The Royal College of Pathologists
Pathology: the science behind the cure

UPDATED 2010 CURRICULUM FOR SPECIALTY TRAINING IN MEDICAL VIROLOGY

(Transitional curriculum for trainees unable to transfer to the 2014 medical virology curriculum)

4 November 2014

Contents

INTRODUCTION

Medical virology in the UK encompasses both practical laboratory and clinical skills. The award of the Certificate of Completion of Training (CCT) or the Certificate of Eligibility for Specialist Registration (CESR) through the Combined Programme (CP) route will require evidence of satisfactory completion of the core aspects of medical virology, which are outlined in this curriculum. Doctors who are applying for entry to the Specialist Register via the award of a Certificate of Eligibility for Specialist Registration (CESR) will be evaluated against all aspects of the curriculum

The curriculum and assessment system meets the General Medical Council's (GMC) Standards for Curricula and Assessment Systems (April 2010). In addition, the curriculum complies with the training framework *A Reference Guide for Postgraduate Specialty Training in the UK*.

For trainees with an NTN or NTN(A) in an approved UK training programme, the curriculum is integrated with and supported by the following documents in order to produce a coordinated training package for the award of the CCT. The relevant package includes:

- a blueprint for the medical virology assessment system (this demonstrates how the College assessments and examinations test the structure of the medical virology curriculum).
- regulations and guidelines for workplace-based assessment including multi-source feedback
- regulations and guidelines for the Fellowship examinations
- Annual Review of Competence Progression (ARCP) guidance

Doctors applying for a CESR in medical virology must be able to demonstrate equivalence to the requirements for the award of a medical virology CCT. Such doctors are strongly advised to read the information available on the GMC website. In addition, the following guidance is available from the College and should also be carefully followed in the preparation of a CESR application:

- general guidance on evidence to submit with applications for a CESR in medical virology (specialty-specific guidance)
- guidance for CESR applicants in specialties and subspecialties overseen by The Royal College of Pathologists
- CESR curriculum vitae guidance.

1. RATIONALE

a. Purpose of the curriculum

The purpose of the curriculum for specialty training in medical virology is to set the standards required by The Royal College of Pathologists and GMC for attainment of the award of the CCT or CESR(CP) in medical virology and to ensure that trainees are fully prepared to lead a full medical virology service at consultant level in the National Health Service (NHS). In addition, the curriculum also sets the standards against which CESR applicants will be judged.

The curriculum provides for:

- a broad understanding of the diagnosis and management of infectious disease from a clinical and laboratory perspective
- the diagnostic techniques required in the practice of clinical virology and where relevant microbiology
- understanding of the areas of clinical microbiology and medical virology detailed in the curriculum
- knowledge of specialist areas in medical virology; including infection control, medical

microbiology and public health to a level dependent on the background and career aspirations of the trainee and enabling their ability to provide a specialist opinion within areas of competency, as appropriate
- the communication skills required for the practice of medical virology and the teaching skills necessary for effective practice
- the acquisition of management skills required in the running of the virology or microbiology laboratory
- knowledge of the health protection aspects of medical virology and clinical microbiology
- experience of research and development projects including critical assessment of published work so as to contribute as an individual and as a team member to the development of the service
- the acquisition of life-long habits underpinning professional development including scientific reading, literature searches, consultation with colleagues, attendance at scientific meetings and presentation of scientific work experience of the practice of clinical governance and audit (specialist and multidisciplinary) through evaluation of practice against the standards of evidence-based medicine, which underpin medical virology practice.

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

Clinical governance is defined by the Department of Health as, “a framework through which NHS organisations are accountable for continuously improving the quality of their services and safeguarding high standards of care, by creating an environment in which excellence in clinical care will flourish.” In medical virology, trainees must acquire knowledge of the lines of accountability, quality improvement programmes, clinical audit, evidence-based practice, clinical standards and guidelines, managing risk and quality assurance programmes. Training in these areas must continue throughout all stages of the curriculum.

The award of the CCT or CESR(CP) will indicate suitability for independent professional practice as a consultant in medical virology. During training, trainees will be able to use the curriculum to monitor their progress towards this goal. Formal assessments and examinations will be based on curricular objectives. The curriculum will facilitate regular assessment of trainees’ progress by trainees and their educational supervisor(s).

b. Stages of training and learning

There are two main stages in the specialty curriculum; general medical microbiology and virology training (ST1 and ST2) and Higher Specialty Training (ST3 – ST5).

