Clinical Recommendations for Hospital Care of People with Parkinson's

The following outlines best practices for care of people with PD in the hospital as recommended by the Parkinson's Foundation. These recommendations are based on research and the guidance of experts in both movement disorders and in hospital care.

The Parkinson's Foundation strongly recommends consultation with the Primary PD Care Provider (Movement Disorder Specialist, General Neurologist or Primary Care Physician) whenever possible when treating a patient with PD. Additionally, please be advised that people with PD and their care partners are the experts in their management of PD because it is such an individualized disease in terms of both symptoms and pharmacological treatment.

PD Medication Management/MODS

Do not substitute PD medications or stop levodopa therapy abruptly. Doing so may cause a life-threatening condition called neuroleptic malignant syndrome (NMS). Symptoms of NMS include rigidity, fever, tachycardia, tachypnea, labile blood pressures, and altered mental status.

The top priority should be to prevent medications from being **M**issed, **O**mitted, **D**elayed, or **S**ubstituted **(MODS)**

- **Missed:** Often when people with PD arrive at the hospital, sometimes for something unrelated to PD like a broken hip or a heart attack, their PD is not mentioned or listed in the Electronic Health Record (EHR) and those medications are missed entirely.
- **Omitted:** Many clinicians incorrectly assume that if someone is not supposed to receive anything by mouth (NPO) before a surgery that PD medications should also be omitted. This could be extremely dangerous. Even in cases of severe difficulty swallowing (dysphagia), medication should not be omitted and alternative sources of medications for PD should be found (see Dysphagia/NPO Protocol below for reference).
- **Delayed:** Medications must be distributed precisely at the home schedule. A one-hour window, while acceptable in most hospital situations, is not acceptable for PD medications. Additionally, the hospital standard distribution schedule (such as three times a day being given at 9:00 a.m., 3:00 p.m., and 9:00 p.m.) is not acceptable for PD patients given the short half lives in the body of many dopaminergic medications. Special attention must be paid to this issue when inputting medications for PD patients to ensure that system-based errors and/or delays do not occur.
- **Substituted:** Because there are so many PD medications, in many cases, the exact form is not available on formulary. Careful attention must be paid to any

medication substitutions and whenever possible substitutions should not be made. Immediate release and continuous should not be substituted without consultation of the patient's Primary PD Care Provider. Nor should name brand be substituted for generic without consultation. For example, Rytary should not be substituted in the same doses as carbidopa/levodopa as they are not equivalent.

In addition to the risk of NMS, consequences of MODS are significant, and place PD patients at risk for:

- **Falls:** Due to rigidity, postural instability, freezing, and bradykinesia
- **Aspiration pneumonia:** Due to dysphagia from impairment in the swallowing muscles
- **Incontinence:** Due to rigidity and bradykinesia which impairs mobility to the bathroom
- **Skin breakdown:** Due to the inability to change position freely
- **Emotional distress:** Due to feelings of helplessness, frustration, anxiety, fear, depression, embarrassment

To ensure that medications are distributed appropriately, medication reconciliation should be performed upon admission. Outreach to the Primary PD Care Provider should be done at this time and adherence to the home regimen should be followed when possible.

Special Considerations for Medications

Dietary Considerations

Gastrointestinal, digestion, and constipation issues are common in people with PD. For example, eating protein may impact medication absorption. Some people with PD find that timing meals an hour after their scheduled medication dose is most effective.

Providers should ask whether or not their patients with PD take medication for constipation at home and should continue with these medications whenever possible.

A nutrition consultation may be indicated to address these issues or concerns with swallowing capacity (along with a Speech Language Pathologist).

Dysphagia/NPO Protocol

If a patient is NPO or has dysphagia, continue PD medications with a small sip of water. If swallow function is severely impaired, consult with the Speech Language Pathologist and consider one of the following options as appropriate:

If any of these options are in the hospital formulary, consider their use:				
Medication (product brand name in parentheses)	Dosages in Milligrams (mg)	Typical Treatment Regimens	Common Side Effects	Indications for Usage
carbidopa/ levodopa orally disintegrating tablets (Parcopa)	10/100, 25/100, 25/250 tablet	150-1000 mg of levodopa total daily dose (divided 3-4 times)	Low blood pressure, nausea, confusion, dyskinesia	Monotherapy or combination therapy for slowness, stiffness, and tremor; need for dissolvable medication in mouth especially if swallowing is impaired
rotigotine transdermal patch (Neupro)	1, 2, 3, 4, 6, 8 patch	4-8 mg once/day	Low blood pressure, nausea, leg swelling and iscoloration, confusion, sleep attacks, compulsive behaviors like gambling, skin rashes	Monotherapy or combination therapy for slowness, stiffness and tremor; skin patch delivery an advantage for some

