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Primary health care providers' knowledge gaps on Parkinson's disease

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Abstract

In order to determine primary health care providers' (PCPs) knowledge gaps on Parkinson's disease, data was collected before and after a one-hour continuing medical education (CME) lecture on early Parkinson's disease recognition and treatment in a sample of 104 PCPs participating at an annual meeting. The main outcome measure was the proportion of questions answered correctly by each PCP before the lecture. We measured the change in proportion of correct answers before and after the lecture (delta). Ninety-nine percent of the PCPs who attended the lecture returned the questionnaire. The level of knowledge on Parkinson's disease before the lecture was relatively low, particularly in management (61.4%) and diagnosis (34.4%). PCPs' perceived knowledge was not associated with the number of correct responses on management at baseline. Test scores significantly improved after the CME lecture. Our results show that PCPs' baseline knowledge of diagnosis and management of Parkinson's disease and self-perceived knowledge on this topic are relatively limited. Appropriately, US reaccreditation programs do not only rely on self-perception. Longitudinal studies are needed to determine the impact of CME in knowledge retention and patient care in Parkinson's disease.

Keywords

Parkinson's disease; education; primary health care providers

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Megan R. Thompson wrote the first draft, assisted in data analysis and revision of the paper.

Ramona F. Stone conducted the data analyses and critically reviewed the paper.

V. Dan Ochs had a role in the conception and study design, questionnaire development and critical paper review.

Irene Litvan had a role in the conception and study design, acquisition of data, development of the questionnaire and CME lecture, and critically reviewed the paper.

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Introduction

There are no definite biological markers for the diagnosis of Parkinson's disease (PD); neuropathological confirmation is needed for a definite diagnosis. PD usually presents in the mid 60s and its prevalence increases with aging. Typically, PD patients present with unilateral hypokinesia with tremor at rest and/or rigidity, benefitting from dopaminergic therapy, and without the presence of atypical features, i.e., rapid progression, early postural instability or dementia (Litvan I, Bhatia KP, Burn DJ, Goetz CG, Lang AE, McKeith I, et al., 2003). PD is at times difficult to diagnose in clinical practice and may be misdiagnosed with essential tremor and other Parkinsonian disorders. Hence, a considerable knowledge about all these disorders is required to accurately diagnose and appropriately manage patients with PD and related disorders. Studies that compared clinical diagnoses to pathology show that even neurologists specialized in movement disorders may misdiagnose 10–24% of patients with PD; this percentage is likely to be higher if patients are evaluated by primary health care providers (PCPs) (Rajput AH, Rozdilsky B, and Rajput A., 1991; Hughes AJ, Daniel SE, Kilford L, and Lees AJ., 1992; Litvan I, MacIntyre A, Goetz CG, Wenning GK, Jellinger K, Verny M, et al., 1998; Swarztrauber K, and Graf E., 2007). Diagnosis is crucial as there are a variety of pharmacological and non-pharmacological interventions that can improve the quality of life of patients with PD.

PD prevalence is expected to increase with an aging population, hence, the ability of PCPs to accurately diagnose and manage PD patients are of special interest. PCPs' knowledge of PD has been scarcely studied and it presents itself as an important area of research to pursue. We sought to determine PCPs gaps in the knowledge of PD.

Methods

Participants

The target population was a group PCPs attending an annual continuing medical education program (CME) in Louisville, KY. One hundred and three out of 104 participants (99%) returned the questionnaires. Six questionnaires were excluded from analysis due to incomplete professional experience responses. Our sample included 75 general practitioners (77.3%), 17 registered nurses (RNs, 17.5%), and five other PCPs not specifying their occupation (5.2%). The PCPs were in practice for an average of 18.3 years \pm 12.2 (mean \pm SD, ranging from 1 to 50 years) and had on average 9 current PD patients (range 0 to 50).

Questionnaire

The questionnaire was designed as an Anticipation Guide following an accepted format (Dufflemeyer F., 1994; Daniels H, and Zimelman S., 2004). Anticipation Guides are used in teaching to activate prior knowledge, and include true and false statements, controversial statements, challenging beliefs or commonly held misconceptions.

