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Medication Adherence in People With Parkinson Disease

Ju Young Shin, Barbara Habermann

ABSTRACT

Parkinson disease (PD) is the second most common neurodegenerative disorder in the United States. Because there is no cure for PD currently, pharmacological therapy is the mainstay of PD symptom management. Despite the importance of medication adherence in PD, several studies have reported medication nonadherence and/or suboptimal adherence. This literature review provides an overview of medication adherence issues in people with PD. Articles were identified for this study using computerized database searches and journal hand searches. Of the 72 medication adherence articles reviewed, the following articles were eligible for this review: (a) 10 articles measuring medication adherence in people with PD, (b) four medication adherence intervention articles, and (c) six studies of medication adherence in hospitalized settings. The importance of adherence assessment and strategies in improving medication adherence are discussed with the goal of improving symptom management and clinical outcomes in people with PD. Because medication taking is a complex and multifaceted phenomena, patient-centered, theory-driven interventions are needed to improve medication adherence and quality of care and life in people with PD.

Keywords: medication adherence, Parkinson disease, quality of care and life, symptom management

Parkinson disease (PD) is the second most common neurodegenerative disorder and the 14th leading cause of death in the United States (Murphy, Xu, & Kochanek, 2013). At least 1–1.5 million people in the United States live with PD, and the number is expected to double by 2030 (Dorsey et al., 2007). The total cost of PD in the United States was projected to be $23 billion in 2005 and $40 billion in 2040, including direct and indirect costs (Huse et al., 2005). PD-related early retirement and income loss are parts of the indirect costs of PD (Johnson et al., 2011).

The causes of PD are not clearly identified yet; however, important risk factors include genetic and environmental factors (Allam, Del Castillo, & Navajas, 2005). In the Western hemisphere, men are more likely to have PD compared with women (Siderowf, 2001). The typical pathologic feature of PD is a loss of dopamine-containing neurons in the midbrain, which is linked to the motor symptoms (Pavon, Whitson, & Okun, 2010). Motor symptoms of PD include resting tremors, bradykinesia, impaired balance, and coordination (Weintraub, Comella, & Horn, 2008). Other nonmotor symptoms include depression, orthopedic hypotension, and constipation, which are linked to the degeneration of other neuronal groups (Linazasoro, 2009).

Because there is no cure for PD currently, pharmacological therapy is the mainstay of PD symptom management. Dopaminergic drug therapy relieves the motor symptoms of PD, improves quality of life, and modestly improves survival (Evans, Lawrence, Potts, Appel, & Lees, 2005). Despite the importance of medication adherence in PD, several studies have reported medication nonadherence and/or suboptimal adherence (Grosset, Bone, & Grosset, 2005; Kulkarni et al., 2008; Valldeoriola et al., 2011). Consequences of nonadherence or suboptimal use of antiparkinsonian medication could lead to lack of efficacy, increased symptoms, premature treatment modifications, or poor outcomes such as an increased risk of dyskinesia and decreased quality of life (Grosset et al., 2005; Kulkarni et al., 2008; Leopold, Polansky, & Hurka, 2004).

Purpose

The purpose of this literature review was to provide an overview of medication adherence issues in people with PD. The importance of medication adherence assessment

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and strategies in improving medication adherence are discussed with the goal of improving symptom management and clinical outcomes in people with PD.

Literature Search Methodology

Articles were identified for this study using computerized database searches and journal hand searches. Computerized database searches of English-language articles were conducted in Cumulative Index of Allied Health Literature (1982–2014), Medline (1976–2014), PsycINFO (1976–2014), and PubMed (1964–2014). The following key words were used in these searches about medication adherence and associated factors: medication-taking, medication compliance, medication adherence, Parkinson's disease, and Parkinson disease. The following key words were used for the section of medication adherence in hospitalization: Parkinson's disease, medication, and hospitalization.

Of the 72 medication adherence articles reviewed, the following articles were eligible for this review: (a) 10 articles measuring medication adherence in people with PD, which were published between 2004 and 2014; (b) four medication adherence intervention articles, which were published between 2007 and 2014; and (c) six studies of medication adherence in hospitalized settings, which were published between 2010 and 2012.

