**Parkinson’s disease**
Welcome to the latest Future Pharmacist: PDS Clinic. Future Pharmacist: PDS Clinic will cover a different area that will help you build on the knowledge that you have already gained from your undergraduate course. In this clinic, we are focussing on Parkinson’s Disease. After downloading the PDF and reading through the material, take time to reflect on what you’ve learnt and write a PDS entry to earn a point.

**Learning objectives**
In this CPD clinic we will look at how we as pharmacy professionals can best support patients with Parkinson’s disease. To do this we will focus on:
- effects of motor and non-motor Parkinson’s symptoms on patients
- treatment options available for people with Parkinson’s, potential side-effects and interactions with these medicines
- supporting people with Parkinson’s to get the best from their medicines
- signposting people living with Parkinson’s and their carers to useful sources of advice.

We will mirror the Parkinson’s UK approach by referring to this condition as Parkinson’s.

**Using a focal point programme**
CPPE developed focal point to deliver short, clinically focused learning sessions. The first step is to read the information in Book 1 and identify your own learning needs. Then you complete case studies and communication exercises called clinical vignettes in Book 2.

In this article we will be using extracts from Book 1 of the CPPE focal point programme *Parkinson’s disease*. This is available to download as a PDF from the BPSA website at: [http://www.bpsa.co.uk/cppe](http://www.bpsa.co.uk/cppe)

**About Parkinson’s**

Parkinson’s is currently the second most common neurodegenerative condition in the UK, with approximately 127,000 people currently living with the condition. The risk of developing Parkinson’s rises with age and there is a higher incidence and prevalence in men compared with women.

Parkinson’s is a progressive neurological condition and symptoms deteriorate over time at varying rates. There are both motor and non-motor symptoms which may fluctuate as frequently as on an hourly or daily basis. Symptoms vary between individuals and it can be difficult to predict how quickly they will advance.

Non-motor symptoms often cause patients more distress than the motor symptoms of Parkinson’s. The addition of medicines to treat these non-motor symptoms can make a patient’s regimen even more complex and lead to polypharmacy issues. Care is required to avoid interactions and side-effects.
Table 1 Motor and non-motor symptoms of Parkinson’s

<table>
<thead>
<tr>
<th>Motor symptoms</th>
<th>Non-motor symptoms</th>
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<tbody>
<tr>
<td>Bradykinesia (slowness of movement)</td>
<td>Anxiety</td>
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<tr>
<td>Resting tremor, usually unilateral at start</td>
<td>Depression</td>
</tr>
<tr>
<td>Rigidity</td>
<td>Impulsive and compulsive behaviour (also known as impulse control disorder)</td>
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<tr>
<td>Postural instability</td>
<td>Bladder disturbances</td>
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<tr>
<td></td>
<td>Constipation</td>
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<td></td>
<td>Postural hypotension</td>
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<td></td>
<td>Sleep disturbances</td>
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<td></td>
<td>Hallucinations/vivid dreams</td>
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<td></td>
<td>Excessive daytime sleepiness</td>
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<td></td>
<td>Changes in speech</td>
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<td></td>
<td>Delayed gastric emptying</td>
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<td></td>
<td>Pain</td>
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</tbody>
</table>

The symptoms of Parkinson’s result from loss of dopaminergic neurons in the substantia nigra pars compacta which innervate the striatum. Dopamine and acetylcholine are the neurotransmitters involved in controlling normal voluntary movement. The overall effect of dopamine depletion leads to the main motor symptoms seen in Parkinson’s.

**Diagnosis**

There is no definitive test for the diagnosis of Parkinson’s, so a diagnosis is usually based on a history and examination. It is important that treatment is not commenced until the patient is seen by a specialist and the diagnosis is confirmed.

**Management**

Management plans for the treatment of Parkinson’s symptoms are patient-specific. The main goal of treatment is to maintain the patient’s functional ability, but there must also be a balance between adequate treatment and minimisation of medication side-effects.

Medicines regimens and timings may change depending on the progression of the condition, patient’s lifestyle or appearance of side-effects. Most Parkinson’s medicines act on the motor symptoms by making more dopamine available or by stimulating postsynaptic receptors normally activated by dopamine (dopaminergic). Antimuscarinics act by reducing cholinergic excess that occurs due to dopamine deficiency.

