



Editor's comment: Although morbidity and mortality are elevated as a result of PD, the magnitude of this effect is not clearly appreciated in terms of hospital admissions. In this study by Braga et al. from a hospital near Milan, over a period of 8 years a cohort of PD patients and matched controls were reviewed in order to assess the reasons for their hospitalization. Given that the mean age of the patients was 77 years, it is understandable that only 20% of admissions were directly related to conditions such as motor complications. Surprisingly, in-hospital mortality was not increased for PD patients, although pneumonia was a common precipitating factor for admission, as were fractures, these two conditions seen most commonly in male and female patients respectively. Finally, this article serves as further evidence of a lower cancer risk for patients with PD, since only 8 PD cases were found to have neoplasia, compared to 23 controls.

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Reasons for hospitalization in Parkinson's disease: A case-control study



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ABSTRACT

Background: To characterize reasons for hospital admission, mortality and surgical procedures in patients with Parkinson's disease (PD) compared to controls.

Methods: The clinical features of all consecutive patients from 2000 to 2007 were reviewed. We identified patients with PD (ICD 9 code 332.0) from a database of our General Hospital (Vimercate) with a catchment's population of 180,000. Data on admitting wards as well as reasons for admission, surgical procedures performed and clinical outcome were collected. Clinical data were compared to an age and sex matched control population admitted in the same period of time.

Results: The total number of admissions was 367. Mean age was 76.7 years. The mean duration of stay was 9.2 days for controls and 9.7 for PD patients. A comorbid disorder was the cause of admission in 80% of cases and 79% of cases came from the Emergency Room. Infectious diseases, mainly respiratory infections, were more frequent in PD of both sexes, while trauma was significantly higher only in PD men. Percentage of patients treated surgically was similar in both cases and controls. Intrahospital mortality was 6% both in PD and controls. Infectious diseases were more frequent in PD patients while cardiovascular death was more frequent in controls.

Conclusions: Comorbidity in PD is higher than reported in other reports. In our study PD patients had the same length of hospitalization and intrahospital mortality as controls. The presence of a control population allows to discriminate between general complications of the elderly and specific vulnerabilities of PD patients.

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1. Introduction

Idiopathic Parkinson's disease (PD) is the second most common neurodegenerative disorder. The prevalence rate is around 102 to 190 per 100,000 people in Western countries [1]. The life-time risk is 2% in men and 1.3% in women. This disease has a significant

impact on disability and quality of life, and its prevalence is likely to increase along with life expectancy [2]. Comorbidity may be defined as the coexistence of two or more conditions that may or may not have the same pathogenesis [3]. Patients with PD often have comorbid conditions that influence health care utilization and life expectancy. The impact of comorbidity in PD is high and most hospital admissions are caused by comorbid disorders [4]. Occurrence of falls, psychiatric disorders, sleep disturbances, infective diseases, cardio or cerebrovascular disorders and digestive complaints are the most reported causes of urgent admission [1], but are also common reasons of hospitalization in aged patients not affected by PD. Therefore a study of comorbidity in PD should, in our opinion, include an age and sex matched control population [5]. Despite the importance of this topic, only few studies have addressed these issues, and even less have a control population to allow direct comparison [6]. Furthermore, methods of data collection in previous reports are heterogeneous, making results not easily comparable among them. Aims of the present study are: 1 – to detect the impact of comorbid conditions in a large population of PD patients admitted in a hospital over a long period of time compared to a control cohort of the same age and sex. 2 – to show if PD influences the patient's admission ward, mean length of stay and intrahospital mortality. 3 – to compare procedures, particularly surgical ones, in PD patients and controls.

2. Methods

The catchment population of Vimercate hospital is approximately 180,000. The hospital has 400 beds, an ambulatory dedicated to PD and a neurology ward. All clinical records of patients with diagnosis of PD discharged from January 2000 to December 2007 were consecutively reviewed by a team of neurologists trained in movement disorders. Patients were stratified by age and sex. Medical records of patients with a discharge diagnosis of PD [International classification of disease (ICD) 9 CM code 332.0] were collected from the administrative data set. Data collection protocol was approved by our Institution. Each case was matched with the next patient not affected by PD of the same ethnicity, sex and age, and hospitalized in the same year [5]. Essential tremor (ICD 9 code 333.1) and other extrapyramidal disorders, including Parkinsonisms-plus (ICD9 code 333.0), were excluded. Patients discharged with diagnosis of "PD" alone were not considered for case-control comparisons. Demographic data, type of admission (planned or urgent), length of hospital stay, reasons for admission, admission ward, surgical procedures and outcome were collected in full compliance with current privacy laws. In order to allow a comparison of the results, reasons of hospitalization were distributed in a fashion similar to other published reports [4]. Reasons for in-hospital deaths were obtained reviewing medical records. Statistical analyses were conducted to evaluate gender and case-control differences. A Fisher's exact test was used to test the differences in proportions for categorical variables. Two-sided *p* values less than 0.05 were considered statistically significant. To evaluate how many PD patients could potentially elude our analysis, an audit was conducted over 6 months of the previous year recruiting consecutively 123 PD patients in our outpatients clinic (diagnosis was made in accordance to UK PDS Brain Bank's Diagnostic Criteria). In only 4 out of the 38 hospitalizations of these patients the diagnosis of PD was omitted (10%); this could reasonably be considered the risk of underestimation of cases of our method of analysis.

