SPECIALTY TRAINING CURRICULUM

FOR THE SUB SPECIALTY OF

METABOLIC MEDICINE

MAY 2007

Joint Royal Colleges of Physicians Training Board

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CURRICULUM IN THE SUBSPECIALTY OF METABOLIC MEDICINE

for either Acute Medicine or

Chemical Pathology NTN Holders

INTRODUCTION

Metabolic Medicine can be defined as a group of overlapping areas of clinical practice with common dependence on detailed understanding of basic biochemistry and metabolism. It therefore falls within the areas of expertise of both the physician and chemical pathologist. Other training programmes do not adequately meet all requirements, particularly with respect to nutritional disorders and adult patients with inborn errors of metabolism (IEM). The areas included are:

- Disorders of nutrition
- IEM
- Disorders of lipid metabolism and CV risk assessment
- Disorders of calcium metabolism and bone
- Diabetes

The award of CCT will require both evidence of satisfactory completion of training in either Acute Medicine (AM) (NB: General Internal Medicine (Acute) curriculum) or Chemical Pathology (CP) (which have their own curriculum) and completion of training in Metabolic Medicine as outlined in this curriculum.

The curriculum will be integrated with and is supported by the following documents to produce a co-ordinated training package:

- Specific curricula in either AM or CP
- A training and learning record including log book for AM or CP
- A training and learning record including log book for Metabolic Medicine

All examinations and assessments undertaken during training will be clearly linked to the content of the curriculum, and their reliability and validity will work towards complying with PMETB's *Principles for an Assessment System for Postgraduate Medical Training*.

While the successful trainees will have adequate skills in all areas, it is expected that they will develop additional experience in one or two areas towards the end of the training programme.

ENTRY REQUIREMENTS

- All applicants must have successfully completed foundation training and a period of core training (core medical training (CMT) or acute care common stem (ACCS)).
- All applicants must possess the MRCP Part 1 (UK or Ireland) and are required to obtain MRCP (UK) or (I) specialty training (or equivalent)
- Acceptance into Acute Medicine or Chemical Pathology training scheme.

DURATION OF TRAINING

Although this curriculum is competency based, the duration of training must meet the European minimum of 6 (six) years for post registration in full time training adjusted accordingly for flexible training (EU directive 93/16/EEC requires that flexible training can be no less than 50% whole time equivalent). The SAC has advised that training from ST1 will usually be completed in 6 (six) years in full time training

For Acute Medicine
The duration of training is determined by the time taken to achieve competencies, but at a minimum determined by the European Union of 6 years

For Chemical Pathology
The duration of training is determined by the time taken to achieve competencies, but at a minimum determined by the European Union of 7 years

CCT will be awarded following –

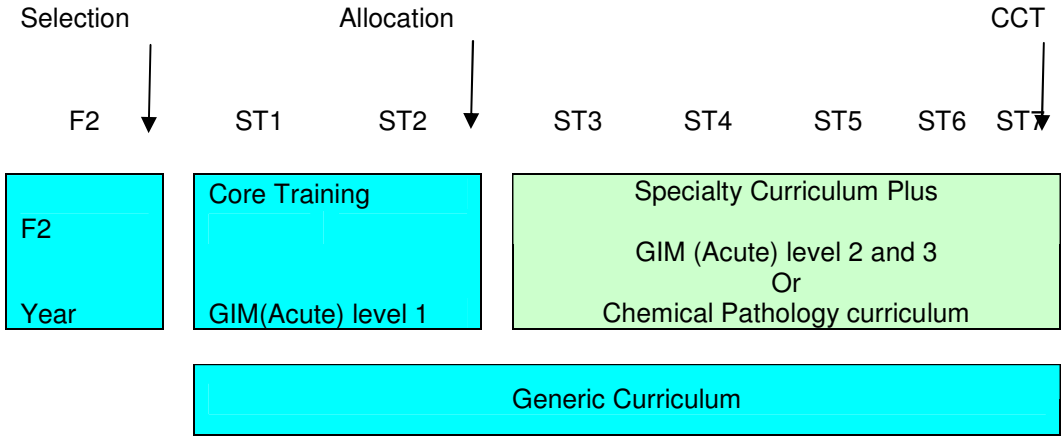
(1) Evidence of satisfactory completion of either the AM or CP curricula

(2) Demonstration at PYA that all areas have been covered or will be covered by the final year and written support that the latter took place from the Postgraduate Dean's office.

