

TEACHING NEUROLOGY IN THE 21st CENTURY

Suggestions for UK Medical Schools

planning their Core Curriculum

Association of British Neurologists
Ormond House, 27 Boswell St, London WC1N 3JZ
Tel: 020 7405 4060 Fax: 020 7405 4070

1994

TEACHING NEUROLOGY IN THE 21ST CENTURY:

SUGGESTIONS FROM THE ASSOCIATION OF BRITISH NEUROLOGISTS FOR UK MEDICAL SCHOOLS PLANNING THEIR CORE CURRICULUM: June 1994

"The burden we place on the medical student is far too heavy, and it takes some doing to keep from breaking his intellectual back" *Thomas Huxley 1876*

SUMMARY

1. We welcome the recent General Medical Council proposal that UK Medical Schools develop a core curriculum with special study modules.
2. We recommend that the core undergraduate curriculum in basic neuroscience and clinical neurology should enable a recently qualified doctor to:
 - Appreciate a patient has a neurological problem
 - Evaluate the *common* neurological presenting symptoms
 - Recognise the *common* neurological disorders
 - Recognise neurological *emergencies* and initiate treatment
 - Manage the *common* neurological disorders using drugs when appropriate, appreciate other aspects of the general management, and know what neurosurgery may have to offer
 - Appreciate the role of doctors and others in the care of patients with *neurological disability*
 - Appreciate *ethical issues* associated with neurological disorders
3. We recommend that the teaching of basic neuroscience and clinical neurology be integrated as far as possible so that basic neuroscience becomes a means to an end rather than an end in itself concentrated merely in the first years of the medical students' course. We recognise that more clinical neurology will need to be taught in the out-patient clinic than in the ward, and that it is important to involve neurosurgeons and neuro-rehabilitationists as well as medical neurologists.
4. We recommend that each medical school names a single senior member of the Faculty of Medicine to be responsible for organising the core curriculum and examinations based on discussions between basic neuroscientists and clinical neurologists throughout all stages of the core curriculum.

INTRODUCTION

Basic neuroscience and clinical neurology` should be taught by enthusiasts who are expert and knowledgeable in the subject. Such teachers will inevitably know far more "neurology" than medical students will ever need to know, or even hear about, and so must constantly be on their guard against overinflating the importance of their own subject within the curriculum, and in particular the part of it that they are teaching. Misplaced, but understandable enthusiasm for the subject has resulted in generations of UK medical students being forced to remember far too much material, clinical as well as basic, of doubtful relevance to their proper aim which is to become, at qualification, an undifferentiated doctor who can *then* train in one of a myriad of different areas. Overburdening the curriculum with irrelevant, albeit interesting material has led to: rote learning for examinations which tend to test memory rather than performance and which are now so frequent that students are exam rather than knowledge driven; students who quickly and randomly forget rather than retain relevant information; stifling enthusiasm amongst students; and - so often - despair by students, and then doctors, that neurology is far too difficult and should be left to brainy egg heads. Most neurological patients are looked after by non-specialist doctors in the community and *not* by highly specialised and neurologically trained physicians and surgeons. What these patients need from their doctors is not so much a detailed knowledge of irrelevant neurology but clinical common sense, sympathy, understanding and - when necessary - appropriate referral for specialist advice.

The issue of an overfull curriculum has recently been addressed by the General Medical Council who have recommended that medical students should acquire "core" knowledge and have time to pursue in depth a variety of "special study modules" in areas which interest them. The Association of British Neurologists warmly welcomes this policy and wishes to contribute by providing our view of what should be contained in the core curriculum for "neurology". We recognise that this should be sufficient to meet the needs of a newly qualified and undifferentiated doctor who must not be overwhelmed with irrelevant factual material, but who must be able to assimilate new knowledge and adapt to change in the years ahead. We acknowledge that very few medical students will become neurologists or neurosurgeons and that the undergraduate curriculum should be weighted towards the needs of future general practitioners who make up the largest specialty group. Whatever else, we recognise that the core curriculum must be relevant to day-to-day clinical practice however interesting or fashionable other areas of the subject may be.

Of course, *detailed* basic neuroscience and clinical neurology will still need to be taught, but no longer to each and every medical student (which is boring for most students and therefore frustrating for their teachers) but to students who *want* to take special study modules in the subject and to postgraduates (which will be far more stimulating and enjoyable for the

¹ By basic neuroscience we mean the study of the anatomy and function of the central and peripheral nervous systems, from molecular mechanisms to whole organ physiology. Clinical neurology is the study of the nature, effects and management of disorders of the human nervous system. "Neurology" embraces both basic neuroscience and clinical neurology.

teachers). In our view special study modules might include "vision"; "acute brain injury"; "brain repair"; "neurogenetics"; "memory"; "language"; "pain"; and "plasticity". These options could be either taken in basic neuroscience, or clinical neurology but - best of all - involve a combination of both. We expect that individual medical schools will devise modules to reflect their strengths and staffing resources.

