Unit Descriptions & Required Resources

The BPNA distance learning course is made up of 12 Units, which may be studied as a whole course or as individual units. Undertaking the 'whole course' is recommended for paediatric neurology trainees. Individual units are recommended for paediatricians who wish to update their knowledge as part of their continuing professional development.

Below, please find a description of each Unit. We will provide all the papers you are required to read, however, some activities also require you to have access to additional resources, which are also listed.

Regarding the purchase of textbooks listed below – firstly check if your local paediatric neurology department has a copy that you can borrow. If you do need/wish to buy a copy, we have found that they are less expensive, and second hand copies are often available, at www.amazon.co.uk

For further information, please email diane@bpna.org.uk or telephone +44 (0) 1204 695958.
Applications forms are available to download at www.bpna.org.uk/distancelearning

UNIT 1: INTRODUCTORY UNIT

This unit is entitled 'Introductory Unit'. This unit starts with an introduction to how you learn, and how you might approach this Distance Learning programme. The remainder of the unit covers some broad principles which underpin the practice of paediatric neurology, including rehabilitation, imaging of the neurological system and genetics.

Contents

Resources required (no resources are required for Section 1):

Textbooks (contact your local paediatric neurology department for access):

- Evidence Based Medicine – How to practice and teach EBM. Sackett DL, Straus SE, Richardson WS, Rosenberg W and Haynes RB. Churchill Livingstone, 2000 ISBN-10 0702031275
- Harper, Practical Genetic Counselling 5th edition, 1998 ISBN-10 0340990694
- A clinical genetics textbook. There are a number of suitable books but these include:
  - ~ Emery's Elements of Medical Genetics. Robert F Mueller and Ian D Young, 10th Edition, Churchill Livingstone, 1998 ISBN—10 0702040436
  - ~ Thompson and Thompson Genetics in Medicine. Nussbaum, McInnes and Willard. 6th Edition, WB Saunders, 2001 ISBN-10 1416030808
  - ~ Medical Genetics. Jorde, Carey, Bamshad and White. 2nd Edition, Mosby 2000. ISBN-10 032053734
- A dysmorphology reference:
  - ~ Oxford Medical Databases: Dysmorphology and neurogenetics database and Gorlin, Cohen, Hennekam. Syndromes of the Head and Neck, 4th Edition, 2001
  - ~ *Although still widely used by paediatricians Smith: Recognizable Patterns of Human Malformation is much less useful and up to date.*
- Have access to the Oxford Medical Databases: Dysmorphology and neurogenetics database.
- Have access to: Jon M Aase: Diagnostic Dysmorphology 1990.

Visits:

- A local postgraduate/university library where you can receive training in the use of Medline.
- Arrange a visit to your radiology department to see the radiologist or senior radiographer.
- Arrange to meet with colleagues involved in rehabilitation in your hospital.
- Attend at least one genetics clinic with a paediatric or neurological focus (possibly a neurogenetics clinic).
- Access to a cytogeneticist at your local cytogenetics department.

Unit 2: Embryology, disorders of neuroembryogenesis, hydrocephalus and neonatal neurology

In this unit we shall be studying the biological processes involved in brain development. We shall then go on to see how environmental and genetic disorders may have an adverse effect on that process. We shall see how the neuroimaging and neurophysiology of newborns benefit initial assessment and how that relates to prognosis. Throughout the unit we shall reflect on how we might most effectively communicate our thoughts to the families involved.

Contents

1.	Development of the nervous system	8 hours
2.	Abnormal cerebral, cerebellar and spinal cord development and neurogenetics	9 hours
3.	Development abnormalities of cranio-facial structures to include craniostenosis and anomalies of the cranio-cervical junction	2.5 hours
4.	Origins and functions of glial cells, cerebral vascular and disorders of myelination; white matter injuries including periventricular leucomalacia (PVL)	6 hours
5.	Acquired injury in the third trimester: cranial haemorrhage, sinovenous thrombosis and foetal stroke	3 hours
6.	Neonatal encephalopathy	6 hours
7.	Neonatal seizures and neonatal EEG	3 hours
8.	Fetal and neonatal hydrocephalus	3 hours
9.	Intrauterine and neonatal infections	4.5 hours
10.	Neurological examination of preterm and full term infant	3 hours