Medicines include:
- Levodopa
- Catechol-O-methyltransferase (COMT) inhibitors
- Dopamine agonists
- Monoamine oxidase-B (MAO-B) inhibitors
- Amantadine
- Antimuscarinics
- Apomorphine
- Duodopa®

**Levodopa**

Levodopa is the gold standard of Parkinson’s treatment. It is the amino-acid precursor of dopamine and acts by replenishing depleted striatal dopamine. It is given with an extracerebral dopa-decarboxylase inhibitor, ie, benserazide in co-beneldopa and carbidopa in co-careldopa. The dopa-decarboxylase inhibitor reduces the peripheral conversion of levodopa to dopamine, therefore limiting side-effects and ensuring effective brain dopamine concentrations are achieved with lower doses of levodopa. There are two available oral levodopa preparations:

- co-beneldopa (Madopar® and generic versions)
- co-careldopa (Sinemet® and generic versions).

Levodopa is typically taken three times daily at the start of treatment, but may be taken more frequently as the condition advances. Modified-release preparations of levodopa are also available. These are usually taken by patients just before going to bed to control nocturnal immobility and rigidity.

Common side-effects of levodopa preparations are:

- nausea and vomiting (likely to be worse when starting treatment)
- postural hypotension
- drowsiness
- dizziness
- confusion
- hallucinations.

Long-term use of levodopa can result in motor complications, such as response fluctuations (on/off phenomena, end-of-dose deterioration) and dyskinesia.

**Catechol-O-methyltransferase (COMT) inhibitors**

There are two available COMT inhibitors:

- entacapone
- tolcapone.

COMT inhibitors prevent the peripheral breakdown of levodopa, therefore allowing more levodopa to reach the brain. They should only be used in combination with co-beneldopa or co-careldopa and are used as an adjunct for patients experiencing end-of-dose deteriorations with levodopa.
COMT inhibitors have the same side-effects as levodopa as they act by making more levodopa available. In addition, entacapone colours urine reddish brown and products containing iron should not be taken at the same time of day as they affect absorption. Tolcapone can cause potentially life-threatening hepatotoxicity and should only be used under specialist supervision. Patients must have regular liver function tests whilst prescribed tolcapone and must be advised to report any symptoms of liver toxicity, eg, nausea, fatigue, lethargy, anorexia, jaundice, dark urine, pruritus or right upper quadrant tenderness.

**Dopamine agonists**

There are three non-ergot dopamine agonists regularly used in practice:

- pramipexole (Mirapexin® and generic)
- ropinirole (Requip® and generic)
- rotigotine (Neupro®).

Dopamine agonists act directly on postsynaptic dopamine receptors in the striatum without the need to be converted to dopamine. They are used alone in early Parkinson’s or with levodopa in advanced disease.

Dopamine agonists have the same side-effects as levodopa, but they are often more severe as the medicines are more potent, acting directly at dopamine receptors. Patients should be started at low doses with slow up-titration.

Dopamine agonists are associated with more psychiatric side-effects than levodopa. They can cause confusion and hallucinations but also impulsive and compulsive behaviour, such as pathological gambling, binge eating and hypersexuality. Patients and their carers should be advised about the risk of impulsive and compulsive behaviour when starting a dopamine agonist. If it is suspected that a patient has developed impulsive and compulsive behaviour, they should be advised not to stop their medicine suddenly and be referred back to their Parkinson’s specialist as the medicine needs to be withdrawn slowly or the dose reduced until symptoms resolve.

Dopamine agonists can cause sudden onset of sleep or excessive daytime sleepiness. Patients should be warned of this side-effect, particularly if they drive or operate machinery. Hypotensive reactions can also occur with dopamine agonists, particularly in the first few days of treatment.

**Monoamine oxidase B (MAO-B) inhibitors**

There are two MAO-B inhibitors available:

- rasagiline (Azilect®)
- selegiline (Eldepryl®, generic and Zelapar®).

MAO-B inhibitors are used alone (usually in early Parkinson’s) or as an adjunct to levodopa to decrease end-of-dose deterioration as the condition progresses. They
work by inhibiting MAO-B which decreases the breakdown of dopamine, so more is left in the synaptic cleft.