In 1991 the Association of British Neurologists distributed to all medical schools a document entitled "Undergraduate neurological education in the UK" which made various recommendations about the teaching of neurology. Although this document set out the aims and objectives of undergraduate neurological teaching it did not explicitly state what should be contained in a core curriculum to be taught to *all* medical students in the UK. Therefore, the Council of the Association of British Neurologists, invited its Training and Education Subcommittee to prepare a statement of what such a core curriculum should contain, bearing in mind the recommendations previously set out in "Undergraduate neurological education in the UK". The present report does *not* seek to lay down how or by whom the core curriculum should be taught, nor where in the course it is taught, and nor how much of the course it should take up. These matters are for individual medical schools although we do have some general preferences which are alluded to at the end of this document.

AIMS OF THE CORE CURRICULUM .

The core undergraduate curriculum in basic neuroscience and clinical neurology should contain enough information, and allow the development of adequate skills, to enable a recently qualified doctor to:-

- Appreciate a patient has a neurological problem
- Evaluate the *common* neurological presenting symptoms
- Recognise the *common* neurological disorders
- Recognise neurological *emergencies* and initiate treatment
- Manage the *common* neurological disorders using drugs when appropriate, appreciate other aspects of the general management, and know what neurosurgery may have to offer
- Appreciate the role of doctors and others in the care of patients with *neurological disability*
- Appreciate *ethical issues* associated with neurological disorders

The core curriculum must not contain material - however interesting - which does not bear on these aims which, if fulfilled, should provide a suitable starting point for postgraduate training in any aspect of hospital, laboratory or community practice.

To achieve these aims the core curriculum must cover:

1. The basic structure and function of the central and peripheral nervous systems in so far as this is relevant to the practice of clinical neurology (and of course psychiatry and psychology)
2. How to make a neurological diagnosis, and how to sort out common neurological presenting symptoms
3. The diagnosis and treatment of the most common neurological disorders
4. Neurological emergencies
5. Where and how to get further information and help
6. Student assessment

and, as a general principle, teaching of neurology should always be concerned with preparing students for a lifetime of self-education motivated through curiosity, critical appraisal of evidence, appreciation of clinical variability and the vagaries of chance and natural recovery, a scientific and humanitarian approach to their work, ethical awareness and an ability to see and manage patients in their own social and physical context. .

1. The basic structure and function of the central and peripheral nervous systems

What must be learned?

The aims of the core curriculum do not include knowledge of the structure or function of the nervous system but such knowledge is still required - to some extent - to meet these aims.

For medical students, the basic neurosciences are, therefore, a means to an end, not an end in themselves.

Naturally, medical students who are particularly interested in "neurology" should be able to take modules in more advanced neuroscience. At the same time, the core curriculum must not be overburdened with basic neuroscience which is irrelevant to clinical problem solving (diagnostic or therapeutic) and must not displace adequate time at the bedside or in the clinic where practical experience with patients can be gained. Indeed, many would argue that basic neuroscience knowledge is best acquired as clinical problems are presented to students (on paper or in real life) so that what is taught is relevant and, therefore, more likely to be remembered for life rather than until just after the next examination.

We suggest that the core curriculum should cover:

1. The gross anatomy of the brain pointing out the areas for motor, sensory, language and visual function in the cortex; the basal ganglia; the internal capsule; the cerebellum; the brainstem; and the cranial nerves, particularly those concerned with vision, speaking and swallowing
2. The gross anatomy of the motor and sensory pathways, and those

subserving sphincter, bladder and other autonomic functions

3. The cross sectional anatomy of the spinal cord and its relationship with the vertebral column and spinal roots
4. The approximate course of those nerve roots and peripheral nerves most often affected by disease, the muscles they innervate, and the dermatomes
5. The topography of the skull and vertebral column
6. The blood supply to the brain
7. The CSF pathways
8. Neural transmission and reflex activity
9. Clinico-anatomical correlation referring to common problems such as "gone off the legs"; "blind in one eye"; "off balance"; "weak hand" etc.

It is not necessary or desirable to cover the detailed internal anatomy of the thalamus, hypothalamus and brainstem; the detailed anatomy of the brachial plexus; the microscopical anatomy of the cerebral cortex; neurotransmitters, except those of direct clinical relevance; nor the molecular biology of genetically determined disorders etc. These interesting issues must though be available within special study modules.

