A perspective on the current issues in the diagnosis of Parkinson's disease

The National Institute for Health and Clinical Excellence published guidelines for the management of Parkinson's disease in 2006. This article summarizes the key diagnostic recommendations of the guidelines, and gives a personal view of current barriers to their implementation and how these might be overcome.

Parkinson's disease (PD) is a progressive neurodegenerative condition characterized by so-called 'motor symptoms' including one or more of tremor, rigidity and bradykinesia. It is estimated that PD affects one in 500 people in the UK (Parkinson's Disease Society, 2007) and has an annual incidence of 12–26 per 100 000 (Campenhausen et al, 2005). With the projected increase in the elderly population, the prevalence of this condition, in common with other neurodegenerative disorders, is likely significantly to increase. The National Service Framework (NSF) for Long-Term Conditions, published in 2005 (Department of Health, 2005), highlighted the need for timely and accurate diagnosis in conditions such as PD. Moreover, new National Institute for Health and Clinical Excellence (NICE) guidelines for management of PD were published in June 2006 (National Collaborating Centre for Chronic Conditions, 2006), which again emphasize the importance of early referral to a specialist with expertise in the diagnosis and management of this disorder.

Why is early referral to a specialist important when the diagnosis of 'typical' PD is not difficult to make in most patients? It is clear that a number of patients are incorrectly diagnosed, either by their GP or hospital physician, but the lowest rate of misdiagnosis has been shown to occur when the patient has been assessed by an 'expert' in PD, usually a geriatrician or neurologist. Most clinicians will be able to make a confident diagnosis of PD as the patient enters the consulting room, but the clinical features of PD are present to varying degrees and in different relative proportions in patients. Although most medical students know that a 'rest tremor' is characteristic of PD, this does not mean that tremor must be present or present only at rest; indeed, the absence of tremor, intermittent tremor or tremor on action as well as at rest, are all entirely consistent with, though admittedly not typical, of PD.

There is another common condition, essential tremor (ET, sometimes referred to as 'benign' essential tremor – in many patients the condition is anything but benign, hence the view that this terminology is inappropriate), where action or postural tremor is characteristic, but there may be instances when the tremor occurs at rest also. Probably the commonest error is for ET to be diagnosed as PD, but the reverse also occurs. For a comparison of the clinical features of PD and ET, see *Table 1*.

Table 1. Clinical differences between Parkinson's disease and essential tremor

Clinical features		Parkinson's disease	Essential tremor
Tremor	Action vs rest	Rest	Postural or kinetic
	Frequency	4–6 Hz	8–12 Hz, can decrease with age
	Response to alcohol	Absent	Present
	Involvement of head, jaw, lips	Yes	Yes
	Symmetry	Usually asymmetrical	Usually symmetrical
Handwriting		Small, gets smaller as patient writes	Untidy, but normal size
Bradykinesia and rigidity		Often present	Absent
Family history		Unusual	Present in 50–60%

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This article reviews what the author believes to be the most important current issues in the diagnosis and management of PD. It presents the available data on the accuracy of clinical diagnosis in suspected Parkinsonian syndromes, discusses ways in which diagnostic accuracy can be improved and considers the cost and health economic implications of the improved care pathways for PD emphasized in both the NICE guidance and the NSF for Long-Term Conditions.

Current care pathways for patients with suspected PD

Modern therapies for Parkinson's disease

Since the introduction of levodopa around 40 years ago, many novel drug therapies which aim to treat the motor symptoms of PD have been developed. A discussion of these drugs is beyond the scope of this article, but the reader is referred to a review article (Schapira, 2005). The importance of so-called 'non-motor' symptoms of

Table 2. Common problems in current care pathways for Parkinson's disease

Failure to recognize symptoms and signs of early Parkinson's disease
Long waiting lists for new and follow – up appointments in secondary care
GPs start treatment before diagnosis is confirmed by a specialist
Lack of information given to patients and carers, and lack of psychological support following a new diagnosis of Parkinson's disease
Unfamiliarity of GPs with new medication for Parkinson's disease
Uncertainty as to whom to contact in a crisis, i.e. Parkinson's disease nurse specialist, GP or consultant
Lack of access to, and ignorance of value of rehabilitation including physiotherapy, occupational therapy and speech therapy
Expensive crisis admissions to secondary care

