Parkinson Disease Treatment in Hospitals and Nursing Facilities: Avoiding Pitfalls

J. Eric Ahlskog, PhD, MD

CME Activity

Target Audience: The target audience for *Mayo Clinic Proceedings* is primarily, internal medicine physicians and other clinicians who wish to advance their current knowledge of clinical medicine and who wish to stay abreast of advances in medical research.

Statement of Need: General internists and primary care physicians must maintain an extensive knowledge base on a wide variety of topics covering all body systems as well as common and uncommon disorders. *Mayo Clinic Proceedings* aims to leverage the expertise of its authors to help physicians understand best practices in diagnosis and management of conditions encountered in the clinical setting.

Accreditation: Mayo Clinic College of Medicine is accredited by the Accreditation Council for Continuing Medical Education to provide continuing medical education for physicians.

Credit Statement: Mayo Clinic College of Medicine designates this journal-based CME activity for a maximum of 1.0 *AMA PRA Category 1 Credit(s).*™ Physicians should claim only the credit commensurate with the extent of their participation in the activity.

Learning Objectives: On completion of this article, you should be able to (1) recognize problems unique to patients with Parkinson disease who are admitted to hospitals or nursing facilities, (2) understand appropriate carbidopa-levodopa dosing principles and pharmacodynamics, and (3) describe strategies for preventing or treating common PD complications.

Disclosures: As a provider accredited by ACCME, Mayo Clinic College of Medicine (Mayo School of Continuous Professional Development) must ensure balance, independence, objectivity, and scientific rigor in its educational activities. Course Director(s), Planning Committee members, Faculty, and all others who are in a position to control the content of, this educational activity are required to disclose all relevant financial relationships with any commercial interest related to the subject matter of, the educational activity. Safeguards against commercial bias have been, put in place. Faculty also will disclose any off-label and/or investigational use of pharmaceuticals or instruments discussed in their presentation.

Disclosure of this information will be published in course materials so that those participants in the activity may formulate their own judgments regarding the presentation.

In their editorial and administrative roles, William L. Lanier Jr, MD, Terry L. Jopke, Kimberly D. Sankey, and Nicki M. Smith, MPA, have control of the content of this program but have no relevant financial relationship(s) with industry.

The authors report no competing interests.

Method of Participation: In order to claim credit, participants must complete the following:

1. Read the activity.
2. Complete the online CME Test and Evaluation. Participants must achieve a score of 80% on the CME Test. One retake is allowed.

Participants should locate the link to the activity desired at http://bit.ly/1kT99oR. On successful completion of the online test and evaluation, you can instantly download and print your certificate of credit.

Estimated Time: The estimated time to complete each article is approximately 1 hour. Hardware/Software: PC or MAC with Internet access.

Date of Release: 07/01/2014

Expiration Date: 06/30/2016 (Credit can no longer be offered after it has passed the expiration date.)

Privacy Policy: http://www.mayoclinic.org/global/privacy.html

Questions? Contact dletcsupport@mayo.edu.

Abstract

The unique needs of patients with Parkinson disease challenge staff when such patients are admitted to hospitals or nursing facilities. Prolongation of the hospital stay, falls with injuries, fainting, or declining motor function may result from therapeutic misadventures or failure to anticipate common problems. Staff familiarity with Parkinson disease, and especially carbidopa-levodopa dosing and dynamics, may prevent such problems and streamline hospital and nursing home care.

 ■ Mayo Clin Proc. 2014;89(7):997-1003

Parkinson disease (PD) is a common condition, estimated to affect about 1 million people in the United States. People with PD have unique problems and special medication needs. This can be a challenge to clinicians and nurses caring for them when they are hospitalized or admitted to a nursing facility. The consequences of therapeutic misadventures due to staff unfamiliarity with PD are potentially substantial. Prolongation of hospital stays due to PD-related problems is common but often avoidable. Patients with PD who are admitted to nursing facilities may experience major upheaval in their medication management. Fortunately, a little knowledge can be quite helpful, and that is the focus of this article, which is directed to doctors, mid-level health care professionals, and nurses.

From the Department of Neurology, Mayo Clinic, Rochester, MN.