Textbooks (contact your local paediatric neurology department for access):

- Clinical Neuroembryology: Edited by Hans ten Donkelaar, Martin Lammens and Akira Hori/ Springer-Verlag Berlin Heidelberg, 2006 ISBN-10 3642067115
  This textbook is available for purchase as an ebook at:
  http://www.springer.com/medicine/neurology/book/978-3-540-29140-4

Visits:

- Discussion with your radiologist

Case notes:

- Case notes of a baby with severe hyperbilirubinaemia

Unit 3: Development and Learning

This unit introduces the normal development of the central nervous system after the neonatal period and up until adult life. The relationship between this maturation and the behaviour observed in the infant and child is discussed. The unit then continues with coverage of the cellular mechanisms of learning and the effect of experience on synaptic plasticity. The remainder of the unit addresses the development of communication, motor skills and cognitive development and their associated specific disorders. The unit includes the broad principles of developmental assessment and intervention.

Contents

Textbooks (contact your local paediatric neurology department for access):

- Barkovich, AJ. *Normal Development of the Neonatal and Infant Brain, Skull and Spine.'* Paediatric Neuroimaging, Lippencott, Williams & Wilkins: Chapter 2, page 28-50
- Hall DMB and Elliman D. 'Health for all children', Fourth edition, 2003, OUP
- Textbook of Normal Infant and Child Development eg Illingworth RS. 'The Development of the Infant and Young Child: Normal and Abnormal' Churchill Livingstone Aug 1987
- Ireton H 1990. Developmental screening measures, in Developmental assessment in clinical child psychology. Eds. Johnson JH and Goldman J. Pergamon; Oxford and New York, page 97-8

Visits:

- Access to a Paediatric Neurosciences Radiology Session in order to participate in viewing and discussing scans
- Access to a clinical population of infants and children with acquired brain lesions and their follow up clinics
- Arrange to contact the lead health visitor, lead school nurse and lead paediatrician or general practitioner for child surveillance in your area to find out what screening and surveillance are carried out
- Arrange to observe a clinical or educational psychologist carrying out psychometric testing
- Opportunity to observe typically developing children between the ages of 9 months and 5 years
- Arrange to meet with Speech and Language Therapy colleagues and view some of their resources and observe an assessment of speech and language and a therapy session
- Arrange to observe the spontaneous movements of a preterm and a term infant in the Neonatal Unit
- Access to a Preterm Follow up Clinic would also be advantageous. You will need access to neonatal services to observe term and preterm infants' spontaneous movements
- Access to a hospital and Community Child Health Records Department.
- Access to either an Occupational Therapy or Physiotherapy Department where professionals treat children with DCD

- Arrange to meet with a colleague who undertakes assessments of visual perceptual and visuo-motor function in children
- Opportunity to hear a child who is learning to read
- Writing samples from a couple of typically developing children and a couple of children with neurological disorders
- Arrange to meet with colleagues involved in the identification and remediation of children with specific learning disorders. This will include representatives from the therapy professions allied to medicine including occupational therapy and speech and language therapy, educational psychologists and learning support and/or specialist teachers

Case notes:

- Case notes of a child from the clinic or from the medical records who has Moebius Syndrome
- Identify a child with aphasia following traumatic brain injury, either prospectively through your clinical contact or retrospectively from a set of medical case notes (2 star activity)
- Refer to a consultation of a 'bottom shuffling' infant in the clinic, or arrange to review a set of appropriate medical notes

Unit 4: Central motor deficits; congenital and acquired spinal cord disorders

This unit should help familiarise you with the commonest motor disorders of childhood and will take you through neural tube disorders, cerebral palsy and acquired motor dysfunction. For each disorder you will be taken through the case of a child, or several children, and you should try to identify similar cases in your own practice with which you have had personal involvement.