Medication Adherence in People With PD

The World Health Organization defines adherence to long-term therapy as "the extent to which a person's behavior—taking medication, following a diet, and/or executing lifestyle changes—corresponds with agreed recommendations from a health care provider" (Sabate, 2003, p. 13). Medication adherence is a patient-centered approach, which requires clinician–patient collaboration, whereas compliance is a clinician-centered approach (Gould & Mitty, 2010).

Medication adherence rates from the findings of 10 studies were summarized in Table 1. Half of the 10 studies were retrospective, secondary analyses of population-based data sets in the United States. In contrast, four of five prospective, observational studies were conducted in the United Kingdom and European countries (Grosset et al., 2005, 2009; Valldeoriola et al., 2011).

In general, medication adherence is evaluated as the percentage of prescribed doses taken during a defined period (Neiheisel, Wheeler, & Roberts, 2014). Medication adherence, defined as taking more than 80% of prescribed doses, widely ranged from 33% to 97.7% in the findings of 10 studies included in this review (Grosset et al., 2005, 2006, 2009; Valldeoriola et al., 2011). The lowest adherence rate (33%) was from the findings of the study of 104 patients with PD who were aged 65 years and older and on Medicare Health Maintenance Organization in the Southern United States between 1996 and 2001 (Kulkarni et al., 2008). The highest adherence rate (97.7%) was measured by electronic monitoring bottles, which recorded the date and time of cap opening in the prospective, observational study conducted in five European countries (Grosset et al., 2009). Notably, medication adherence rates from retrospective, secondary analyses of medication insurance claims in the United States showed lower adherence rates compared with those of prospective, observation studies (ranges = 33%–72.7% and 60.4%–97.7%, respectively).

The observed discrepancy in adherence rates in this review may be because of differences in the methodology and participants for these studies. Measures of adherence varied among studies, including self-report using the Morisky–Green test, pill count, physician judgment, medication possession ratio based on pharmacy refill data, and electronic monitoring caps on all antiparkinsonian medications (Davis et al., 2010; Grosset et al., 2009; Kulkarni et al., 2008; Valldeoriola et al., 2011). There was disagreement on adherence rate between patients' self-report using the Morisky–Green test and prescribing physicians' perception (60.4% and 93.7%, respectively; Valldeoriola et al., 2011). In addition, the agreement between pill counts and the Morisky–Green test was fair (intraclass correlation coefficient = .40) in a study of 413 patients with PD (Elm et al., 2007). Adherence rates measured by electronic monitoring bottles ranged from 84.6% to 97.7% (Grosset et al., 2005, 2006, 2009; Leopold et al., 2004). Despite the objectivity of electronic devices, there are potential discrepancies between the record data of opening a bottle and the fact that the patient has actually taken the medication or taken the dosage as prescribed. In addition, participants in the retrospective studies were 46,162 people with PD in the United States, who enrolled in various health insurance plans between 1996 and 2009. These data may show a real-life adherence compared with those of the prospective, observational studies.

Because of highly individualized experiences of PD symptoms, episodes of nonadherence to antiparkinsonian medications varied between patients. In a qualitative study by Drey, McKeown, Kelly, and Gould (2012), each individual with PD mentioned at least one to several different types of nonadherent behavior. For instance, they simply forgot to take a dose or were confused with doses, took doses early to achieve better symptom control, were taking extra doses regularly, or were rescheduling dose time without telling their healthcare providers.

Timing nonadherence was the most frequently reported type in medication nonadherence in previous studies (Grosset et al., 2005; Leopold et al., 2004). With advanced PD, the medication regimen becomes complex, and people may take several doses during the day. Thus, timing nonadherence can result in either undertaking or overtaking medications. Correct timing

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TABLE 1. Medication Adherence in People With PD

