Laurence Knowles, Elective Report 2017
Neurology, Barker Lab at the Centre for Brain Repair, Addenbrookes Hospital

What are the major patterns of neurological disease in Cambridge and East Anglia, and how and why do they differ from those elsewhere in the UK and globally?

My elective was spent at the Barker lab, which has a specific focus on two neurodegenerative diseases – Parkinson's disease and Huntington's disease. In this report I will thus first discuss patterns of general neurological disease, before focusing on the two diseases mentioned above.

There is little specific research on the epidemiology of neurological disease in East Anglia specifically; however, in demographic terms, East Anglia is broadly similar to the UK as a whole (see objective 3 for further discussion), so UK wide data should give an accurate estimate of disease patterns. The neurological alliance has produced such data[1], indicating that 12.5 million patients have some sort of neurological disorder in the UK. The commonest diagnoses are migraine, essential tremor, dementia, epilepsy, stroke, traumatic brain injury, Parkinson's disease and multiple sclerosis. This is similar to the patterns seen in other developed countries such as the USA[2]. If we compare these figures to the global patterns of disease as reported by the WHO[3], the obvious difference is that infectious causes of neurological disease – for example meningitis, tetanus, post-polio syndrome and Japanese encephalitis – make up a greater proportion of disease burden, despite declining from 2005 to 2015. However, the unifying theme is that both in the UK and globally, neurological disease accounts for a significant proportion of the burden of chronic disease and health expenditure (for example, the NHS spent over £4.4 billion on neurological disease in 2013/14; this represents an increase of 200% over the preceding 10 years). Furthermore, this proportion is rising and health services and governments are underequipped to deal with this challenge.

With reference to my specific elective, the Barker lab has carried out epidemiological work on two Parkinson's disease cohorts (CAMPAIGN and PICNICS), allowing precise estimates of the incidence of Parkinson's disease in Cambridgeshire, estimating a crude incidence of 15.6/100000[4]. This is very similar to other estimates from the north of England[5] (15.9 per 100000) and other European countries[6] (12.6/100000). Huntington's disease is much rarer, so similar work is much harder, but the published data estimates an average incidence in the UK of 7.2 per million person years[7]. Interestingly, there seem to be geographical discrepancies in HD incidence – they are consistently lower in parts of Europe and East Asia, but the reasons for this are not known.

How are tertiary services, specifically Neurology, organised and delivered in Cambridgeshire? Compare and contrast this with a.) the organisation of such services in London, and b.) other healthcare systems such as Canada and America.

As in the rest of the UK, neurological care in Cambridgeshire are organised on a “hub and spoke” model, with a central tertiary centre (Addenbrookes Hospital) providing specialist services and several smaller district general hospitals providing general neurological care; many neurologists provide services in both settings. This is complemented by care from the rest of the MDT; general practitioners, clinical nurse specialists, physiotherapists, occupational therapists and speech and language therapists (amongst others) all contribute to the care of patients with complex neurological disorders. This also involves interaction between NHS provided services and local council provided services such as “social” care. Compared to London, the underlying model is the same and the challenges are often similar – for example, my experience in both locations is that

patients often struggle to negotiate the complex interface between “medical” and “social” care mentioned above. One key difference is that there are relatively many more tertiary centres in London – East Anglia, with a population of 5.6 million, has Addenbrookes and Norwich University Hospital, whilst in London (population 9 million) there are at least 10 tertiary centres. London has thus often lead the way in providing new models of neurological care, such as the development of Hyperacute Stroke Units.

Compared to countries such as Canada and the USA, one obvious difference is that there are generally fewer, larger tertiary centres which cover much broader geographic areas. For example, in Vancouver where I did my other elective, Vancouver General Hospital is the only tertiary neurological centre in British Columbia and provides care for 9 million people over a geographic area greater than that of the UK; there is accordingly much more of an emphasis on models of care including innovations such as telemedicine. However, for patients the experiences of care can be very similar – many of the patients I met in British Columbia had the same problems as those in the UK surrounding the divisions between social and medical care, and the difficulties navigating the institutions which provide them.

The populations of East Anglia and London differ greatly. Discuss what impact this has on neurological disease, with reference to the social determinants of health and illness.

Compared to East Anglia (5.6 million), London (population 9 million) has a larger and denser population, with a much greater proportion of recent immigrants and in general, greater deprivation. However, this broad picture can obscure nuances – for example, although East Anglia is on the whole relatively non-deprived, there are pockets of great socio-economic deprivation, particularly in coastal areas[8]. 88% of East Anglia's population are White British, compared to 54% of London's[9].

It has long been accepted that social factors – which can broadly be defined as “the conditions in which people are born, grow, live, work and age – conditions that together provide the freedom people need to live lives they value”[10] – affect health outcomes. How this affects neurological disease specifically has not been extensively researched. However, we might reasonably expect that there is a greater prevalence of neurological disease in deprived areas – for example, we know that a greater proportion of the population smoke in urban and deprived areas, and smoking is a risk factor for several neurological diseases[11] inculding Alzheimer's disease and cerebrovascular disease. Social determinants do not simply affect risk of developing disease, however – in the case of neruological disease there is an ongoing and dynamic relationship between social factors, treatment and rehabilitation programmes offered and patient responses to those programmes. For example, patients who experience socio-economic deprivation have poorer outcomes form neurological rehabilitation programmes[12].

Personal Development Objective - To improve my clinical skills and knowledge in the area of neurology; in particular to begin developing neurological skills to a more in depth level than taught as an undergraduate. To gain clinical experience to help make decisions regarding a possible future career in neurology; in particular, to spend some time doing clinical neurology prior to foundation training (during which specific neurological placements are relatively uncommon).

I certainly feel that I have accomplished these objectives during my two weeks spent on this elective. Through attendance at outpatient clinics I have in particular become much more familiar

with the clinical features and management of Huntington's disease, something I had never encountered as an undergraduate. I also attended two Parkinson's Disease research clinics, which was a very interesting experience – I gained a lot of insight into how studies on large cohorts of patients are arranged and carried out, as well as the current developments in Parkinson's disease research. This was also interesting from a personal point of view – I am strongly considering ultimately training in neurology, and I would very much like to have an academic component to my future career. Seeing how the academic neurology trainees work day to day and discussing future career plans with them was very helpful, and has reinforced my commitment to a career in neurology. In terms of specific clinical skills, I certainly built upon the basic neurological examination skills developed as an undergraduate – in particular, I gained experience of the specific clinical assessment of Parkinson's and Huntington's diseases with the Unified Parkinson's Disease Rating Scale and Unified Huntington's Disease Rating Scale respectively.

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