The questions were developed by a movement disorder specialist to measure knowledge in three areas: epidemiology, diagnosis, and management following diagnostic and treatment clinical practice guidelines (Litvan I, Bhatia KP, Burn DJ, Goetz CG, Lang AE, McKeith I, et al., 2003; Suchowersky O, Reich S, Perlmutter J, Zesiewicz T, Gronseth G, and Weiner

WJ., 2006). No attempt was made to balance the number of questions in these categories. The questionnaire was piloted (prior to and after the same lecture to geriatricians, PCPs, and students) and refined using feedback from three movement disorder specialists and two clinical coordinators. The final instrument included twenty questions (Table 1) with true, false, and don't know response categories. The Cronbach alpha reliability coefficient was at an acceptable level (0.63). The questionnaire included two response columns, one to be completed before and one after the seminar. Participation in the study was voluntary and anonymous.

Additional information on occupation, number of years of medical practice, number of current PD patients, perceived knowledge, perceived improvement, and sources of information used for PD diagnosis was collected. CME credits provided were not contingent on completion of the questionnaire and no monetary compensation was provided.

Data Analyses

Univariate and bivariate statistics were used to describe the sample, and to identify relationships between participants' characteristics and PD expertise. The percentage of unanswered questions was 9.5 (range: 1–29). Responses were categorized as incorrect when they were wrong or blank, and when “do not know” was the answer selected. The proportion of correct responses was estimated before and after the lecture. The 20 questions were a priori grouped into three categories: epidemiology, diagnosis, and management. In addition, they were classified into “prior knowledge” and “new knowledge. Pre-post tests were conducted to measure changes (delta) in level of knowledge.

The lecture included a PowerPoint presentation and 12 short videos (ranging from one to three minutes) on the epidemiology, diagnosis and the management of PD. Specifically, the focus was on Parkinsonian features, PD diagnosis and differential diagnosis from other Parkinsonian and tremor disorders. In addition, epidemiologic aspects, etiopathogenesis and management (pharmacologic and surgical) were discussed. Finally, the participants were provided with algorithms for diagnosis and management of PD.

Results

There were no significant gaps between group differences on the average pretest correct responses for general practitioners (57.7%) and nurses (53.5%, $p=0.3$) or post-test correct responses (general practitioners, 77.2%; RNs, 78.5%, $p=0.6$). General practitioners pretest scores were slightly higher on diagnosis (63% vs. 55.9%) and management (34.1% vs. 31.8%), whereas the RN's scores were higher on epidemiology (80.4% vs. 76%). However, the two occupational groups did not differ significantly in the proportion of questions correctly answered, and thus, data were analyzed without controlling for occupation. Table 1 shows the errors in responses before and after the CME lecture. Overall, pretest scores show more errors on PD diagnosis and treatment. Test scores significantly improved on all areas after the lecture (Table 2). There was an association between the number of PD patients and the PCPs' correct responses before the lecture ($\rho=0.32$, $p=0.01$), particularly with regards to disease management ($\rho=0.33$, $p=0.009$). There was no association between the number of

years of experience in practice and number of correct responses, on any of the three areas ($p>0.10$).

Participants rated their knowledge at baseline as minimal, average, and great deal; 59% felt they had average knowledge, 33% minimal knowledge and 8% did not answer this question. PCP's perceived knowledge was not related to the proportion of correct responses. The majority (75%) of the participants felt that the lecture improved their knowledge base, but all showed improvement on the post-test.

The majority of participants used at least one source of information (56%), mostly journals (55%), less frequently colleagues (21%) and Internet (11%); 13% used multiple sources.

Discussion

Despite the fact that PCPs are frequently the first and at times the only ones to manage PD patients, only a few studies have assessed PCPs' knowledge gaps on the diagnosis and management of this disorder (Swarztrauber K, and Graf E., 2007; Rybicki BA, Johnson CC, and Gorell JM., 1995; Guttman M, Slaughter PM, Theriault ME, DeBoer DP, and Naylor CD., 2002). To measure PCPs knowledge of PD, we developed a questionnaire that has acceptable reliability and was applied before and after a CME lecture. We found no between-group differences on general practitioners' and RNs' knowledge on PD, as previously reported (Swarztrauber K, Graf E., 2007; Gormley GJ, Steele WK, Gilliland A, Leggett P, Wright GD, Bell AL, et al., 2003; Kaye W, and Mancini ME., 1986).