(3) Satisfactory completion of a short research project which has been written up and assessed as satisfactory by either the SAC Subcommittee in Metabolic Medicine for AM trainees or the dissertation element of the MRCPath examination for CP trainees.

Generic Curriculum

This specialty curriculum is complementary to the generic curriculum which applies to all 28 physicianly specialities. The generic curriculum follows the headings of good medical practice and runs through from core training to CCT (see fig 1). Trainees should read and understand both their specialty curriculum and the generic curriculum. Both curricula should be seen as integrated so that generic competencies are acquired at all stages of specialty training. Some generic components are also further expanded and deepened for some specialties (eg palliative medicine). When planning specialty programmes, deaneries and trainers should ensure that both specialty and generic competencies can be acquired and assessed.



FLEXIBLE TRAINING

'Flexible training' is the term used to describe doctors undertaking training on a less than full-time basis, normally between five and eight sessions per week. The aim of flexible training is to provide opportunities for doctors in the NHS who are unable to work full time. Doctors can apply for flexible training if they can provide evidence that "training on a full-time basis would not be practicable for well-founded individual reasons".

Flexible trainees must accept two important principles outlined in European law (Directive 93/16/EEC):

- Part-time training shall meet the same requirements (in depth and breadth) as full-time training.
- The total duration and quality of part-time training of specialists must be not less than those of a full-time trainee. In other words, a part-time trainee will have to complete the minimum training time for their specialty *pro rata*.

For SpRs, the regulations governing flexible training are outlined in section 6 of *A Guide to Specialist Registrar Training (1998).*

Trainees must have their flexible training approved by the JRCPTB (for AM) or RCPath (for CP) before beginning their flexible training.

RESEARCH

Trainees who wish to acquire extensive research competencies, in addition to those specified in the generic element of the curriculum, may undertake a research project as an ideal way of obtaining those competencies, all options can be considered including taking time out of programme to complete a specified project or research degree. Time out of programme needs prospective approval from the SAC and the support of the Postgraduate Dean. Funding will need to be identified for the duration of the research period. A maximum period of 3 years out of programme is allowed.

RATIONALE

The main objectives of the Metabolic Medicine curriculum is

1. to provide a scientific and clinical training for several areas of medicine which require greater knowledge of biochemistry, genetics and molecular biology than most organ-based specialities.

2. to develop the clinical training of Chemical Pathologists who wish to practice, predominantly on an outpatient basis, in these areas of medicine.

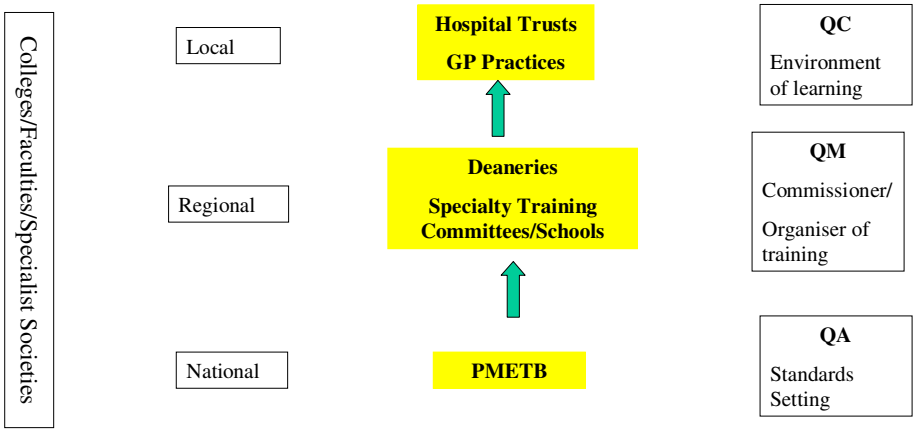
3. to support the academic progress and development of Metabolic Medicine.