Citation	Sample Size	Study Design	Recruitment Site/Inclusion Criteria	Sample Description	How Adherence is Measured	Findings
Davis, Edin, and Allen (2010)	3,119 patients, population-based	Retrospective secondary analysis, population-based	United States; insurance claims from over 30 U.S. health plans, Integrated Health Care Benchmark Services, January 1, 1997, to December 31, 2004; more than one APM prescription, enrollment for >6 months before and 12 months after first PD prescription	Mean age = 69 years, male: 58.1%; Charlson Comorbidity Index for 6 months: 1.4 of 33	Mean MPR > 0.8	Mean MPR = 0.58; adherence: 39%, nonadherence: 61%; at least one interruption of APD during 12 months: 32%; a large positive relationship between nonadherence and both medical and total healthcare costs (+$3,451, $p < .0001$, and +$2,383, $p = .0053$, respectively)
Grosset et al. (2009)	112 patients	Prospective, observational study	Five countries (France, Germany, Italy, Spain, United Kingdom), eight centers, 4 weeks	Patients with PD taking dopaminergic therapy; mean age = 65 years, male: 71%, PD duration = 7.7 years	Electronic monitoring bottles; adherence: took more than 80% of medications	Total adherence: 97.7%; days adherence: 86.2%; timing adherence: 24.4%; overusage: one patient (0.9%), 134% use; omissions: 21% patients
Grosset et al. (2005)	54 patients	A single-center, observational study	United Kingdom, for 3 months; U.K. Brain Bank criteria, taking at least one APM, exclusion: selegiline or amantadine only	Mean age = 61.9 years, male: 56%	MEMS	Adherence: 79.6% (43/54); suboptimal: 20.4% (11/54); timing compliance: poor; 11% for underusers, 25% for satisfactory users; poorer compliance associated with younger age, depression, more tablets per day
Grosset, Bone, Reid, and Grosset (2006)	69 patients	Prospective, single-blind randomized crossover design	United Kingdom, U.K. Brain Bank criteria	Mean age = 64 years, male: 57%	Electronic monitoring bottles; adherence: take more than 80% of prescribed APM	Adherence: 81% (56/69), suboptimal: 19% (13/69)

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TABLE 1. Medication Adherence in People With PD, Continued

Citation	Sample Size	Study Design	Recruitment Site/Inclusion Criteria	Sample Description	How Adherence is Measured	Findings
Kulkarni et al. 2008	104 patients	Retrospective, longitudinal cohort, population-based	United States; Medicare HMO in Southern United States, 1996–2001	Aged 65 years and older, mean age = 80 years; Charlson Comorbidity Index for 5 years: 3.7 of 33; male: 50.4%	MPR > 0.8	MPR ratings (0.42–0.55); adherence: 33% suboptimal adherence: 67%; first year: 62.5%, second year: 64%, third year: 63.1%, fourth year: 72%, fifth year: 71.6%
Leopold et al. (2004)	39 patients with PD, one medical center	Blind study	United States, 28 observational days	Mean age = 68.3 years; 22 men, 18 women; duration of disease = 7.2 years	MEMS; self-report adherence: took more than 80% of doses taken correctly	Adherence: 84.6%; suboptimal adherence: 15.3%; mistiming self-report: 73% (27/39); MEMS use: 82.1% (32/39)
Richy, Pietri, Moran, Senior, and Makaroff (2013)	15,846 patients	Retrospective, secondary analysis, population-based	United States/PharMetrics Claims Data, December 31, 2005, to December 31, 2009; two diagnoses for PD between December 31, 2005, and December 31, 2008; above 18 years old, enrolled at least 12 months after the date of the most recent PD diagnosis, no missing or invalid data	60% male, 35% depression; mean age = 72.6 years	MPR > 0.8	Adherence: 54.3%; suboptimal: 45.7%; positive correlates of nonadherence: multiple daily doses, longer than 2 years of diagnosis, a diagnosis of GI disorder, depression, age between 41 and 80 years
Tarrants, Denarié, Castelli-Haley, Millard, and Zhang (2010)	19,510 patients, population-based	Retrospective analysis, population-based	United States; IMS Health Longitudinal Prescription Database, March 1, 2007, to May 31, 2007; a new PD drug if they initiated PD therapy for the first time, added adjunctive PD therapy, or switched one PD drug for another	Filled more than two prescriptions; mean age = n/a	MPR > 0.8; persistence: the duration of uninterrupted therapy	Adherence: 53.5%; nonadherence: 46.5%; persistence: 44.1% for 90 days and 32.2% for 150 days