Contents

Textbooks (contact your local paediatric neurology department for access):

A basic textbook of neuroanatomy:

- Clinical Neuroanatomy made ridiculously simple. S Golberg. MedMaster Inc. 2003. ISBN 0940780577

or

- Neurophysiology and Neuropsychology of Motor Development. K Connolly & Hans Forssberg Editors Mc Keith Press 1997. *A good developmental physiology book.*
- Chapter 9 "Hypoxic-Ischemic Encephalopathy: Clinical Aspects" in Volpe JJ. Neurology of the Newborn 4th Ed. Saunders. Philadelphia 2001.
- Sullivan PB, Rosenbloom L. Feeding the disabled child. 1996. Clinics in Developmental Medicine No 140 Mac Keith Press.
- Communication without Speech: Practical AAC. Ed Helen Cockerill and Leslie Carroll-Few (2001).
- Clinical Pediatric Neurology. GM Fenichel. 4th edition. WB Saunders. ISBN 0721692346.
- Topical diagnosis in Neurology. Peter Duus. 3rd Edition. Thieme. ISBN 086577-711-X

Visits:

- Attend a feeding clinic or feeding assessment and discuss with a Speech and Language Therapist
- Your centre's local protocol on the management of the neuropathic bladder
- Your local neurosurgical practice with regards to the management of a high spina bifida

Case notes:

- Notes of a child with cerebellar lesion

Unit 5: Development and function of the peripheral nervous system and neuromuscular disorders

This unit covers the full spectrum of neuromuscular disease. It provides up to date information on how growing knowledge of molecular genetics has contributed to our rapidly expanding understanding of these disorders and changed diagnostic strategy. Access to a busy neuromuscular service will bear witness as to how this knowledge is put into practice and a number of sections are devoted specifically to intervention.

Contents:

1.	Muscular dystrophy classification, proteins and genes – multisystem involvement	3 hours
2.	A. Neurophysiology and imaging in neuromuscular disorders B. Dystrophin and Becker muscular dystrophy	3 hours
3.	Limb girdle muscular dystrophies, congenital muscular dystrophies and FSHD	4 hours
4.	A. Congenital myopathies B. Phenotype genotype correlations in muscular dystrophy and congenital myopathies	4 hours
5.	Inflammatory myophathies	3 hours
6.	Spinal Muscular Atrophy (SMA)	3 hours
7.	Neuropathies	3 hours
8.	Neuromuscular junction transmission defects The Childhood Myasthenias	3 hours
9.	Myotonic dystrophy	2 hours
10.	Metabolic and mitochondrial myopathies; Ion channel disorders; malignant hyperthermia susceptibility	6 hours
11.	The floppy infant syndrome	3 hours
12.	Physiotherapy, orthoses and rehabilitation	3 hours
13.	Respiratory complications of NMD	3 hours
14.	Cardiac involvement in NMD	3 hours
15.	Feeding difficulties, nutritional aspects – multidisciplinary management /MDC	2 hours

Textbooks (contact your local paediatric neurology department for access):

- Dubowitz V. Muscle Disorders in Childhood, 2nd edition. London: WB Saunders 1995 ISBN-10 0702014370
- Dubowitz V 1989. A Colour Atlas of Muscle Disorders in Childhood. Wolfe Medical Publications Ltd, London ISBN-10 081512967X
- Peripheral Neuropathy in Childhood. RA Ouvrier, JG McLeod, JD Pollard
- A standard paediatric neurology textbook such as Swaiman or Aicardi
- Dubowitz V. The Floppy Infant: Second Edition. 1980, Spastics International Medical Publications, London. ISBN-10 052141203X

Visits:

- Attend your local neuromuscular clinic where you can meet children with SMA
- Local Regional Genetics Laboratory

Case notes:

- Notes of a child with a metabolic myopathy
- The weight/height charts of six teenagers, (preferably aged 15 years +), with Duchenne muscular dystrophy
- Video fluoroscopic barium swallow of at least one child with SMA 2, oral congenital myopathy who has gastrostomy feeding
- Watch a video fluoroscopic barium swallow preferably on a child with neuromuscular disorder