This curriculum is set to the standards required by the JRCPTB or Royal College of Pathologists and PMETB to ensure that trainees are fully prepared to lead a specialist clinical service in any of the five areas.

Quality Management

Deaneries are responsible for quality management, PMETB will quality assure the deaneries and educational providers are responsible for local quality control, to be managed by the deaneries. The role of the Colleges in quality management remains important and will be delivered in partnership with the deaneries. The College role is one of quality review of deanery processes and this will take place within the SACs on a regular basis.

The Organisation and Quality Assurance of PG Training



CONTENT OF LEARNING

See pages 9 – 21 of this document for knowledge, skills and attitudes and behaviours.

GOOD MEDICAL PRACTICE

Aspects of Good Medical Practice headings can be found within the AM and CP curricula and trainees must acquire the competencies set out in the generic curriculum. Any trainee seeking entry onto the Specialist Register must fully comply with one of these curricula. Attitudes and Behaviours described on pages 8 – 20 encompass specific additional areas covered by GMP.

MODEL OF LEARNING

The educational programme provides:

- Experience of practical laboratory skills to understand the difficulties, variabilities and problems with diagnostic tests.
- Opportunity to gain knowledge of metabolic changes in diseases.
- Acquisition of lifelong habits of reading, literature searches, consultation with colleagues, attendance at scientific meetings, and the presentation of scientific work that are essential for continuing professional development (CPD).
- Experience of the practice of clinical governance and audit (specialist and multi-disciplinary) through evaluation of practice against the standards of evidence-based medicine, which underpin biochemistry practice.

The balance between practical laboratory and clinical training will be influenced by educational background, personal interests and guidance from supervisors.

- Training in communication skills, improvement in clinical diagnostic skills and teaching skills necessary for effective practice.

- Acquisition of clinical compliance in all five areas of Metabolic Medicine.

The award of Metabolic Medicine Subspecialty will indicate suitability for independent practice. During training, trainees will be able to use the curriculum to monitor their progress towards this goal. The curriculum will facilitate regular assessment of trainee's progress by trainee and their trainers.

SUPERVISION AND FEEDBACK

The trainees will have an educational supervisor who will review their work regularly with them. They will undergo formal RITA reviews and will need to complete a number of formal assessments.

Mini-CEX for each of the five sections must be undertaken. Multi source feedback (MSF) will be required in year 1 and before the penultimate year assessment (PYA.). Completion of MRCP(UK) or (I) will be required before the end of ST3 as an assessment of clinical skills.

For CP trainees, the acquisition of MRCPath is required as per CP curriculum.

EVIDENCE OF COMPETENCE

Detailed procedures and clinical exposure as observed by Clinical Supervisors and judged to be satisfactory will be recorded in the Trainee's log books. This will be used as evidence of satisfactory progress.

Level 1 is expected to be completed within the first half of the specific section and Level 2 by the completion of that section of training.

CURRICULUM DEVELOPMENT AND REVIEW

Curriculum review will be informed by a number of different processes. For instance the SAC will be able to use information gathered from specialty heads, specialty deans and the National Health Service. It will have available to it results of the trainee survey, which will include questions pertaining to their specialty. Interaction with the NHS will be particularly important to understand the performance of specialists within the NHS and feedback will be required as to the continuing need for that specialty as defined by the curriculum. It is likely that the NHS will have a view as to the balance between generalist and specialist skills, the development of generic competencies and, looking to the future, the need for additional specialist competencies and curricula.