Participants' baseline knowledge of PD varied, scoring lower on diagnosis and management than epidemiology. Our findings are supported by prior studies showing difficulties in PD diagnosis and delay referral of PD patients to specialists (Swarztrauber K, Graf E., 2007; Gormley GJ, Steele WK, Gilliland A, Leggett P, Wright GD, Bell AL, et al., 2003; Litvan I, MacIntyre A, Goetz CG, Wenning GK, Jellinger K, Verny M, et al., 1998; Hoglinger GU, Rissling I, Metz A, Ries V, Heinermann A, Prinz H, et al., 2004). More than 75% of the participants in this study inaccurately believed that postural instability is an early feature of PD. In fact, postural instability and/or falls should question a PD diagnosis (Litvan I., 1998). The majority of the PCPs were unaware that usually PD patients present with unilateral features, and that tremor at rest, although relevant for the diagnosis of parkinsonism, is not the most important diagnostic feature of PD. Tremor at rest can be observed in related Parkinsonian disorders (i.e., multiple system atrophy and dementia with Lewy bodies).

Moreover, once PD was diagnosed PCPs had a limited knowledge on how to manage it. PCPs had difficulties in tailoring the various antiparkinsonian medications to patients' characteristics. More than 75% of the respondents would initially treat young PD patients with levodopa despite that evidence-based medicine guidelines recommend the use of dopamine agonists in these patients, as they delay the appearance of motor complications (Stowe RL, Ives NJ, Clarke C, van Hilten J, Ferreira J, Hawker RJ, et al., 2008). On the other hand, most PCPs would treat PD patients with cognitive impairment with dopamine agonists even though current practice guidelines recommend avoiding their use in these circumstances as they could worsen both cognitive and psychiatric symptoms. Similarly,

most PCPs were unaware of the benefits and risks of deep brain stimulation surgery in PD patients.

Our findings support the notion that PCPs have less experience in the diagnosis and management of PD and related disorders than neurologists or movement disorder specialists (Swarztrauber K, and Graf E., 2007). This finding coincides with a cross-sectional survey of PD patients in New Zealand that showed that respondents want better access to specialist care as PCPs may offer less information on treatment and support for their needs (Buetow S, Giddings LS, Williams L, and Nayar S., 2008).

At baseline the PCPs responded better to questions related to prior (commonly held beliefs i.e., Parkinsonism but not PD is caused by medications that block dopamine receptors, action tremor is not frequent in PD) than new (i.e., loss of olfaction precedes the motor symptoms) knowledge.

There was no association between PCPs' perceived knowledge base and the proportion of correct responses at baseline. Our results coincide with prior studies showing the limited accuracy of PCPs' self-assessment of their level of expertise (Davis DA, Mazmanian PE, Fordis M, Van Harrison R, Thorpe KE, and Perrier L., 2006).

Improvements over the baseline were observed in all knowledge areas after the lecture (overall 35%), with the greatest improvement in disease management (62%). Whether this improvement of knowledge will result in better patient management care or better referral practices will need to be studied.

Video presentations are considered the most valuable tool to increase knowledge in movement disorders residents (Portera-Cailliau C, Victor D, Frucht S, and Fahn S., 2006). While two-thirds of the presentation time was spent in teaching new knowledge, two-thirds of the videos emphasized old knowledge. This mix was used in an attempt to build a flexible knowledge base that included prior knowledge and new knowledge. When prior knowledge is activated one maximizes potential learning and can build on what is known. However, if prior knowledge contains misconceptions then learning may be assimilated incorrectly (Bransford J, Brown AL, and Cocking RC., 2000). Our study found no association between years of experience and prior knowledge as previously reported in a study examining the level of PCPs' knowledge of emergency contraception and practices (Veloudis GM, Jr., and Murray SC., 2000). On the other hand, PCPs who actively treated patients with PD were more knowledgeable on the management of the disease at baseline.