Unit 6: Membranes, channels, epilepsy and paroxysmal disorders

In this Unit, you will study paroxysmal disorders. The largest group of conditions studied will be epileptic seizure disorders / the epilepsies. The overall aim is to provide you with an understanding of the physiological basis of seizure disorders and their epidemiology, along with the detailed clinical knowledge necessary to manage children with seizure disorders to an advanced (tertiary) level. At the end of the whole Unit you should be adept at using the International Diagnostic Scheme, be able to describe the electroclinical features of the different types of epileptic seizures, be able to identify common and not so common epilepsy syndromes and have a good knowledge of the various diseases and condition in which epileptic seizures may occur. You will consider the role of EEG, neuroimaging and other investigations in the evaluation of children with seizure disorders. A number of sections deal with treatment issues, including antiepileptic drugs, epilepsy surgery and less conventional / well established treatment modalities, such as vagal nerve stimulation. The effect of epilepsy on the individual, including co-morbidities will also be considered. Epileptic seizure disorders are often confused with non-epileptic paroxysmal disorders: you will review the differential diagnosis of paroxysmal disorders including the Headache Disorders of Childhood.

Contents

Textbooks (contact your local paediatric neurology department for access):

- Epilepsy in Children. Wallace SJ & Farrell K (eds). Arnold, London 2004 (thereafter referred to as Epilepsy in Children)
  BPNA can supply this as an ebook, please contact diane@bpna.org.uk

Visits:

- Attend paediatric EEG recordings
- You may wish to approach your local clinical neurophysiologist for further discussion of certain tasks

Case notes:

- See a child who has had a suspected epileptic seizure or seizures
- Case notes of a child with an epileptic encephalopathy

Unit 7: Cerebrovascular disease, trauma and coma

In this Unit you will be learning about some acute neurological conditions, namely coma, trauma and cerebrovascular disorders. All of these are extremely common conditions in neurological practice; hopefully you will find yourself better equipped to deal with them once you have worked through this Unit. We will start by going over some principles of anatomy and physiology relevant to both of these disorders and then consider the epidemiology, clinical features and management of each of these in turn. You will be referring back to the principles of brain imaging and rehabilitation covered in Unit 1.

Contents

Textbooks (contact your local paediatric neurology department for access):

- Paediatric Neurology, edited by EM Brett. Churchill Livingstone 1997 ISBN-10 044305200X
- British National Formulary or the RCPCH publication "Medicines for Children" – or your own nationally approved pharmacopoeia for children

Visits:

- Arrange a visit to your local intensive care unit
- Arrange a meeting with a neurophysiologist
- A 30 – 45 minute meeting with the 'designated doctor' or child protection lead in your hospital

Case notes:

- Case notes of a child who had treatment for an intracranial vascular malformation
- Case notes of an infant with diagnosis of NAHI
- Case notes of a child who sustained a traumatic brain injury (TBI) over 2 years ago (it would be even more valuable if you have managed to see the child and family, if possible)

Unit 8: Inflammation and infection of the nervous system

This unit explores the mechanisms of inflammation within the CNS, examining the role of the immune system in the control and modulation of infection and inflammation and the impact of immune dysregulation and immune deficiency. Infection processes are examined in detail to develop an in depth knowledge of meningitis, encephalitis, brain abscess as well as sections on specific pathogens which may be less common but very important including TB, HIV and prions. Prevention is better than cure so finally an overview considers immunisation, infection control and public health measures to prevent CNS related infection.

Contents

Textbooks (contact your local paediatric neurology department for access):

- The Childrens British National Formulary (http://bnfc.org/bnfc/) - you will need to register to use it – but it is free worldwide
- RCPCH Manual of Childhood Infections ("Blue Book"). Eds EG Davies et al. Pub.WB Saunders
- Forfar & Arneil's Textbook of Pediatrics or your favourite alternative
- Departmental guidelines on empiric meningitis treatment
- Neurology textbook
- Essential Immunology – Ivan Roitt, Blackwell Scientific publications (or other immunology text. Borrow, don't buy!)
- Pediatric Neurology – Principles and Practice. Swaiman, Ashwal. Mosby.
- The Green Book: Immunisations against Infectious Diseases (either hard copy or electronic version) http://www.dh.gov.uk/en/Publichealth/Healthprotection/Immunisation/Greenbook/DH_4097254
- RCPCH Manual of Childhood Infections
- British National Formulary (either hard copy or electronic version)

Case notes:

- Notes of a case with ADEM
- Notes of a case with acute encephalitis

Unit 9: Metabolic, Nutritional and Systemic Disease

Ultimately all conditions are metabolic. In this unit we shall concentrate on those disorders determined by primary metabolic disorders, an increasing number of which have been elucidated genetically. We shall learn how clinical acumen can increase the suspicion of a neurometabolic disorder. We shall consider the classification of these disorders and how that can help a rational approach to investigation. As usual we shall consider how information on these conditions, often complex can be relayed to the families involved.

