ELECTIVE (SSC5a) REPORT (1200 words)

A report that addresses the above four objectives should be written below. Your Elective supervisor will assess this.

I feel very fortunate to have had the opportunity to conduct an elective in my field of interest at Johns Hopkins University. In the following report, I will address each of my pre-specified objectives in turn.

Objective 1

Describe the pattern of multiple sclerosis in the USA and discuss this in the context of global health.

Multiple Sclerosis (MS) prevalence is growing in the United States of America (USA) (1). Ascertainment bias cannot completely explain this growth, though increasingly sophisticated imaging and more flexible diagnostic criteria laid out in the 2017 McDonald revisions for MS diagnosis may play some role (2). More problematically, increased incidence is also partially attributable to decades of underdiagnosis of MS in marginalised communities. MS was classically, and wrongly, considered a disease that predominantly affected Caucasians, but modern epidemiological studies have largely dismissed this thesis. The significant proportion of non-Caucasians in the US renders increased ascertainment in marginalised communities an important contributor to increased prevalence.

This US pattern of MS incidence is not unique and has been observed globally. Interestingly, distributions of MS prevalence have traditionally exhibited a strong geographic gradient, with higher burdens found in populations further from the equator (3). Aetiological factors such as sunlight exposure and vitamin D have been used to explain this previously. However, the geographic gradient is not particularly pronounced in the USA (4). Perhaps increased knowledge of effective vitamin D supplementation has driven this country-specific trend.

It is important to recognise that the growing global burden of MS represents an opportunity to expand research efforts. In particular, genetic research relies heavily on statistical power to derive more precise estimates of single nucleotide polymorphism (SNP) significance through genome-wide association studies. The increased ascertainment in marginalised communities also enables more robust genetic research to be conducted within a more diverse range of ancestral backgrounds – a research avenue that has been sorely missed from efforts to date (5).

Objective 2

Describe the pattern of health provision in relation to the USA and contrast this with other countries, or with the UK.

Healthcare provision in the United States is largely privatised, with a growing, but chronically underfunded public sector. Most US citizens *should* have medical insurance, whether that be privately purchased, employer-sponsored, or through public services. Theoretically, this should mean every US citizen has access to adequate healthcare. However, this theory does not translate into the real world.

Firstly, the US healthcare system '*officially'* neglects undocumented immigrants (6). Whilst census details on this population are obviously lacking, it makes up a significant proportion of US inhabitants. The qualifier 'officially' is important. Anecdotally and unofficially, undocumented immigrants will be treated for free at the point of care 'off the books.' Nonetheless, more robust provision is required for this community. Importantly, it is important to recognise that the UK National Health Service (NHS) has an identical policy. Undocumented individuals are technically ineligible for free healthcare in the UK as well, but a similar unofficial policy exists.

The more fundamental, practical problem with the US healthcare system are the insurance companies themselves. Over my time at Johns Hopkins, every doctor I met criticised the current insurance system in the US. The problems are too extensive to explore in a single reflective report, however reasons include the complexities of state borders, difficult authorisations, and pharmaceutical company influence. As an example, I observed a young patient in the research clinic. She was enrolled in three clinical trials at Johns Hopkins for MS care. However, owing to insurance limitations, she was not permitted to have her blood drawn for her clinical care at Johns Hopkins. Therefore, she had blood drawn for her research studies at Hopkins, but had to travel to a completely different hospital to have her clinical blood drawn. This seemed extremely inefficient and unjust for the patient.

Objective 3

To conduct a piece of research studying the epidemiology of multiple sclerosis.

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I was fortunate to be very well supported to conduct research at Hopkins under my supervisor Professor Ellen Mowry. I am conducting three projects, with one manuscript already completed. The first study explores cognitive disability in MS through examining a unique phenotype of 'predominant cognitive impairment' without other neurological disability (7). The second study examines the association between patient-reported metrics of cognition in MS (neurological quality of life questionnaires) and objectively measured cognitive assessments (processing speed test). The third study examines the relationship between John Cunningham (JC) Virus and natalizumab (Tysabri), particularly looking at patterns of seroconversion and the risk this confers towards developing progressive multifocal leukoencephalopathy.

I have learnt a tremendous amount through conducting these studies. I have further developed my coding skills in R, learnt new statistical methods such as 'nearest matching' in nested case control studies, and significantly expanded my knowledge of cognitive disability in MS. Perhaps most uniquely, my time conducting research has enabled me to learn more about the intricacies of bureaucracy and 'red-tape' in research in the US. The legal aspects of research are taken very seriously in the US, with lawyers involved in ethics submissions and approvals. Perhaps this is a function of the more litigious nature of healthcare in the US. I was particularly struck by how stifling these processes are to actual research activity. The senior academics at Hopkins spent much of their time navigating this red-tape and preparing reports for funders, rather than conducting analyses. This trend is only increasing, and steps should be taken to streamline administrative processes. Whilst a similar pattern exists in the UK, it was certainly more pronounced in the US.

Objective 4

To learn more about a career as a clinical academic in neurology and the differences between the UK and the US. As I may wish to do an MPH in the USA after F2, this elective will offer an outstanding foundation.

Professional training in the UK and US appears hugely different on the surface (8). In the UK, you finish medical school in 5-6 years, then complete foundation training (2 years), core training (3 years), a PhD (3 years), and higher training (4-6 years). This makes the total length of postgraduate training for neurologists about 10 years without a PhD and 12 years with a PhD, if no interruptions are taken. In the US, one completes college (4 years), medical school (4 years), then residency (4 years). Technically, you could then be an attending (consultant) just 4 years after completing medical school. However, in the US, subspecialist training is very common and takes place through post-residency fellowships. In neurology, these range from 1-4 years. Ultimately, the training time is certainly quicker in the US, but not by the orders of magnitude suggested by social media.

With regards to physician-scientist training, the fundamentals are conserved between the US and UK. In both countries, a research degree (MD/PhD) is a prerequisite. However, the realities of the job are quite different. In the UK, trainees can follow an integrated academic training pathway, with protected time for research throughout training. This takes the form of an academic specialised foundation programme (with 4 months of academic time in 2 years of total training) followed by an academic clinical fellowship (with 25% academic time over 3 years of training), and then a clinical lectureship (with 50% academic time over 4-5 years of training). In the US, programmes with fully protected time are rare in residency, though the residency itself is much shorter.

As senior physician scientists, there are even more differences between the UK and US. In the US, you will take a significant salary sacrifice to be a physician-scientist, as clinical work is paid at a higher rate, particularly in private practice. In the UK, the NHS standardises salaries, meaning the pay discrepancy between a full-time NHS consultant working only clinically will be broadly equivalent to a full-time NHS consultant working as a physician-scientist. This policy is less discriminatory towards physician-scientists in the UK, though the gross pay discrepancy between the US and UK is still large regardless of the path followed.

References

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