

# Clinical Guideline

## ***Guideline for the Management of Adults with Parkinson's disease Undergoing Surgery***

### Summary

This guideline aims to provide healthcare professionals with advice on how to manage adult inpatients with Parkinson's disease undergoing elective or emergency surgery in an acute hospital setting. Parkinson's disease is a multisystem disorder with patients frequently having complex, time crucial medication regimes. Surgery adds to the burden of these complexities and so a co-ordinated approach to care is essential. The guidelines are based around the entire peri-operative period and aim to address common concerns at each stage of surgery. Close working with the Parkinson's Specialist Team is advocated.

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<b>Contents</b>	<b>Page</b>
<b>1. Introduction</b>	<b>2</b>
<b>2. Background</b>	<b>2</b>
<b>3. Aims</b>	<b>2</b>
<b>4. Scope</b>	
4.1 Guideline Purpose	<b>2</b>
<b>5. Pre-operative Management</b>	<b>3</b>
5.1 Elective (planned) surgery	<b>3</b>
5.1.1 Pre-operative Assessment Clinics	<b>3</b>
5.1.2 Pre-operative Assessment of PD patients	<b>3</b>
5.1.3 Essential requirements at pre-operative pre-assessment	<b>3</b>
5.1.4 Potential considerations at pre-assessment	<b>5</b>
5.2 Non-elective (unplanned) surgery	<b>6</b>
<b>6. Peri-operative Management</b>	<b>6</b>
6.1. PD related medication and treatment considerations	<b>6</b>
6.2 Swallowing, medication absorption and nil-by-mouth issues	<b>7</b>
6.3 Alternative administration routes for PD medication	<b>7</b>
6.4 Other PD Specialist Treatments	<b>8</b>
6.4.1 Deep Brain Stimulator (DBS)	<b>8</b>
6.4.2 Duodopa® intestinal gel	<b>8</b>
6.5 Anaesthetic considerations	<b>8</b>
6.5.1 Induction. Regional and General Anaesthesia	<b>8</b>
6.5.2 Medications used in the peri-operative period	<b>9</b>
6.5.3 Other PD considerations in the intra-operative period	<b>10</b>
6.6. Surgical considerations	<b>10</b>
<b>7. Post-operative Management</b>	<b>11</b>
7.1 Medication considerations	<b>11</b>
7.2 Medical considerations	<b>12</b>
<b>8. The Specialist Parkinson’s Team and Other Useful Contacts</b>	<b>15</b>
<b>9. Terminology</b>	<b>16</b>
<b>10. PD Medications Glossary</b>	<b>17</b>
<b>11. Useful Related Documents</b>	<b>18</b>
<b>12. References</b>	<b>19</b>

## 1. Introduction

Parkinson's disease (PD) is a complex neurodegenerative disease which is becoming more prevalent. It is a multi-system disorder associated with significant morbidity and can be challenging to manage. In addition to the well-recognised motor symptoms patients experience a burden of non-motor complications including mood and psychiatric symptoms, dementia, pain and autonomic disturbance e.g. bladder and blood pressure problems.

## 2. Background

**2.1** The number of older adults undergoing surgical procedures is also rising not only due to rising numbers of older people but also advances in anaesthetic and surgical techniques.

**2.2** The patient with PD undergoing surgery poses some unique challenges from medical, surgical and anaesthetic perspectives. They are considered higher risk surgical candidates due to the PD itself and the higher incidence of swallowing problems and consequences of delayed time critical Parkinson's medications (e.g. during perioperative starvation).

**2.3** Recent publications have highlighted issues around the management of PD in hospital, including surgery, in which there is increased morbidity, mortality and length of stay.<sup>1,2,3</sup>

**2.4** The National Patient Safety Agency (NPSA) highlights PD inpatients as a group likely to experience more harm related to medication errors<sup>4</sup>.

**2.5** Therefore there is need for comprehensive guidelines for the optimal management of patients with PD undergoing surgery.

## 3. Aim

**3.1** This guideline aims to provide healthcare professionals with advice on how to manage adult inpatients with Parkinson's disease undergoing elective or emergency surgery in an acute hospital setting.

**3.2** The guideline addresses the recommendations of NPSA Patient Safety Alert - Reducing harm from omitted and delayed medicines in hospital 2010<sup>4</sup>.

## 4. Scope

**4.1** These guidelines are aimed at medical, nursing, anaesthetic and surgical staff involved in managing patients with PD before, during, and after their operation. The purpose of these guidelines is to enable those who care for PD patients to optimise the preoperative medical care, anticipate the peri-operative anaesthetic and medication issues, and describe the common postoperative problems.

**NOTE: You are not expected to manage Parkinson's disease on your own. The PD specialist team should be contacted at the earliest opportunity for advice.**

This guideline complements the 'Guideline for the Management of adults with Parkinson's disease acutely admitted to hospital' ([GSTT Guideline for the Management of Adults with Parkinson's disease acutely admitted to hospital](#)).

## 5.0 Pre-operative management

See Figure 1 Page 4 for 'The surgical patient with Parkinson's disease operative summary'.

Some key points include:

**It is important to consider early referral** to the team especially if there is:

- Prolonged surgery >6 hours
- Complex medication regimen
- Frequent/severe on-off motor symptoms
- Surgery that will affect swallow or absorption of medications (e.g. head and neck or gastrointestinal surgery).

In the event of unplanned / emergency surgery prescribe medications and ensure given

**Do not stop PD medication suddenly.**

**It is safe to continue small sips of clear oral fluids up to 2 hours before elective surgery, so oral PD medications should be continued until anaesthetic induction.** <sup>1,6</sup>

### 5.1 Elective (planned) Surgery

This section is aimed at all patients with an established diagnosis of PD undergoing elective (planned) surgery.

#### 5.1.1 Pre-operative Assessment Clinics

- Patients should be reviewed pre-operatively as part of existing surgical pre-assessment clinics. Standard pathways should be followed.
- **Consider referral of those aged 65 and over to the Proactive Care for Older People Undergoing Surgery (POPS) clinic** based at the Older Person's Assessment Unit (OPAU) in Guy's Hospital. A comprehensive geriatric assessment (CGA) is performed pre-operatively to ensure older patients are optimised before surgery. Patients can be referred using the Electronic Patient Record (EPR) system by typing 'POPS' into the order set.