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TABLE 1. Medication Adherence in People With PD, Continued

Citation	Sample Size	Study Design	Recruitment Site/Inclusion Criteria	Sample Description	How Adherence is Measured	Findings
Valldeoriola et al. (2011)	418 patients, 169 neurologists	Cross-sectional survey	Spain; multicenter, tertiary and secondary hospitals, public health system; patients with PD with APM; 169 neurologists from neurology department, (had to know at least for 1 year)	Mean age = 70.2 years, mean duration of disease = 5.7 years, male: 61 %	Neurologist perception, one-item yes/no question, Morisky–Green test (patient's self-report)	Adherence rate; Morisky–Green test: 60.4%, physician's opinion: 93.7%; positive correlates of adherence: high level of knowledge about PD, good clinical control, a spouse or life partner, higher incomes; negative correlates of adherence: cognitive impairment and psychiatric symptoms
Wei et al. (2014)	7,583 patients	Cross-sectional, population-based	United States/Medicare Part D Beneficiary, June 1, 2006, to December 31, 2007; had more ≥2 APM prescription refills and continuously enrolled in Medicare Parts A, B, and D for up to 19 months or until death in 2007	Aged ≥ 65 years (93.6%), male: 39.1%, White: 89.3%, residents in long-term care facilities (46.3%)	Modified MPR > 0.8	Adherence: 72.7%; suboptimal adherence: 27.3%; received therapy for at least 436 days (75.3%); positive correlates of nonadherence: aged ≥ 65 years, non-White race, non-low-income subsidy recipients, last Part D enrollees, cognitively impaired, highly comorbid, and who experienced multiple changes in APM therapy

Note. APM = antiparkinsonian medications; MPR = medication possession ratio; MEMS = medication event monitoring systems; PD = Parkinson disease.

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of doses is important to maintain the therapeutic level of antiparkinsonian medications in the blood stream. Irregular medication taking can result in motor fluctuation and dyskinesia because of intermittent dopamine intake and brief peaks of levodopa availability to the brain (Donaldson, Marsden, Schneider, & Bhatia, 2012). In contrast to suboptimal adherence, a group of people with PD experience overtaking or compulsive dopaminergic drug use, which is called dopamine dysregulation syndrome (DDS). People who have DDS were more likely to be younger at the onset of PD, be depressed, and drink more alcohol (Evans et al., 2005). However, little known about the longitudinal clinical outcomes of DDS, so future studies are needed to explore the relationships.

Clinical Outcomes of Medication Nonadherence

Suboptimal adherence to antiparkinsonian medications may lead to premature treatment modifications, increased symptoms, and poor outcomes (Grosset et al., 2005; Leopold et al., 2004). Thus, medication adherence should be assessed before increasing the dose of antiparkinsonian medication. Nonadherence and suboptimal adherence to PD treatment may also be associated with increased use of medical resources and associated costs, despite offsets from reduced medication intake. For instance, a large positive relationship between nonadherence to medications and both medical and total healthcare costs were reported in a retrospective secondary analysis of insurance claims in a population with PD (Davis et al., 2010). However, little is known about the impact of nonadherence of antiparkinsonian medication on the development and severity of motor complications later in the course of the disease (Bainbridge & Ruscin, 2009).

Associated Factors of Medication Adherence in People With PD

Several associated factors of antiparkinsonian medication nonadherence were reported in previous studies (Daley et al., 2014; Richy et al., 2013; Wei et al., 2014). In this literature review, a conceptual framework was developed by adopting the framework entitled, "Predictors of Medication Adherence" (Wheeler, Roberts, & Neiheisel, 2014). In the developing framework, medication adherence was explained by associated factors, and the outcomes of medication adherence were presented (Fig 1). Associated factors of adherence to antiparkinsonian medications identified from the findings of previous studies were divided into six categories. Patient characteristics are age, gender, race, and risk-taking behaviors, and the social factor is lack of spouse/partner. Disease-related factors are cognition, mood disorder, and longer disease duration. Financial and health system barriers are low income and maintaining employment. Patient–provider relationship factors are regimen complexity/polypharmacy and poor knowledge of PD/education. Treatment-related factors are poor symptom control or quality of life.