The general common competencies should be acquired during their entire training period as well as all the competences of the general medical microbiology and virology and higher specialty training.

Trainees may progress to higher specialty training subject to satisfactory ARCP. Trainees would normally have be expected to have passed the FRCPath Part 1 examination before progression.

The trainees Educational Supervisor will provide guidance on when a trainee should move between stages.

To obtain and maintain a licence to practise the principles and values set out in Good Medical Practice (GMP) (www.gmc-uk.org/gmp2013) must be followed. GMP is set out to cover the following domains:

Domain 1 – Knowledge, Skills and Performance
Domain 2 – Safety and Quality
Domain 3 – Communication, Partnership and Teamwork
Domain 4 – Maintaining Trust

The "GMP" column in the curriculum defines which of the four domains of the GMP Framework for Appraisal and Revalidation are addressed by each competency. Most parts of the curriculum relate to "Knowledge, Skills and Performance" but some parts will also relate to other domains.

The "Assessment Methods" shown are those that are appropriate as **possible** methods that could be used to assess each competency. It is not expected that all competencies will be assessed and that where they are assessed not every method will be used. "GMP" defines which of the four domains of the GMP Framework for Appraisal and Revalidation are addressed by each competency. See above for more details.

i. General medical microbiology and virology

The General medical microbiology and virology curriculum has been designed to provide trainees with basic but comprehensive training in medical microbiology, medical virology, infection prevention and control and infectious diseases over a two year training period.

This section has also been designed to reflect the modernisation of UK microbiology and virology laboratory services and the need to train infection specialists with a sound knowledge of both clinical and laboratory practice.

It is recognised that different training programmes may allow trainees to acquire the appropriate competencies within different settings according to local availability of experiences and teaching. The aim of this section is to produce a doctor who is familiar with laboratory practice in the diagnosis of infection as well as the clinical presentations and management of infections.

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ii. Higher Specialty Training in medical virology

The Higher Specialty Training section of the curriculum in medical virology builds on the earlier general section, and is designed to provide trainees with advanced training in medical virology, in order to enable them to practise independently as consultants in this specialty.

Like the previous section, it recognises the changing nature of medical virology services, especially:

- a trend towards laboratory centralisation and increasing automation
- an increasing trend for virological/serological testing to be carried out in nonspecialist laboratories, with the consequent need for specialist Virology oversight of relevant serology and molecular services especially where tests are carried out on platforms shared with other Pathology disciplines
- increasing clinical involvement of Medical Virologists including provision of a 24-hour service, ward consults, expertise in use of antiviral agents, and direct management of patient care especially those with HIV infection and chronic viral hepatitis.

Although Virology has a separate CCT, many hospitals do not have a separate virology service and will require support from a specialist virologist.

In order to achieve the competencies required for the Higher Specialist Curriculum, training programmes will need to be carefully designed, and some flexibility may be required, with secondment to other specialties, or specialist centres, if appropriate. The precise structure of the programme will depend on local circumstances. For example because specialist medical virology services often provide diagnostic services for a range of bacteria, fungi and parasites, medical virologists, depending upon their career plans, may wish to become familiar with such organisms.

c. Training programmes

Training programmes will be quality assured by the GMC and training posts and programmes will be recommended for approval by the relevant Local Education and Training Boards (LETBs) in England and Postgraduate Deanery (in Scotland, Northern Ireland and Wales) with input from The Royal College of Pathologists.

The laboratory training period will include a formal induction into good laboratory practice in the diagnosis and management of infection as well as with the clinical presentations and management of infections. There will also be an introduction to the management and organisational structures within which the virology service operates. It will be important for trainees to understand, at an early stage, the pathology and public health environments on which the diagnosis, prevention and control of infection depends, and the multidisciplinary nature of this environment. Following the induction period, the trainee will receive instruction and practical experience in further aspects of bacteriology, virology, mycology and parasitology, both laboratory and clinical. The emphasis will be on acquiring basic microbiological and virological knowledge and practical bench skills in a routine laboratory and clinical setting. As the trainee progresses through training, they will continue to broaden their experience and understanding of common infectious problems and their management. The knowledge gained during ST1 and ST2 will be assessed by the FRCPath Part 1 examination.

