



2006

Learning about Disorders of the Nervous System

*Recommendations for UK Medical
Undergraduate Education*

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Summary

- 1.** Medical students should learn about disorders of the nervous system (DNS) because they are common. These disorders (whether of brain, spinal cord, peripheral nervous system or muscle) account for up to one in eight consultations in general practice, one in five emergency medical hospital admissions and a high proportion of disability (particularly severe and progressive disability) in the population. Disorders of the nervous system are relevant not only to the clinical specialities of neurology and neurosurgery but also, inter alia, to psychiatry, general medicine, general practice, anaesthetics, radiology, pathology and clinical pharmacology.
- 2.** We recommend that students should have sufficient understanding of basic neurosciences to support learning about disorders of the nervous system (DNS) and the principles of their diagnosis and management.
- 3.** We recommend that students should take the full range of opportunities presented in a medical curriculum to learn about DNS. A multidisciplinary approach to learning should be encouraged and learning should be broadly linked to patient experiences, clinically relevant events and opportunities guided by appropriate neurologically trained staff.
- 4.** We recommend that the newly qualified doctor should have the skills to:
 - recognise what clinical events may indicate DNS
 - obtain, report and interpret an accurate history relating to DNS
 - carry out, report and interpret an appropriate neurological examination including that of the unconscious patient
 - formulate a differential diagnosis and implement appropriate monitoring, observation and early treatment in emergency situations
 - understand the nature of and indications (and contraindications) for common neurological investigations and the significance of important results
 - understand the key roles of other medical specialities and the multidisciplinary team in the management of DNS
- 5.** We recommend that the newly qualified doctor should have knowledge of:
 - basic neuroscience to support understanding of clinical practice and to provide opportunities to expand learning and research
 - major neurological symptoms
 - common and/or important neurological conditions and their management
 - common emergency problems and their management
 - common investigations and their role
 - principles underlying management of neurological disability including an understanding of the relationship between impairments, activity and participation
- 6.** We recommend that each medical school has an implementation strategy for learning about DNS with a clear clinical lead (usually though not exclusively from Clinical Neurology) to highlight and coordinate local learning opportunities in collaboration with other specialties and basic neuroscience disciplines.

2 Introduction

In 1994 the Association of British Neurologists set out its views on undergraduate medical education and neurology in a document entitled "Teaching Neurology in the 21st Century: Suggestions for UK Medical Schools planning their Core Curriculum".ⁱ The central message was the need for undergraduate courses to focus strictly on material directly relevant to newly qualified doctors as recommended by the General Medical Council and to adjust the balance of basic neuroscience to serve clinical need. The impetus for revising this document springs from developments both in clinical neurology and medical education.

Firstly, the last decade has seen a major expansion in understanding of how the brain functions, promoted by an ability to image healthy and disordered brain function, and by greater understanding of the genetics of neurological diseases.

Secondly, evidence-based treatments for DNS have proliferated, including disease modifying medications for previously untreatable disorders (for example stroke, multiple sclerosis, motor neuron disease, dementia), interventional radiological techniques and functional neurosurgery. There has also been a growing appreciation of the role of neurorehabilitation in the restoration of activity and participation best exemplified by the contribution of stroke units and a growing evidence base for neurorehabilitative techniques. Neurological symptoms and conditions are extremely common and account for about one in eight consultations in general practice and about 20% of acute medical emergency admissions. The prevalence of neurological disability is high in the community (about 2000/10⁵) and is often severe and/or progressive.ⁱⁱ

Thirdly, undergraduate medical education has evolved. Graduate entry schemes, emphasis on problem-based learning, self-selected study components and reflective self-reliance in learning are all features of modern curricula. Assessment methods more systematically test clinical skills and competencies, attitudes and conduct as well as core knowledge.

Finally, postgraduate training is in a process of transformation with the introduction of a two year Foundation Programme with a defined and evaluated curriculum followed by Basic and then Higher Specialist training, all accompanied by new learning and assessment methods.