Some factors in the framework could be modifiable; however, others may not be modifiable by the nature of the disease. For example, nonintentional nonadherence, or more simply, forgetting to take dosages, could be the area most amendable to interventions, which aim to improve medication adherence in people with PD. However, there are some gaps noted about the roles of patients' beliefs, characteristics, and decision-making process in the area of adherence to antiparkinsonian medications (Fleisher & Stern, 2013). In addition, little is known about factors associated with nonadherence, including patients' fear of higher dose medication, side effects, and limited options for future medication therapy (Grosset et al., 2009).

Thus far, the focus has been on the individual factors that influence medication adherence. However, it must be acknowledged that PD is a progressive disease. In the early stages, many people with PD will be able to manage their medications independently; however, in the moderate to advanced stages, they may need additional help and support. Because most care for people with PD in the United States is provided at home by family members, family caregivers play vital roles in the care of moderate-to-advanced PD. Most people with PD (93%) at 10 years of the disease live at home, thus emphasizing the importance of the family caregiver (Hassan et al., 2012). At home, family caregivers assist the individual with PD in safety, medication compliance, activities of daily living, and social involvement (Cifu et al., 2006). As Schrag, Hovris, Morley, Quinn, and Jahanshahi (2006) noted, caregivers of people with PD experience a significant burden affecting physical, emotional, and social aspects of their quality of life. For instance, 90.4% of caregivers reported some level of caregiver strain in a multicenter, nationwide, observational longitudinal study (Oguh, Kwasny, Carter, Stell, & Simuni, 2013). Notably, the domains of caregiver strain were shifted from social and time constraints in caregivers with the mild strain to physical and financial strains in those with moderate and severe strain. Therefore, management of PD including medication regimen does not equate to patient care alone but also necessitates education and support for their caregivers.

Medication Administration in Hospitals and Long-Term Care Facilities

During the period of hospitalization for a patient with PD, antiparkinsonian medication administration is mostly based on hospital schedules (Aminoff et al., 2011; Hou et al., 2012). Nonadherence to regular antiparkinsonian medication dosing schedules during hospitalization was reported in previous studies (Chou et al., 2011; Hou et al., 2012; Wood, Neumiller, Carlson, Setter, & Corbett,

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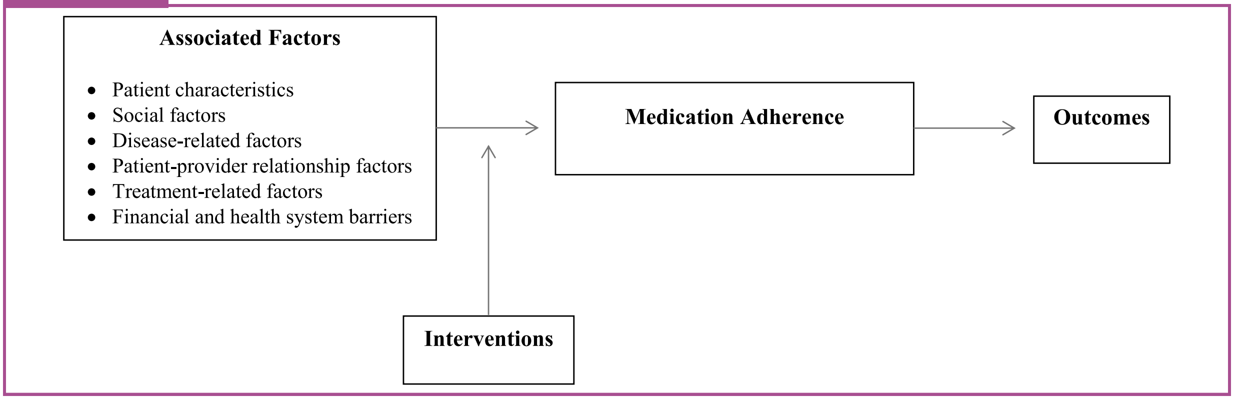

FIGURE 1 Developing Framework of Medication Adherence in People With Parkinson Disease

2010). For instance, 46.3% of patients did not receive antiparkinsonian medications on time, and 30% of patients had three or more doses that were missed because of lack of availability of the medication on the floor (Wood et al., 2010). Correct administration of medication was also lower during the first 2 days postadministration compared with subsequent days and was higher for patients who had neurological consultants (Hou et al., 2012).