EQUALITY AND DIVERSITY

In the exercise of these powers and responsibilities, the Royal Colleges of Physicians will comply, and ensure compliance, with the requirements of relevant legislation, such as the:

- Race Relations (Amendment) Act 2000;
- Disability Discrimination Act 1995 and Special Educational Needs and Disabilities Act 2001;
- The Disability Discrimination Act 1995 (amendment) (further and higher education) regulations 2006
- Age Discrimination Act in October 2006

The Federation of the Royal Colleges of Physicians believes that equality of opportunity is fundamental to the many and varied ways in which individuals become involved with the Colleges, either as members of staff and Officers, as advisers from the medical profession, as members of the Colleges' professional bodies or as doctors in training and examination candidates. Accordingly, it warmly welcomes contributors and applicants from as diverse a population as possible, and actively seeks to recruit people to all its activities regardless of race, religion, ethnic origin, disability, age, gender or sexual orientation.

Deanery quality assurance will ensure that each training programme complies with the equality and diversity standards in postgraduate medical training as set by PMETB.

Compliance with anti-discriminatory practice will be assured through:

- Monitoring of recruitment processes
- Ensuring all College representatives and Programme Directors have attended appropriate training sessions prior to appointment or within 12 months of taking up post
- Ensuring trainees have an appropriate, confidential and supportive route to report examples of inappropriate behaviour of a discriminatory nature
- Monitoring of College examinations

Ensuring all assessments discriminate on objective and appropriate criteria and do not unfairly disadvantage trainees because of gender, ethnicity, sexual orientation or disability (other than that which would make it impossible to practise safely as a physician). All efforts shall be made to ensure the participation of people with a disability in training.

STATUTORY RESPONSIBILITIES

The Royal Colleges of Physicians will comply, and ensure compliance, with the requirements of legislation, such as the:

- Human Rights Act 1998
- Freedom of Information Act 2001
- Data Protection Acts 1984 and 1998

ACKNOWLEDGEMENTS

Professor Alan Shenkin and the SAC Subcommittee in Metabolic Medicine.

SPECIALITY SPECIFIC CURRICULUM IN METABOLIC MEDICINE

Beyond that described in the G(I)M or CP curricula, this includes details of generic skills required in history taking, examination, forming a differential diagnosis and management plan, interacting with patients and record keeping skills.

All trainees will be expected to develop the theoretical and clinical competence to provide a service in any of these, with additional expertise in one or two areas. Where laboratory experience is required, trainees in AM will be expected to spend sufficient time in the laboratory as part of their structured weekly activities, to obtain a basic knowledge of relevant methods and their limitations, and more detailed knowledge of interpretation of results. Trainees in Chemical Pathology will integrate this into their programme of training in laboratory medicine.

LABORATORY TRAINING

All trainees in Metabolic Medicine will undertake a period of laboratory training in which they will become familiar with the laboratory techniques used in the investigation and monitoring of the various disease states included in the curriculum. They are required to undertake a project which would normally be laboratory based to acquire appropriate analytical skill.

AIM – to develop competence and limitations of relevant complex laboratory investigations

Basic Laboratory Training

	KNOWLEDGE	SKILLS	ATTITUDES & BEHAVIOUR
Competency Level 1	Gain knowledge of laboratory practice including Health & Safety and COSSH. Gain knowledge of biological and analytical variability. Knowledge of specimen collection, handling, transport and sample storage. Knowledge of common pre-analytical biological factors. Knowledge of Quality Assurance.	Assess risks inherent in a laboratory. Ability to calculate critical difference between two results. Assess unstable analytes and why specific handling is required. Assess patient's physiological status prior to testing. Assess what is appropriate analytical performance and concepts of precision and accuracy.	Maintain safe environment for other laboratory staff. Recognise that slight changes in result do not indicate significant differences. Recognise importance of working with the laboratory. Recognise importance of correctly timed samples. Recognise issues in rare tests with inter-laboratory comparability.
Competency Level 2	Spectrometry: visible, UV, *reflectance, bichromatic, derivative, linear diode array, infra red.* Turbidimetry, *nephelometry, densitometry, fluorimetry.* *Nuclear magnetic resonance.*	Experience of the application of some of these methods.	