The present document, like its predecessor, reaffirms and modifies core learning objectives for DNS (combining essential neurology, neurosurgery and neuro-rehabilitation). The philosophy remains:

- to highlight common, relevant and/or important disorders of the nervous system
- to emphasise that knowledge and understanding of the basic neurosciences is fundamental to understanding of disorders of the nervous system, to life-long learning and to research into improving outcomes for patients
- to emphasise opportunities for learning about clinical and basic neuroscience in greater depth beyond core material for some students
- to leave the details of how the curriculum should be delivered to individual medical schools guided and evaluated by the GMC
- to leave aside generic issues of medical education except where they have special reference to disorders of the nervous system

We recognise the close and important links and overlaps between the clinical specialties of Psychological Medicine/Psychiatry and Neurology in relation to both scientific understanding and clinical issues but do not attempt in this document to formally write a unitary curriculum.

3 Principles behind Core Curriculum

The curriculum suggests the knowledge and skills which a newly qualified doctor needs on entry to the Foundation Programme.ⁱⁱⁱ However, learning about DNS will also stimulate a deeper and more academic interest in some students who may wish to extend understanding through intercalated degree programmes and student selected learning components (SSCs) in basic or clinical neuroscience departments.

Students can learn about DNS through a wide range of opportunities throughout the curriculum and not just in a series of specified “blocks” or weeks devoted to “Neuroscience”. Thus DNS are likely to be experienced in general practice attachments, a range of hospital based attachments (Medicine, Paediatrics, Old age Medicine, Psychiatry, A&E etc.) as well as in specific neuroscience attachments, SSCs, project work and lectures. Every effort should be made to make learning opportunities progressive through the curriculum and at a level that the student can assimilate. Learning must be clinically focused, relevant and patient-based, avoiding the traditional pitfalls of an excessively detailed approach to neuro-anatomy and the neurological examination. The joint engagement of curricular organisers from clinical neurology and basic neurosciences is integral to this endeavour.

The curriculum must emphasise the central role of patients and their journey with a disorder of the nervous system, the role of the family and social environment and the roles played by a broad range of medical and health professionals. In addition curricular emphasis should be informed by an understanding of the public health and epidemiological aspects of DNS with emphasis on the common and/or important.

The curriculum assumes the principles laid out in the GMC document “Tomorrow’s Doctors”^{iv} and “Principles of Good Medical Education and Training”.^v

4 Five Parts of Core Curriculum

This section sets out suggested learning outcomes under the following headings:

- Scientific basis
- Clinical skills and understanding
- Core clinical knowledge
- Investigation and management
- Neurological disability

4.1 **Scientific basis**

Scientific background knowledge should be integrated with clinically relevant situations, centred round patients and viewed as a means to understand the diagnosis and management of DNS. The dynamic changes in the nervous system and its susceptibility to injury throughout life indicate that processes of development and aging should be included.

Learning outcomes

Know the:

- essential structures and functions of the brain with particular reference to consciousness, language and other cognitive functions, behaviour and mood, vision and hearing, breathing and swallowing, movement, sensation, and autonomic control
- processes and pathways which lead to voluntary muscle movement starting in the motor cortex including the corticobulbar and corticospinal pathways (upper motor neuron), the lower motor neuron, neuromuscular junction and muscle: the role of extrapyramidal systems including basal ganglia and cerebellum: the control of posture and reflex movement
- structure and function of the spinal cord with particular reference to movement, sensation and autonomic control (including sphincters, blood pressure and sexual function)
- cranial nerves, major nerve roots and main peripheral nerves (including major muscle groups innervated, dermatomal (root) and sensory nerve distributions)
- clinically relevant features of the skull and the vertebral column with particular attention to the anatomical relations of the cranial nerves, spinal cord and nerve roots to bony and soft tissue structures
- anatomical and physiological principles underlying the blood supply to and drainage from the brain and spinal cord
- broad pharmacological principles as applied to the brain and its milieu
- principles regulating intracranial pressure, cerebrospinal fluid formation and its constituents, circulatory pathways and reabsorption
- clinically relevant aspects of neural development and aging processes
- broad processes – pathological, physiological, genetic, metabolic, immunological – which result in disordered neural function; and relevant public health and epidemiology

4.2 Clinical skills and understanding

Learning outcomes

Be able to:

- obtain and communicate (in writing and verbally) an accurate history; understand when it may indicate a disorder of the nervous system; extend and amplify it appropriately by additional history from a witness or carer; for example in the context of loss of consciousness, confusional state or dementia
- perform, interpret and communicate (in writing and verbally) a basic neurological examination relevant to the clinical problem
- use history (especially the distribution of symptoms and their time course) and examination findings to suggest an anatomical or system localisation for a neurological problem and a differential diagnosis of common and/or important causes
- request appropriate initial investigations and initiate relevant observations, monitoring and early treatment in certain emergency situations
- understand the implications of diagnosing DNS for patients and their families particularly in the context of progressive and / or degenerative disorders
- understand the importance of effective and empathic communication of the diagnosis, the implications for the individuals within their social framework and relevant ethical considerations, especially those relating to consent and management

4.3 Core clinical knowledge

This is approached under overlapping headings.

A. Major neurological symptoms

Learning outcomes

Know the nature, mechanism and common causes of important presenting symptoms including:

- Headaches
- Blackouts & loss of consciousness (overlap with Cardiology)
- Dizziness & vertigo (overlap with ENT)
- Weakness
- Altered sensation
- Coma and brain death (overlap with ITU)
- Disordered cognition, mood and behaviour (overlap with Psychiatry)
- Visual problems (overlap with Ophthalmology)
- Speech problems
- Breathing and swallowing disorder (overlap with Respiratory & GI Med)
- Incontinence (overlap with Urology)

B. Common and/or important conditions

Learning outcomes

Basic knowledge of the principles of diagnosis, investigation, early management and (where appropriate) prevention of the following:

- Headaches (acute new headache, migraine, tension type headaches)
- Raised intracranial pressure and hydrocephalus

- Syncope, coma, brain death
- Epilepsy (including status epilepticus)
- Head injury (including common complications)
- Stroke (including subarachnoid haemorrhage)
- Dementia
- Meningitis and encephalitis
- Brain tumour
- Parkinsonism and movement disorders
- Multiple sclerosis
- Spinal cord and root dysfunction (including spinal cord compression)
- Peripheral neuropathy (including Guillain-Barré syndrome & common mononeuropathies)
- Neuromuscular disorders (including motor neuron disease, myasthenia gravis and myopathy)
- Functional symptoms as presentation of psychological disorder

C. *Emergency neurology*

In the context of expected roles in the Foundation Programme[#] special emphasis should be given to knowing and understanding causes and factors associated with the following:

- sudden loss of consciousness and coma
- epileptic seizures
- acute confusional state
- acute new headache

Additionally the principles of diagnosis and management relating to acute stroke, head injury and spinal cord (& cauda equina) compression should be understood.

4.4 Investigation and management

A. *Investigation*

Learning outcomes

Know the role of common investigations for DNS, who undertakes them, how they are requested and/or undertaken and how the results are evaluated: in particular knowledge and understanding of the following deserve emphasis:

- use of relevant blood/urine investigations especially in emergency neurology (4.3.c)
- CT and MRI brain scanning
- MRI scanning for spinal cord, root and some brain pathology
- lumbar puncture (including contraindications)

Understand the general purpose and role of the following investigations and what is entailed:

- electroencephalography
- electromyography and nerve conduction studies
- genetic investigations
- angiography
- brain, muscle and nerve biopsy

B. *Observation and ongoing monitoring*

Learning outcomes

Understand the importance of observing change in the status of patients with disorders of the nervous system particularly in relation to coma, confusional state or weakness. This should include knowledge of:

- Glasgow coma scale
- routine neurological and general observations
- respiratory (spirometry and blood gases) and swallowing evaluation in the paralysed patient
- the role of medical, nursing staff and allied health professionals
- the role of specific environments eg ITU to support this care

C. *Treatment*

Many DNS have specific treatments and all such disorders need to be managed

Learning outcomes

Know and understand the principles of treatment including:

- specific pharmacological interventions (eg epilepsy, meningitis, stroke)
- specific neurosurgical or radiological interventions (eg for intracranial mass or aneurysm)
- supportive treatments including management of ventilation, nutrition/feeding, bladder & bowel, circulation and skin management in the unconscious or paralysed patient
- contribution of nurses, dieticians, speech & language therapists, physiotherapists and occupational therapists in the acute care of the unconscious or disabled patient
- the role of rehabilitation in the management of the patient following an acute neurological disorder (eg stroke or head injury) or in the maintenance of ability in chronic neurological disease (eg multiple sclerosis)

4.5 Neurological disability

Learning outcomes

Appreciate the frequency of DNS in contributing to loss of activity and participation in the community including understanding of:

- the contribution of neurodevelopmental and learning disorder
- the impact of injury and acquired neurological disease (including persistent vegetative state) especially in younger age groups
- the impact of stroke and dementia especially in the older population

Understand the role of measurement and of common assessment tools (eg Barthel index, quality of life indices) in evaluating and monitoring impairment, activity and participation in neurological disorders.