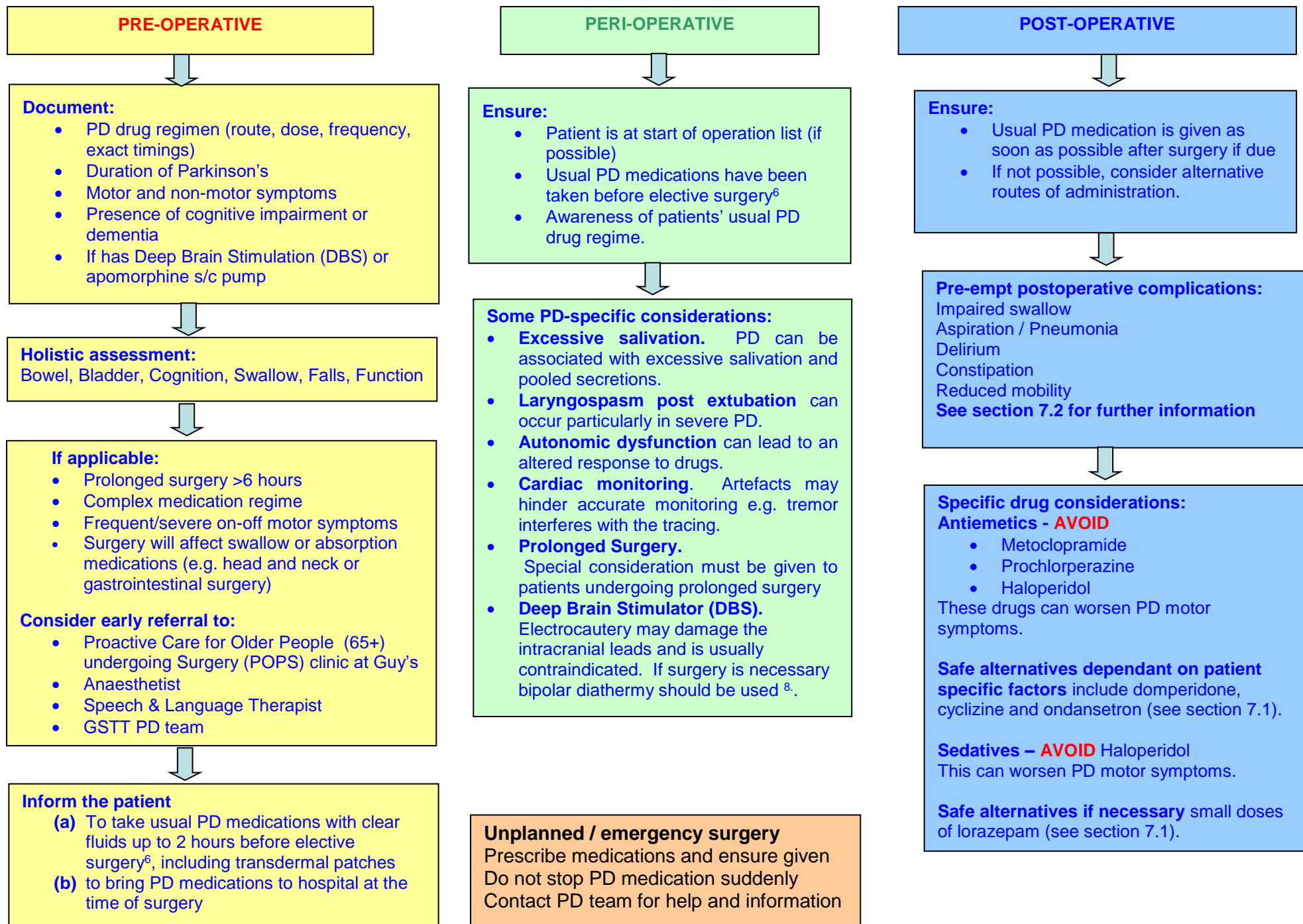
#### 5.1.2 Pre-operative Assessment of PD patients

PD patients vary dramatically depending on their disease stage, age, non-motor complications and co-morbidities. The clinician must therefore decide on the detail of the pre-assessment on a case by case basis. Nevertheless, certain elements should be carried out for all patients (see Figure 1).

#### 5.1.3 Essential requirements at pre-operative pre-assessment

- Clear documentation of ALL medication, specifically PD medications
- This includes essential supportive medication (e.g. laxatives, rivastigmine)
  - route (oral, transdermal, subcutaneous)
  - dosage
  - **EXACT times doses are taken by the patient.**
- Clear plan documented concerning PD medication timings and dosing during the peri-operative period. Patients who are fasted pre-operatively, who require prolonged surgery, or who will be unable to swallow tablets post-operatively must have a clear medication plan. **Early referral to the PD Specialist Team must be sought** (see Section 8).
- Inform patient that PD medications must be brought into hospital at the time of surgery.

**Figure 1. The surgical patient with Parkinson's disease: pre, peri and post-operative considerations**



### 5.1.4 Potential considerations at pre-assessment

	Action to consider	Contacts to consider
<b>Cognitive assessment</b>	<p>Patients may have existing Parkinson's Disease Dementia (PDD). Consider a screening tool such as the Clock Drawing Test (CDT). If abnormal proceed to the Montreal Cognitive Assessment (MoCA) tool.</p>	<p>If cognitive deficits are identified consider:</p> <ul style="list-style-type: none"> <li>○ Refer to PD specialist teams.</li> <li>○ Delirium risk assessment and counselling.</li> <li>○ Assessment of capacity to consent to surgery – Refer to <a href="#">GSTT Mental Capacity Assessment Tool</a></li> </ul> <p>Prescription of cholinesterase inhibitors (<b>on specialist advice only</b>).</p>
<b>Bowel assessment</b>	<p>If constipation is present ensure adequate fluid intake and consider the use of Macrogol.</p>	<p>Continence Nurse Specialist St. Thomas' Hospital Bleep: 2799</p>
<b>Bladder assessment</b>	<p>Urine dipstick should be performed Mid-Stream Urine (MSU) sent if appropriate. Measure post-void residual volume (PVRV). If symptoms of Overactive Bladder (OAB) consider treatment.</p>	<p>Continence Nurse Specialist St. Thomas' Hospital Bleep: 2799</p>
<b>Swallowing assessment</b>	<p>Suspect if history of drooling, pneumonia, choking/coughing after eating/drinking Highlight the increased risk of aspiration pneumonia during the peri-operative period.</p>	<p>If swallowing is a major concern consider referral to Speech and Language Therapist (SLT) and the PD Specialist Team (see section 8).</p>
<b>Falls assessment</b>	<p>Ensure baseline Electrocardiogram (ECG), lying and standing blood pressures (orthostatic hypotension is a common problem). Consider gait assessment and medication review. Highlight falls risk.</p>	<p>Refer to <a href="#">GSTT Falls guidelines</a></p>
<b>Functional assessment</b>	<p>Numerous measurement scales exist e.g. Barthel or Nottingham Extended Activities of Daily Living.</p>	<p>If deficits found, consider early referral to occupational therapist or social services if appropriate. Consider whether patient will need ongoing rehabilitation postoperatively e.g. intermediate care.</p>
<b>Clinical examination</b>	<p>Particular focus should be given to</p> <ul style="list-style-type: none"> <li>- cardiovascular examination</li> <li>- assessment of gait</li> <li>- neck movements</li> <li>- note any troublesome tremor, dyskinesias or dystonias</li> </ul>	<p>Anaesthetist (severe tremor or dyskinesias may interfere with regional anaesthesia)</p>