The knowledge gained during this stage of training at ST1 and ST2 level will be assessed by the FRCPath Part 1 examination. Medical microbiology trainees should normally undertake 6–12 months training in virology, at least 1 month of which should take place before the FRCPath Part 1 examination. The delivery of this virology training is a local matter. Medical virology trainees should normally undertake at least 6 months training in medical microbiology, at least 2 months of which should take place before the FRCPath Part 1 examination. The delivery of this medical microbiology training is a local matter.

The trainee entering higher specialty training in medical virology will have a sound theoretical and practical knowledge of virological practice but will not have had a great deal of unsupervised experience in applying that knowledge. Higher specialty training is thus devoted to acquiring self-sufficiency in the specialty during this period. The medical virology trainee will be expected to have specific training in infection control and prevention, virology, epidemiology and public health/health protection medicine and will need a broad experience of medical virology training as it is practised in any NHS setting; additional training in microbiology including mycology and parasitology should also be available.

The structure and operation of the training programme is the responsibility of a Specialty Training Committee (STC), which will ensure that every trainee is provided with an

appropriate range of educational experience to complete their training.

The local Training Programme Director (TPD) is responsible for the overall progress of the trainee and supported by educational supervisors, will ensure that the trainee satisfactorily covers the entire curriculum by the end of the programme. It must be ensured that there is an adequate number of appropriately trained, qualified and experienced staff in place to deliver an effective training programme and that all areas of the curriculum must be delivered by staff with the relevant specialist expertise and knowledge. Progression through the stages of learning will depend on both formative (i.e. DOPS, CBDs and ECEs) and summative assessments (e.g. FRCPath Part1) and regular appraisals with the Educational Supervisors.

Each trainee should have an identified educational supervisor at every stage of their training. A trainer is any person involved in training the trainee (e.g. consultant, clinical scientist, senior biomedical scientist [BMS]). A trainee may be trained by a number of trainers during their training.

If there is a breakdown of relationship between a trainee and their educational supervisor the trainee should, in the first instance seek advice from their TPD. If the matter is not resolved to the trainee's satisfaction, then he/she should seek further advice from the Head of Pathology School of equivalent. As a last resort, trainees can seek advice from the College through the appropriate College specialty advisors.

d. Curriculum development

This updated medical virology curriculum has been developed in line with the GMC CIT curriculum and its associated higher specialty training in virology.

The content of the curriculum was derived from current and predicted UK hospital and laboratory practice in medical virology

It is implicit in this curriculum, even if not stated, that the knowledge, skills and behaviours mentioned in the specialty specific section of the general curriculum, will need to be retained and enhanced when proceeding through higher specialist training in medical virology. It is acknowledged that there are necessarily areas of overlap between different sections in the curriculum.

The curriculum will allow trainees to take control of their own learning and to measure achievement against objectives. It will help in the formulation of a regularly updated education plan in conjunction with an educational supervisor and the local Specialty Training Committee (STC).

The curriculum was agreed by the Co-Chairs of the Medical Microbiology and Virology CSTC on 12 June 2014.

The curriculum was approved by GMC on 4 November 2014 and formally published in December 2014.

2. CONTENT OF LEARNING

The curriculum details the level of knowledge and skill that a trainee should acquire to provide a high quality service at consultant level in the NHS. This includes both common competencies and specialty practice. The common competencies identified in the curriculum aims to ensure that doctors in the NHS trained to a Royal College of Pathologists' developed curriculum in medical virology are developed to be practitioners, partners and leaders. It also aims to ensure an understanding of issues of inequality around health and healthcare. Doctors must take the opportunity to positively influence health determinants and inequalities.

The trainee will develop the clinical, scientific, technical, management, communication and leadership skills required to run a laboratory and deliver a high-quality clinical service.

The curriculum outlines the knowledge, skills and behaviours that a trainee is expected to obtain in order to achieve the award of the CCT or CESR(CP).

Throughout their training, trainees are given increasing responsibility and independence appropriate for their demonstrated level of competence and professional development, as judged by their clinical and educational supervisors. The purpose of this component of training is to take such graded responsibility further, to enable the transition to the independent practice required of a CCT holder.