If the patient is already using any of the following rescue options, they can be considered for use:				
apomorphine subcutaneous injections (Apokyn)	30 mg/3 ml vial	0.2-0.6 ml up to 5 times a day as needed	Low blood pressure, nausea, leg swelling and discoloration, confusion, sleep attacks, compulsive behaviors like gambling; for nausea, may receive anti-nausea medication daily for 3 days before starting medication	Adjunct therapy as needed for "off" periods; the only injectable, fast-acting dopaminergic drug, starts working in 10 minutes and lasts for up to 90 minutes
levodopa inhalation (Inbrija) via inhaler	42 per capsule	84 mg (2 capsules) inhaled by mouth up to 5 times a day as needed	Low blood pressure, nausea, confusion, dyskinesia, cough	As needed for "off" periods; starts working in 10-30 minutes and lasts for up to 60 minutes; regularly scheduled oral carbidopa/ levodopa doses should be continued.
carbidopa/ levodopa enteral suspension (Duopa) via surgically implanted tube between the stomach and small intestine	4.86 mg/20 ml casette	Up to 2000 mg of levodopa over 16 hours	Low blood pressure, nausea, confusion, dyskinesia	For the treatment of motor fluctuations in patients with advanced PD

If swallowing is completely compromised and the above options are not available or appropriate, consider the use of Liquid Sinemet:

Formula for Liquid Sinemet

1 mg levodopa per 1 ml solution

- Sinemet 25/100 tablets 10 tablets (1000 mg levodopa) (do not use Sinemet CR)
- Ascorbic acid (Vitamin C) crystals ½ tsp. (approximately 2 grams)
- Tap water or distilled water 1 liter or 1 quart

1. Mix the above ingredients in a liter/quart plastic container with lid (do not use metal).
2. Rotate or shake gently until tablets dissolve (no need to crush tablets). Tablets may not go completely into solution.
3. Formula will maintain full strength and purity for 24 to 48 hours in refrigerator.

Optimal dosing can vary tremendously from one person to another.

Dosing Recommendations

(Always establish a dosing plan the Primary PD Care Provider whenever possible)

1. **Morning ("Jump Start") dose:**

- 60 ml of the formula (60 mg or a little more than ½ of a 25/100 tablet of carbidopa/levodopa) or may use amount comparable to usual tablet dose.
- Adjust dose 5-10 ml up or down every three to five days until you achieve the best "on" response with the least dyskinesia.

2. **Hourly dosing:**

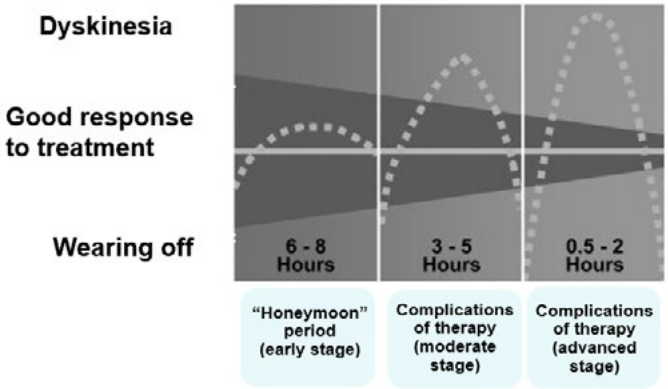
- 30 ml of the formula on the hour while awake, or hourly proportion of usual tablet dose. (For instance, a person with PD taking one carbidopa/levodopa 25/100 tablet every two hours might try 50 ml per hour of the liquid.)
- Adjust dose 5-10 ml up or down every three to five days until "on" periods are smoother.

For the best overall result, it is strongly recommended that you adjust the morning jump start dose prior to adjusting the hourly doses. Accuracy of the dose and exact hourly timing between doses is critical for optimal benefit.

If use of a nasogastric (NG) tube is indicated, carbidopa/levodopa (Sinemet) 25/100 mg immediate release tablets can be crushed and administered via the tube.

Motor Fluctuations and "On-Off" Time

It is normal for a person with mid-to late-stage PD to show a varying degree of symptoms throughout each day. Motor fluctuations, sometimes referred to as "on-off time," are due to the combined effect of disease progression and the shrinking therapeutic window of dopaminergic medications over time. During "on" time medications are working and the patient experiences reasonably good symptom control. During "off" time, medications are not working so well and symptoms of PD (primarily motor symptoms but not exclusively) become more noticeable.



As PD progresses, "on time" decreases and "off time" and troublesome dyskinesias (involuntary, erratic, writhing movements of the face, arms, legs, or trunk) increase. It is important for all care providers to understand this so that additional treatments are not given inappropriately due to what appears to be a sudden change in movement.

Rehabilitation therapies should be scheduled during "on time" to be effective and optimize the impact.

Psychosis, Hallucinations, and Delirium

Hallucinations and psychosis can be part of the typical progression of PD or can be a side effect of medications for PD.

Many people with PD can feel disoriented or confused in the hospital even when that is not normal for their condition. Infections can cause sudden changes in behavior and motor function. Monitor closely for urinary tract and lower respiratory infections such as pneumonia.

