**CURRICULUM OBJECTIVES FOR CHEMICAL PATHOLOGY/METABOLIC MEDICINE (HEENW)**

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| **COMPETENCIES TO BE ACHIEVED DURING TRAINING** |  **Achieving competencies** |
| **CLINICAL GOVERNANCE AND AUDIT COMPETENCIES*** To gain knowledge of the lines of accountability, quality improvement programmes, clinical audit, evidence-based practice, clinical standards and guidelines, managing risk and quality assurance programmes. Recognise roles, responsibility and accountability. Participate in risk assessment. Monitory/report adverse events.
* Discuss workload compared with national standards, clarity of lines of responsibility and accountability in pathology, communications within and outside the department. Identify availability and adherence to agreed protocols for investigations of common conditions.
* Discuss turnaround time, complaint analysis with lesson learning and corrective action taken, out-of-hours service. Make patient care the prime concern. Share best practice with others. Learn from mistakes and complaints. Maintain probity in clinical and laboratory practice.

***Clinical audit**** Discuss clinical effectiveness and audit:
* concept of systematic reviews and evidence-based medicine
* role of audit in the hospital
* audit cycle
* Participation in regular clinical audit, within and between departments, at the interface with primary care and at regional level.
* Discuss philosophy of clinical effectiveness: role of clinical audit in achieving this, methods of clinical audit in healthcare. Plan, undertake, report, and present audits at multidisciplinary audit meetings and the follow up.
* Use audit to gather evidence provided by formal review of practices and clinical performance that quality requirements and the needs of governance are being met.
* Recognise the benefit of audit to clinical care and the multidisciplinary nature of clinical audit.
* Understanding that clinical audit:
* provides the evidence
* indicates change needed
* Highlights the resources required.

**Outline the principles of clinical governance, clinical risk and clinical audit including the audit cycle** | *Attending the quality and clinical governance departmental meetings**Participating and presentation of audits**Undertake at least one audit project. Discuss the benefit of audit to clinical care**Attendance at audit meetings in the department, other disciplines where appropriate, and possibly regional and national audit meetings**Taking responsibility for an audit* |
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| **CHEMICAL PATHOLOGY OF DISEASE*** To relate understanding of normal human biochemistry and physiology to the clinical biochemistry of screening, diagnosis and monitoring of disease. Should be fully conversant with generic aspects.
* Knowledge of the pharmacology of the therapeutic agents required in management.
* Molecular biology to identify genetic disorders.
* Biological variability:Discuss the setting up and maintenance of reference values and population statistics:
* Liver disease, function, diagnosis and testing
* Gastrointestinal tract disease, function, diagnosis and testing
* Urogenital tract disease (including renal), function, diagnosis and testing.
* Gas transport and H+ metabolism
* Water and electrolytes
* Proteins, basic science, disease and testing
* Lipids and Cardiovascular system
* Diabetes mellitus and glucose.
* Endocrinology: adult and paediatric.
* Calcium, magnesium, bone
* Nutrition
* Haemoglobin and porphyrins
* Enzymology
* Genetics and molecular biology
* Pregnancy
* Newborn
* Childhood
* Inherited metabolic disorders
* Neuromuscular system
* Cancer
* Metabolic response to insults.
* Therapeutic drug monitoring and toxicology
* Advise on the appropriate use and interpretation of the results of the laboratory investigations in screening for disease, to establish (differential) diagnosis, to monitor progress and treatment.
* Liaise and communicate clearly with colleagues and other clinical teams in primary and secondary care both verbally and via clinic letters.
* Act as an effective interface between laboratory and clinical staff, as part of team.
* Interact effectively with members of multidisciplinary teams in hospital, GP and community.
 | *Attending the PGCert (postgraduate certificate in advanced clinical biochemistry) course in Manchester**Attending the departmental or regional teaching programme* *Developing communication skills with clinicians, patients and colleagues* |
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| **INTERPRETATION OF LABORATORY DATA*** Develop ability to advice on the interpretation of laboratory results in diagnosis, treatment and monitoring of patients.
* To attain a level of knowledge of clinical practice, giving the ability to conduct a dialogue with clinical colleagues, confidently and competently, in relation to:
* appropriate selection of tests
* interpretation of their results
* initiation of further investigation based on these results
 | *Interpretation of laboratory results in relation to clinical diseases**Laboratory reporting* *Giving clinical advise on management of biochemical abnormalities in patients* |
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| **COMPETENCIES IN RESEARCH AND DEVELOPMENT*** Gain experience in research and development to develop skills in independent and team-driven problem solving, critical assessment of published work and for gaining analytical expertise.
* All trainees to undertake at least one research project during their first three years of training. The project should be consistent with the research and development programme of the laboratory or hospital and should be sufficiently novel and timely to be suitable for presentation at a scientific meeting and publication in a peer-reviewed journal.
* Formulate research questions and develop appropriate experimental design.
* Undertake analytically and clinically based research and/or development projects.
* Design, cost, undertake and evaluate experiments.
* Troubleshoot methods, make appropriate modifications and test for validity.
* Use appropriate statistics for clinical and laboratory practice.
* Write reports.
* Obtain consent for the use of patient samples in research.
* Maintain a questioning and critical approach to all aspects.
* Maintenance of probity in research.
* Maintain an enquiring attitude.