Demonstration of the skills required for independent practice is a requirement of the curriculum, and the relevant competencies must be assessed and achieved prior to completion of the training programme.

Currently, the most appropriate context in which to train for and achieve the competencies for independent practice is out-of-hours working, in an 'on-call' setting. However, there may be practical alternatives to this training context. If a training programme does not offer the opportunity to develop and demonstrate these skills through out-of-hours working, there must be alternative arrangements agreed by the Training Programme Director in consultation with the local LETB or Deanery Specialty Training Committee or Postgraduate School of Pathology Board or equivalent.

The recommended learning experiences are listed on page 15.

On completion of the medical virology training programme, the trainee must have acquired and be able to demonstrate:

- appropriate attitudes in order to be able to work as an independent professional practitioner in medical virology
- good working relationships with colleagues and the appropriate communication skills required for the practice of medical virology
- the knowledge, skills and attitudes to act in a professional manner at all times
- the knowledge, skills and attitudes to provide appropriate teaching and to participate in effective research to underpin medical virology practice
- an understanding of the context, meaning and implementation of clinical governance
- a knowledge of the structure and organisation of the NHS
- the acquisition of management skills required for the running of a medical virology laboratory
- familiarity with health and safety regulations, as applied to the work of a medical virology department.

a. Entry Requirements

Trainees are eligible for entry to a medical virology training programme following satisfactory completion of a UK foundation training programme or equivalent.

b. Duration of training

The Royal College of Pathologists anticipates that five years would normally be required to satisfactorily complete the medical virology curriculum to the required depth and breadth. It is anticipated that two years would normally be required to satisfactorily complete the general medical microbiology and virology section of the curriculum and three years to complete higher specialty training in medical virology.

The CCT in medical virology will be awarded on the recommendation of The Royal College of Pathologists following:

- evidence of satisfactory completion of the medical virology curriculum
- satisfactory completion of the requisite number of workplace-based assessments (including multi-source feedback)
- attainment of the College's Year 1 Medical Microbiology and Virology OSPE (objective structured practical examination)
- attainment of FRCPath by examination in medical virology
- acquisition of ARCP outcome 6.

Further detailed information about the annual progression points including assessment requirements that will enable progression at each ARCP, as well as the completion of the CCT or CESR(CP) is available on the College website.

c. Transitional Arrangements

With the exception of trainees in the final year of training prior to the award of the CCT, all medical virology trainees are expected to transfer to this curriculum.

Trainees in the final year of training will remain on their current curriculum. Such trainees would normally be expected to have already achieved FRCPath Part 2 by examination.

Training under earlier editions of the medical microbiology and virology curricula will be recognised and accredited like for like, provided that it has taken place in a GMC-approved medical microbiology and virology programme. For example, if a trainee were to transfer from the 2007/8 medical microbiology and virology curriculum at the end of ST2 into the 2014 GMC-approved medical virology curriculum at the beginning of ST3, he or she would not have to go back and "make up the difference" between the curriculum content and assessments from ST1 and ST2 in a previous version of the curriculum.

d. Dual training in Medical Virology and Infectious Diseases

Trainees are able to apply for and undertake training leading to a CCT in infectious diseases as well as CCT in medical virology. Trainees will need to achieve the competencies, with assessment evidence, as described in both the infectious diseases and medical virology curricula.

There are currently no plans for triple accreditation in medical virology, infectious diseases and general internal medicine.

Separate guidance on dual training arrangements will be published following confirmation of the new arrangements by the GMC.

e. Registration as a trainee

Trainees must register with The Royal College of Pathologists on appointment to a medical microbiology training programme or if they are appointed to a Locum Appointment for Training (LAT) or Fixed Term Specialty Training Appointment (FTSTA). It is the trainee's responsibility to familiarise themselves with the curriculum and assessment requirements both for the satisfactory completion of each stage of training and the award of the CCT or CESR(CP). They must be familiar with all aspects of the assessment system; workplace-based assessment including multi-source feedback and the FRCPath examination. It is the trainee's responsibility to ensure that they apply in good time for any assessments and examinations that demand an application. Trainees must also make appropriate use of the LEPT system and e-learning.