Confusion accompanied by psychosis sometimes requires a simpler medication regimen. Should delirium occur, avoid haloperidol (Haldol) and most other antipsychotics. Only pimavanserin (Nuplazid), quetiapine (Seroquel), and clozapine (Clozaril) are considered appropriate for treating psychosis associated with PD.

About 50-60% of people with PD have rapid eye movement sleep behavior disorder (RBD). Speaking during sleep or acting out dreams should not be confused with

hallucinations or psychosis. It is inappropriate to treat RBD with antipsychotics, and though it is sometimes treated with benzodiazepines this may not be appropriate for those prone to delirium.

Potentially Inappropriate Medications/ Contraindicated Medications

Dopamine-blocking medications, including most antipsychotics, could be added to the allergy list for patients with PD. This acts as an added check for the hospital pharmacist in case a different care provider such as someone on call overnight prescribes the medication inadvertently. Please refer to the following chart before prescribing dopamine-blocking medications (including those indicated for psychosis), pain medication, anesthesia, nausea/gastrointestinal (GI) drugs, or antidepressants to people with PD.

Medical Purpose	Potentially Safer Medications	Medications to Avoid
Antipsychotics	**pimavanserin** (Nuplazid, FDA approved to treat PD psychosis **quetiapine** (Seroquel) **clozapine** (Clozaril)	avoid all other typical and atypical antipsychotics
Pain Medication	most are safe to use but narcotic medications may cause confusion/ psychosis and constipation	if patient is taking MAO-B inhibitor such as selegiline or rasagiline (Azilect), avoid: **meperidine** (Demerol)
Anesthesia	request a consultation with the anesthesiologist, surgeon, and Primary PD Care Provider to determine best anesthesia given your PD symptoms and medications	if patient is taking MAO-B inhibitor such as selegiline or rasagiline (Azilect), avoid: **meperidine** (Demerol) **tramadol** (Rybix, Ryzolt, Ultram) **droperidol** (Inapsine) **methadone** (Dolophine, Methadose) **cyclobenzaprine** (Amrix, Fexmid, Flexeril) **halothane** (Fluothane)
Nausea/GI Drugs	**domperidone** (Motilium) **trimethobenzamide** (Tigan) **ondansetron** (Zofran) **dolasetron** (Anzemet) **granisetron** (Kytril)	**prochlorperazine** (Compazine) **metoclopramide** (Reglan) **promethazine** (Phenergan) **droperidol** (Inapsine) **chlorpromazine** (Thorazine)
Antidepressants	**fluoxetine** (Prozac) **sertraline** (Zoloft) **paroxetine** (Paxil) **citalopram** (Celexa) **escitalopram** (Lexapro) **venlafaxine** (Effexor)	**amoxapine** (Asendin)

Fall Risk and Early Mobilization

Mobilization

Most motor symptoms of PD will become more pronounced when movement is limited. Early mobilization should be established as part of a nurse-driven mobility protocol unless contraindicated.

Physical Therapy (PT) and Occupational Therapy (OT) consultations should be obtained for all PD patients in the hospital whenever possible.

Consideration should be made in regard to "on-off time" when scheduling rehabilitation therapy. Assessments should be performed during "on time" based on the known amount of each patient's time to respond to medications for PD.

Outpatient referrals to rehabilitation therapy should be provided at discharge if patients are not candidates for inpatient or skilled rehabilitation immediately following a hospital stay.

Fall risks

Many PD symptoms have the potential to increase fall risk. These include:

- **Festination**: Short, rapid steps taken during walking. May increase the risk of falling and is often seen in association with freezing (see below).
- **Freezing**: Gives the appearance of being stuck in place, especially when initiating a step, turning or navigating through doorways or other tight places.
- **Neurogenic Orthostatic Hypotension (nOH):** A persistent drop in blood pressure that occurs upon moving from a sitting position to standing, or from lying down to either sitting up or standing, is common in PD. It can be caused by a lack of the neurotransmitter norepinephrine due to PD progression or can be caused by certain medications, dehydration. Conditions such as diabetes, adrenal insufficiency, thyroid disease or various heart conditions can also increase this risk.
- **Postural Instability:** Difficulty maintaining and regaining balance
- **Rigidity**: Stiffness that can occur on one or both sides of the body and contribute to a decreased range of motion

Though counterintuitive, effective rehabilitation therapies can decrease fall risk despite these symptoms as physical inactivity often makes these symptoms more severe.

Summary

We believe that outcomes for hospitalized PD patients can improve when these recommendations involving medication management (timing, drug-drug interactions, and contraindications), reducing fall risk, and facilitating early mobilization are

adhered to closely. The overall goal is to increase awareness in a way that could decrease the chances of complications and help avoid prolonged hospital stays. We urge all providers to review the Aware in Care® content at **Parkinson.org/AwareinCare** including the additional information available about Deep Brain Stimulators, the delivery of carbidopa/levodopa enteral suspension via a Duopa pump, and other special considerations.

Should any questions arise as you implement these recommendations, you are encouraged to reach out to the Parkinson's Foundation Helpline at 1-800-4PD-INFO.