***Outlines the principles of critical review*** * Critically review and appraise the literature.
* Assess the validity of data, experimental design and problem solving techniques.
* Implement evidence-based clinical biochemistry.
* Use library and IT facilities.
* Use evidence-based medicine in support of patient care.
* Outline data handling and statistical methods

***Summarise the place of research and development in the NHS**** Summarise the processes for application for grants to support research projects.
* Write at least one local research and ethics committee (LREC) submission for a project approval.
* Awareness of the opportunities for research.
 | *Research for a higher degree or for a dissertation for the Part 2 examination may be initiated during this period**Writing research protocol, ethics approval, developing analytical methodology* *Presentation of research hypothesis in departmental meeting**Attending journal clubs to develop the understanding of critically appraising the literature**Outline research presentation skills**Produce work of publishable quality**Present a poster and publish a paper in a peer reviewed journal* |
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| **DIRECT PATIENT CARE*****Generic aspects of clinical management***Become competent in the generic and communication skills required for assessment and treatment of patients, referred for a specialist biochemical opinion within an outpatient setting. Trainees should be competent in at least two of the clinical modalities, and would be expected to have had at least the same clinical experience in these areas as those trainees in chemical pathology/metabolic medicine.**Educate patients about their disease, investigations, lifestyle, treatment*****Calcium and metabolic bone disorders*****Objective:** competent to diagnose and manage patients with disorders of calcium and bone metabolism.***Diabetes mellitus*****Objective:** competent to manage patients with diabetes mellitus. ***Inherited metabolic disorders*****Objective:** competent to manage patients with inherited metabolic disorders.***Lipidology and cardiovascular risk assessment*****Objective:** competent to manage patients with lipids and cardiovascular risk assessment. ***Nutrition*****Objectives:** competent to manage patients with nutritional disorders. ***Renal stone disease*****Objective:** competent in the metabolic management of patients with renal stones.***Thyroid disease*****Objective:** competent to manage patients with thyroid disease. | *Managing patients in clinics:**Bone Metabolism* *Lipid disorders**Renal stone metabolism**CVS diseases and prevention(weight management clinics)**Management of adult patients with inborn errors* *Understanding of paediatric biochemistry* *Participating in the multidisciplinary hospital nutrition support team meetings* *Presentation of cases in departmental meetings**Participating in diabetes/Endocrinology clinics*  |
| **LABORATORY MANAGEMENT COMPETENCIES** * To develop skills to take independent responsibility for the direction and management of the service (request/report cycle) including, Request initiation, specimen transport and what contributes to error, Organisation of the analytical and reporting process, the structure and organisation of the NHS, where decision making occurs, process of change and ways of influencing decisions.
* Discuss business planning, finance, financial control, and costing, pricing, contracting, purchasing, resource management.
* Identify practical aspects of personnel management, industrial relations, team building, staff training, motivation, continuing education, appraisal, dealing with problems, colleagues.
* Describe how to apply the concepts of accreditation, e.g. CPA, good laboratory practice
* Outline legal requirements and Department of Health guidance.
* Discuss multidisciplinary working patterns.
* Report experience and training in reception.
* Appreciates the place of laboratory automation and IT.
* Explain mentoring and supervision relative to personal and professional development, prioritising work, time management, delegation, planning, staff motivation.
* Appreciate that compliance with CPA standards ensures that training facilities are adequate.

**Quality assurance** * Discuss how to control the quality of a method
* Describe internal quality control programmes and quality control rules.
* Outline external quality assurance programmes.
* Discuss laboratory accreditation.
* Interpret quality control/quality assurance data and advise on subsequent course of action.
* Act as or assist laboratory quality control officer and attend laboratory quality control meetings.
* Report how QC and QA apply to point of-care testing.
 | Participation in departmentallaboratory meetingsDeveloping skills of method evaluation and business evaluationParticipation in hospital/laboratory protocols or guidelines*Attend management course training**Shadow senior departmental staff involved in business planning, writing business case, contracting, finance and resource management.**Participate in departmental staff appraisal programme, using appraisal to develop skills**Attend departmental management meetings**Undertake accreditation review of a section of the laboratory.**Establish rapport, respect and understanding with laboratory staff.**Show respect for others’ opinions.*Participating in the quality assurance programme of the department |
| **Health and safety*** Describe the principles of Health and safety and COSHH.
* Discuss individual and collective responsibility.
* Outline the handling of potentially infectious samples and noxious chemicals.
* Describe radiation protection measures.
* Outline mechanical, fire and electrical safety.
* Discuss how to deal with an accident.
* Outline current safety guidelines.
* Attend laboratory safety committee meetings.
* Observe safe working practices.
 | Understanding hospital and departmental health and safety issues |
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| **Selection of analytical equipment and IT*** Discuss how to specify and evaluate an analytical system.
* Outline financial issues relating to analyser installation (capital purchase, reagent rental, competitive tendering)
* Outline the role of IT in delivery and management of service
* Describe the stages in producing results and problems with turnaround time.
* Outline the principles of instrument interfaces, and links to other computers.
* Describe reporting/authorisation procedures.
* Outline the problems of patient identification and methods of ensuring accuracy.
* Report how management statistics are compiled and reported.
* Outline the data protection act
* Discuss retention of records.
* Review pathology services
* Describe the Freedom of Information act
* Report on the effects of IT on all aspects of clinical biochemistry/clinical biochemistry
* Explain the principles of effective negotiation, influencing colleagues.
* Resolve technical, scientific, clinical and management problems through leadership skills and promoting morale
* Work within a team, communicating with clinical, managerial and other health care staff
* Report conflict resolution
* Involve patients, staff, and colleagues in decision making
 | *Participate in the local process**Participation in laboratory management meetings**Participation in regional management meetings**Prepare, present, and explain scientific reviews/data/findings, both orally and in writing.* |
| **Teaching experience*** Evidence of understanding of principles of adult education
* Evidence of participation in teaching e.g. medical students and laboratory staff
* Evidence of on-going evaluated participation in teaching and of implementation of the principles of adult education.
 | Participating in undergraduate and hospital teaching programme |
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| **Out of Hours experience** | Giving advice to clinicians on abnormal biochemistry results |
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