## 5.2 Non-Elective (unplanned) Surgery

This section is aimed at all patients with an established diagnosis of PD undergoing non-elective (unplanned) surgery.

By definition, this group usually require emergency surgery. There may well be limited time to ensure pre-operative optimisation.

In this case it is advisable to:

- Contact the PD specialist team as early as possible (**see Section 8**).
- If emergency PD advice is needed out of normal working hours contact the on call Medical Registrar (StR) bleep 0154
- Follow peri-operative guidance (see section 6)
- If PD medication adjustment is needed contact the ward pharmacist during working hours (09.00-17.30). Out of hours (17:30-09:00) the on call pharmacist should be contacted (bleep 0462 St Thomas' site, bleep 1347 guy's site)

## 6. Peri-operative Management

### 6.1. PD related medication and treatment considerations

Medicines management in PD can be complicated and confusing. Dopaminergic therapy is the mainstay of drug treatment in PD. There are several different classes of PD medications with various routes of administration including oral, transdermal and subcutaneous. In addition, medication can be either immediate or controlled release and not all oral preparations are suitable for enteral use.

Surgical and Anaesthetic teams should not be expected to manage these complexities alone but rather seek advice and a clear plan from the **PD Specialist Team** or the on-call services (see Section 8). Ideally, a clear plan for PD medication should be in place after the pre-assessment process but in the case of non-elective (unplanned) surgery this is often not possible (see Section 5. Pre-operative Management).

The consequences of missing a PD medication dose vary enormously from patient to patient and the disease severity. Some patients have very little ill effects whilst others become very immobile which can be disastrous in the intra-operative and post-operative period. Missing a dose in more advanced disease can lead to a **neuroleptic malignant like syndrome (NMLS)** (also known as Parkinsonism Hyperpyrexia syndrome) characterised by fever, confusion, raised muscle enzymes and ultimately death.<sup>5,19</sup>

Another less acute syndrome provoked by a reduction or omission of dopamine agonist medications is known as **dopamine agonist withdrawal syndrome (DAWS)**. Characterised by craving, anhedonia, apathy, depression, anxiety, and other non-motor symptoms and worsening of Parkinson's motor symptoms

**If NMLS or DAWS is suspected PD medications should be started as a matter of urgency and senior staff contacted as a medical emergency to discuss its management:**

- Medical StR available 24 hours bleep 1504.
- Neurology StR via switchboard 9-6pm weekdays, 11am-6pm weekends.

***PD medications should therefore never be stopped suddenly.*** All medication queries should be discussed with the PD Specialist Team or relevant on call services.

## 6.2 Swallowing, medication absorption and nil-by-mouth issues

**It is safe to continue small sips of clear oral fluids up to 2 hours before elective surgery<sup>6</sup>. It is routine practise to continue oral medications until anaesthetic induction and this should be encouraged in patients with Parkinson's patient<sup>1</sup>.**

- Special consideration must be given to PD patients who are:
  - Nil-by-mouth for a prolonged period of time (and hence unable to take oral medication).
  - Undergoing prolonged surgery (usually greater than three hours) who may require intra-operative PD medicines.
  - Undergoing surgery that will affect their ability to swallow medication (e.g. head and neck surgery).
  - Undergoing surgery that will affect absorption of PD medications (e.g. upper gastrointestinal surgery or an expected post-operative ileus).
  - See **Figure 2 page 15** for further advice.
- If a patient is unable to take oral PD medicines (as above), expert help should be sought to devise an alternative route of administration. Alternative routes include transdermal, subcutaneous and direct gastric administration i.e. via a nasogastric tube if appropriate.
- Always contact the PD Specialist Team or relevant on call person(s) to discuss alternate routes of administration or medication dosing (**see Section 8**).
- Once the patient can swallow their PD medication they can go back to their usual PD drug regime. Contact PD Specialist Team for advice.

## 6.3 Alternative administration routes for PD medication

- **Always** contact the PD Specialist Team or relevant on call person(s) to discuss any queries or alternate routes of administration (see Section 8).
- **The Enteral Route.** If patients are unable to swallow but small bowel absorption is intact, PD medicines can be administered via a nasogastric (NG) or nasojejunal tube (NJ). Of note:
  - Controlled release (CR) preparations should not be given by this route. These should be converted to standard release preparations before administration
  - Certain tablets or capsules should not be crushed as it affects the bioavailability of the drug (e.g. Stalevo, Sinemet CR and Ropinirole).
  - Dispersible Levodopa (Madopar) can be used if immediate absorption is required.
- **The Transdermal Route.** The rotigotine patch is a dopamine agonist applied to the skin for a 24 hour period. In an open label study 14 patients were switched to rotigotine from their usual treatment the day before they underwent surgery. This was well tolerated by patients; only one had a side effect of nausea. It is easy to use and well tolerated but may not be potent enough for some patients especially those on higher drug doses <sup>7</sup>.
  - The rotigotine patch can be used at an equivalent levodopa dose instead of oral medications when the patient's swallow is impaired or the enteral route is not appropriate.
  - Dose conversions must be discussed with the PD Specialist Team or on-call pharmacist.
- **The Subcutaneous Route.** Apomorphine is a potent dopamine agonist which is delivered by intermittent injections or a continuous infusion pump. It is vital that this



medication is continued during admission and that the pump remains functional at all times. **DO NOT CHANGE THE PUMP SETTINGS UNLESS ASKED TO DO SO BY SPECIALIST PARKINSON'S TEAM.**

