Parkinson’s disease (PD) is the second most common neurodegenerative disease, next to Alzheimer’s disease. As these patients advance through their disease, they are hospitalized more frequently than their age-matched controls and tend to stay longer than those without PD. By far, motor symptoms such as wearing off, dyskinesias, or falls related to freezing or postural instability tend to be the most common cause of hospitalization. However, this patient population also may have non-motor symptoms that could complicate their hospitalization, including cognitive disturbances such as delirium or psychosis, infections such as aspiration pneumonia from dysphagia, or side effects to anti-parkinsonian medications such as intractable nausea or vomiting. Below are special considerations for managing this complex patient population.

How should I deal with anti-parkinsonian medication for the hospitalized patient?

In the outpatient setting, the patient and neurologist work closely to fine tune the timing and dosing of dopaminergic medications to avoid wearing off and other motor complications. As such, timing is everything. While hospitalized, it is best (if possible) for patients to bring their own medications from home, as sometimes hospitals may not carry certain formulations of these medications (i.e. controlled release formulations of carbidopa/levodopa or medications such as entacapone). Substitutions should generally be avoided.

Because the timing is so important, broad time frames should be avoided and actual times used instead. For example, delays from pharmacy or nursing staff can lead to erratic times in a TID order rather than 8 a.m., noon, and 4 p.m. schedule. Remember that dopaminergic medications should not be abruptly discontinued, as this can increase the risk of developing neuroleptic malignant syndrome (NMS), which is characterized by rigidity, high fever, delirium, autonomic instability, and rhabdomyolysis.

Are there any medications to avoid or limit in patients with PD?

In general, anti-dopaminergic medications should be avoided in patients with PD as these can often lead to worsening in motor and non-motor symptoms. These medications are often used in patients with hospital-acquired delirium or with antiemetics for post-operative nausea.

When treating psychosis in a patient with PD, quetiapine or clozapine is preferred as they have less extrapyramidal side effects in general. For nausea, ondansetron or trimethobenzamide are good alternatives since they have no anti-dopaminergic properties. Domperidone is another option that is effective for nausea but is not currently available in the US. Benzodiazepines may also be used but place the patient at increased risk for poor balance, confusion, and falls.

Lastly, additional medications that could worsen cognition, such as narcotics, hypnotics for sleep, and anticholinergics should be used with caution as these patients are often vulnerable to delirium, which some studies indicate increases the risk of death compared with controls.

How do I manage psychosis in the PD patient?

Psychosis may occur in up to 40 percent of patients with PD. This is usually manifested by visual hallucinations or delusions. Psychosis is especially increased in the hospital setting due to sleep/wake cycle disturbances, the administration of medications predisposing to altered sensorium,
and coexisting delirium. Additionally, medications used to treat PD can also predispose patients to psychosis. If a patient’s psychosis seems to fit temporally with the addition of a new anti-parkinsonian medication, then medications should be discontinued in the following order: anticholinergic agents (i.e. trihexyphenidyl), amantadine, dopamine agonists, COMT inhibitors, MAO-B inhibitors, and finally, levodopa. If patients cannot tolerate the weaning of these medications due to worsening motor function, consider a trial of quetiapine or clozapine. Quetiapine usually is started at a dose of 12.5mg–25mg as needed and increased from there. Clozapine is also an atypical antipsychotic that can reduce psychotic symptoms without worsening motor symptoms when used at doses 6.25-50mg/d. However, there is an up to 1.5 percent cumulative one-year risk of agranulocytosis with clozapine, which should be monitored by frequent complete blood counts.

What are the considerations for PD patients needing elective surgery or anesthesia?

Some studies suggest that elective general and orthopedic procedures in those with PD have longer hospital stays, higher in-hospital mortality, and increased post-operative complications, such as bacterial infections when compared to those without PD. However, we as neurologists should recommend early mobilization, physical therapy, and monitoring of post-operative complications in an effort to optimize surgical outcomes.

Prior to surgery, patients should be proactive in discussing PD medications with the surgeon and counseled that PD patients have longer recovery times and an increased risk of delirium post-operatively. Regarding anesthesia, regional anesthesia is preferred over general anesthesia as it avoids, in most cases, the risk of pneumonia after intubation, nausea, sedation, and confusion. If general anesthesia cannot be avoided, special care must be taken in post-operative order sets for nausea as some medications such as metoclopramide and prochlorperazine have anti-dopaminergic properties. Ondansetron, trimethobenzamide, and granisetron are a few options for nausea in the PD patient.

Most PD medications should be continued just prior to the surgery start time and restarted immediately following the surgery in order to reduce worsening of motor function. However, rasagline is typically stopped two weeks prior to surgery to avoid interactions with anesthesia. If the patient cannot take PO, medications should be given through nasogastric tubes if possible. If this is not an option, there is one dopamine agonist available in a patch form (rotigotine) or apomorphine, which is available by injection. These two medications may be more convenient to administer, but do not serve as direct substitutions for the patient’s oral regimens. It is important to note there is not a direct conversion between the agonists.