PD, such as sleep disturbance, falls, memory and psychiatric problems, autonomic dysfunction and pain is being increasingly recognized and highlighted (Chaudhuri et al, 2006). These symptoms may respond less well to dopaminergic therapy, as some may be the result of derangement of other neurotransmitter systems. There is increasing evidence that they have a major impact on quality of life. Consequently, the management of PD is evolving from one based primarily around pharmacotherapy of the motor symptoms of the disease, to a more holistic approach which includes ongoing access to a range of services and therapies including rehabilitation delivered by a multidisciplinary team, often led by the Parkinson's disease nurse specialist (PDNS).

How close do we come to this 'ideal' at present? It is clear that practice varies widely around the UK, and many are hindered from developing their service by lack of resources. Some regions have developed well-defined care pathways, with clear referral criteria. Here, most patients are initially diagnosed by a specialist in PD, but are then managed almost exclusively by community-based PD teams which may include a GP with a special interest (GPwSI). In other less developed areas, patients may not even have access to a PDNS. Common problems in the current pathways for PD are shown in *Table 2*.

This article will now consider the key steps in the care pathway for PD patients, and the obstacles to development of an integrated care model, that underpins the recommendations of the NICE guidelines.

Accurate and timely diagnosis

The potential physical benefits of an early diagnosis of PD might seem self-evident, but what are the consequences, both physical and psychological, of a delayed or inaccurate diagnosis? Although formal studies to address this question are lacking, the NICE Guideline Development Group reported 'experience that delay in making an accurate diagnosis can lead to psychological stress for the patient and their carer. Similarly, the need to revise an incorrect diagnosis which has initially been made by a non-expert can be stressful for patients'. When adjusted for disease severity and depression, 'satisfaction with the explanation of the condition at diagnosis' has a significant impact on health-related quality of life (Findley, 2002). There is increasing interest in drugs that may delay the progression of the disease, so-called neuroprotective therapies, and preliminary data are encouraging for rasagiline, a new monoamine oxidase-B inhibitor (Siderowf and Stern, 2006). Hence, early treatment even before subjective disability may become standard practice in future.

The critical consultation in the care pathway for PD is the initial one the patient has with his or her GP. The importance of recognizing possible symptoms and signs of PD at this point cannot be overstated. Indeed many patients may visit their GP for an unrelated symptom, and the GP may notice a tremor or paucity of movement of which the patient was unaware. Yet, available evidence suggests that GPs are not good at accurately diagnosing PD, with incorrect diagnoses made in up to 47% of patients (Meara et al, 1999). Let us suppose that a patient with early PD presents to his GP and the GP notices a tremor. Consider the following scenarios:

1. The GP suspects PD, but does not start drug treatment and refers the patient for confirmation of the diagnosis from a geriatrician who confirms PD, recommends levodopa and arranges to review the patient in 6 months' time. The patient fails to improve on this treatment.
2. The GP suspects PD, but because the waiting list to see the neurologist is so long, decides to initiate drug therapy herself, while still referring the patient. The patient improves on the treatment. The patient is eventually seen at the hospital by the neurologist, who cannot detect any signs of PD, and wonders if the GP got it right.
3. The GP diagnoses ET, and starts the patient on propranolol. The patient gets worse, and returns 3 months later. The patient is referred for a specialist opinion. A further 3 months elapse before the geriatrician sees the patient, diagnoses PD and recommends a dopamine agonist, and the patient responds well to the treatment.
4. The GP is unsure as to whether the patient has PD or ET but, as the patient is not significantly disabled by symptoms, decides to review the patient herself in 6 months' time. Six months later, nothing has changed, the patient still has symptoms but these are not disabling; he still doesn't have a diagnosis.

The common factors in these scenarios are uncertainty and delay to correct diagnosis. It is likely that these scenarios occur quite frequently in reality; the pathway followed by an individual patient depends critically upon local circumstances and referral patterns, and the initial interaction with the GP is, as ever, crucial.