How to teach it

It is no longer necessary for all medical students to dissect the entire body and there is little place for formal anatomy lectures in isolation. Neuroanatomy is best learned from individual study of prosections of the brain, spinal cord and limbs although some dissection may still have a place. In addition, neuroanatomy must now be learned from cross sectional CT and MR images of the brain and spinal cord which vividly illustrate the relationships between nervous tissue, blood vessels, CSF and bone. The principles of neurophysiology can be demonstrated (perhaps in practical classes) in human volunteers by using stimulation and recording from peripheral nerves, although a few lectures will still be required. We can see little need for neuropharmacology practicals in the core curriculum although core knowledge of neural transmission must inevitably include some pharmacology.

2. Neurological diagnosis

What to learn?

There are so many neurological disorders that it is unrealistic to expect medical students to see all of them and then, because many are rare, to recognise one many years later: even multiple sclerosis, a relatively common disease to neurologists, still only presents every ten years to an average general practitioner. Instead, students must learn the general *principles* of neurological diagnosis which depend on taking a sensible history (which requires common sense, tact and practice), doing a practical rather than detailed neurological examination

(practice again, as well as knowing which parts of the nervous system to examine on the basis of the history), knowing what is likely (based on experience, epidemiology and some pathology), sometimes ordering investigations, and knowing when to refer for specialist help. Inevitably certain presenting symptoms keep coming up, particularly in general practice, and it is these that the students must learn to evaluate above all others: headache, blackouts, dizziness, loss of memory, weakness, pins and needles, and pain. For less common symptoms the students must learn to record them in plain English, however bizarre they may be, and not draw unjustified conclusions. A student must be able to present a case clearly and coherently, comment on the location of the lesion and the most likely cause, and make a management plan.

How to teach it?

Not in large lectures and probably not much with books. There is really no effective substitute for learning and practising with - at first - normal individuals, and then quickly thereafter with real patients. Video demonstrations are also useful. As an aside we recommend that the Association of British Neurologists acts as a clearing house for, and keeps a catalogue of, learning packages in basic neuroscience and clinical neurology (such packages may be videos, tape slide programmes etc.). It follows therefore that students must be given time with inpatients and outpatients, and get feedback from experienced clinicians (preferably from trained neurologists or their trainees). All neurologists know that diagnosis depends more on the history than the examination and yet so many teachers concentrate on the examination because it is easier than teaching how to take a good history. Good history taking is absolutely essential and should be emphasised. Perhaps a good way to start learning this is by observing neurologists assessing new patients in clinics. Indeed, as neurological practice moves increasingly from inpatients to outpatients it is crucial that doctors *and* students are given space *and* protected time in the outpatient clinic for undergraduate neurological education.

The core curriculum must provide some idea of the utility, dangers and costs of neurological investigations and students should at least see one of each type so they can appreciate what the patient has to go through. The only practical procedure which might be included in the core curriculum is lumbar puncture, although we would argue that this skill is best learnt during the pre-registration year or general professional training. We assume that elsewhere in the core curriculum students will be taught the general principles of the diagnostic process, and the concepts of sensitivity, specificity, pre and post test probability etc.

3. Common neurological disorders

What to learn?

The core curriculum can only - and should only - cover what is common in community terms ie. stroke, transient ischaemic attacks and subarachnoid haemorrhage; epilepsy; migraine and other forms of headache; head injury; coma; cervical and lumbar pain and radiculopathy; dementia; multiple sclerosis; Parkinson's disease; intracranial tumours; intracranial infections; peripheral neuropathy; the common peripheral nerve lesions; a little on muscle disorders; and non-organic functional disorders. Even this is a long list and it is unlikely that much detail can be included except where important points about diagnosis must be made;

where knowledge of pathology is relevant; and where treatment is effective. The core curriculum should also cover the prevention and general management of stroke; the pharmacological treatment and care of patients with epilepsy; the treatment of migraine and other headaches; the drug treatment and care of Parkinson's disease; awareness of the nature of neurological disability and the role of the doctor in its management; and awareness of what neurosurgery has to offer. Clearly it is important that the adverse effects and complications of any treatment - surgical, medical or others - for common disorders are appreciated so that cost effective treatment options can be used. At all stages students must be made aware of how treatment has been, and should be, evaluated.

How to teach it?

Basic information can be taken from books, and perhaps some large group lectures and in small group seminars. But, in addition, students must see and speak to patients with the common neurological disorders and also be involved in their management. Therefore, students will need exposure to these conditions not just in outpatients and in the medical neurology wards but in neurological rehabilitation departments and in neurosurgical wards where there is usually a wealth of "clinical material". It is important, therefore, that neurological teaching involves neurosurgeons and neuro-rehabilitationists for maximum coverage, interest and value. In addition, some sessions with neuropathologists will be useful so that the nature and causes of the common neurological disorders can be better understood.