Selegiline is metabolised to amphetamine derivatives and can have an alerting effect, eg, insomnia, nightmares and vivid dreams, especially at night. It is therefore recommended to be taken once daily in the morning.

MAO-B inhibitors have many interactions with antidepressants and other medicines, including over-the-counter (OTC) remedies (see Appendix 1 of current BNF and individual summaries of product characteristics).

It is important to remember that MAO-B inhibitors used at licensed doses in Parkinson’s are selective for the MAO-B enzyme and hence are not subject to any dietary restrictions. At higher doses these medicines become nonselective and, like MAO-A inhibitors, can cause hypertensive crisis through the tyramine reaction if certain foods are ingested.

**Amantadine (Symmetrel®)**

Amantadine is an antiviral medicine with modest antiparkinsonian effects. Its mechanism of action is uncertain and it is mainly used to decrease dyskinesia in people with advanced Parkinson’s. It can also be prescribed to help combat fatigue due to its weak stimulant effect. Amantadine is usually taken twice daily and can cause side-effects of confusion and hallucinations. Because it can also cause insomnia, the second dose should be taken several hours before retiring to bed.

**Antimuscarinics**

The antimuscarinics orphenadrine, procyclidine and trihexyphenidyl (benzhexol) are generally not used for idiopathic Parkinson’s as they are not as effective as dopaminergic medicines and can cause confusion and cognitive impairment. They may however be useful in younger people with tremor dominant Parkinson’s but careful monitoring is required.

**Specialist treatments**

For more information about other treatments for Parkinson’s go to the CPPE Parkinson’s disease focal point programme on the BPSA website.

**Diet and Parkinson’s medicines**

Timing of Parkinson’s medicines in relation to food depends on the stage of the disease and individual choice. Protein competes with levodopa (an amino acid) for absorption. When patients are starting a new dopaminergic medicine, they may take it with food to minimise gastrointestinal disturbance. With more advanced Parkinson’s, patients may take medicines before food to maximise response. Some specialist teams advise all new patients to take levodopa at least 30 minutes before food and only to take it with food if severe, persistent nausea develops.
Medicines to avoid in Parkinson’s

Generally, medicines that block dopamine receptors should be avoided in Parkinson’s. The antiemetics metoclopramide and prochlorperazine should be avoided. The antiemetic of choice in Parkinson’s is domperidone; however the MHRA advice on risk of cardiac side-effects must be recognised. Cyclizine or a 5-HT3 antagonist such as ondansetron would be alternative antiemetic options if domperidone were unsuitable.

First-generation antipsychotics, eg, haloperidol, should be avoided. However, some patients may be prescribed second-generation atypical antipsychotics, eg, quetiapine, for behavioural and psychological symptoms of dementia in later Parkinson’s. These should always be recommended or initiated by a Parkinson’s specialist.

Patients should also take care with sedating medicines, eg, OTC chlorphenamine, or cough and cold remedies, as their effect may be cumulative with sedating side-effects of Parkinson’s medicines. Antimuscarinic medicines, eg, oxybutynin, may increase confusion.

Cumulative effects of Parkinson’s medicines and antihypertensives may need to be considered if patients have a drop in their blood pressure or suffer postural hypotension. Other medicines, eg, selective serotonin reuptake inhibitors (SSRIs), can also cause or worsen postural hypotension.

Living with Parkinson’s

This section aims to give you a better appreciation of the difficulties faced by people with Parkinson’s and how you might help patients and carers to manage the impact the condition has on them.

Anxiety is a significant non-motor symptom, affecting around 40 percent of patients during their illness. Patients may feel empowered if they can recognise anxiety and its causes and if they have a strong network of family and friends.

Speaking, writing, communication

People with Parkinson’s are likely to have some difficulty with communication. The majority of patients find the quality of their voice changes: they may speak more slowly and quietly, and their voice may have a flatter quality to it.