- Inform the PD team of any patient admitted on apomorphine
- For more infusion lines or information regarding the APO-Go pump function out of hours contact the APO-GO Helpline 0844 880 1327

## 6.4 Other PD Specialist Treatments

**6.4.1 Deep Brain Stimulator (DBS).** This is a treatment for advanced PD where electrodes are placed into the brain from a pacemaker which is usually sited subcutaneously below the clavicle. **The presence of a DBS must be recorded in the notes.**

- Diathermy (generation of heat within body tissue from a high frequency electromagnetic current) may damage the intracranial leads and is usually contraindicated.
- If surgery is necessary bipolar electrocautery (generation of heat within a metal wire electrode by passing current through) should be used with minimum power settings.
- The DBS may need to be switched off during anaesthesia to minimise electromagnetic interference, and turned on before reversal of anaesthesia and emergence. Seek advice from PD specialist or neurosurgeon<sup>8</sup>.
- MRI imaging is contraindicated with DBS.
- It is essential that the specialist clinician or neurosurgeon who manages the patient's DBS is contacted before surgery or soon as possible in emergency surgery

**6.4.2 Duodopa® intestinal gel.** This is used for the treatment of advanced PD with severe motor fluctuations. A continuous infusion of levodopa (Duodopa®) is inserted directly into the upper jejunum via a percutaneous endoscopic jejunostomy (PEJ). Bolus doses can also be given via the PEJ.

- **Inform the Parkinson's Specialist Team or the named centre where the device was fitted for specialist advice**
- Ideally the infusion should continue during surgery. If this is not possible (type of surgery) **specialist advice must be sought** to determine an alternate treatment option
- For information regarding the Duodopa® pump function out of hours contact the Duodopa helpline on 08004584410

## 6.5. Anaesthetic considerations

### 6.5.1 Induction. Regional and General Anaesthesia

Anaesthetic choice will be influenced by several factors relating to the individual patient and surgical factors (see table 1).

Table 1

The advantages and disadvantages of regional and general anaesthesia in PD patients. (adapted from <sup>1,9,10</sup> ).		
Anaesthesia	Advantages	Disadvantages
Regional (RA) (i.e.spinal, epidural)	Remains conscious therefore can restart PD medication soon after procedure (provided gastrointestinal tract is functional)  Can monitor PD symptoms  May preserve peristalsis better than GA	Technical difficulty (for surgeon and anaesthetist) due to tremor and rigidity  May hinder monitoring  Patient with cognitive impairment may not be able to cooperate
General (GA)	Removes tremor/dyskinesias which may impede surgery and monitoring *  May be safer in severe PD with swallowing dysfunction to protect the airway	Several GA drugs can worsen PD  May worsen already compromised cough, swallow, respiratory function  Nausea and vomiting  Increased risk of delirium

\* Some motor symptoms in PD such as tremor or dyskinesia are severe and GA is preferred

### 6.5.2 Medications used in the peri-operative period

There is no one anaesthetic regime for all PD patients. Most evidence is from small case series with the absence of large randomised control trials. Choice should be based on each individual case by the anaesthetist responsible for the patient. Listed below are *some* medicines used in the peri-operative period with associated cautions where necessary.

#### Anaesthetic drugs:

<b>Propofol.</b>	Commonly used to induce anaesthesia. Propofol has also been reported to cause dyskinesias in some case reports <sup>11</sup> . However, this was in the context of conscious sedation and not induction. Propofol has the advantage of suppressing tremor and has an antiemetic effect.
<b>Halothane</b>	Sensitises the heart to catecholamines precipitating arrhythmias and should be <b>avoided</b> in patients who are on Levodopa.
<b>Opioids:</b>	
- Fentanyl	There are reports of fentanyl causing muscle rigidity in PD patients.
- Morphine	At low doses morphine has been shown to reduce dyskinesias but at higher doses dyskinesias can increase.
<b>Pethidine</b>	Interacts with selegiline and rasagiline to cause delirium, agitation, muscle rigidity, hyperreflexia and autonomic instability (serotonin syndrome) <sup>18</sup> .
<b>Ketamine</b>	There is a theoretical exaggerated sympathetic response. However, not born out in clinical practice and still used.

## Antiemetics

If an intraoperative antiemetic is required, dopamine antagonists such as **metoclopramide, prochlorperazine or haloperidol should be AVOIDED<sup>16</sup>**. These drugs can worsen PD motor symptoms (extrapyramidal effects).

<b>Domperidone</b> (Dopamine antagonist)	Does not cross the blood brain barrier Precautions- consider if patient has cardiac risk factors and potential interactions with other medications. Maximum dosage 10mg three times a day for shortest duration maximum of one week <sup>16</sup>
<b>Ondansetron</b> (5-hydroxytryptamine-3 antagonist)	Can also be used safely. Precautions- consider if patient has cardiac risk factors and potential interactions with other medications. Maximum dosage 4mg three times a day for shortest duration <sup>16</sup>
<b>Cyclizine</b>	Can be used safely with monoamine oxidase-B inhibitors e.g. rasagaline or Selegiline but may result in increased sedation. Maximum dosage 50mg three times a day

### 6.5.3 Other PD considerations in the intra-operative period

- **Excessive salivation.** PD can be associated with excessive salivation and pooled secretions. This is usually due to reduced frequency of swallow rather than overproduction of saliva. Anticholinergics such as glycopyrrolate can be used to increase saliva viscosity although this can worsen swallow and precipitate confusion.
- **Laryngospasm post extubation** can occur particularly in severe PD. This is often associated with an excess of thick saliva.
- **Autonomic dysfunction** can lead to an altered response to drugs. Post-operative care in a high dependency or intensive care setting may be indicated if respiratory compromise is present. Anticipate worsening respiratory function if adequate PD control cannot be achieved.
- **Cardiac monitoring.** Artefacts may hinder accurate monitoring e.g. tremor interferes with the tracing.