This study has several limitations that include the use of a relatively small convenience sample, which limits the generalizability of results. However, the sample is sufficiently large to have a normal distribution of scores. Moreover, the response rate was very high and the percentage of unanswered questions was low. It would have been ideal to have data to link the knowledge the PCPs gained during the lecture to long-term learning and improvements in their medical practice, but this was beyond the scope of this study.

Future studies should further explore if PCPs knowledge on PD is retained. Hopefully, as in other fields of medicine, CME improvement will translate in improved PD patient

management (Shuval K, Shachak A, Linn S, Brezis M, Feder-Bubis P, and Reis S., 2007; Martinez-Valverde S, Castro-Rios A, Perez-Cuevas R, Klunder-Klunder M, Salinas-Escudero G, and Reyes-Morales H., 2010; Casebeer L, Engler S, Bennett N, Irvine M, Sulkes D, DesLauriers M, et al., 2008). Increased use of distance learning technology and the existence of large Health Maintenance Organizations will allow the assessment of CME on long-term knowledge retention. Our results support the need for CME programs for PCPs on PD. Suitably, the US reaccreditation programs do not only rely on self-perception and test PCPs every 10 years (Dale DC., 2007). It is likely that patients in countries worldwide could benefit from requiring CME programs for PCPs.

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Table 1

Parkinson's Disease Questionnaire - Errors Per Question Before and After Lecture

Number of participants errors before lecture	PD Questionnaire	Correct response	Number of participants errors after lecture
19	The incidence of PD will increase dramatically in future years	T	6
14	PD appears to be familial in a small percentage of patients.	T	12
20	Depression may precede the motor symptoms and is considered a non-motor feature of PD	T	1
32	Dementia occurs more frequently in PD than in the general population	T	9
24	PD progresses very fast and patients may be wheelchair bound in 4 years.	F	15
63	Resting tremor is the most important symptom to make the diagnosis of PD and in differentiating between PD and parkinsonism	F	34
41	Action tremor is present in most PD patients	F	12
78	The three most prominent early symptoms of Parkinson's disease are tremor, bradykinesia, and postural instability	F	48
47	Loss of olfaction is one of the early non-motor symptoms of PD	T	2
58	PD can be differentiated from other Parkinsonian disorders in that those with PD patients typically exhibit symptoms on both sides of the body at an early stage.	F	19
9	Parkinsonian symptoms, but not PD, can be caused by medications that block dopamine receptors	T	11
21	Small strokes can cause parkinsonian symptoms.	T	16
30	Blood tests are now available to diagnose PD	F	10
52	Tests such as SPECT, and PET can be used for confirmation of PD diagnosis	T	24
6	There is no single definitive test for PD.	T	11
68	The initial treatment for a patient with young onset of PD is levodopa/carbidopa.	F	15
76	Dopamine agonists are the best treatment for patients with PD and cognitive disturbances	F	62
22	Hallucinations may be a side effect of levodopa/carbidopa therapy.	T	37
78	Gambling and increase in sex drive may be a side effect of dopaminergic therapy.	T	73
74	Benefits from surgical treatment for PD outweigh the risks	T	27

Parkinson's disease (PD) questionnaire and number of errors per questions before and after a CME lecture (total number of responses =97). Instructions given to participants were: "Please fill out the True/False/Don't Know column on the left side prior to our presentations. Fill out the right side after the program ends and return the questionnaire before you leave. Mark a T (True), F (False) or 0 (don't know) in each blank."

Table 2

Health Care Providers' Correct Answers by Knowledge Type

	Before (%)	After (%)	Delta	% Improvemen
Overall	57.1	77.1	20.0**	35.0%
Epidemiology	77.7	90.7	13.1**	16.9%
Diagnosis	61.4	82.6	21.1**	34.4%
Management	34.4	55.9	21.4**	62.2%
Prior Knowledge	61.6	77.1	15.5**	25.2%
New Knowledge	53.4	77.1	23.7**	44.4%

= % points difference (after-before); % improvement = [(after-before)/before]*100;

**
p< 0.0001.