Barriers to referral of patients with suspected PD

The Parkinson's Disease Society of the UK has long recommended referral of all patients with suspected PD to a specialist for confirmation of the diagnosis before treatment is initiated. Yet, it is clear from the author's own practice that a significant but unknown number of patients with PD have never seen a specialist. Why is this? Many GPs may have legitimate difficulty withholding treatment while their patient waits 13 weeks (and in the past, much longer) for a hospital appointment, when the symptoms are disabling enough to merit treatment, but not sufficiently severe to merit an urgent outpatient appointment. On treatment, symptoms improve for many, so the need for referral may be obviated in the short term, and the question of a specialist opinion may not arise again for many years.

Which doctors look after patients with PD?

There are no accurate data as to how many PD patients are managed solely by their GPs and/or who have never seen a 'specialist'. Moreover, although it is commonly agreed that the majority of patients with PD who are followed up in secondary care in the UK are managed by geriatricians, with a smaller proportion under the care of a neurologist, again there are no reliable figures. To some extent this prejudice is a reflection of the smaller number of neurologists, around 400 compared to around 3000 geriatricians. Some neurologists and geriatricians work closely together and even run joint PD clinics.

Key NICE guidelines for implementation and implications for clinical practice

The key priorities for implementation set out by NICE are listed in *Table 3*. NICE is not prescriptive about the exact 'care pathway' that patients with PD should follow, and local arrangements will vary depending on existing services. However, emphasis is placed on patient-centred care, with prompt referral and diagnosis, provision of information, education and self-management, ongoing access to rehabilitation and palliative care. Care should be delivered as close to the patient as possible.

Referral to a specialist or expert for accurate diagnosis

NICE guidance states that 'PD should be suspected in people presenting with tremor, stiffness, slowness, balance problems and gait disorders'. As we have seen, the GP must suspect the diagnosis for the patient even to be considered for referral. The new NICE guidelines state that a patient with suspected PD should be reviewed by 'a specialist with expertise in the differential diagnosis of this condition'. Here we can get into difficulty with definitions. Physicians who manage PD may be described or may describe themselves variably as having an 'interest', a 'special interest' or an 'expertise'? A general neurologist should have an interest and an expertise in PD by definition, as this is one of the commonest neuro-degenerative disorders he or she is likely to encounter. In contrast, geriatricians are likely to have a much broader range of capabilities and special interests, and familiarity with or interest in PD is not universal. In recognition of this, the British Geriatric Society, through its Parkinson's disease section (www.pdsection.org.uk), aims to 'identify and coordinate interest and expertise in the field of Parkinson's disease and related disorders, particularly in older people, among the health-care professions', a stance for which it should be commended.

A spot check of the Dr Foster website (www.drfoster.co.uk) records 30 general physicians, 68 geriatricians and 86 neurologists with a stated 'special interest' in PD. The Specialist Info website (www.specialistinfo.com) returns 22 general physicians, 118 geriatricians and 98 neurologists with a 'special interest' in PD. Although this is likely to be an under-estimate, assuming that there are approximately 90 000 patients with PD in the UK, this equates to only one clinician with a special interest for every 380 patients with PD.

How much of an interest or expertise does one need to reliably make the diagnosis of PD? A number of studies have addressed this, many using post-mortem pathology as the gold standard. One perhaps unrepresentative study showed that around 25% of diagnoses of PD made by consultant neurologists were incorrect (Hughes et al, 1992), compared to only 6–8% of cases diagnosed by 'experts' in movement disorders (Jankovic et al, 2000; Lees et al, 2001). In an ideal world therefore, all patients with PD would be referred to a movement disorder expert, but with the numbers of PD 'specialists' estimated above, this would be unmanageable. Therefore, referral to either a geriatrician with a stated expertise and interest in PD, or to a general neurologist is the least that patients with suspected PD should expect.

How quickly should patients with PD be seen by a specialist?