3. Results

During the study period (January 2000–December 2007) there were 367 admissions (79% urgent) involving 285 PD patients.

Table 1
Distribution of admissions for cases and controls by age.

Age	Males (%)		Females (%)	
	Cases	Controls	Cases	Controls
<45	–	–	–	–
45–54	1 (0.68)	1 (0.68)	1 (0.68)	1 (0.68)
55–64	10 (6.80)	10 (6.80)	7 (4.73)	7 (4.73)
65–74	57 (38.78)	57 (38.78)	33 (22.30)**	33 (22.30)**
75–84	60 (40.82)	60 (40.82)	70 (47.30)	70 (47.30)
85+	19 (12.93)	19 (12.93)	37 (25.00)*	37 (25.00)*
All ages	147 (100.00)	147 (100.00)	148 (100.00)	148 (100.00)

Males vs. females. **p* < 0.05, ***p* < 0.01.

Patient's mean age was 76.7 years; female/male ratio was 1:1.02. The distribution of admissions for patients and controls by sex and age is given in Table 1. Admission wards for reasons unrelated directly to PD are listed in Table 2 for cases and controls. A significant prevalence of admission in the general ward is evident for PD patients, in particular females. Admission in urology is less represented in PD and control females.

Presence of a comorbid disorder was the cause of hospitalization in 295 out of 367 admissions (80%) while the remaining patients were hospitalized for a diagnosis or a complication directly related to PD (e.g. motor fluctuation). The mean length of stay was 9.7 days for PD patients and 9.2 days for controls. The reasons for admission for PD patients and controls are listed in Table 3. "Neuropsychiatric disorders" includes psychosis, severe anxiety/depression and cognitive disorders, "other" includes seizures. "Gastrointestinal disorders" includes bowel occlusion, gastrointestinal bleeding, and dysphagia. "Metabolic disorders" includes renal failure, electrolyte imbalance, endocrine gland disease, diabetes and rheumatic disease. The main reason for admission in male PD patients was pulmonary infection (*n* = 28), followed by urological disorders (not infectious disease, *n* = 21) and fractures (*n* = 14), see Table 3. In male controls, the main reason of admission was cancer (*n* = 23), followed by myocardial infarction and gastrointestinal disorders (*n* = 17); in female PD patients the main reasons of hospitalization are fractures (*n* = 33), pulmonary infections (*n* = 20), and metabolic diseases (*n* = 12); in female controls other medical conditions (*n* = 24), followed by fractures (*n* = 21) and metabolic disorders (*n* = 14).

Invasive procedures performed are listed in Table 4. Patients were admitted for ocular surgery till the end of 2000, before the opening of day surgery service. The total number of procedures is significantly lower in females compared to males, however female PD patients underwent hip replacement more frequently than any other group while female controls had the highest percentage of

Table 2
Admission wards for PD patients and age/sex matched controls.

Admission wards	Males (%)		Females (%)	
	Cases	Controls	Cases	Controls
Cardiology	5 (3.40)*	16 (10.88)	3 (2.03)	11 (7.43)
Surgery	12 (8.16)	22 (14.97)	6 (4.05)	13 (8.78)
Medicine	45 (30.61)*	28 (19.05)	63 (42.57) ^o	46 (31.08) ^o
Nephrology	3 (2.04)	10 (6.80)	3 (2.03)	4 (2.70)
Neurology	18 (12.24)	9 (6.12)	14 (9.46)	16 (10.81)
Orthopaedics	13 (8.84)	7 (4.76)	34 (22.97) ^o	20 (13.51) ^o
Pneumology	14 (9.52)	23 (15.65)	20 (13.51)	15 (10.14)
Urology	33 (22.45)	23 (15.65)	1 (0.68) ^{oo}	7 (4.73) ^o
Other	4 (2.72)	9 (6.12)	4 (2.70)**	16 (10.81)
Total	147 (100.00)	147 (100.00)	148 (100.00)	148 (100.00)

Cases vs. controls. **p* < 0.05, ***p* < 0.01.

Males vs. females. ^o*p* < 0.05, ^{oo}*p* < 0.01.

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