Patients also suffer a loss of higher functioning ability, ie, ability to manage several actions or thoughts happening at the same time, for example, walking and holding a conversation simultaneously. Reduced non-verbal cues greatly affect a patient’s ability to communicate. Altered body language, reduced hand gestures and facial expression (often described as mask-like) mean it is more difficult for a Parkinson’s patient to connect and interact during conversation.
Handwriting becomes small (micrographia), and this is typically an early sign of Parkinson’s.\(^6\)

**Diet and exercise**

People with Parkinson’s should be encouraged to have a healthy, well-balanced diet and work towards improving their overall physical health. Fitness is thought to be beneficial in preventing Parkinson’s and, although this is not proven, good fitness can help a patient’s strength and balance and improve mental wellbeing. Fitness referral schemes are available in some parts of the UK and reduced gym membership fees may be obtainable.\(^7\) Referral to a dietician or physiotherapist can be helpful if a patient has particular problems.

Common symptoms, such as constipation and postural hypotension, which are problematic in Parkinson’s can, in part, be managed by patients remaining hydrated.

**Travel and leisure**

People with Parkinson’s should be encouraged to pursue travel and leisure activities as they feel able. Understanding their particular limitations, preparing and being organised can help reduce associated anxiety. The Parkinson’s UK leaflet *International travel and Parkinson’s* may be useful. It is available at: www.parkinsons.org.uk/content/international-travel-and-parkinsons-information-sheet

People with Parkinson’s should be advised that they must tell the Driver and Vehicle Licensing Agency (DVLA) about their diagnosis.

**Information for carers**

Parkinson’s is a progressive condition and although patients might find minor difficulties in the early stages, they may become more reliant on family and friends as the condition progresses. This can lead to family and friends taking more of a caring role.

If you are interested in learning more about how you can support carers, visit the Supporting carers floor on theLearningpharmacy.com™: www.thelearningpharmacy.com

The following resources may be helpful for patients and carers:

**National organisations and general advice**

**Parkinson’s UK website**

www.parkinsons.org.uk

The Parkinson’s UK website has information about local support teams and groups at: www.parkinsons.org.uk/localtoyou
People living with Parkinson’s can also call their free helpline on 0808 800 0303.

NHS Choices
www.nhs.uk
The *Health A-Z – conditions and treatments* web page can be used to locate local Parkinson’s support services by postcode.

Age UK
www.ageuk.org.uk
Search for Parkinson’s disease for general information and wider support specifically for older people.

Research Institute for Consumer Affairs
www.ricability.org.uk
This is an independent research charity dedicated to providing free, practical and unbiased information of value to older and disabled people. It has a range of reports on products and services, including *Getting in and out of a car* and *Choosing cookers, ovens, hobs and microwaves*.

Finance
United Kingdom Government website
www.gov.uk
The *gov.uk* website provides information on caring for someone, money, tax and benefits, travel and transport. Specific information on the disability living allowance and carers/attendance allowances available can be found at: [www.gov.uk/dla-disability-living-allowance-benefit](http://www.gov.uk/dla-disability-living-allowance-benefit)

Young patients
American Parkinson Disease Association National Young Onset Center
www.apdaparkinson.org/national-young-onset-center/
This website offers particular support for young people with Parkinson’s.

Emotional support for patients and carers
Parkinson’s UK
www.parkinsons.org.uk/peersupport
Carers of people with Parkinson’s can find advice on the *Our peer support service* section of the Parkinson’s UK website.

Partners in Parkinson’s
www.partnersinparkinsons.org/parkinsons-relationships
This website was created by the Michael J Fox Foundation for Parkinson’s Research and AbbVie, and offers helpful advice for patients, including tips on their relationships and communication.

Summary

There are approximately 127,000 people living with Parkinson’s in the UK.¹
Medicines are critical to the management of the condition, so pharmacy professionals have an important role to play in supporting patients and carers. Parkinson’s symptoms and responses to treatment are patient-specific and therefore individual treatment plans are required. The main goal of treatment is to maintain the patient’s functional ability, but there must also be a balance between adequate treatment and minimisation of medication side-effects. Community and primary care pharmacy teams should take a holistic view of the effect the condition has on patients and carers and be able to signpost them to local and national sources of help and information.

References

1. Parkinson’s UK. About Parkinson’s. [Website] www.parkinsons.org.uk/content/about-parkinsons