The NSF for Long-Term Conditions required 'prompt access', which it did not define further, to specialist

Table 3. National Institute for Health and Clinical Excellence guidelines – key priorities for implementation

'Quick' referral to a specialist or expert for accurate diagnosis
Regular expert review of diagnosis
Regular access to specialist nursing care
Access to physiotherapy
Access to occupational therapy
Access to speech and language therapy
Need for palliative care to be considered throughout disease

From National Collaborating Centre for Chronic Conditions (2006)

expertise. The new NICE guidelines recommend all patients should be seen untreated within a maximum of 6 weeks. It is reasonable to withhold treatment for 6 weeks, but there are very few centres in the UK that can boast this short a waiting time for a new patient appointment. If these 'ideals' are to be achieved, there will need to be substantial redesign of outpatient services in most geographical areas; as we are all too well aware, neither NSFs nor NICE guidelines come with any extra resources specifically attached to them. Most clinicians agree that if access to specialist nurses were improved, this would free up specialist time from follow-ups, and allow them to concentrate on new patients. Most would accept as reasonable that if outpatient waiting times were sufficiently short, and resources adequate, all patients should be seen by a specialist and the diagnosis confirmed before treatment is commenced.

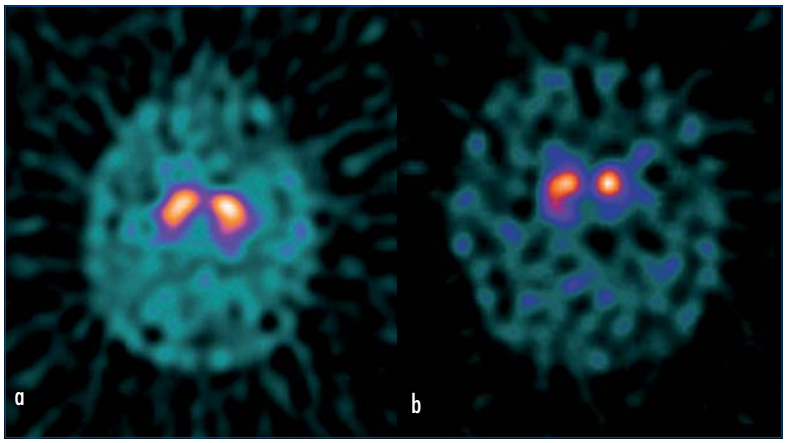
Can we improve the accuracy of clinical diagnosis of PD?

As we have seen, even in the best hands, patients with suspected PD can be misdiagnosed, with significant implications for treatment and prognosis. In clinically uncertain cases, a 'watch and wait' approach is often taken, or various treatment trials are administered. There are a number of problems with these seemingly perfectly reasonable approaches:

- Drugs used such as dopamine agonists are expensive, averaging around £200 per month
- Pushing up the dose of these drugs in order to ascertain possible efficacy can produce unnecessary side-effects
- The psychological impact of diagnostic uncertainty, including possible loss of trust in the treating physician.

Would it not be desirable to have a diagnostic test that is 100% sensitive and specific? Sadly, such tests are rare. A number of tests both clinical and investigative were evaluated by NICE, including single photon emission computed tomography (SPECT), positron emission tomography (PET), magnetic resonance (MR) imaging, MR spectroscopy, MR volumetry, acute apomorphine and levodopa challenges, and objective smell testing; midbrain ultrasonography has received some interest (Berg, 2006), although this was not evaluated by NICE. With the exception of SPECT imaging, none of these methods has been recommended by NICE in the routine investigation of suspected PD. However, in routine clinical practice, when there are atypical features, NICE accepts that it is entirely reasonable to request 'standard' imaging such as MR imaging or CT to exclude other pathology such as a space-occupying lesion.

Figure 1. a. A normal single photon emission computed tomography (SPECT) scan showing symmetrical, characteristic 'comma' shaped uptake in the striatum (caudate and putamen). b. Abnormal SPECT scan showing asymmetrical uptake in the striatum with reduced uptake in left side. The appearance of the tracer signal is likened to a 'full stop'.



The utility of SPECT in the diagnosis of PD

PET and SPECT were developed initially as research tools, using a range of isotopes to target different components of the dopamine system (Ravina et al, 2005). The loss of dopaminergic neurones which project from the substantia nigra to the caudate nucleus and putamen underlies the motor features of PD, and also occurs in other Parkinsonian syndromes. A SPECT scan using different tracers, for example (^{123}I)-FP-CIT or (^{123}I)-β-CIT, exploits this dopaminergic cell loss. The tracer binds specifically to the dopamine transporter which is expressed by dopaminergic neurones. The radioactivity of the bound tracer is detected by an external gamma camera. A reduction in the number of dopaminergic neurones will result in a reduced amount of bound tracer leading to a reduced signal with respect to normal control subjects (*Figure 1*). However, any Parkinsonian syndrome which is associated with a dopaminergic deficit will have an abnormal SPECT scan, which cannot distinguish between individual cases of PD, progressive supranuclear palsy or multiple system atrophy.