Understand the importance of a team-based approach to people with long term neurological disorders whether the result of a single event (for example stroke, head injury, Guillain-Barré syndrome) or of progressive disease (for example dementia, Parkinson's disease, multiple sclerosis, motor neuron disease or muscular dystrophy).

5 Opportunities and Implementation

Opportunities

- A medical curriculum presents many opportunities to learn about DNS and to interact with people who have these disorders. Close liaison between clinical and basic science teachers is needed in organising curricula to maximise opportunities and to make students aware of them.
- Whether a problem-based learning or more traditional approach is used, people with DNS may be encountered by students as hospital inpatients, in stroke or rehabilitation units, as outpatients, in day units, in A&E or ITU departments, in GP surgeries, on home visits, at clinical demonstrations or on elective attachments. All present opportunities for learning especially when guidance from neurologically trained staff is available.
- In keeping with these principles a broad range of medical and non-medical disciplines can contribute to providing learning opportunities for students through various components of the curriculum provided that there are agreed aims and objectives. Apart from non clinical scientists these include clinical neurologists, neurosurgeons, neuropathologists, clinical neurophysiologists, neuroradiologists, acute physicians, ophthalmology, ENT, A&E teams, rehabilitation, elderly care and general internal medicine physicians, child health physicians, psychiatrists and general practitioners. Clinical (neuro) psychologists, clinical nurse specialists, allied health care professionals and many others can all potentially contribute to the learning process in a broad range of situations and approaches.
- The student should be encouraged to utilise and collate these experiences as part of a portfolio of knowledge and experience of DNS.

Implementation

- Learning to take neurological histories and carry out a neurological examination should be supervised by competent neurologically trained doctors.
- Total curricular provision and opportunities should reflect the importance of DNS as reflected by the fact that up to one in eight GP consultations, 20% of acute medical emergency admissions and a high proportion of community disability have a neurological basis.
- Medical Schools and NHS should work together to integrate a relevant and achievable learning and assessment process for DNS and make appropriate crosslinks with other relevant disciplines. Identification of a specific clinical neurologist (academic staff or NHS with appropriate honorary academic appointment) in the planning process is essential.
- Where medical schools have two courses such as a traditional five year course and a graduate entry programme we suggest that the syllabus and learning objectives are as similar as possible even if the learning and assessment methods differ.

Assessment

The assessment of core knowledge and skills related to DNS should be integral to all curricula. Students should be guided to undertake self-evaluation of their knowledge and skills of DNS as part of their own reflective development plan. Given the frequency of DNS in medical practice all students should anticipate the likelihood or certainty of formative and summative evaluations of their neuroscience knowledge and skills during their undergraduate training.

Skills' assessments should concentrate on students' ability to take and report a history, elicit and report appropriate signs, draw conclusions and understand aspects of early management of common and important disorders. Knowledge-based assessment has an important role in confirming the core knowledge, stimulating learning and in making explicit the standards expected and required for safe clinical practice.

References

- i *Teaching Neurology in the 21st Century: Suggestions for UK Medical Schools planning their Core Curriculum.* Association of British Neurologists (1994).
- ii *UK Neurology – the next ten years – putting the patient first.* ABN (2003).
<http://www.theabn.org/publications/ABNlist.php>
- iii *Curriculum for the Foundation Years in Postgraduate Education and Training*
<http://www.mmc.nhs.uk/pages/foundation/Curriculum> (2005).
- iv *Tomorrow's Doctors.* General Medical Council (2003).
http://www.gmc-uk.org/education/undergraduate/tomorrows_doctors.asp
- v *Principles of Good Medical Education and Training* (2005).
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This report was compiled on behalf of the Association of British Neurologists Council by the Training & Education Subcommittee (TESC).

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