

Medication Selection and Nursing Interventions for Parkinson's Disease Patients

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Abstract: Parkinson's disease is a neurodegenerative disorder that significantly impacts patients' lives. Currently, treatment primarily relies on drug therapy, while effective nursing interventions can help mitigate adverse reactions associated with medication use. This article reviews medication selection and nursing interventions for patients with Parkinson's disease, aiming to alleviate symptoms, improve quality of life, and provide a scientific and comprehensive basis for medication and clinical nursing practices.

Keywords: Parkinson's disease; Medication analysis; Nursing interventions

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1. Introduction

Parkinson's disease (PD) is a chronic, progressive neurodegenerative disorder of the central nervous system, also referred to as parkinsonism. Parkinsonism commonly affects individuals aged 50–65 years, with clinical manifestations divided into motor and non-motor symptoms. Motor symptoms include resting tremors, bradykinesia, muscle rigidity, and abnormal posture and gait, while non-motor symptoms involve sensory disturbances^[1,2]. In China alone, approximately 2.5 million individuals are affected by PD, and with the aging population, the prevalence continues to rise, significantly impacting patients' quality of life^[3]. The pathogenesis of PD is complex and not fully understood; however, reduced dopamine secretion in the brain is believed to be a central factor. Therefore, PD treatment typically targets dopamine pathways and includes medications such as levodopa, dopamine agonists, enzyme degradation inhibitors, and central cholinergic drugs. Additionally, implementing nursing measures can effectively slow the progression of PD. This article summarizes medication approaches and essential nursing practices in the treatment of PD, providing guidance for optimizing patient care and enhancing patients' quality of life.

2. Clinical medication analysis of Parkinson's disease

In PD, the pathological state is characterized by decreased dopamine levels in the substantia nigra and striatum, as well as the accumulation of α -synuclein in the brain, which leads to Lewy body formation and further neuronal damage. Additionally, the reduction in dopamine causes cholinergic nerve function to become relatively dominant, resulting in muscle rigidity during movement ^[6]. Therefore, dopamine supplementation is a crucial therapeutic approach, and appropriately reducing cholinergic nerve activity can also effectively alleviate symptoms.

2.1. Dopamine prodrugs

Levodopa is a common dopamine precursor used to treat PD. Levodopa effectively crosses the blood-brain barrier into the central nervous system, where it is absorbed by dopaminergic neurons and converted to dopamine, thus compensating for the dopamine deficiency in the brain ^[4]. After conversion, dopamine plays an essential role in regulating the striatum, promoting striatal function recovery, and improving motor dysfunction. Enhanced neural communication results in more flexible and coordinated movement, helping alleviate gait instability and abnormal posture in PD patients.

This medication, which directly increases dopamine levels in the central nervous system, is indispensable in treating most PD patients. Typically administered in low doses and gradually increased as needed, levodopa can cause side effects with long-term use, including nausea, vomiting, anorexia, constipation, and cardiovascular issues such as orthostatic hypotension and arrhythmia. Therefore, it is critical to adhere to the recommended dosage and schedule and to monitor for possible side effects. To reduce adverse effects, levodopa is often combined with receptor agonists and monoamine oxidase inhibitors in clinical practice. For instance, Sinemet, a controlled-release tablet with carbidopa, enhances levodopa's bioavailability in the central nervous system by blocking its peripheral metabolism, thus reducing side effects ^[5]. Madopar, a combination of levodopa and benserazide, improves levodopa's efficacy, prolongs patients' symptom-free intervals, and delays the onset of PD symptoms.

2.2. Dopamine receptor agonists

Dopamine agonists mimic dopamine by binding to central nervous system receptors, stimulating them to enhance dopamine's effects. Clinically, dopamine agonists are divided into ergot and non-ergot categories, with non-ergot agonists such as pramipexole, ropinirole, and rotigotine often preferred for safety ^[6]. However, as the disease progresses, their efficacy may diminish compared to levodopa, and side effects like motor and neurological dysfunction can arise. Therefore, they are commonly used as adjunct therapies to levodopa.

2.3. Inhibitors of dopamine-degrading enzymes

After dopamine is released in the central nervous system, most of it is reabsorbed at nerve endings by the dopamine transporter (DAT) and is subsequently degraded by monoamine oxidase (MAO) and catechol-O-methyltransferase (COMT) before being excreted in the urine ^[7]. Inhibiting these degrading enzymes to increase dopamine concentration is an effective strategy for slowing PD progression. Selegiline, a selective MAO-B inhibitor, inhibits MAO-B activity, reducing dopamine degradation at the presynaptic membrane, increasing dopamine concentration in the synaptic cleft, and prolonging dopamine's action time. COMT is another enzyme involved in dopamine degradation, acting by inhibiting COMT activity to slow dopamine degradation.

However, compared to MAO-B inhibitors, COMT inhibitors are used less frequently in clinical practice. The use of enzyme inhibitors slows down dopamine degradation in the brain, increases dopamine concentration in the synaptic cleft, and prolongs dopamine's duration of action, which can help alleviate PD symptoms. However, this can also prolong levodopa's side effects and increase liver toxicity and other adverse effects ^[8]. Consequently, these inhibitors are often used as adjunctive therapies with levodopa rather than as standalone treatments.

2.4. Central cholinergic agents

Recent studies suggest that reducing cholinergic receptor activity in the central nervous system may alleviate PD symptoms ^[9]. Anticholinergic drugs help restore the dopamine-acetylcholine balance by inhibiting acetylcholine activity, thereby improving PD symptoms. Benhexol, for instance, is effective in treating Parkinsonian tremors and is widely used in PD management. Due to potential side effects, it is essential to closely monitor patients and adjust dosages or medications as needed.