What is the gold standard for the diagnosis of PD?

When considering the usefulness of a diagnostic test, the 'gold standard' of diagnosis should be established and the test compared with that standard. To date, SPECT has not been compared directly to what most would view as the gold standard, that is post-mortem pathological confirmation. Self-evidently, it is unlikely that sufficient post-mortem material will become available from patients who have had SPECT to allow such a study. So what can we use? The UK Parkinson's Disease Society Brain Bank study (Hughes et al, 2002) showed that if rigorous clinical criteria are applied, the sensitivity of the final PD clinical diagnosis was 91%, with a specificity of 98% and a positive predictive value of 99% (72 out of 73 correctly diagnosed). Hence, it can be argued that for the purposes of establishing the sensitivity and specificity of any diagnostic test, comparison to the UK Parkinson's Disease Society Brain Bank criteria (*Table 4*) is justifiable and adequate.

Sensitivity and specificity of SPECT in clinically 'definite' cases

So how good is SPECT imaging and when should it be used in the differential diagnosis of PD? A number of studies have shown that SPECT can reliably distinguish between patients with a Parkinsonian syndrome and ET with sensitivities of 87–98.3% and specificities of 80–100% (Asenbaum et al, 1998; Acton et al, 1999; Benamer et al, 2000, 2003; Parkinson Study Group, 2000). Similarly, subgroups of patients with clinically definite PD can be distinguished from ET with a sensitivity of 87–97% and specificity of 93% (Benamer et al, 2000, 2003).

However, a word of caution: it is important to note that up to 5% of those patients with a clinical diagnosis of PD according to clinical criteria have been found to have normal SPECT scans, so-called subjects without evidence of a dopaminergic deficit (SWEDDs) (Benamer et al, 2000, 2003). A number of drugs can interfere with the binding of tracer to the dopamine transporter, and this may explain some of these results, especially if the drugs were undeclared. However, it is unlikely that this explains all these cases, and these patients are being followed up closely to determine whether they will go on to develop abnormal SPECT imaging. There is a small but finite false-positive rate of clinical diagnosis of both ET and parkinsonism (Brooks et al, 1992; Hughes et al, 1992), and this may also go some way to explaining this discrepancy.

Utility of SPECT in clinically uncertain cases

As we have seen, with few exceptions, SPECT can distinguish reliably between clinically definite parkinsonism and ET. But there is no need to image patients where there is no doubt about the diagnosis. SPECT imaging is used only when there is clinical uncertainty, and the key indication for the use of SPECT is where, despite thorough clinical evaluation, a Parkinsonian syndrome cannot be distinguished from a non-Parkinsonian syndrome, specifically ET. What is the utility of determining this difference?

In the phase IV study by Catafau and Tolosa (2004) SPECT imaging resulted in a change in clinical diagnosis in 61 patients (52%). However, and perhaps of greater importance, a change in management took place as a result of SPECT in 85 (72%) of 118 patients with clinically uncertain Parkinsonian syndromes (*Figure 2*). In 46%, the change was to an alternative therapy.

With regular clinical review, the diagnosis in a given patient tends to become more certain. Comparing a clinical diagnosis of Parkinsonism or non-Parkinsonism at 6 months follow-up, the 'gold standard' in this case, with the SPECT imaging diagnosis, Jennings et al (2004) found that there was disagreement between only three out of thirty-five cases (8.6%) with the SPECT result, where scans were visually assessed.

Taken together, these two studies provide evidence that SPECT can change the clinical diagnosis and can have clinically meaningful consequences for the patient. NICE concluded that ^{123}I-FP-CIT SPECT 'should be available to specialists with expertise in its use and interpretation, and should be considered for people with tremor where essential tremor cannot be clinically differentiated from parkinsonism'.

Other key guidelines for implementation

Regular access to specialist nursing care

In many existing PD services, the PDNS is the key member of the team, providing support and advice, liaising between the GP, the specialist, the patient and carer, and in some cases prescribing and adjusting medication.