Nonadherence to antiparkinsonian medication during the hospitalization may increase negative clinical outcomes, including worsening mobility and motor control changes, longer length of stay, and increased healthcare costs (Aminoff et al., 2011; Wood et al., 2010). Sudden cessation of antiparkinsonian medications may have severe consequences such as withdrawal syndrome from dopamine agonist. Because most hospital admissions were related to non-PD-related diseases (Chou et al., 2011; Wood et al., 2010), administration of antiparkinsonian medications may not have been the first priority of treatment plans for the hospitalization. In addition, unfamiliarity of pathophysiology of PD and/or of antiparkinsonian medications among hospital staff members may be associated with the reported nonadherence to regular schedules in hospital settings (Derry, Shah, Caie, & Counsell, 2010). Thus, there are great needs for thorough admission assessments about the regular schedule of antiparkinsonian medications and for better communication among hospital staff, patients with PD, and their family members. An interprofessional team approach with the inclusion of a PD specialist may provide quality care during the hospitalization (Aminoff et al., 2011; Chou et al., 2011; Oguh & Videnovic, 2012; Wood et al., 2010). In the United Kingdom, the “Get It On Time” campaign has launched to ensure that people with PD are given their appropriate medications during hospitalization in a timely manner (Wood et al., 2010). The campaign supports self-administration of antiparkinsonian medications in hospitals and considers antiparkinsonian medication administration at the same level of importance as insulin administration (Wood et al., 2010). Furthermore, a discharge plan for people with PD should be well organized to promote a smooth transition from acute hospitalization to the community and to decrease readmission to the hospital.

There is a lack of knowledge about adherence to antiparkinsonian medications in long-term care facilities or rehabilitation centers. Adherence to antiparkinsonian medications was not considered as a priority according to the findings of a study identifying quality measures for medication continuity in long-term care facilities (Bell, Brener, Comrie, Anderson, & Bronskill, 2012). Therefore, future studies are needed to explore the adherence to antiparkinsonian medications in the transitional phases in long-term care facilities.

Interventions to Improve Medication Adherence

Because of its complexity and multifactorial nature, it is hard to find a single way to improve medication adherence (Bainbridge & Ruscin, 2009; Brown & Bussell, 2011). For instance, the authors of a recent Cochrane review concluded that current methods of improving adherence for chronic health problems are mostly complex and not very effective, so the full benefits of treatment cannot be realized (Haynes, Ackloo, Sahota, McDonald, & Yao, 2008). Most medication adherence interventions for older adults focused on promoting knowledge and skills for medication taking; however, memory aids and self-monitoring strategies were underutilized (Ruppar, Conn, & Russell, 2008). Involvement of family caregivers in medication adherence interventions for older adults was also suggested as one of the strategies to improve medication adherence (Russell, Conn, & Jantarakupt, 2006).

Three of four intervention studies included in this review utilized counseling/education to improve medication