### 6.6 Surgical considerations

- **Prolonged Surgery.** Special consideration must be given to patients undergoing prolonged surgery (greater than 6 hours). Patients may require intra-operative PD medication. Early referral to the PD Specialist Team (see Section 8 should be sought as alternative routes for PD medication administration may be required (see Section 6.4).
- **Involuntary muscle movements and surgery.** Abnormal muscle movements are common in PD and include the classic PD tremor as well as troublesome dyskinesias. Dyskinesias can be severe and occur during the peak dose or wearing off period of PD medications. If local anaesthesia is used these movements may persist and cause difficulties for the surgeon. Choice of anaesthesia is important in these circumstances (see Section 6.5).

- **Deep Brain Stimulator (DBS).** See Section 6.4 for guidance and contraindications including diathermy<sup>8</sup>.

## 7. Post-operative Management

There is overlap between this section and Section 5 (peri-operative period) but both should be read.

### 7.1. Medication Considerations

- Ensure there is no delay in giving PD medication when due after surgery. Alternative routes of administration may need to be considered in the initial post-operative period depending on the surgery. Refer to Section 6.3 for guidance.
- Contact the PD Specialist Team for PD medication concerns (see Section 8).
- It is good medical practice to ensure a clear plan is in place for PD medication in the post-operative period. This should have been achieved at the pre-operative stage if possible (see Section 5)
- **Non-PD Medicines (supportive medication)**

	<b>Do NOT give</b>	<b>CAN give</b>
<b>Antiemetic (anti-nausea)</b>	<ul style="list-style-type: none"> <li>• <b>Metoclopramide,</b></li> <li>• <b>Prochlorperazine or</b></li> <li>• <b>Haloperidol</b></li> </ul> <p>These drugs can worsen PD motor symptoms.</p>	<p><b>Domperidone (Oral)</b> Precautions- consider if patient has cardiac risk factors and potential interactions with other medications. Maximum dosage 10mg three times a day for shortest duration not greater than one week<sup>16</sup></p> <p><b>Ondansetron (Oral, IV, IM)</b> Precautions- consider if patient has cardiac risk factors and potential interactions with other medications. Maximum dosage 4mg three times a day for shortest duration<sup>16</sup></p> <p><b>Cyclizine (Oral, IV, IM) 50mg TDS</b> Cyclizine may be given with PD MAOB inhibitors (Rasagiline® or Selegiline) but can result in increased sedation.</p>
<b>Sedatives</b>	<b>Haloperidol</b> for acute delirium or psychosis	<b>Lorazepam</b> should be used if necessary 0.5mg – 1mg oral/ IM 1-2 hourly maximum 4mg daily

## 7.2. Medical Considerations

### • Delirium

Delirium or acute confusional state is common in the post-operative period and increases with age. Parkinson's patients may have pre-existing cognitive impairment, dementia, hallucinations, depression or anxiety, thus increasing the risk of post-operative delirium. Please ensure:

- GSTT Delirium Guidelines are followed ([Trust Delirium Guideline](#)) Early involvement of the PD Specialist Team, POPS Team, or the Delirium and Dementia (DaD) Team (See Section 8)
- Common deliriogenic drug culprits should be avoided if possible in the preoperative period including steroids, benzodiazepines, anticholinergics and opiates
- If pharmacological management is required then **AVOID haloperidol** (this worsens PD symptoms). Use lorazepam 0.5mg – 1mg oral/ IM 1-2 hourly maximum 4mg daily

### • Pain control

Use the same management approach for patients with PD as for other surgical patients. Particular considerations in PD include:

- Pain related to 'off' symptoms. Pain occurs when the PD medication wears off or there is a missed dose. This can be associated with abnormal muscle contractions (dystonias) which may be visible e.g. torticollis or foot inversion. Ensure PD medications are **given on time**<sup>12</sup> and seek specialist advice for on-going problems (see Section 8). The Trust has developed a generic 'Time Critical' medication magnet alert for the patient ward boards and laminated posters for use above the patient bed (available from pharmacy or the Parkinson's nurse specialist) for use with all-time critical medications<sup>17</sup>
- Opioids may be necessary but should be used with caution due to risk of constipation and delirium. Smaller, frequent doses should be used.
- Tramadol increases the risk of serotonin syndrome in patients taking MAO-B inhibitors (selegiline and rasagiline) and should be avoided in these patients<sup>18</sup>.
- Paracetamol is safe to use
- Non-steroidal analgesics (NSAIDs) do not worsen PD symptoms but should be used with caution in the older adult due to cardiovascular, gastrointestinal and renal side effects
- Some PD patients **may not** be able to operate patient controlled analgesia devices (PCA) or communicate their needs for effective pain control

### • Bowel care

Patients with PD are at high risk of constipation due to reduced mobility, reduced fluid intake, and the disease process itself which slows colonic transit time. Constipation can lead to impaired PD medication absorption which can worsen PD motor symptoms. Please ensure:

- Stool chart is kept up to date
- Early patient mobilisation by all healthcare staff
- Patients are kept well hydrated.
- Minimal use (where possible) of constipating agents such as opiates
- Early use of laxatives such as macrogol (e.g. Laxido @1-3 sachets per day) which has an evidence base in PD<sup>13</sup>.

### • Bladder care

Patients with PD may have symptoms of urge incontinence from an overactive bladder. Good clinical practice includes:

- Early removal of the urinary catheter post-operatively to prevent a catheter associated urinary tract infection (CAUTI) which can worsen overactive bladder symptoms ( [Trust Guideline for Urinary Catheterisation in Adults](#) ).
- Regular toileting (where possible) for those with urge symptoms
- Ensuring PD medication is given on time.
- Prompt treatment of established urinary tract infections (UTIs).

- **Nausea and vomiting**

Patients with PD can be more prone to vomiting with problems such as gastroparesis, medication side effects or as a result of constipation. Please refer to guidance in Section 7.1 on use of appropriate antiemetics.

- **Pneumonia / chest infection / aspiration**

Patients with PD may have abnormal pulmonary function secondary to rigidity, akinesia, and poor swallow. These factors can lead to an increased risk of atelectasis, lower respiratory tract secretions and infection. Pneumonia is a leading cause of death in patients with PD. It is good practice to:

- Ensure the patient is positioned in the upright position (as much as possible).
- Ensure the patient is mobilised early in the post-operative period.
- Consider pneumonia as a cause for an acute deterioration in a PD patient.
- Seek urgent specialist help if a PD patient is made nil-by-mouth (NBM) or is unable to swallow PD medications because of pneumonia (See Section 8). **Never** make a PD patient NBM without ensuring that an alternate route of administration is found for PD medications (see Section 6.2).