Table 4. UK Parkinson's Disease Society Brain Bank criteria for the diagnosis of Parkinson's disease

Step 1. Diagnosis of a parkinsonian syndrome	
Bradykinesia and at least one of the following:	Muscular rigidity
	Rest tremor (4–6 Hz)
	Postural instability unrelated to primary visual, cerebellar, vestibular or proprioceptive dysfunction
Step 2. Exclusion criteria for Parkinson's disease	
History of:	Repeated strokes with stepwise progression
	Repeated head injury
	Antipsychotic or dopamine-depleting drugs
	Definite encephalitis and/or oculogyric crises on no drug treatment
	More than one affected relative
	Sustained remission
	Negative response to large doses of levodopa (if malabsorption excluded)
	Strictly unilateral features after 3 years
	Other neurological features: supranuclear gaze palsy, cerebellar signs, early severe autonomic involvement, Babinski sign, early severe dementia with disturbances of language, memory or praxis
	Exposure to known neurotoxin
	Presence of cerebral tumour or communicating hydrocephalus on neuroimaging
Step 3. Supportive criteria for Parkinson's disease	
Three or more required for diagnosis of definite Parkinson's disease:	Unilateral onset
	Rest tremor present
	Progressive disorder
	Persistent asymmetry affecting the side of onset most
	Excellent response to levodopa
	Severe levodopa-induced chorea
	Levodopa response for over 5 years
	Clinical course of over 10 years

From Hughes et al (2002)

NICE considered evidence from one randomized controlled UK trial of community-based PDNS care with GP care *vs* standard GP care (Jarman et al, 2002). This study showed that the PDNS improved the patient experience with improved information and medication monitoring with no significant increase in cost.

NICE points out that only limited evidence is available as to improved outcomes with PDNS treatment, but states that patients should have access to:

- Clinical monitoring and medication adjustment
- A continuing point of contact for support, including home visits, when appropriate
- A reliable source of information about clinical and social matters of concern to people with PD and their carers, which may be provided by a PDNS.

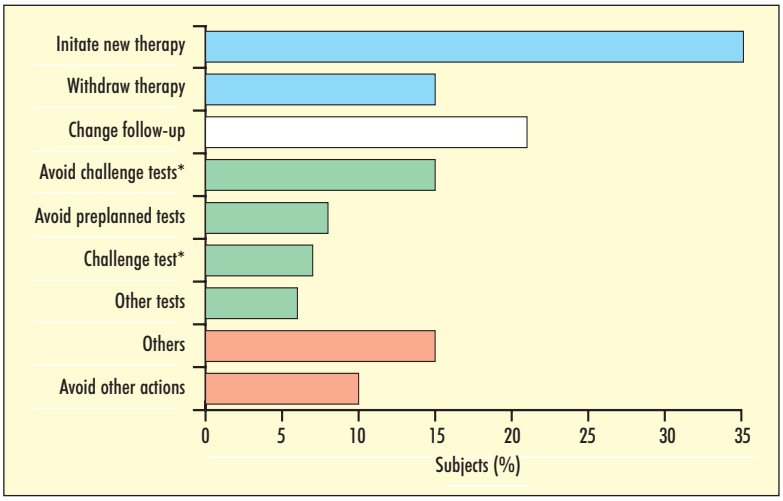
Access to therapy services

NICE concluded that there is 'encouraging' evidence from randomized controlled trials of the effectiveness of some physiotherapy interventions for people with PD. NICE was less convinced about occupational therapy studies which it felt were methodologically flawed in the main. It concluded that there is 'insufficient evidence to support the efficacy of occupational therapy interventions in PD'. However, NICE recognizes the 'value of many of the aspects of this therapy, particularly with respect to the provision of aids and adaptations to maintain functional independence in people with PD'. It felt that further trials of both physiotherapy and occupational therapy are required to evaluate the role of different aspects of occupational therapy and to define what physiotherapy interventions are effective in the different stages of the disease, with quality-of-life evaluations by the patient.

NICE felt that there was 'good preliminary evidence' for the use of speech and language therapy for speech disorders in PD, and the Lee-Silverman voice technique (Ramig et al, 2001a,b) received positive criticism, but this is not widely available in the UK at present. NICE was concerned about the practicalities of providing 16 1-hour treatment sessions on the NHS. Overall, NICE was supportive of the use of speech and language therapy intervention in people with PD.