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adherence in people with PD. In a study by Grosset and Grosset (2007), active counseling groups were provided verbal and written information about the continuous dopaminergic theory and tailored written guidance on optimal medicine timing for their drug regimen. After the intervention, timing adherence, but not motor scores, was improved in the intervention group compared with the control group. In a phase II randomized controlled trial by Daley and colleagues (2014), a cognitive-behavioral approach (i.e., adherence therapy) focused on modifying beliefs and exploring ambivalence toward medication was examined. The seven weekly one-to-one adherence therapy sessions showed improved self-reported adherence and quality of life. In addition, participants in the intervention group reported improvements in mobility, activities of daily living, emotional well-being, cognition, communication, and body discomfort. In Germany, a standardized pharmaceutical care in community pharmacies showed improved health outcomes and quality of drug treatment compared with a comparison group (Schröder, Martus, Odin, & Schaefer, 2012). The standardized pharmaceutical care of 8 months was composed of assessment of drug-related problems, development of a pharmaceutical care plan, and evaluation of the patient's health and drug regimen. Finally, Keränen and Liikkanen (2013) reported that a medication reminder delivered by short message service was a feasible method for people with advanced PD, who were taking at least four doses of levodopa/carbidopa per day. Despite the advanced stage of PD, 35 of 50 participants were able to set up the reminder system without any help, and most participants in the study (91%) reported that short message service reminders worked well for them. As discussed above, a few intervention studies were conducted to improve medication adherence in people with PD, and they were delivered to people with PD in the community settings.

Implications and Suggestions

Medication adherence has complex, multifactorial aspects as reported in previous studies. Accurate assessment of medication adherence is the first step to understanding medication-taking behaviors in people with PD using pill count, the Morisky–Green test, or medication diary or log. Home medication diary or log would be the easy and simple way to monitor the effectiveness and side effects of drug therapy (Hauser, Deckers, & Lehert, 2004). In addition, using alarm clocks or smartphone applications as reminders would decrease unintended nonadherence such as forgetting to take a dose on time. There is a need to understand each patient's emotional readiness to initiate pharmacological therapy and expectations before initiating antiparkinsonian medications. Then, interventions aiming to improve medication adherence should be tailored to decrease or modify each patient's identified barrier(s; Ruppar et al., 2008). Cognitive impairment and depression should also be assessed to evaluate the patient's self-management skills. The need to include the caregiver in an intervention study should be evaluated. A partnership among various healthcare providers, patients with PD, and their caregivers using a patient-centered, nonjudgmental, and collaborative approach may improve medication adherence (Bainbrige & Ruscin, 2009; Fleisher & Stern, 2013; Gould & Mitty, 2010). Medication costs may be one of the barriers associated with medication adherence in people with PD who are older adults with fixed incomes or who have left their work because of the symptoms of PD. Therefore, the information regarding medical insurance such as Medicare Part D should be provided at the early stage of the disease to plan their financial futures.

Because of lack of experimental studies in the area, longitudinal, patient-centered, theory-driven randomized controlled trials in various settings are needed to provide strong evidence in the area. Utilizing advanced monitoring technologies and reminder systems may be beneficial for people with PD to improve medication adherence, clinical outcomes, and quality of life.

Nursing's Role

Nurses would play the pivotal roles in improvement of medication adherence. In the community setting, assessment about the patient's knowledge and medication-taking skills as well as readiness and attitude toward antiparkinsonian medications would lead to deliver patient-centered, tailored education to people with PD and their caregivers. In addition, adequate caregiver support would decrease caregiver strain and improve their quality of life. In hospitals, acute care nurses should identify the regular schedule of antiparkinsonian medications to administer the medication on time. The appropriateness of self-reminder systems to self-administer medications in the acute care facility needs exploration for those persons who are cognitively intact. Although there are no formally recognized PD specialized nurses in the United States as existing in some European countries, continuous education would be one way to increase the awareness of the importance of medication adherence in people with PD.

This literature review included research published in English so there is a possibility of not including studies written in other languages. However, this literature review included various aspects of medication adherence in PD such as the prevalence of medication adherence, associated factors with medication adherence in PD, and interventions used to improve medication adherence in PD. The importance of taking PD medication at the scheduled time during hospitalization and the nurse's role were also discussed.

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Conclusions

PD is a neurodegenerative disease that is more prevalent in older adults. Antiparkinsonian medications are the mainstay in symptom management of PD. However, medication nonadherence and suboptimal adherence have been documented in the previous studies. Because medication taking is a complex and multifaceted phenomena, patient-centered, theory-driven interventions are needed to improve medication adherence and quality of care and life in people with PD. Furthermore, the caregiver's role in medication taking and adherence should be investigated in the future. Nursing has a role in the area via education and advocacy for people with PD.

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