	KNOWLEDGE	SKILLS	ATTITUDES & BEHAVIOUR
Competency Level 2 continued	Mass spectrometry. *Flame emission spectrometry.* Atomic absorption:		
Competency Level 2	POCT, especially Extra Laboratory Glucose Monitoring. Knowledge of POCT requirements. More complex metabolic tests.	Understand the limitations of methods in use within hospital. Ability to train other healthcare professionals in their use. Ability to interpret complex metabolic results while understanding the limitations of the methods.	Recognise limitations and risks from POCT. Appreciate the issues and interest that non-laboratory staff take to POCT testing.

2A. Objective: To assess and treat adult patients with obesity in Outpatient setting.

	KNOWLEDGE	SKILLS	ATTITUDES & BEHAVIOUR
Competency Level 1	Diagnosis of obesity. Investigation and classification. Knowledge of risk factors. Basic dietary and lifestyle advice and know when to refer to dietician.	Calculate BMI. Measure skinfold thickness, bioimpedance. Clinically assess complications and appropriate investigations. Practical experience of giving basic dietary advice.	Understand analytical and practical limitations of techniques. Re-assess risk factors over time to improve life expectation and decrease morbidity.
Competency Level 2	Knowledge of suitable drug therapies. Knowledge of role of surgical treatment. Knowledge of complications of obesity – Diabetes Mellitus +/- Hypertension +/- Hyperlipidaemia	Experience of supporting obese patients and initiating drug therapies. Experience of treating complications.	Working as part of multi-disciplinary team to address obesity. Show a willingness to provide explanation to patients as to rationale for investigations and treatments.

2B. Objective: Competent to assess and manage patients with malnutrition and prescribe nutritional support by enteral and IV routes on a short-term or long-term basis.

	KNOWLEDGE	SKILLS	ATTITUDES & BEHAVIOUR
Level 1	Assessment and management of nutritional support for protein-energy efficient status. Principles of parenteral and enteral feeding. Markers of nutritional status. Effects of starting TPN.	Prescribe nutritional support and care of patients with standard and long-term nutritional support. Appropriate use and care of equipment. Ability to confirm siting of nasogastric and nasojejunal tubes. Maintenance of central vein cannulas. Prescribing and review of short and long term monitoring.	Maximise the use of enteral route, whenever possible. Treat each patient as an individual. Appreciate the effects of chronic disease states on patients and their relatives
Level 2	Assessment of micronutrient and vitamin deficiencies and difficulties in interpretation during acute phase. Assessment in a variety of clinical scenarios, such as acute disease (e.g. stroke), chronic disease (e.g. inflammatory bowel disease) and surgery/severe trauma (e.g. ITU). Management of patients with excess fluid/electrolyte losses. Complications of nutritional support and their assessment.	Ability to clinically identify specific signs and assess risks based on underlying clinical condition. Exposure and experience in a number of areas. In depth understanding of assessment and management of fluid and electrolyte balance. Clinical and laboratory monitoring of patients preserving nutritional support	Direct appropriate investigations avoiding blanket screening. Work as part of a multi-disciplinary team. Educate other healthcare workers improving understanding. Developing leadership skills for the multi-disciplinary team.

3A. Objective: Competent to manage patients with common inherited metabolic disorders.

	KNOWLEDGE	SKILLS	ATTITUDES & BEHAVIOUR
Level 1	Principles of common disorders: Biochemical consequences of a primary enzyme block in a metabolic pathway and the way in which clinical and pathological signs may be produced. Understanding of the key issues in engaging "young people" during the transition from paediatric to adult services. Methods and monitoring of treatment.	Trainees are not expected to have in-depth knowledge of all Inherited Metabolic Defects but should be aware of the major categories; presentation, investigation, mechanisms of inheritance, scope of prenatal and newborn diagnosis, principles of treatment (coenzyme supplementation, enzyme inhibition, dietary manipulation.	Ability to collaborate with other professionals (paediatricians, nurses, dieticians) in investigation and management of patients. Ability to interact well with patients and relatives.
Level 2	Adult impact of common IEMs especially PKU Galactosaemia MCAD MSUD Homocysteinuria	Use of specialised dietary treatments and specific drug therapies. Able to counsel affected families and offer advice on prophylaxis and treatment. Working knowledge of prenatal diagnosis and odds-ratio assessment.	Demonstrate an understanding of the need for involving patients in decision. Ability to involve geneticists where appropriate.