Contents

Textbooks (contact your local paediatric neurology department for access):

It is ideal but not essential for you (and your department!) to have access to both the following texts. If not, do not worry.

- A clinical guide to inherited metabolic diseases, 3rd Edition. JTR Clarke, Cambridge University Press, Cambridge 2006. ISBN 13 978-0-521-61499-3 (also available as an eBook at the Cambridge University Press website)
  Or download at: http://www.4shared.com/office/XNeL8EOF/a_clinical_guide_to_inherited_.html

AND/OR

- Inborn metabolic diseases, diagnosis and treatment, 4th revised edition. Editors John Fernandes, Jean-Marie Saudubray, Georges van den Berghe, John H Walter. Springer Heidleberg, 2006. ISBN-10 3-540-28783-3
- Movement disorders in children. E Fernandez-Alvarez and J Aicardi. 2001 MacKeith Press, London. This is a book produced by the International Child Neurology Association.
- Your favourite general paediatric textbook is likely to be useful to look at specific points quickly.

Case Notes:

- You will also need to access to the case notes of two or three children who have a metabolic disease

Unit 10: Vision, hearing and their disorders

The first five sections are vision and the last 5 hearing. During these sections you will develop an understanding of the principles behind vision and visual disorders and their management and investigation. In the final 5 sections you will develop an understanding of hearing, its associated disorders and management.

Textbooks (contact your local paediatric neurology department for access):

- Paediatric Audiological Medicine Ed V Newton Whurr Publishers, London, 2002 ISBN-10 1861562284

Visits:

- Arrange to make a visit to your local Visual Impairment Service or teacher to see a child with Visual Impairment and discuss how they advise on management
- Visit to orthoptist and ophthalmologist to see some testing of visual function

Unit 11: Neuro-oncology

The unit starts with two sections which provide an overview of the epidemiology of central nervous system tumours in childhood and an introduction to tumour biology. The remainder of the unit is more clinically based. Four sections are devoted to the clinical effects of tumours and the methods we use for diagnosis and for surveillance following diagnosis. Four sections deal with management, the neuro-toxic effects of treatments and the late effects which are so important in young people with central nervous system tumours. Paraneoplastic syndromes, principally the Dancing Eye Syndrome, are covered in one section and the unit finishes with an overview of palliative care.

Contents:

1.	Epidemiology and pathogenesis of brain and spinal tumours	2 hours
2.	Tumour biology	2 hours
3.	Presentation and diagnosis of brain tumours	2 hours
4.	Radiological and clinical surveillance of brain and spinal tumours	2 hours
5.	Presentation and diagnosis of spinal cord tumours	2 hours
6.	Endocrine manifestations of brain tumours	2 hours
7.	Treatment pathways and surgical and radiotherapy management of patients with brain and spinal tumours	2 hours
8.	Chemotherapy in the management of patients with brain and spinal tumours and advances in oncological treatments	2 hours
9.	Neurotoxicity of oncological treatments	2 hours
10.	Late effects of tumours and their treatments	2 hours
11.	Paraneoplastic disorders in childhood and their immunological basis	2 hours
12.	Palliative treatment and symptom and pain control	2 hours

Textbooks (contact your local paediatric neurology department for access):

- Brain and Spinal Tumors of Childhood. DA Walker, G Perilongo, JAG Punt and RE Taylor (editors). Publishers: Arnold Publishers. 2004. ISBN 0 340 76260 8
- Neurological Differential Diagnosis by John Patten (Springer 1996, ISBN 3 540 19937 3) or any similar text
- Neurologic Complications of Cancer. Contemporary Neurology Series No.45. Jerome B Posner. F A Davis Company. 1995. ISBN 0-8036-0006-2

