

STROKE AROUND THE WORLD

Catherine L. M. Sudlow,* 12 Park Avenue, Worthing, West Sussex BN11 2HT

By one of those lucky flukes I obtain membership of the College in February 1994, eighteen months into my SHO rotation. Six months to go I am still riding high and feeling invincible. The continuing flow of adrenaline prevents me from lounging in front of the TV like any normal human being on those now free evenings. In search of a solution to my restlessness, I approach my consultant and suggest getting involved in a small research project. I end up a week later in Professor Charles Warlow's office. He suggests the very thing for exercising the mind to free it from the last few months of drudgery. *Something he has been planning to do for a while . . . already started the ball rolling . . . of course I would be capable. . . .* I leave half-an-hour later with a pile of introductory papers almost as high as my stack of books for Part II, promising to read them before I return a couple of days later.

I am impressed with myself at managing to get through about half the pile in that time. The task is to collect data from studies around the world to carry out an up-to-date overview of the worldwide incidence of stroke. Epidemiology! I found it uninspiring as a student. But I am very excited by this. Eight months working in the Department of Clinical Neurosciences in Edinburgh has been enough to convince me of the importance of what I have heard called 'big medicine': large well-designed trials answering worthwhile questions; decision-making based on proven information; the importance of considering the population impact of what we do in medical practice (usually minimal); the need to describe features of populations accurately so that we can compare them and plan health care effectively; the role of good systematic reviews in collecting together the information already available and making some sense out of it. An automatic extension of this naming scheme would be to call the sexy molecular stuff 'little medicine'. I hope that, one day, big and little medicine will meet in an explosion of knowledge, and solutions to a huge number of problems will suddenly become apparent in the light of the complementary information.

Over the next few months I immerse myself during all spare moments in this project. I discover very quickly that it is far from small. Suddenly I need to acquire all those skills that I somehow managed to get away without up to now. I undergo a self-taught course in basic epidemiology which seems to come alive now that I've got a real problem to which I can apply the principles. I brush up on my rusty knowledge of elementary statistics and realise that I'm going to need a lot of help when it comes to the more detailed analyses. I learn by trial and error the inefficient and subsequently the efficient ways of carrying out a Medline search. My basic word-processing skills improve and I master spreadsheets, graphs and a reference database on my fancy new PC. I develop a writing style for communicating with overseas researchers which I note has to vary depending on who I am writing to—one launches into first name terms with Australians after the first letter, whereas with the Japanese everything has to remain almost stultifyingly formal.

*Medical Registrar.

In April I fix up my next job. I'm to start in November—one of the selling points for me—which gives me three months to play with. I make a firm decision that this should be time away from the wards and preferably away from the country. I would go mad lying on a beach or even pursuing some sporting but non-intellectual activity for three months so I need to arrange some kind of academic challenge. My father suggests, half in jest, that I might like to visit one or two of the centres whose papers I have been reading. I mention this to Charles Warlow in early May when we are discussing the project and he thinks it is a great idea. *I must visit all the collaborating centres—the European ones by train, the rest by aeroplane, a few days in each—making an on-the-ground assessment of each study and collecting that information and raw data which just isn't available in the literature. It will be a wonderful opportunity to meet and learn from the very best of epidemiologists and stroke specialists worldwide. The department will prime the project with a generous contribution towards my costs and I should be able to find the rest through travel grant schemes, pharmaceutical companies and so on.*

The next few months become a flurry of grant applications and travel arrangements. I realise more and more how important will be the information I'll be able to obtain from these visits in terms of its contribution towards both the stroke incidence overview and my general education. I have no trouble in justifying the expense, though formalising it in applications is more difficult. I become an expert travel agent. I read what seems like vast quantities of stroke literature to bring my knowledge up to a level where I can attempt to understand the intricacies of what I have undertaken. Somehow, miraculously, it all falls into place in time and I begin my European 'tour' in mid-August, with a backpack stuffed full of the relevant papers and a PC notebook as hand luggage.

To describe my travels in detail would be rather like one of those dreadful evenings spent looking at someone else's holiday snaps. My various destinations are these: Oxford, Umea, Soderhamn, Stockholm, Copenhagen, Warsaw, Dijon, Aosta, Perugia, Tokyo, Okinawa, Perth, Adelaide, Sydney, Auckland and Rochester, Minnesota.

My comments are restricted to the highlights.