Are patients with PD at increased risk of infections while hospitalized?

Infections such as aspiration pneumonia and urinary tract infections are common reasons for hospitalization in those with PD. In addition, the risk of infection is increased in those hospitalized with PD due to poor motor function. Because patients with PD can have dysphagia as a complication from their disease or difficulty managing increased secretions due to bradykinesia in the throat musculature, these patients are at risk of aspiration pneumonia. In this case, speech and language pathology services should be provided and patients instructed on conservative measures for swallowing such as the chin-tucking maneuver or modification of meal consistency. If assessed by speech pathologists, assessments should be immediately after administration of anti-parkinsonian medications.

This patient population is also at risk for developing urinary tract infections. These infections, as in the case of other neurological conditions such as stroke, myasthenia gravis, and multiple sclerosis, can cause worsening of motor function. Patients may not be symptomatic from their infection and may not complain of dysuria, hesitancy, or frequency. Therefore, a high index of suspicion and low threshold should be considered for ordering a urinalysis. As with other hospital patients, Foley catheters should be avoided if possible and intermittent straight catheterization performed if the patient is unable to void on his own.

How do I approach a fall in those with PD?

The majority of falls in those with PD occur when walking, stopping, turning, standing up, or bending down. This is often attributed to postural instability and the loss of righting reflexes but can also be contributed by motor fluctuations such as freezing or wearing off. Up to 40 percent of patients with postural instability have multiple falls that cause injuries including wrist and hip fractures. If they are admitted for a fall, the etiology should be determined. Often times, falls are attributed to lack of using an assistance device such as a cane or walker.

If motor fluctuations are the cause of the fall, the usual approach is to increase the levodopa dose if no dyskinesias are present or to increase the frequency if dyskinesias are present. Other alternatives are to add a dopamine agonist or controlled release formulation of levodopa. However, dopamine agonists and similar medications can potentially worsen orthostatic hypotension. A physical therapy consult for gait and balance training should be obtained to promote postural stability and prevent falls. A home safety evaluation should also be considered.
Lastly, the clinician should continue to prevent infections and minimize delirium that would predispose the patient to increased falls while hospitalized.

How do I manage orthostatic hypotension in those with PD or other parkinson-plus syndromes?

Orthostatic hypotension (OH) is defined as a drop in blood pressure by 20 mmHg from a lying to standing position at three minutes or an increase in pulse by 10 beats per minute after three minutes of standing. In patients with PD, OH is a common non-motor feature thought to be due to a loss of post-synaptic noradrenergic neurons which leads to impaired sympathetic input to the cardiovascular system. In general, the blood pressure will drop or pulse raise prior to three minutes when dehydration plays a role.

If not dehydrated with other clinical signs, other causes of OH should be considered including cardiac causes (TTE, tilt table, or telemetry) or other medication causes such as diuretics. In this special population, OH can be attributed to antiparkinsonian medications, especially dopamine agonists, usually in a dose dependent manner. In this case, gradual weaning of these medications or reducing them to a lower dose may help alleviate OH. Once the above measures are done, one can recommend nonpharmacological treatments of OH including avoidance of sudden standing, increasing intraabdominal pressure prior to standing, thigh-high compression stockings, and increasing salt intake with salt tablets (usually >8 grams daily.) Otherwise, pharmacological agents such as midodrine 2.5-10 mg TID, fludrocortisone 0.1-0.3mg daily, or even Droxidopa, a newly FDA approved medication for neurogenic OH.

Are there any special considerations in those with deep brain stimulators implanted?

Deep brain stimulation (DBS) in patients with PD is an accepted treatment that has proven efficacy, safety, and sustainability. However, there are a few specific considerations when treating these patients.

In general, imaging such as x-rays, CT’s, and ultrasounds can be performed on these patients but MRIs require special attention. MR imaging other than brain imaging is contraindicated due to risk of diathermy. However, Medtronic Inc. has provided good safety data in performing MR imaging of the brain using specific settings. In order to perform MR Brain imaging, the MRI should be a 1.5-Tesla MR machine with a receive-only head coil. Also, the head SAR value should not exceed 0.1 W/kg and the gradient switching (dB/dt) should be limited to ≤ 20T/sec. These are details that can be worked out through the radiology department and MRI technicians. Older devices such as Kineta or Soletra devices should be programmed to 0 volts and turned off prior to the MRI and reset to the original settings after the study. Newer devices such as the Activa PC, Activa RC, and Activa SC do not need to be set to 0 volts prior to the study but do need to be turned off prior to the study and on after the study. With the newer devices, the patient can turn the device off and on with their handheld patient controller.

Other considerations in patients with DBS include turning the device off prior to EEGs or EKGs as it can often cause artifact during the study. Also, when having elective surgery, bipolar electrocautery is recommended with the ground plate kept as far away from the DBS system as possible.

Consider All Options

The above points are meant to serve as a general guide to managing or consulting on PD patients in the hospital setting. However, as a general rule of thumb, have a low threshold for contacting the patient’s primary neurologist or movement disorder subspecialist.

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