Case notes:

- Clinical information about 3 children with CNS tumours at their time of diagnosis
- Clinical information about one child with a spinal tumour at their time of diagnosis

Unit 12: Psychological Development, Psychiatric Disorder, Communication, Learning Disability and Service Networks

You will explore the two principal approaches to the classification of psychiatric disorders – the WHO ICD-10 and the American DSM-IV. The Unit will cover developmental psychology, learning disability (causes, genetics, classification, measurement, management), pervasive developmental disorders, childhood psychoses, depression, conduct disorders and disorders of attention. The Unit concludes with sections on Children's Rights and the ethical and legal issues surrounding consent and treatment, and an exploration of the consultation process and partnership working.

Content:

1.	Classification in psychiatry	1.5 hours
2.	Developmental psychology	3.5 hours
3.	Learning disability (i. Definition, classification and measurement; ii. Clinical features	7 hours
4.	Psychosis (i. Childhood depression; ii. Psychosis)	7 hours
5.	Pervasive development disorder	7 hours
6.	Other psychiatric disorders (i. Disorders of attention; ii. Conduct disorder and aggression)	7.5 hours
7.	Complex genetic learning disability syndromes (i. Non progressive syndromes; ii. Progressive syndromes)	6.5 hours
8.	Children's rights, consent and the legal framework	4 hours
9.	The consultation and partnership working	3 hours

Textbooks (contact your local paediatric neurology department for access):

- Access to DSM-IV and ICD-10 manuals. (If not immediately available in your local psychiatry or psychology departments, these are always available in medical school libraries)
- Chapters 5 and 6 from: Spreen, O & Strauss, E (2nd Ed). *A Compendium of Neuropsychological Tests.* Oxford: Oxford University Press
- O'Brien, G (Ed) (2002). *Behavioural Phenotypes in Clinical Practice*. London: Mac Keith Press
- A copy of the General Medical Councils 'Guide to Good Medical Practice.' This can be accessed at www.gmc-uk.org
- A copy of the UN Convention of the Rights of the Child. This can be accessed at: www.unicef.org/crc/crc.htm
- A copy of the Children's Act 1989. This can be assessed at: www.ntas.org.uk/childrenact.htm

Visits:

- Meeting with a Clinical Psychologist to observe an IQ Test being carried out, preferably on an individual with learning disability

OR

- Alternatively, ask a Clinical Psychologist if (s)he can give you some time to talk about the process of selecting an appropriate test of intelligence, and how this will be administered, and how the result will be interpreted: other facets to be explored carefully would be the various factors which affect performance on a given test, by a given child, at a given time
- Arrange a meeting with the complaints officer within your hospital

Case notes:

- Access to two recent clinical cases involving children with a psychiatric diagnosis
- You will need to refer to at least two children you have treated or seen treated:

~ ***Case 1:*** should be one in which serious life-threatening illness and/or death and the emotional reactions thereof have been an issue.

~ ***Case 2:*** should be one in which presenting physical problems were due to emotional disorder/depression in the affected child. Please be prepared to consider two such cases in some depth.

- Access the case, or case notes, of two children/adolescents on drug treatment for major psychotic illness. This will probably involve consultation with a child or adolescent psychiatrist, or adult psychiatrist with a case that has been in treatment from childhood.
- Access to a clinical case for assessment, either in person or by video. We recommend "Autism Awareness: A guide for Parents and People Working with Young Children to Help Detect Autism." (2000) Produced by PHAD, and narrated by Anne le Couteur.
- Access to two children (or to the case notes/clinicians treating two children); one with ADHD under treatment, and one who has been assessed and found not to have ADHD, having been referred to a clinician as a possible case of ADHD. This should be arranged either in consultation with a Child Psychiatrist or other specialist and/or your educational supervisor.
- Your own experience of childhood aggression (outside of clinical practice)
- Two cases where aggression or conduct disorder has been a feature of a case in child practice
- Access to either one of two films – Rain Man or Forrest Gump. *This is an optional Activity.*