

Multidisciplinary care with deep brain stimulation for Parkinson's disease patients

YF Cheung *, MPH, FRCP

Department of Medicine, Queen Elizabeth Hospital, Hong Kong; Hong Kong Movement Disorder Society

* cyfz02@ha.org.hk

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Since Benabid et al's introduction in 1987,¹ deep brain stimulation (DBS) has emerged as a standard therapeutic option for various movement disorders when they become refractory to pharmacological treatment. The commonest clinical indications for DBS include Parkinson's disease (PD), dystonia, and essential tremor.^{2,3} In Hong Kong, more than 200 patients have received DBS therapy since 1997 when the procedure was first introduced to Hong Kong. Apart from PD, which accounts for most patients,^{4,5} successful treatment has been reported locally in patients with dystonia⁶ and Tourette's syndrome.⁷ Deep brain stimulation devices are expensive. In the Hospital Authority, these devices for advanced PD and severe dystonia are covered under standard services for improving the standard of care, provided that certain selection criteria have been fulfilled. This programme has facilitated provision of DBS services to those patients in need, but who cannot afford the devices themselves.

In this issue of the *Hong Kong Medical Journal*, the Prince of Wales Hospital/Chinese University of Hong Kong Movement Disorder Group⁵ report their experience of 41 PD patients who received bilateral subthalamic nucleus DBS over 12 years. The group has demonstrated both efficacy and safety of the procedure by improvement of Unified Parkinson's Disease Rating Scale part II and III scores of 32.5% and 31.5%, respectively and improvement in PD diary parameters, as well as its low surgical complication rate and zero perioperative mortality.

The authors⁵ also compared the outcomes of patients operated on before mid-2005 with those operated on after that date, and showed significant improvement in the latter group. They attributed the difference to multiple factors, one of which is the dedicated, multidisciplinary approach that they adopted. Deep brain stimulation is a procedure that emphasises multidisciplinary teamwork. Expertise from various disciplines contributes to patient management, including neurologists, neurosurgeons, nurse specialists, clinical psychologists, radiologists, physiotherapists, occupational therapists, and speech therapists. Each team member has a specific role to play, yet coordination and communication between disciplines is key to the best outcome.

From a patient journey perspective, PD

patients are first assessed by neurologists who check for the indications and contra-indications for DBS (eg does the patient really have advanced PD? Are there any physical or psychiatric illnesses that might increase the risks and adversely affect the outcomes?). Neurosurgeons determine whether a patient is a suitable surgical candidate and evaluate the surgical risks. Nurse specialists act as case managers to liaise with different parties and offer education and counselling to patients and their caregivers. Meticulous preoperative assessment is then performed, which is protocol-driven and includes detailed neuropsychological tests by clinical psychologists, magnetic resonance imaging of the brain by radiologists, and levodopa challenge test and video recording by neurologists and nurse specialists.

On the day of DBS, both the neurosurgeons and the radiologists are responsible for precise target localisation and trajectory planning. After the burr hole is created under local anaesthesia, microelectrode recording is performed by neurologists, who verify characteristic neuronal signals from the brain target. Once the quadripolar DBS electrode has been implanted, macrostimulation can be delivered and neurologists can assess the therapeutic responses and the thresholds for inducing side-effects. When the electrodes are optimally placed, an impulse generator is inserted under general anaesthesia by neurosurgeons. During the operation, nurse specialists play an important role in patient reassurance and alleviation of their anxiety.

Postoperative stimulation and DBS programming is usually delayed for a few weeks to allow for the microlesioning effects to resolve. Regular adjustment of pulse generator settings is performed by neurologists and nurse specialists to sustain clinical improvement, which can last for years. Rehabilitation is contributed to by physiotherapists, occupational therapists, and speech therapists. Ad-hoc troubleshooting is provided by nurse specialists. Finally, multidisciplinary clinics co-attended by clinicians, nurses, and allied health care professionals can enhance communication, care coordination, and patient accessibility.

The concept of multidisciplinary care in PD has evolved over many years. Parkinson's disease is a

heterogeneous condition, with both motor and non-motor manifestations, which vary considerably from one individual to another. As the disease progresses, new symptoms emerge that are levodopa-resistant and become the dominant causes of death and disability.^{8,9} Modern health care also underscores patient-centred care and patient empowerment, which highlights patient preferences and their own decision-making. Hence, it is generally accepted that a multidisciplinary health care model is preferable to a monodisciplinary model. In a recent review, van der Marck and Bloem¹⁰ have pointed out the challenges associated with the implementation of multidisciplinary care in PD. Due to the lack of high-quality conclusive evidence, the optimal composition of the team and the relative contribution of specialists remain unknown. The degree of collaboration between team members (ie multidisciplinary care, interdisciplinary care, or integrative care) that can translate into the most robust benefits is still unclear. It is also uncertain at what stage of the disease the application of an organised team approach can yield the best results. Finally, the setting of service delivery varies from centre to centre (ie in-patient, specialised out-patient centre, or regional community-based network).

Despite the challenges and the uncertainties mentioned above, multidisciplinary care will continue to be one of the pillars in the management of DBS patients. According to a survey in The Netherlands, barriers that impede the implementation of multidisciplinary care for PD include insufficient expertise, poor interdisciplinary collaboration, inadequate communication, and lack of financial support.¹¹ We are probably facing similar problems in Hong Kong. While we wait for more evidence, efforts should be made in our local centres to develop rehabilitation protocols, provide training for movement disorder specialists, functional neurosurgeons, nurse specialists and

allied health care professionals, and optimise delivery of DBS service in a streamlined and well-coordinated fashion.

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