Cost-Effectiveness Analysis of a Device to Monitor Levodopa-Induced Dyskinesia in Parkinson's Patients

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BACKGROUND AND OBJECTIVES

Patients with Parkinson's disease (PD) are frequently treated with levodopa which helps to reduce stiffness, slowness and tremors. Many patients develop problems with involuntary movements called 'dyskinesia' as a result of levodopa medication. Levodopa-induced dyskinesia (LID) can be improved by adjusting the dosage to find a tolerable balance between the benefits and side effects. These movements fluctuate in severity throughout the day but there is no reliable way of objectively monitoring them at home. This means that clinicians have very scant clinical information to base treatment decisions on, resulting in a series of 'trial and error' drug regimen changes, and delayed optimal management.

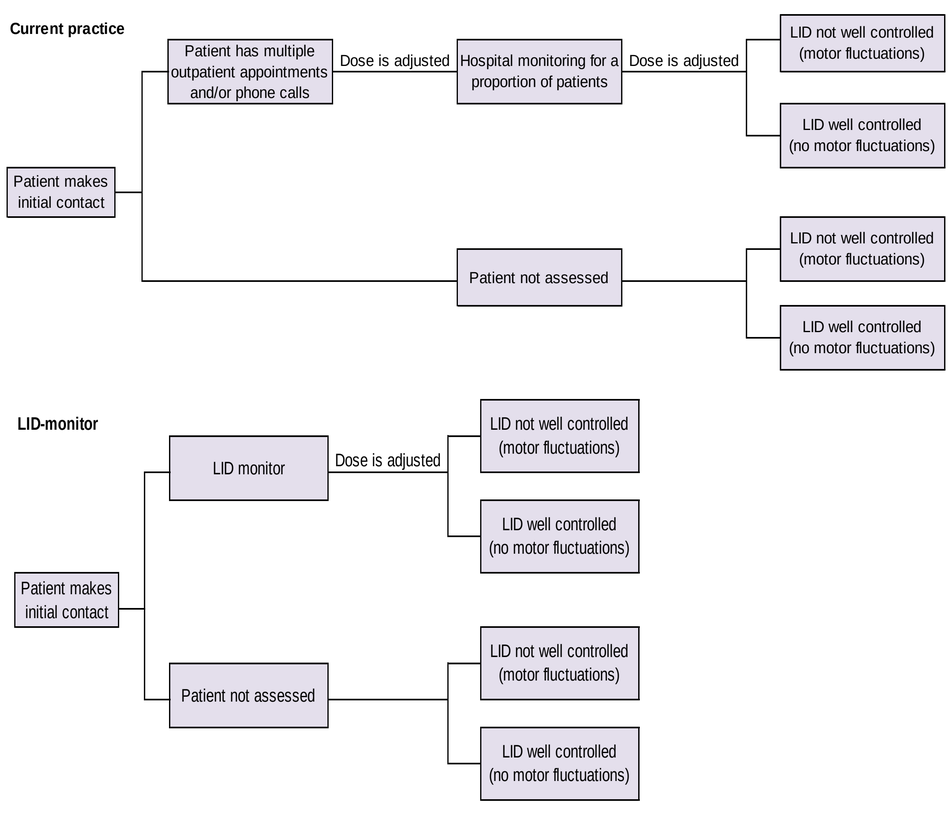
The intervention that was assessed is ClearSky's LID-Monitor which demonstrates the severity of involuntary movements in relation to drug doses, enabling clinicians to make informed decisions regarding altering complex drug regimens. The intervention involves patients wearing small sensors and carrying a mobile phone in their pocket for 24 hours.

The objective of this study was to assess the cost effectiveness of implementing LID-Monitor in Parkinson's patients with dyskinesia.

Table 1: Key parameters

Parameter	Value	Source
Incidence		
Prevalence of PD in whole population	0.20%	Parkinsons.org [1]
Percentage of PD patients with LID	28.00%	clinical opinion
Effectiveness		
Proportion of patients assessed per annum: current practice/LID monitor	80%/90%	Clinical opinion / assumption
Of patients assessed, proportion well controlled: current practice/LID monitor	55%/93.73%	Clinical opinion / Cancela *et al.* [2]
Proportion that go on to have hospital monitoring: current practice	1.71%	Clinical opinion
Falls resulting in hospitalisation – well controlled patients	1.07%	Wood *et al.* [3]
Falls resulting in hospitalisation – poorly controlled patients	1.55%	Wood *et al.* [3]
Time from first contact to dose well controlled: current practice/LID monitor	6/1 months	Clinical opinion
Utilities		
PD patients without dyskinesia	0.72	Haycox *et al.* [4]
PD patients with dyskinesia	0.48	Haycox *et al.* [4]

Figure 1: Model structure



METHODS

An early stage cost-effectiveness model was developed from a UK National Health Service (NHS) perspective. The decision tree model examined implementation of LID-Monitor compared to current practice over one year (Figure 1).

The model considers the incident population, the proportion of patients that are well-controlled or poorly-controlled, the number of falls, healthcare resource use and utility associated with dyskinesia. The model inputs were derived from published literature and where no data were available clinical expert opinion was elicited from clinicians experienced in the disease area and use of the device (Table 1). Cost parameters were obtained from NHS Reference Costs (2012-13), PSSRU (2013) and device costs provided by the manufacturer. Due to the high level of uncertainty associated with some model inputs, extensive univariate and two-way sensitivity analyses were conducted.

Table 2: Results

Whole cohort results	LID monitor	Current practice	Incremental
Initial contact	£427,703	£427,703	£0
Cost of LID monitor	£4,095,273	£0	£4,095,273
Routine consultations	£10,341,961	£10,341,961	£0
Extra consultations as a result of LID	£0	£9,686,071	-£9,686,071
Hospital monitoring	£0	£1,536,201	-£1,536,201
Falls	£1,805,401	£2,206,410	-£401,009
Total costs	**£16,670,337**	**£24,198,346**	**-£7,528,009**
Total QALYs (for whole cohort)	**19,653**	**15,817**	**3,836**
ICER	-	-	Dominant
Net monetary benefit	-	-	£84,250,822
Per patient			
Total costs (per patient)	**£566.60**	**£822.47**	**-£255.87**
QALYs (per patient)	0.668	0.538	0.130
Events (for whole cohort)			
LID-specific telephone consultation	0	65,904	-65,904
LID-specific outpatient appointment	0	44,721	-44,721
Hospital attendance for monitoring	0	403	-403
Excess bed days for monitoring	0	2,699	-2,699
Emergency attendances due to falls	4,145	5,066	-921

RESULTS AND CONCLUSIONS

The model estimated that implementing LID-Monitor resulted in a dominant incremental cost-effectiveness ratio (ICER) and a net monetary benefit (NMB) of over £84 million for the whole of England. The cost savings were a result of reducing consultations, reducing hospital monitoring and reducing the number of falls and outweighed the cost of implementing LID-Monitor. Patients also benefitted from an increase in QALYs with an average incremental QALY of 0.13 per patient per year. Sensitivity analysis showed that results were dominant in all plausible scenarios. The model shows that implementing ClearSky's LID-Monitor in UK hospitals has the potential to reduce costs to the NHS and increase patients' quality of life.

REFERENCES

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