Trainees undertaking dual training in medical virology and infectious diseases must register with the Royal College of Physicians, who will automatically inform the Royal College of Pathologists of all such trainees. Trainees undertaking dual training will receive the same benefits from the Royal College of Pathologists as those offered to trainees who register with the college directly.

f. Training regulations

This section of the curriculum outlines the training regulations for medical virology. In line with GMC guidance this reflects the regulation that only training that has been prospectively approved by GMC can lead towards the award of the CCT. Training that has not been prospectively approved by GMC can still be considered but the trainee's route of entry to the Specialist Register changes to CESR(CP) route.

i. Less than full-time training

'Less than full-time training is the term used to describe doctors undertaking training on a basis that is not full-time, normally between five and eight sessions per week. In exceptional circumstances, trainees may be allowed to undertake training at less than 50% of full-time. These circumstances should be considered by trainee's deanery and should have the support of the Postgraduate Dean or their Deputy. A placement at less than 50% of full time should be for a maximum of 12 months and should be subject to regular review.

The aim of less than full-time training is to provide opportunities for doctors in the NHS who are unable to work full time. Doctors can apply for less than full-time training if they can provide evidence that "training on a full-time basis would not be practicable for well-founded individual reasons".

Less than full-time trainees must accept two important principles:

- 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.

Prior to beginning their less than full-time training, trainees must inform the Training Department at The Royal College of Pathologists in order that the medical virology College Specialty Training Committee (CSTC) can ensure that their less than full-time training programme will comply with the requirements of the CCT. The

documentation towards a less than full-time training application will be collected and checked to ensure compliance and a revised provisional CCT date issued. It must also be ensured that the less than full-time training post is approved as part of a GMC approved training programme. Separate guidance and an application form are available on the College website for this purpose.

ii. Time Out of Training

The GMC has provided guidance on the management of absences from training and their effect on a trainee's Certificate of Completion of Training (CCT) date. The GMC guidance states that within each 12 month period where a trainee has been absent for a total of 14 days or more (when a trainee would normally be at work), a review to determine if the trainee's CCT date should be extended is triggered. The absence includes all forms of absence such as sickness, maternity, compassionate paid/unpaid leave etc. but does not include study or annual leave or prospectively approved Out of Programme Training/ research. The administration of the absence and any extension to training will be undertaken by the relevant deanery in consultation with the relevant College/Faculty where necessary. The GMC supports the Deaneries implementing this guidance flexibly to reflect the nature of the absence, the timing and the effect of the absence on the individual's competence. Each trainee's circumstances will be considered on an individual basis and any changes to CCT date will reflect the trainee's demonstration of competence.

iii. Acting up as a Consultant (AUC)

A doctor in training can apply to the Dean to take time out of programme and credit the time towards CCT/CESR(CP) as an AUC. Where the AUC is in the same training programme, then prospective approval is not needed from the GMC. If it is a different training programme, the usual Out of Programme (OOP) process applies. When you are acting up as a consultant, there will need to be appropriate supervision in place and approval will only be considered if the acting up placement is relevant to gaining the competences, knowledge, skills and behaviours required by the curriculum. AUC posts can only be taken in the final year of specialty training.

iv. Research

Some trainees may wish to spend a period of time in research after entering medical virology training as out-of-programme research (OOPR).

Research undertaken prior to entry to a medical virology training programme

Trainees who have undertaken a period of research that includes clinical or laboratory work directly relevant to the medical virology curriculum, prior to entering a medical virology training programme can apply to have this period recognised towards an entry on the Specialist Register. However, as the research is unlikely to have been prospectively approved by the GMC, the route of entry to the Specialist Register will be through the CESR.