4. Neurological emergencies

What to learn?

Young doctors must have some idea how to cope with the management of coma, raised intracranial pressure, spinal cord compression, status epilepticus, infections of the nervous system, neuromuscular respiratory failure, stroke and subarachnoid haemorrhage. The core curriculum must cover how to recognise and investigate these emergencies, how to manage them generally, and how to initiate treatment although continuing treatment is more likely to be done by specialists with further postgraduate training than by newly qualified doctors.

How to teach it?

Again, there is little substitute for practical experience which implies that students must be attached to busy neurological/neurosurgical units for a period of time. In medical schools where neurologists are not involved with emergency work, it is important that neurological emergencies are covered in the general internal medicine core curriculum. Unless there are facilities for the students to live for a while on site, they will miss important emergency experience.

5. Where and how to get further information and help

Inherent in the "core plus special study modules" philosophy is the fact that no longer can medical students learn enough to be independent and unsupported doctors at qualification; probably they never could. So, although we can expect core knowledge and skills from young doctors they must still acquire more training as they begin their postgraduate career

and when they become consultants or general practitioners. Therefore, from an early stage, the medical student must acquire techniques and habits of searching for new information, looking up necessary but forgotten information, and asking for help. We cannot but abhor memorisation of long lists of facts as a substitute for thinking and knowing where to look things up. We assume that elsewhere in the core curriculum there will be attention to the use of libraries, electronic databases, etc. In neurology, the students must be shown where specialist knowledge can be obtained and also encouraged to know their own limitations (which vary between individuals and with time) and therefore when to refer for specialist help, and how quickly.

6. Assessment

Both students and teachers expect some kind of assessment of whether core neurological knowledge has been imparted from the latter to the former. It is not for us to say whether such assessment is best organised continuously, or at the end of the core curriculum, or at the end of the medical course. However, we believe that the students must be able to:

1. Understand the basic principles of brain, spinal cord and peripheral nerve anatomy and function
2. Take a competent neurological history
3. Perform a basic neurological examination
4. Formulate diagnostic possibilities and a plan for further investigation
5. Discuss the nature, features and management of the common neurological disorders and emergencies

IMPLEMENTATION OF THE CORE CURRICULUM IN NEUROLOGY

The Association of British Neurologists cannot dictate exactly where the core curriculum is taught, by whom, for how much time, and during which part of the medical students' course. Such things depend on local medical school facilities, traditions and resources. In general, however, we have the following suggestions:

1. Each medical school states exactly what its core curriculum in basic neuroscience and clinical neurology is, as well as the aims and objectives of this curriculum (hopefully based on what we have proposed).
2. The core curriculum is developed by a group of basic neuroscientists and clinical neurologists aided by one or two senior medical students, a recently qualified general doctor, and a senior specialist not primarily concerned with neurology. A general practitioner would also be very helpful. Clinicians must be involved with the setting of the examinations, even in the basic neurosciences if these are to be examined separately from clinical neurology.
3. Each medical school should identify a single named person from the senior

membership of the Faculty of Medicine to be responsible for the core curriculum in basic neuroscience *and* clinical neurology *as well as* the examinations who might chair a "neurology" curriculum committee as constituted in (2) above.

4. On the whole a clinical problem solving approach works best and is the most enjoyable method for the taught and the teachers, even though this may mean bringing the basic neurosciences, neuropathology, neuro-epidemiology, clinical neuro-pharmacology and neurological rehabilitation to the bedside or seminar room. Such a problem-based learning approach with vertical integration between basic and clinical science is also emphasised by the GMC.
5. To complement clinicians being involved from the earliest stages of the core curriculum and the associated examinations, we believe that basic neuroscientists should be involved throughout the core curriculum until its latest stages. Naturally the emphasis will gradually shift from "mostly basic" to "mostly clinical" as the students progress from school leavers to doctors.
6. Basic neuroscience is ideally taught by basic neuroscientists and clinical neurology by neurologists and neurosurgeons. We do recognise, however, that the resources in some medical schools may be insufficient to fulfil this ideal.
7. The implementation of our suggestions will inevitably cut across departmental boundaries and might therefore lead to friction. However, we are encouraged by the fact that many medical schools now offer a neuroscience BSc course which transcends departmental boundaries, some medical schools are moving rapidly towards schools of neuroscience already, and the neuroscience research community tends to work across departmental boundaries.