- **Swallowing**

PD patients may already have impaired swallow which may deteriorate or develop new problems as a result of inter-current illness.

Enteral (gastrointestinal tract) absorption may be impaired due to: constipation, vomiting, ileus or recent bowel surgery.

Levodopa can be administered via nasogastric or nasojejunal tube and is rapidly absorbed from the proximal bowel.

When absorption is impaired, transdermal route of medication may be appropriate (See Figure 2 page 15).

- **Reduced mobility and falls risk**

There is an increased risk of falls post operatively in patients with PD. Good clinical practice includes:

- Adequate hydration (to prevent unnecessary hypotension).
- Avoiding hypotensive agents.
- Early physiotherapy input and early post-operative mobilisation
- Giving PD medications on time
- Consideration of bone protection in those who are falling ([GSTT Falls guideline](#))

- **Uncontrolled dyskinesia**

*Dyskinesia* is the term for involuntary, uncontrollable twisting movements, it does not refer to tremor, this is different.

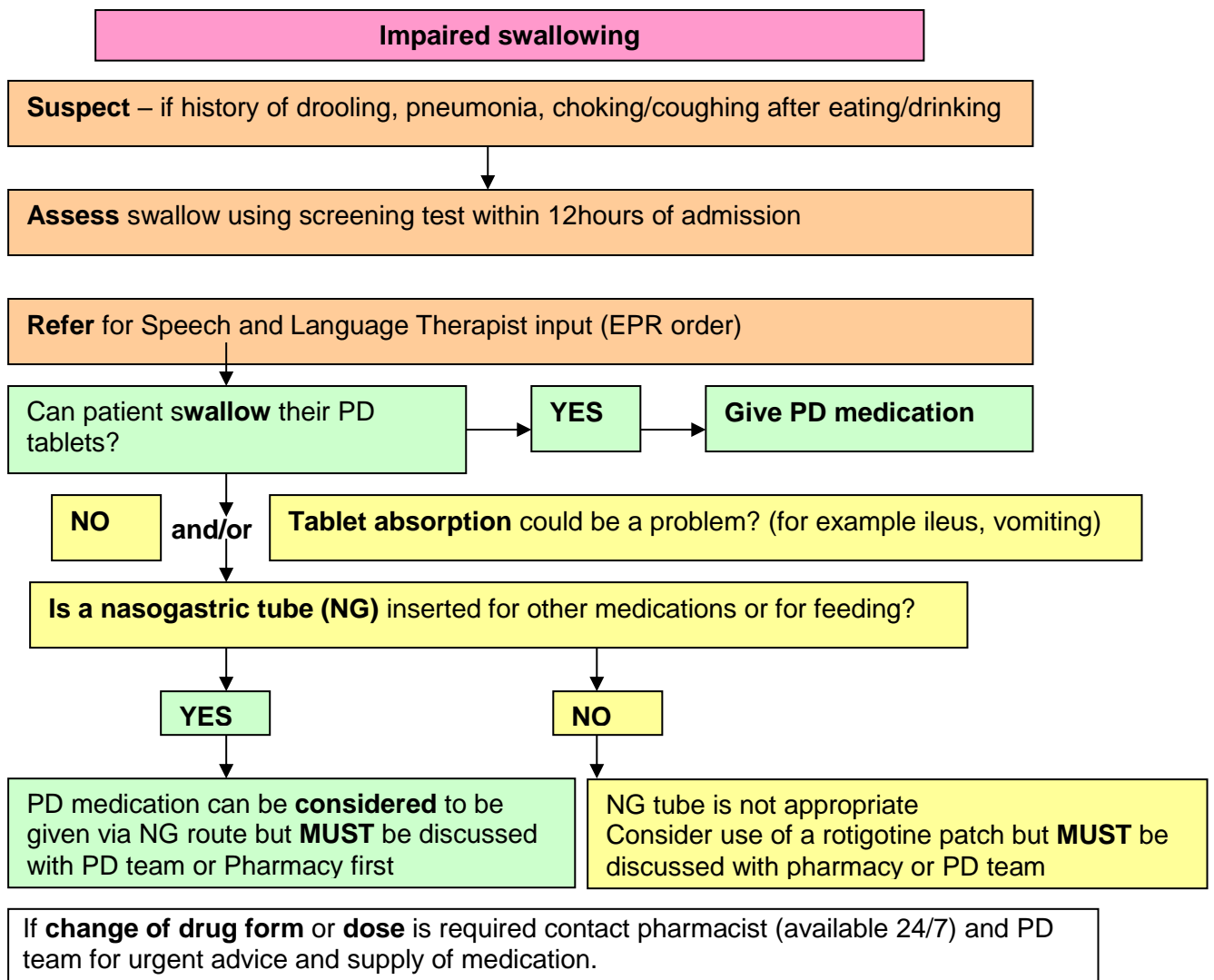
Dyskinesias are related to long term, high doses of levodopa. They usually occur after a tablet has been taken has reached its peak level in the brain. More complex patients may also get a post dose dyskinesia. Dyskinesias can be exhausting. **If a patient usually has a dyskinesia, when they anxious, unwell or in an unfamiliar or unwanted environment (such as hospital) their dyskinesia can become more pronounced.** Keeping the patient as stress free as possible and giving medication at the right dose at the right time will help. **Specialist advice on the management of dyskinesia needs to be sought from the Parkinson's team.** Keeping a dyskinesia diary will help the team assess the situation.

• **Rehabilitation**

Rehabilitation in PD patients may take longer due a variety of reasons including post-operative delirium, medication adjustments, and disease related gait and balance problems.<sup>14</sup> Good practice should therefore include:

- Early referral to physiotherapy services
- Early referral to occupation therapy services
- The potential use of additional discharge services such as the Enhanced Rapid Response (ERR) team, the Supportive Discharge Team (SDT), HomeWard, and intermediate care services.
- Close liaison with the POPS team (for older patients with PD)

**Figure 2. Summary of managing impaired swallow in patient with PD**



**DO NOT DELAY OR OMIT A PD MEDICATION**

Monday to Friday 9am to 5.30pm: bleep ward pharmacist.