Research undertaken during a medical virology training programme

Trainees who undertake a period of out-of-programme research (OOPR) after entering a medical virology training programme and obtaining their National Training Number (NTN) may have up to 6 months accepted by the medical virology CSTC towards their CCT. In order to be eligible to have this period of research recognised towards the award of the CCT, trainees must have their OOPR approved prospectively before beginning their research. However, trainees must be able to demonstrate that they have achieved, or will be able to achieve, all requirements of the curriculum. Prior to beginning the period of research, trainees must agree the OOPR with their LETB/Deanery and inform the Training Department at The Royal

College of Pathologists in order that the medical virology CSTC can ensure that the trainee will comply with the requirements of the CCT programme. The period of research must include clinical or laboratory work directly relevant to the medical virology curriculum. The documentation towards a CCT recommendation will be collected by the Training Department at the College, checked to ensure compliance and a revised provisional CCT date issued. It must be ensured that, following deanery agreement and acceptance from the medical virology CSTC, the GMC prospectively approve the OOPR in order that the period can count towards a CCT. Separate guidance and an application form are available on the College website for this purpose.

v. Academic trainees

Trainees who intend to pursue a career in academic or research medicine may undertake specialist training in medical virology. Such trainees will normally be clinical lecturers and hold an NTN(A). It is expected that such trainees should complete the requirements of the medical virology curriculum in addition to their academic work. However, the content of their training, while meeting the requirements of the curriculum, will have to take into account their need to develop their research and the provisional CCT date should be amended accordingly. NTN(A) holders in medical virology should consult the Training Department at the College on an individual basis with regard to the agreement of their provisional CCT date.

vi. Overseas training

Some trainees may wish to spend a period of time in training outside of the UK after entering medical virology training as out-of-programme training (OOPT).

Overseas training undertaken prior to entry to a medical virology training programme

Some trainees may have undertaken a period of medical virology training overseas prior to entering a medical virology training programme in the UK. Such trainees must enter a medical virology training programme at ST3 (i.e. having completed CMT/ACCS and MRCP). Trainees can have this period recognised towards an entry on the Specialist Register. However, as the period of overseas training is unlikely to have been prospectively approved by the GMC, the route of entry to the Specialist Register will be through the CESR.

Overseas training undertaken during a medical virology training programme

Some trainees may wish to spend a period of training overseas as out of programme training (OOPT) after entering a medical virology training programme in the UK. Trainees can have up to one year of training overseas accepted towards their training. In order to be eligible to have this period of training recognised towards the award of the CCT, trainees must have their OOPT overseas training approved prospectively by GMC before beginning their overseas training. Prior to beginning the period of overseas training, trainees must agree the OOPT with their Deanery and inform the Training Department at The Royal College of Pathologists that they will be undertaking overseas training in order that the medical virology CSTC can ensure that the trainee will comply with the requirements of the CCT programme. The documentation towards a CCT recommendation will be collected by the Training Department at the College, checked to ensure compliance and a revised provisional CCT date issued. It must be ensured that, following Deanery agreement and acceptance from the medical virology CSTC, GMC prospectively approves the OOPT in order that the period can count towards a CCT. Separate guidance and an application form are available on the College website for this purpose.

Trainees must have their OOPT agreed by the relevant Deanery, accepted by the medical virology CSTC and approved by GMC before beginning their overseas training.

3. SUPERVISION AND FEEDBACK

Specialty training must be appropriately delivered by senior medical and scientific and nursing (especially infection prevention and control) staff on a day-to-day basis under the direction of a designated educational supervisor and a Specialty Training Committee that links to the appropriate Postgraduate Deanery/LETB.

Educational supervision is a fundamental conduit for delivering teaching and training in the NHS. It takes advantage of the experience, knowledge and skills of educational supervisors and trainers and their familiarity with clinical situations. It ensures interaction between an experienced clinician and a doctor in training. This is the desired link between the past and the future of medical practice, to guide and steer the learning process of the trainee. Clinical supervision is also vital to ensure patient safety and the high quality service of doctors in training.

The College expects all doctors reaching the end of their training to demonstrate competence in clinical supervision before the award of the CCT. The College also acknowledges that the process of gaining competence in supervision starts at an early stage in training with foundation doctors supervising medical students and specialty registrars supervising more junior trainees.

The example provided by the educational supervisor is the most powerful influence upon the standards of conduct and practice of a trainee.