3B **Objective**: Competent to assess patients with inherited metabolic disorders and seek appropriate treatment regimes.

	KNOWLEDGE	SKILLS	ATTITUDES & BEHAVIOUR
Level 1	Understanding of the causes of hypoglycaemia, hyperammonaemia, metabolic acidosis and encephalopathy.	Ability to direct appropriate investigations and interpret them. Understand the effect of IEM on routine biochemical tests. Ability to start acute treatment to manage these conditions while specific diagnosis is in progress.	Ability to support and work with others in the acute management. Sympathetic handling of acutely ill patients.
Level 2	Range of IEM affecting Intermediate metabolism e.g. urea cycle, Glycogen Storage Disorders Membrane transport e.g. Cystinuria Lysosomal metabolism e.g. Fabry Disease Peroxisomal metabolism e.g. Refsum's Disease Mitochondrial disorders Disorders of Metal Metabolism e.g. Haemochromatosis and Wilson's Disease Porphyrias	Experience of working in a metabolic laboratory and the range of tests and sources of information available. Experience of range of treatment options available and their potential problems e.g. ERT.	Ability to work in multi-disciplinary teams with biochemists, dieticians, pharmacists, etc.

4A **Objective**: Competent to manage patients with hyperlipidaemia.

	KNOWLEDGE	SKILLS	ATTITUDES & BEHAVIOUR
Level 1	Understanding of the metabolic basis of lipid metabolism and apolipoproteins in inherited and acquired hyper- and hypo-lipoproteinaemias.	Identify clinical features of genetic dyslipidaemias (xanthelasma, xanthoma-tendinous, eruptive and planar, corneal areas, lipaemia retinalis) and evidence of macro- and micro-vascular disease.	
Level 2	Understanding of the types of lipid disorder and their underlying aetiology Genetic counselling skills for affected families.	Diagnose the underlying aetiology Interpretation and critical appraisal of biochemical and genetic investigations for dyslipaemia. Aware of need to screen and offer support to other members of patient's family in th case of severe familial dyslipidaemia. Experience of using different lipid lowering agents alone or in combination.	

4B Objective: Competent to assess cardiovascular risk and institute appropriate management.

	KNOWLEDGE	SKILLS	ATTITUDES & BEHAVIOUR
Level 1	Physiological basis for atheroma, coronary heart disease and associated risk factors and diseases including chronic kidney disease and metabolic syndrome. Primary and secondary cardiovascular disease prevention. Current methods of calculating risk and their shortcomings. Pharmacology of lipid lowering agents.	Identify factors contributing to athero-sclerosis, including diabetes, obesity, renal disease, hypertension. Give appropriate basic dietetic advice and when to refer for specialist dietetic input.. Ability to combine agents and consider role of anti-obesity and anti-diabetic/insulin resistance lowering medication.	Ability to work in multi-disciplinary teams with biochemists, dieticians , etc. Appropriate safe prescribing .
Level 2	Assess cardiovascular risk taking into account risk factors as a whole as well as those related to lipid metabolism Investigation of hypertension. Complication of hypertension.	Ability to interpret additional risk factors and consider them in relation to standard CV risk factors. Assessment of hypertension including rare underlying causes and its complications. Role of drugs in reducing hypertension and how to combine them. Assessment of 24 hour BP monitoring.	

5A Objective: Competent in the metabolic management of patients with renal stones.

	KNOWLEDGE	SKILLS	ATTITUDES & BEHAVIOUR
Level 1	Normal renal clearance of metabolites. Pathogenesis of renal stone formation.	Interpretative skills of renal analytes and how pathophysiological processes alter them. Competent to manage patients with renal stones. Able to direct investigations and understand their limitations. Ability to implement appropriate treatments to prevent recurrence of renal stones.	