BACKGROUND

Parkinson disease is a neurodegenerative disorder that notoriously causes slowness (bradykinesia), stiffness (rigidity), and a walking disorder typified by a stooped, shuffling gait with reduced arm swing; most, but not all, patients have a resting tremor. Unrecognized by many clinicians, however, are the nonmotor features of PD, which include anxiety, akathisia, depression,

dysautonomia, as well as insomnia and other sleep disorders, to name a few.

Neurodegenerative disease with loss of the brain neurotransmitter dopamine underlies many of the motor and nonmotor symptoms of PD. The recognition that replenishment of brain dopamine with levodopa alleviates many PD symptoms was a revolutionary discovery. Despite 4 decades since the discovery of levodopa therapy, it still remains the most efficacious treatment for PD (as carbidopa-levodopa).

With advancing PD, the Lewy body neurodegenerative process extends beyond dopaminergic systems, causing dysautonomia (eg, orthostatic hypotension), cognitive impairment, and motor symptoms refractory to carbidopa-levodopa and related medications. Nonetheless, carbidopa-levodopa remains the foundation of treatment throughout the lifetime of those with PD, necessary for optimal quality of life. Basic knowledge of levodopa dosing and dynamics is crucial when caring for patients with PD who are hospitalized or admitted to nursing facilities.

CARBIDOPA-LEVODOPA

Dopamine cannot cross the blood-brain barrier, whereas the amino acid precursor levodopa crosses via an amino acid transporter. When levodopa was initially introduced without carbidopa, nausea and vomiting were common adverse events, and extremely high levodopa doses were necessary. These problems were related to the conversion of levodopa to dopamine before entering the brain, ie, in the bloodstream. Prematurely converted dopamine in the circulation is excluded from the brain. However, it crosses in one limited region where the blood-brain barrier is patent: the brainstem nausea/vomiting center. The addition of carbidopa solved that problem. Carbidopa blocks the enzyme that converts levodopa to dopamine; it does this only outside the brain because it does not cross the blood-brain barrier. Carbidopa-levodopa remains the most efficacious drug for symptomatic PD treatment.

The antiparkinsonian effect from carbidopa-levodopa occurs in 2 patterns, termed the *long-duration response* and the *short-duration response*. The levodopa long-duration benefit builds up over about a week with stable dosing. This is typically the primary pattern during the first several years of PD. Patients treated with a stable carbidopa-levodopa dosing scheme can be early or late with their doses or occasionally even skip a dose without consequence. If the carbidopa-levodopa is stopped, the deterioration may be delayed for days up to a week.

After several years of PD, a second response pattern superimposes, the short-duration response. This presumably occurs because of the progressive loss of dopamine neurons, ie, the cumulative beneficial effect cannot be "stored," and the responses increasingly mirror the levodopa concentrations in the circulation. For example, those with a short-duration levodopa response may be unable to walk in the morning before taking their medications, only to note a normal gait an hour after carbidopa-levodopa administration. The short-duration effect typically spans 2 to 6 hours, with the response duration typically shortening over time. Higher levodopa doses do not substantially prolong the response. An appropriate treatment strategy for such short-duration responses is to identify the optimal dose (the individual dose producing the best effect 60-90 minutes later) and administer that dose at intervals matching the response duration. It is important to recognize that there is no arbitrary ceiling on the number of doses or tablets per day.[1,2]

Carbidopa-levodopa has few adverse effects, and they tend to reflect short-duration dynamics. Involuntary movements (chorea), known as dyskinesias, represent an excessive levodopa effect, typically appearing about an hour after a dose and lasting 2 to 4 hours. A sudden drop in the standing blood pressure (BP) may be provoked by individual doses of carbidopa-levodopa, with potential for syncope. Because of the short-duration levodopa dynamics, the BP may vary dramatically, depending on the time since the last carbidopa-levodopa dose. Nausea may be induced by levodopa, and like the other levodopa adverse effects, it tends to be time locked to the doses.

OTHER DRUGS FOR PD

Drugs for the treatment of PD are listed in Table 1; all work through dopamine mechanisms, except for the anticholinergic medications and amantadine. Although amantadine pharmacology was initially linked to dopamine, the primary activity is now recognized

Mayo Clin Proc. ■ July 2014;89(7):997-1003 ■ http://dx.doi.org/10.1016/j.mayocp.2014.02.018
www.mayoclinicproceedings.org