The role of the educational supervisor is to:

- have overall educational and supervisory responsibility for the trainee in a given post
- ensure that the trainee is familiar with the curriculum relevant to the year/stage of training of the post
- ensure that the trainee has appropriate day-to-day supervision appropriate to their stage of training
- ensure that the trainee is making the necessary clinical and educational progress during the post
- ensure that the trainee is aware of the assessment system and undertakes it according to requirements
- act as a mentor to the trainee and help with both professional and personal development
- agree a training plan (formal educational contract) with the trainee and ensure that an induction (where appropriate) has been carried out soon after the trainee's appointment
- discuss the trainee's progress with each trainer with whom a trainee spends a period of training
- undertake regular formative/supportive appraisals with the trainee (at least two per year, approximately every six months) and ensure that both parties agree to the outcome of these sessions and keep a written record
- regularly inspect the trainee's training record, inform trainees of their progress and encourage trainees to discuss any deficiencies in the training programme, ensuring that records of such discussions are kept
- keep the STC Chair informed of any significant problems that may affect the trainee's training.

In order to become an educational supervisor, a consultant must have a demonstrated interest in teaching and training, appropriate access to teaching resources, be involved in

and liaise with the appropriate regional training committees, be involved in annual reviews and liaise closely with the TPD. The Deaneries organise extensive training programmes for educational supervisor's development. Educational supervisors are expected to keep up-to-date with developments in postgraduate medical training (e.g. by attending Deanery and national training the trainer courses), have access to the support and advice of their senior colleagues regarding any issues related to teaching and training and to keep up-to-date with their own professional development.

4. MANAGING CURRICULUM IMPLEMENTATION

The curriculum outlines the minimum medical virology training requirements for delivery in a training programme. It guides educational supervisors as to what is required to deliver the curriculum and trainees in the learning and assessment methods required for satisfactory completion of training.

It is the responsibility of the TPD and their LETB/Deanery, with the assistance of the regional STC to ensure that the programme delivers the depth and breadth of medical virology training outlined in the curriculum. The TPD must ensure that each post within the programme is approved by the GMC and Heads of Schools that have a strategic overview of training in the Pathology specialties. They are responsible for ensuring that the delivery of education and training meets the College's and GMC agreed curriculum and is provided to the standards set by the College and GMC.

It is the responsibility of the GMC to quality assure training programmes and the responsibility of The Royal College of Pathologists through the medical virology CSTC to ensure training programmes across the UK are able to deliver a balanced programme of training.

It is the responsibility of the educational supervisor of a particular post or attachment within a programme to ensure that the training delivered in their post meets the requirements of the relevant section(s) of the curriculum. The educational supervisor must undertake regular educational appraisal with their trainee, at the beginning, middle and end of a section of training, to ensure structured and goal-oriented delivery of training.

Trainees must register with the appropriate College on appointment to a medical virology training programme or if they are appointed to a Locum Appointment for Training (LAT) or Fixed Term Specialty Training Appointment (FTSTA). It is the trainee's responsibility to familiarise themself with the curriculum and assessment requirements both for the satisfactory completion of each stage of training and the award of the CCT or CESR(CP). They must be familiar with all aspects of the assessment system: workplace-based assessment including multi-source feedback and the FRCPath examination. It is the trainee's responsibility to ensure that they apply in good time for any assessments and examinations that demand an application. Trainees must also make appropriate use of the electronic portfolio.

5. MODELS OF LEARNING

There are three broad categories of learning which trainees employ throughout run-through training: instructionalist model, constructionist model and the social learning model. The models of learning can be applied to any stage of training in varying degrees. The majority of the curriculum will be delivered through work-based experiential learning, but the environment within the departments will encourage independent self-directed learning. It is the trainee's responsibility to seek opportunity for experiential learning.

The principles of Bloom's taxonomy have been applied to the knowledge, skills and behaviours outlined in the curriculum to indicate the trainees learning journey from the initial

acquisition of knowledge and comprehension, through to application and analysis and resulting in the synthesis and evaluation required to achieve mastery in the specialty of medical virology. In using this model, it is acknowledged that there are many different versions of the taxonomy. The achievement of mastery in this curriculum requires the trainee to demonstrate a combination of detailed knowledge in the associated political context, with the ability to do independent clinical work, and to lead and organise services.

Trainees have a service provision role and it is recognised that a large component of training can occur as an apprenticeship, provided appropriate supervision is available. Normally, 50–80% of training would be by in-service training. It should be with a readily available consultant, well supervised, with the appropriate content, have a broad exposure and include laboratory issues.