5B **Objective**: Competent to diagnose and manage patients with disorders of calcium, magnesium and phosphate.

	KNOWLEDGE	SKILLS	ATTITUDES & BEHAVIOUR
Level 1	Physiological basis of calcium, magnesium, phosphate Vitamin D and PTH. Pathophysiological processes which perturb these analytes. Hyper- and hypo-parathyroidism.	Ability to assess patients looking for features which give a diagnosis and direct investigations of patients.	
Level 2	Causes of hyper- and hypo-calcaemia: calcium sensor abnormalities. Hypo- and hyper-phosphataemia. Acute management of hypercalcaemia.	Ability to accurately investigate and diagnose calcium sensor abnormalities. Able to direct acute management.	

5C Objective: Competent to diagnose and manage patients with a range of bone disorders.

	KNOWLEDGE	SKILLS	ATTITUDES & BEHAVIOUR
Level 1	Bone cycle. Disorders of common bone conditions including osteomalacia and rickets. Osteoporosis. Paget's Disease. Range of therapeutic drugs which have a role in altering bone turnover.	Ability to assess patients identifying the severity and prognosis. Direct and interpret range of radiological and biochemical tests to assess bone disease. Choice of drugs and assessment of their effectiveness.	
Level 2	The range of osteogenesis imperfecta and how it influences adult life. Renal osteodystrophy. Bone turnover and different biochemical bone markers.		

6A **Objective**: Competent to manage patients with diabetes mellitus in an outpatient setting.

	KNOWLEDGE	SKILLS	ATTITUDES & BEHAVIOUR
Level 1	Classification of diabetes including diagnostic criteria for Diabetes, IGT, IFG Pathophysiology of diabetes: - Diabetes Mellitus Type I - Diabetes Mellitus Type II Principles of treatment of diabetes and monitoring of diabetic control - Glycated haemoglobin	Advise on the laboratory diagnosis, investigation and management. Distinguish between the various causes of diabetes. Assess comparison to DCCT measurement.	
Level 2	Basic dietary advice In depth knowledge of: - Oral hypoglycaemic agents - Insulin resistance altering therapies - Types of insulin and pens Understand the role of BP control, in particular Type II Diabetes Mellitus	Advise patients on the importance particularly in Type II Ability to institute appropriate treatment when dietetic failure. Ability to recognise the need for insulin treatment in diabetic patient. Ability to institute insulin therapy and advise on insulin dose adjustment. Provide lifestyle advice with regard to employment, driving, exercise, weight control and smoking. Monitor and increase anti-hypertensive therapy (often by combination) to ensure adequate BP control.	Work as part of a multi-disciplinary team. Appropriate safe prescribing Treat each patient as an individual. Work empathetically with patients appreciating their social expectations and difficulties in fully complying with lifestyle changes. Appropriate safe prescribing

6B Objective: Competent in assessing, treating or referring complication of Diabetes Mellitus

	KNOWLEDGE	SKILLS	ATTITUDES & BEHAVIOUR
Level 1	Complications of Diabetes Mellitus and the need for regular screening. Knowledge of cardiovascular risk.	Screen for macro- and micro-vascular complications by means of clinical examination and investigations. Interpret results of screening micro albuminuria, retinal photographs. Maximise improvement in CVR by lipid lowering, and hypertensive and diabetic therapies.	
Level 2	Pathophysiology cataract and retinal disease. Pathophysiology of nephropathy. Pathophysiology of vascular disease and neurological status of the lower limit.	Diagnose proliferative retinopathy and advance eye disease and when to refer for ophthalmological assessment. Advise patients about complications. Assess proteinuria and implement anti hypertension therapy. Recognise and manage the different types of diabetes neuropathy. Assess vascular supply and neurological status of the lower limb. Identify patients at risk of foot problems and advise them on how to prevent this. Supervise care of the patient with foot problems in multi-disciplinary setting.	Work with ophthalmologists to ensure that correct group is referred. Work with others, particularly Diabetes Nurse Specialists, Podiatrists, Surgeons in avoiding and managing foot problems.