Despite this limited evidence, NICE selects access to physiotherapy, occupational therapy and speech and language therapy as key guidelines for implementation, no doubt having been swayed by the body of expert opinion which believes that benefits to patients from these interventions can go some way beyond those outcomes that lend themselves readily to measurement.

Figure 2. Changes to planned management after ^{123}I-Ioflupane single photon emission computed tomography (SPECT) imaging. One patient can have more than one item. *Challenge tests: L-dopa or apomorphine. From Catafau and Tolosa (2004).



Costs of NICE guideline implementation and implications for existing resources

Using 1998 figures, the annual direct treatment costs of PD to the NHS in 1998 have been estimated at approximately £2298 per patient, representing 38% of the total annual cost of care which included NHS, social services and private expenditure of £5993 per patient (Findley et al, 2003). Assuming there are 90 000 individuals with PD in the UK, the total direct costs are approximately £540 million per year. Total costs of care increase with age and disease severity.

As well as the guideline itself, NICE has published a cost impact analysis of guideline implementation, including a costing template and implementation advice. The analysis focuses on the guidelines predicted to have the greatest economic impact, namely provision of adequate specialist nurse support and therapy services. Initially, NICE considered that early referral to a specialist would have a significant cost implication, but it was concluded that regular nurse specialist support could free up consultant time for the initial assessment. Whether this is sufficient to offset these extra costs will be a matter for local debate and consideration. Interestingly, it does not identify the provision of SPECT scanning as having a major economic impact.

The extra cost of implementing the guidelines is estimated as approximately £10.2 million, but potential savings of £6.4 million are identified, through reduced admissions and outpatient attendances, resulting in a net cost of guideline implementation of just under £3.8 million. This represents a 0.7% increase in the current estimated total treatment costs outlined above. However, the report emphasizes that a number of assumptions relating to incidence, prevalence, numbers of patients requiring therapy services, and costs of such interventions have necessarily been made, and accepts the limitations of this analysis. It also states that any savings will arise only if the improvements in access to these services are fully implemented.

Conclusions

Implementation of both the NSF for Long Term Conditions and of the NICE guideline presents a huge

challenge to the way services are currently delivered in respect of both resource allocation and the philosophy of care. The national tariff and 'Payment by Results' will have a significant impact on the commissioning and provision of health care. Delivery of health care for chronic conditions in the community, away from acute hospitals which are expensive, is key to the government's strategy for the NHS. Yet over the last 10 years we have seen an unprecedented reduction in community services and hospitals for the very same reason of excess cost. Are we now coming full circle? Where will we be delivering these community-based services? Cynics will protest that NICE guidelines are not compulsory and simply result in the shift of resources from one area to another. Yet with creative thinking and redesign of services, it is always possible to do things better without necessarily incurring higher costs.

It seems that one of the most important single factors in improving the care pathway for PD is for the GP to suspect the diagnosis, and obtain confirmation of the diagnosis before commencing treatment. If this is missed early on, then efforts to improve the care pathway for PD will be wasted. It is vital therefore that efforts are made nationally and locally to support and educate our GP colleagues, and close relationships between secondary and primary care, which are not as close as in the past, are vital, e.g. educational seminars, clinical case studies, GPwSI training. Closer links must be sought between commissioners and service providers to effect change that is informed by local circumstances. A truly seamless service between primary and secondary care, as envisaged by the NSF for Long Term Conditions, will be facilitated by by these measures. Moreover, involvement of both patient and carer in the planning of care pathways will help to ensure that services are relevant, responsive and patient centred. **BJHM**

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KEY POINTS

- Primary care physicians need increased awareness and knowledge of Parkinson's disease.
- If suspected, patients with Parkinson's disease should be referred to a specialist neurologist or geriatrician before treatment is commenced.
- In difficult cases, Parkinson's disease can be accurately distinguished from essential tremor using single photon emission computed tomography scan.
- The diagnosis of Parkinson's disease should be continually reviewed by a specialist.
- Patients with Parkinson's disease should have early and continuing access to a Parkinson's disease nurse specialist and to rehabilitation services.