SWEDEN deserves a mention from the outset because of its accessibility to the epidemiologist. Every person in the country has a unique identifying number assigned at birth and tagged onto all sets of medical records thereafter, making document tracing somewhat easier than in the NHS. GPs have been in limited supply until a recent government directive that all people should have access to a primary care physician. The relative lack of GPs may not have been ideal for hospitals, showered with unfiltered self-referrals as a consequence, but it does mean that most cases of any moderately severe illness (strokes included) have tended to present directly to hospital and there have been many less GPs to keep tabs on for tracing those patients cared for at home. The organisational structure makes census data as reliable as one can get, with reliable official updates fortnightly (no poll tax related dodges here). Until recently, all the information was handled by the church. It's not so wonderful now that it's been taken over by local government.

WARSAW is fascinating. It is the only Eastern European centre I visit and the study here is the only one I am aware of in this part of the world which has

attempted to ascertain cases cared for at home as well as those admitted to hospital.¹ There are some potentially important findings as a result. One of the questions I hope to make some headway towards answering is this: Why is it that the official figures for stroke mortality are so much higher in Eastern Europe than in the West? From the Warsaw study it doesn't look as though the explanation lies in a higher incidence—the rates are not far off those in Western Europe, in fact a bit lower in the elderly—but perhaps at least partly in the case fatality which is twice as high. My visit helps me to develop some hypotheses, if not certain solutions, as to why this might be.

Having taken a look round the Institute of Psychiatry and Neurology, I am impressed by the availability of CT, MRI and other shiny high tech mod cons. Up on the wards, though, the patients are in crowded four-bedded bays and, despite an abundance of (mostly female) doctors busily preparing abstracts for impending deadlines, nurses are in pretty short supply. Those few that there are do all the blood-letting and setting up of intravenous infusions. I approve, of course, but I do wonder when they have time to get around to the basic nursing care bit, the stuff of the prevention of bedsores, deep vein thromboses, pulmonary emboli and sepsis. I resist the temptation to challenge a study carried out here looking at the effects of intravenous immunoglobulin on outcome after stroke but am convinced that the money could be better spent on employing a phlebotomist and a couple more nurses.

It is possible, of course, that the higher prevalence of known risk factors for disease (untreated hypertension, cigarette smoking and so on) in this part of the world leads not to a higher incidence of disease but to a different and more severe pattern of stroke with a higher fatality. Another explanation might be that the people of Warsaw just don't present to the medical services with minor strokes. After all, we know that a substantial proportion of those experiencing transient ischaemic attacks in the UK (Oxfordshire Community Stroke Project) do not seek medical attention.² I cannot see why the same should not be true of mild strokes. Variable 'illness behaviour' between countries, cultures and generations is something of an unknown quantity but nonetheless may play its part. I am fairly impressed with the case finding methodology here and it sounds as though medical care is accessible enough so I do not think that too many mild strokes can be missing for want of looking. If I had not already, I realise at this stage that I am going to generate as many questions as answers over the next few weeks. I could spend a lifetime attempting to answer them.

JAPAN is a real challenge. I have to make a three hour trip across rush hour Tokyo from the international to the domestic airport to catch the 'plane for my destination, the subtropical islands of Okinawa, about halfway between mainland Japan and Taiwan. It is not a pleasant experience. Still, Japanese Airlines are excellent with plenty of the conventional nodding and bowing from the air stewardesses. Okinawa turns out not to be a palm-trees-and-beaches paradise. The main island is a densely inhabited sprawling urban mass with no public transport system and the streets perpetually crowded with private cars. Nearby the American air and naval bases send noisy jets soaring overhead at regular intervals.

There is something very interesting about strokes in this part of the world. Japan's very low incidence of coronary heart disease is not paralleled by that of stroke. Stroke mortality has been very high, although it appears to have fallen

quite dramatically over the last couple of decades. The explanation is obscure but diet and lifestyle have been proposed as reasons for both the high stroke and low coronary heart disease mortalities.³ Sceptics suggest that the high mortality rates for stroke reflect diagnostic fashions⁴—it has apparently been regarded as heroic to die from a stroke (especially a haemorrhagic one) in at least some parts of the country. We clearly need to dissect the official mortality statistics into their components—incidence, case fatality and diagnostic inaccuracies—to find the true answer.

Despite the large number of papers looking at stroke epidemiology in Japan, there is a lack of community-based incidence studies. A well conducted one from the late 1970s suggests that total stroke incidence was similar then to that in Western Europe. All the Japanese studies (plus several from China and Taiwan) have reported a high relative proportion of intracerebral haemorrhages—25–35 per cent as compared with 15 per cent or so in Caucasian populations.^{5,6} Before CT scanning, though, one could never be certain that this was not diagnostic artefact. Our ability to distinguish clinically between infarcts and haemorrhages is poor.⁷ We need to find a community-based study of stroke in Japan with high rates of CT scanning. The one in Okinawa looks promising. It is a huge study based on a population of one-and-a-half million which makes it the largest I have come across anywhere.