**Out of hours:** On call pharmacist bleep 0462 St Thomas' site, 1347 guy's site

**Never leave a PD inpatient without any form of dopaminergic medication**

## 8. The Specialist Parkinson's Team and Other Useful Contacts

### The Specialist Parkinson's Team

The team consists of a neurologist, geriatricians and a PD nurse specialist. They are experts in the care of patients with PD and should be contacted for PD related concerns, particularly medication issues. The team includes:

Dr Peter Diem (Consultant Geriatrician)  
[Peter.diem@gstt.nhs.uk](mailto:Peter.diem@gstt.nhs.uk) Contact via switchboard

Dr Thomasin Andrews (Consultant Neurologist)  
[Thomasin.andrews@gstt.nhs.uk](mailto:Thomasin.andrews@gstt.nhs.uk)

Stella Gay (PD nurse specialist)  
[Stella.gay@gstt.nhs.uk](mailto:Stella.gay@gstt.nhs.uk) Contact via switchboard or extension 85832

- **Proactive Care for Older People Undergoing Surgery (POPS) Team**

This is a multidisciplinary team responsible for the pre-assessment and inpatient medical care of older people undergoing surgery. The team is lead by a Consultant Geriatrician. They have expertise in perioperative medical care. Although they may not be Parkinson's specialists they will be able to offer medical advice and seek expert help when needed.

To refer for a POPS pre-assessment outpatient clinic please type 'POPS' into the EPR orderset and follow the on-screen instructions. To contact a member of the inpatient POPS team (Specialist Nurse or Doctor) please use the bleep system. Relevant numbers can be obtained via the hospital bleep operator.

- **The Delirium and Dementia (DaD) Team**

A team designed to assist inpatient medical and surgical teams with the management of inpatients with delirium and dementia. The team is led by a Consultant Geriatrician. Although they may not be Parkinson's specialists they will be able to offer medical advice and seek expert help when needed.

An Electronic Patient Record (EPR) referral should be completed to the DaD team (type in 'Delirium' or 'Dementia' in the orders section) if management of delirium or dementia in a PD patient is problematic.

- **Parkinson's UK**

A very useful information and support for patients and doctors  
Helpline 0808 800 0303 Opening times: Mon-Fri: 9am-7pm, Sat: 10am-2pm  
Email: [hello@parkinsons.org.uk](mailto:hello@parkinsons.org.uk) Website: [www.parkinsons.org.uk](http://www.parkinsons.org.uk)

- **Medic Alert**

A bracelet/pendant can state which PD medications they are on – MedicAlert House 327-329 Wian Court, Upper Fourth street, Milton Keynes MK9 1EH . Telephone: 01908 951045 Email: [info@medicalert.org.uk](mailto:info@medicalert.org.uk) website: [www.medicalert.org.uk](http://www.medicalert.org.uk)

### On call contacts

Parkinson's disease nurse specialist (Stella Gay) Works Monday – Thursday	Extension 85832 Mobile via switchboard
Neurology StR on call Works 9am-6pm weekdays, 11am-6pm weekends	Bleep 0355
Medical StR on call 24 hours	Bleep 0154



Elderly Care Unit (ECU) StR on call 09:00-20:00 Mon-Fri 12:00-18:00 Sat and Sun	Bleep 2631
Pharmacist on call 17:30-09:00 Mon-Fri 17:00-09:00 Sat and Sun	Bleep 0462 St Thomas' site Bleep 1347 Guy's site

## 9. Terminology

**Atelectasis** is defined as collapse or deflation of lung alveoli resulting in reduced gas exchange. A common cause is post-surgical atelectasis, especially with restricted breathing (major abdominal surgery), smokers or older patients

**Deep Brain Stimulator (DBS).** A surgical procedure used to treat severe tremor or dyskinesia. Metal electrodes are placed in a particular part of the brain (the basal ganglia) and controlled by a separate pacemaker box. Patients with a DBS will be under a specialist neurosurgical centre.

**Dopamine.** The neurotransmitter in the brain that is deficient in patients with PD. Most PD medication aims to provide additional dopamine or prolong its action in the brain.

**Dopaminergic.** Relating to dopamine e.g. dopaminergic medications are medicines that contain or prolong the neurotransmitter dopamine.

**Dyskinesia.** Abnormal involuntary muscle movements that are similar to chorea or tics. They can be very pronounced and involve upper and lower limbs. They can be disturbing to watch.

**Dystonia.** An abnormal involuntary muscle contraction that can be present in patients with PD. Common examples include torticollis (abnormal posturing of the neck muscles) or inversion of the foot. PD medications can help

**Motor symptoms** of PD include resting tremor, rigidity, bradykinesia and postural instability.

**Nil-By-Mouth (NBM).** A medical term used for patients who are not allowed to eat or drink or take oral medications. This is usually common before a medical or surgical procedure and operations involving the gastrointestinal tract.

**Non-motor symptoms** of PD. These do not involve movement, coordination or mobility. There are many non-motor symptoms including autonomic (postural hypotension, constipation, overactive bladder). Neuro-psychiatric (dementia, depression, anxiety, hallucination) and sensory disturbance (pain).

**Overactive bladder.** Is a syndrome characterised by urgent and frequent urination that can be debilitating and lead to urinary incontinence. The syndrome is associated with PD as well as other medical conditions and certain drugs such as diuretics and caffeine.

**PEJ (percutaneous endoscopic jejunostomy)** is a procedure where a tube is passed endoscopically into the jejunum to provide a means of feeding or medication delivery when oral intake is not possible

## 10. PD Medication / treatment Glossary

### Levodopa Products

Generic	Brand	Formulation	Strength	Additional information
Co-careldopa	Sinemet®	Tablet (Immediate Release)	Sinemet® 12.5mg/50mg or '62.5' Sinemet® 10mg/100mg Sinemet® Plus 25mg/100mg or '125' Sinemet® 25mg/250mg	25/100 or '125' describes 25mg of carbidopa and 100mg of levodopa.
Co-careldopa	Sinemet®	Tablet (Controlled Release)	Half Sinemet CR (25mg/100mg) Sinemet CR (50mg/200mg)	Controlled release preparations have CR after the drug name.
Co-beneldopa	Madopar®	Capsule (Immediate Release)	Madopar® -62.5mg Madopar® -125mg Madopar® -250mg	12.5mg/50mg or 62.5 describes 12.5mg of benzeraside and 50mg levodopa.
Co-beneldopa	Madopar®	Capsule (Controlled Release)	Madopar® CR (25mg/100mg)	Controlled release preparations have CR after the drug name.
Co-beneldopa	Madopar®	Dispersible Tablets	Madopar® 12.5mg/50mg Madopar® 25mg/100mg	The dispersible tablet has a much shorter half-life.
Co-careldopa	Duodopa®	Gel infusion		co-careldopa in gel form delivered into the jejunum via PEJ tube.
Entacapone and co-careldopa	Stalevo®	Tablets	Stalevo® 50mg/ 12.5mg/200mg	Describes Levodopa 50mg/ Carbidopa 12.5mg/ Entacapone 200mg The entacapone (COMT inhibitor) limits levodopa breakdown.