2.5. New drugs for central neuroprotection

Research indicates that abnormal α -synuclein accumulation can damage the central nervous system, while glucocerebrosidase (GBA) gene mutations may reduce lysosomal activity, impair mitophagy, and promote neurotoxic α -synuclein oligomer formation, worsening PD progression. Approaches like α -synuclein clearance through monoclonal antibodies and inhibitors that prevent α -synuclein misfolding have shown promise in slowing PD progression. Glucoside-targeted drugs have demonstrated efficacy in preclinical studies, while neuroprotective agents such as glucagon-like peptide-1 receptor agonists and antioxidants play a vital role in maintaining neurological function.

2.6. Therapeutic application of traditional Chinese medicine

While Western treatments for PD have yielded considerable results, they primarily focus on symptom management rather than halting disease progression. Long-term drug use can also lead to increased dosage requirements and aggravated side effects, making treatment more challenging in the middle and late stages of PD. Traditional Chinese medicine (TCM) offers a new therapeutic direction, with benefits like stable efficacy, lasting effects, and low toxicity.

In early treatment, TCM's preventive approach can help slow disease progression. *Cistanche deserticola*, for instance, has been shown to tonify kidney yang, nourish essence and blood, and improve intestinal motility, helping to increase dopamine content in the brain and prevent the loss of dopaminergic nerve endings in the striatum. Additionally, TCM can reduce adverse reactions associated with levodopa. In mid-stage treatment, combining TCM with Western medications enhances efficacy, minimizes side effects and dependency, and maximizes therapeutic benefits. For example, tetrandrine not only promotes dopamine secretion but also exhibits anticholinergic effects, supporting PD management across disease stages ^[10].

3. Basic care for Parkinson's disease

3.1. Medication care

Patients in the early and middle stages of PD often rely primarily on drug therapy. However, commonly used

drugs in clinical practice can have varying degrees of side effects, so nurses should closely monitor the patient's condition, strictly adhere to the medication plan ^[11], and guide patients in proper medication use. Dopamine drugs should be administered one hour before meals or two hours after meals to avoid interference from food protein with drug absorption ^[12]. The “switch” effect and “end-of-dose” phenomenon ^[13] associated with this type of medication require careful monitoring for any adverse reactions. Should these reactions occur, nurses must promptly communicate with the physician to adjust the drug dose or medication regimen. In long-term care, it is essential to monitor and address the potential side effects of anticholinergic and other medications on the central nervous and motor systems ^[14]. Patient medication and symptom changes should be documented in a timely manner to support physicians in making necessary treatment adjustments.

3.2. Surgical care

When PD advances and as necessary, surgical intervention may effectively slow disease progression. Comprehensive intraoperative nursing care provides essential support to ensure optimal outcomes during and after surgery. Whole-process nursing is based on the principles of nursing science, offering holistic care that addresses both physiological and psychological needs according to the patient's specific situation. Prior to surgery, patient records are organized and information consolidated to establish a thorough understanding of the patient's condition, facilitating further treatment planning. Intraoperative care is critical for the smooth progress of the operation and for minimizing postoperative complications. Postoperative nursing includes recovery care, rehabilitation, and psychological support, which help mitigate the physical and emotional impacts of surgery and promote patient recovery.

3.3. Condition monitoring

Nursing care should prioritize monitoring changes in symptoms such as tremors, muscle rigidity, bradykinesia, and the emergence of any new symptoms. Regular neurological assessments, including evaluations of muscle strength, muscle tone, sensory function, and reflexes, should be conducted to comprehensively assess the patient's neurological status. Cognitive assessments using tools such as the Mini-Mental State Examination are important to evaluate cognitive function, observe emotional changes, and identify psychological issues such as depression or anxiety in a timely manner. Monitoring the effects and side effects of drug therapy is also essential; improvements in symptoms, as well as side effects like nausea, vomiting, and orthostatic hypotension, should be closely observed.

3.4. Psychological care

Patients with PD frequently experience emotional disorders, including depression and anxiety. Neuroendocrine changes, neurological deficits, and cognitive impairment due to brain tissue damage contribute to these emotional challenges ^[15]. Family members and healthcare providers should offer care and support while monitoring the patient's emotional well-being. Psychological counseling and family support can help patients build confidence, re-establish self-worth and social identity, and reduce their psychological burden.

3.5. Family care

Family members play a crucial role in the treatment process. Nutritional support, regular routines, and dietary management can help minimize the occurrence of constipation in patients. Rehabilitation exercises encourage

patients to engage in appropriate physical activity and training to improve motor function and relieve symptoms.

4. Conclusion

Parkinson's disease is a prevalent neurodegenerative disorder with a rising incidence among middle-aged and elderly populations. Its complex mechanisms, prolonged course, and lack of an effective cure make both treatment and prevention challenging. Current drug therapies have significant limitations in managing symptoms and alleviating patients' physical and psychological conditions. Therefore, only through strengthened and standardized drug therapy, along with effective nursing support, can the efficacy of treatment be optimally enhanced. This article reviews the treatment and nursing care of Parkinson's disease, focusing on medication management and disease care, to provide patients with scientific and practical guidance for treatment selection, medication, and disease management. Currently, drug therapy remains the primary treatment choice. However, future directions will likely include developing new therapeutic targets, broadening the combined use of traditional Chinese and Western medicine, and minimizing the side effects of long-term medication. Implementing effective nursing strategies to support and ensure medication efficacy is also a valuable approach to improving symptoms in PD patients.

Disclosure statement

The authors declare no conflict of interest.

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