There are some problems, though. I am not convinced that all of the out of hospital cases have been found. There is also the problem of out of hospital deaths. Routine, regular access to death certificates with retrospective validation of all possible stroke deaths is regarded as an essential component of complete case ascertainment.⁹ In Okinawa, and much of mainland Japan, an almost religious form of ancestral respect means that autopsies are almost never done and death certificates cannot be made routinely available even to medical professionals. The search for an 'ideal' incidence study in Japan continues. Meanwhile, though, I think there is enough evidence to suggest that the distribution of pathological types of stroke in Japan is different. The Okinawa study reveals a CT-proven proportion of haemorrhagic strokes of 35 per cent which I do not think can all be explained away by the study's potential biases. Quite why this should be is another question. Attempts to answer it might reveal some interesting ideas about the differences in aetiology between cerebral infarction and intracerebral haemorrhage.

AUSTRALIA is wonderful and I meet some fascinating people. The Perth Community Stroke Study lives up to all my expectations from reading their very good papers.^{9,10} I try some fine wines in Adelaide and I also manage to fit in a quick visit to Sydney where I attend the Stroke Society of Australasia's annual conference, a feast of up-to-the-minute presentations from Australasian and international contributors. I will remember it as the first medical conference I have attended where I felt I knew as much as some of the speakers.

NEW ZEALAND is quite as beautiful as the descriptions I have previously heard. What strikes me here is the rate of CT scanning for patients with stroke admitted to Auckland's main teaching hospital which, at 35 per cent, I consider surprisingly low. I wonder what the average in the UK is. Certainly a recent

survey by the Stroke Association showed that over 90 per cent of UK physicians would like to have a CT scan if they had a stroke (Richard Lindley, personal communication) but I'm sure that with the continuing problem of limited access in some district general hospitals this does not reflect widespread practice.

ROCHESTER, Minnesota is my last stop. This amazing town has grown from a population of one or two thousand at the beginning of the century to its current seventy-five thousand. The growth is almost entirely due to the founding and expansion of what local medical students refer to in their notes as WFMC (World Famous Mayo Clinic). The whole town is given over to its influences. It starts at the airport where wheelchairs are lined up beside the luggage trolleys. The city centre is built over a complex, temperature-controlled, carpeted subway system which connects all the central hotels to the main clinic building. Down here is everything you need and more: bookshops selling histories of the Mayo Clinic and countless lay health guides, smart boutiques, coffee houses, restaurants and so it goes on. You need never go outside in this place, which is intelligent design considering the temperature drops to an average of -30 degrees Celsius in the winter.

I am pleased to learn that the original founder of the Mayo ideal, 'Father Mayo', was originally from Eccles, just outside Manchester. Most of the genius and invention, though, came from Henry Plummer, a friend and colleague of William and Charles Mayo, sons of Father Mayo. A kind of Leonardo da Vinci of his day, not only was he a very competent doctor but also a skilled architect, engineer and inventor. He invented the pneumatic underground transport system for laboratory samples, designed the telephone and pager network and dreamed up the incredibly efficient medical records system. Neither these nor several of his other brilliant schemes have been outmoded by anything better since they were established in the early 1900s. The medical records are what impress me most. There are some four million original sets of records here, all of them now also held on a computer network. They cover the whole community of Rochester, including primary care consultations, and date back as far as 1907. Out of that four million, they reckon that no more than a dozen have been lost irretrievably. This is an epidemiologist's dream! I try not to imagine how the rate of loss of records compares in Edinburgh—it would be all too depressing. In this very special case, therefore, where documentation is reliable, accurate and community-wide,¹¹ I am happy to accept that a retrospective study of stroke incidence is probably up to scratch. Anywhere else, only prospective studies will do.

Now that I am back, the task of putting together the mass of information I have collected is getting underway. What the papers arising from this project may not be able to reflect, however, is the enormous benefit of this opportunity I have had which goes way beyond the results I will produce, important though they may be. I hope I might have given you a flavour of what I have learnt and experienced. I am very grateful for the generous support from the Royal College of Physicians of Edinburgh's Myre Sim Bequest and to all my other sponsors, without whose help this research trip could not have gone ahead. Finally, my thanks to Professor Charles Warlow, whose unfailing enthusiasm and encouragement has been, and continues to be, a source of inspiration.

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