### Other drug groups

Generic	Brand	Drug group	Formulation	Maximum daily dosage	Additional information
Rotigotine	Neupro®	Dopamine agonist	Patch	16mg/24hours	Apply patch to dry, non-irritated skin on torso, thigh, or upper arm, removing after 24 hours and siting replacement patch on a different area (avoid using the same area for 14 days)
Ropinirole	Requip®	Dopamine agonist	Immediate release (IR) and Controlled Release (XL)	TDS for IR OD for XL Maximum 24mg/24hours	
Pramipexole	Mirapexin®	Dopamine agonist	Immediate release (IR) and Controlled Release (PR)	TDS for IR  OD for PR Maximum 4.5mg/24hours (Salt)	Complicated dosing – this drug can be described as either base or salt and the doses are not equivalent.
Entacapone	Comtess®	COMT inhibitor	Tablets	200mg with each dose of Levodopa with dopa decarboxylase inhibitor maximum 2g/24 hours	
Rivastigmine	Exelon®	Acetylcholinesterase inhibitor	Capsules or Patch	Orally max 6mg BD Topically 9.5mg/24 hours	used in Parkinson's disease dementia not be confused with rotigotine
Apomorphine	APO-go®	Potent dopamine agonist	Subcutaneous injection or continuous subcutaneous infusion	Maximum total daily dose = 100mg	administered subcutaneously either by a continuous infusion pump or one off injections as required

### 11. Useful related documents

- [GSTT Guideline for the Management of Adults with Parkinson's disease acutely admitted to hospital](#)
- [GSTT Falls guideline](#)
- [GSTT Guideline for Urinary Catheterisation in Adults](#)
- [GSTT Delirium guideline](#)
- [GSTT Code of Practice for Administration of medicines](#)
- [GSTT Protocol for Self/Carer administration of medicines](#)

- [GSTT Mental Capacity Assessment Tool](#)
- [Conversion and monitoring of medicines for patients with PD Guideline](#)
- [NICE clinical guideline Parkinson's disease in Adults \(NG71\) 2017](#)
- [SIGN Diagnosis and pharmacological management of Parkinson's disease \(2010\)](#)

## 12 References

1. Brennan KA, Genever RW (2010) Managing Parkinson's disease during surgery. *British Medical Journal*. (341): 990-993
2. Gerlach OH et al (2011) Clinical problems in the hospitalized Parkinson's disease patient: systematic review. *Movement Disorders* (26): 197-208
3. Pepper PV & Goldstein MK (1999) Postoperative complications in Parkinson's disease *Journal of American Geriatrics Society*. 47:967-72
4. National Patient Safety Agency (NPSA). Rapid response report PSA/2010/RRR009: *Reducing harm from omitted and delayed medicines in hospital*. February 2010. Available at: <http://www.npc.nhs.uk/rapidreview/?p=1359> Accessed 17<sup>th</sup> January 2019
5. Ueda M, Hamamoto M, Nagayama H, Otsubo K, Nito C, Miyazaki T, et al (1999) Susceptibility to neuroleptic malignant syndrome in Parkinson's disease. *Neurology*.; 52 : 777-81.
6. Brady M et al (2009) Preoperative fasting for adults to prevent preoperative complications. Cochrane Database Syst review. 7:C005285
7. Wullner U et al. Transdermal rotigotine for the perioperative management of Parkinson's disease 2010 *J Neurol Transn* 117:855-9
8. Yeoh, T. Y., Manninen, P., Kalia, S. K., & Venkatraghavan, L. (2016). Anesthesia considerations for patients with an implanted deep brain stimulator undergoing surgery: a review and update. *Canadian Journal of Anesthesia/Journal Canadien D'anesthésie*, 64(3), 308–319
9. Errington DR et al (2002) Parkinson's disease. *British Journal of Anaesthesia* CEPD Reviews. 2:3,69-73
10. Nicholson G, Pereira AC and Hall GM (2002) Parkinson's disease and Anaesthesia. *British Journal of Anaesthesia* (2002) 89 (6):904-916
11. Krauss JK et al. (1996) Propofol induced dyskinesias in Parkinson's disease. *Anesthesia and Analgesia* 83:420-2
12. Parkinson's UK. 'Get it on time' campaign [internet]. London: Parkinson's UK Available from: <http://www.parkinsons.org.uk/content/get-it-time-campaign> Accessed 15th January 2019
13. Coggrave M and Norton C. (2013) Management of faecal incontinence in adults with central neurological diseases. Cochrane Database Systematic Reviews (2013) Issue 12. Art. No.: CD002115. DOI: 10.1002/14651858 CD002115.pub4

14. .Mueller MC et al. (2009) Parkinson's disease influences the perioperative risk profile in surgery. *Langenbecks Archives of Surgery*. 394(3):511-515
15. lindahl AJ & MacMahon DG (2011) Managing dopamine agonist withdrawal syndrome in Parkinson's disease. *Progress in Neurology & Psychiatry*. 15:4
- 16 Medicines and Healthcare Products Regulatory Agency (MHRA) *Domperidone: small risk of serious ventricular arrhythmia and sudden cardiac death*. Available at: <http://www.mhra.gov.uk/Safetyinformation/DrugSafetyUpdate/CON152725>. Accessed 23 May 2014
17. GSTT Omission of Drugs Committee 2014
18. Roberts, D. P., & Lewis, S. J. G. (2018). Considerations for general anaesthesia in Parkinson's disease. *Journal of Clinical Neuroscience*, 48, 34–41
19. Urasaki E & Fukudome T et al (2013). Neuroleptic malignant syndrome (parkinsonism–hyperpyrexia syndrome) after deep brain stimulation of the subthalamic nucleus. *Journal of Clinical Neuroscience*, 20(5):740-741. [doi.org/10.1016/j.jocn.2012.04.024](https://doi.org/10.1016/j.jocn.2012.04.024)