 7, PSP in 8 and VP in 13. Forty subjects had parkinsonism but no definite diagnosis could be made. Finally, in 22 cases we found no symptoms or signs of parkinsonism at all. In 53 of the 258 residents (20.5%) the diagnosis was either changed to another form of parkinsonism ($n = 31$) or was rejected because no parkinsonism ($n = 22$) could be established (see Table 1).

The most frequent diagnostic changes concerned new cases of PD who were formerly diagnosed as 'parkinsonism'. Using the final diagnosis, the estimated prevalence of PD in the nursing homes was 2.8% (95% CI 2.4–3.2). The prevalence of all forms of parkinsonism (including PD) was 4.3% (95% CI 3.9–4.7).

4. Discussion

There are two main findings in this study. First, in 20% of the examined nursing home subjects with parkinsonism as their

Table 1

Diagnostic changes in 53 of 258 nursing home patients.

New- and rejected diagnosis within parkinsonian spectrum ($n = 31$)	Parkinsonism and PD rejected ($n = 22$)
<i>PD newly diagnosed (19)</i>	<i>Parkinsonism rejected (17)</i>
- Parkinsonism → PD (9)	→ AD (5)
- VP → PD (3)	→ hypertonia after stroke (4)
- MSA → PD (2)	→ contractures (2)
- 'falls' → PD (1)	→ lumbar stenosis (1)
- AD → PD (1)	→ polyneuropathy (1)
- DLB → PD (1)	→ hypertonia in MS (1)
- VD → PD (1)	→ multimorbidity (1)
- 'frontal dementia' → PD (1)	→ head titubation (1)
	→ ET (1)
<i>DLB newly diagnosed (5)</i>	<i>PD rejected (5)</i>
- AD → DLB (2)	→ AD (1)
- MSA → DLB (2)	→ myoclonus eci (1)
- 'dementia' → DLB (1)	→ orthopedic (1)
	→ stroke (1)
	→ akathisia (1)
<i>MSA newly diagnosed (2)</i>	
- 'falls' → MSA (1)	
- parkinsonism → MSA (1)	
<i>PSP newly diagnosed (1)</i>	
- DLB → PSP (1)	
<i>PD/MSA rejected (4)</i>	
- PD → parkinsonism (3)	
- MSA → parkinsonism (1)	

The diagnosis in italics represents the groups of diagnosis newly made or rejected. All diagnosis behind the arrows (→) represents the individual new diagnosis made in the study.

VD = vascular dementia ET = essential tremor MS = multiple sclerosis VP = vascular parkinsonism.

MSA = multiple system atrophy AD = Alzheimer's disease PSP = progressive supranuclear palsy.

admission diagnosis, we changed or rejected the diagnosis. Second, we observed a prevalence of PD of 2.8%, which is lower compared to prior reports (5–7%) [2,3]. However, the observed prevalence for all forms of parkinsonism combined (4.3%) was comparable to other studies.

One older study not only diagnosed new incident PD cases in the nursing home, but also rejected a suspected diagnosis of PD in many residents [4]. These subjects were diagnosed with Alzheimer's disease, MSA, PSP, drug-induced parkinsonism and – in some cases – as having no parkinsonism at all.

The diagnostic mutations in our study were largely clustered into two groups. The first consisted of residents with a changed diagnosis within the parkinsonian spectrum. In most of these cases the diagnosis had not been made earlier, although these patients fulfilled clinical criteria for PD or another parkinsonian disorder. In the second cluster, we rejected previously diagnosed PD and parkinsonism. Difficulty with walking or balance, hypertonia and various other signs and symptoms were misjudged as part of a parkinsonian syndrome. Strikingly, in the second cluster, five residents actually had a diagnosis of Alzheimer's disease upon admission. We agreed with this admission diagnosis and no parkinsonism could be ascertained, yet the nursing home chart mentioned parkinsonism. Finally, in other patients, a diagnosis of Parkinson's disease that had been made correctly in the outpatient phase had simply been 'ignored' in the nursing home charts, and was not mentioned as a primary or secondary diagnosis in the nursing home. These findings underscore the importance of adequate follow-up of patients after admission, with periodic critical review of the diagnosis. This latter conclusion was also

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