The environment within a training department should encourage independent self-directed learning and make opportunities for relevant off-the-job education by making provision for attendance at local, national and, where appropriate, international meetings and courses. Independent self-directed learning should be encouraged by providing reference text books. It is the trainee's responsibility to seek opportunity for experiential learning. The rotation should also be arranged in such a way that trainees have time available for participation in research projects as part of their training. The more academically inclined trainees will be encouraged to take time out from the training time to include a more sustained period of research working towards a higher degree.

6. LEARNING EXPERIENCES

The following teaching/learning methods will be used to identify how individual objectives will be achieved:

- observation of, assisting and discussion with senior medical staff
- working under consultant supervision
- task specific on the job training
- observation of laboratory methods
- discussion with clinical scientists and senior BMS staff
- practical bench work
- personal study
- reflective thinking and learning
- appropriate postgraduate education courses
- tailored clinical experience
- laboratory and clinical team and directorate meetings
- discussion with Infection Prevention & Control Nurses and/or Infection Control Doctor
- Consultant in Communicable Disease Control (CCDC)/Consultant in Public Health and/or Regional Epidemiologist (RE)
- attendance and participation at relevant Trust committees
- attending training available through equipment and kit manufacturers
- attending ward round and multidisciplinary team meetings and telephone advice to clinicians
- teaching undergraduates and other health professionals
- awareness of appropriate guidelines
- attending regional, national and international medical or scientific conferences
- interaction with/attachment to specialist reference laboratories
- e-learning
- undertaking a laboratory-based project
- learning with peers
- work-based experiential learning

- medical clinics including specialty clinics
- consultant-led ward rounds
- practical laboratory experience
- formal postgraduate teaching
- independent self-directed learning
- formal study

It must be ensured that the appropriate teaching and learning methods are employed for each area of the curriculum.

7. PURPOSE OF ASSESSMENT

The Royal College of Pathologists' mission is to promote excellence in the practice of pathology and to be responsible for maintaining standards through training, assessments, examinations and professional development.

The purpose of The Royal College of Pathologists' assessment system in medical virology is to:

- confirm suitability of specialty choice at an early stage of the chosen career path
- help to identify trainees who should change direction or leave the specialty
- indicate the capability and potential of a trainee through tests of applied knowledge and skill relevant to the specialty
- demonstrate readiness to progress to the next stage(s) of training having met the required standard of the previous stage
- provide feedback to the trainee about progress and learning needs
- support trainees to progress at their own pace by measuring capacity to achieve competencies for their chosen career path
- drive learning, as demonstrated through the acquisition of knowledge and skill
- enable the trainee to collect all necessary evidence for the ARCP
- gain Fellowship of The Royal College of Pathologists
- provide evidence for the award of the CCT
- assure the public that the trainee is ready for unsupervised professional practice.

A blueprint of the Medical Virology assessment system is available on the GMC website.

a. Methods of assessment

Trainees will be assessed in a number of different ways during their training. Workplace-based assessment allows the trainee to be assessed at regular intervals in the workplace by an appropriately trained, qualified and experienced assessor. The MSF, amongst other things, generates candid feedback on behaviour, attitude, communication and team-working issues. The FRCPath examination provides an external, quality assured assessment of the trainee's knowledge of their specialty and their ability to apply that knowledge in the practice of the specialty. Satisfactory completion of all assessments and examinations will be monitored as part of the ARCP process and will be one of the criteria upon which eligibility to progress will be judged. A pass in the FRCPath examination is required as part of the eligibility criteria for the award of the CCT or CESR(CP).

Year 1 Medical Microbiology and Virology OSPE (objective structured practical examination)

Trainees must pass the Year 1 Medical Microbiology and Virology OSPE as one of the requirements for satisfactory completion of ST1 of training.

Workplace-based assessment
Trainees will be expected to undertake workplace-based assessment throughout the entire duration of their training in virology.

These will comprise:

- Case-based discussion (CbD) (minimum of 6 satisfactory outcomes required per year)
- Directly observed practical skills (DOPS) (minimum of 6 satisfactory outcomes required per year in ST1 and ST2, minimum of 4 in ST3, ST4, ST5)
- Evaluation of Clinical and Management Events (ECE) (minimum of 4 satisfactory outcomes required per year in ST1 and ST2, minimum of 6 in ST3, ST4, ST5))
- Multi-source feedback (MSF) (minimum of 3 during training, at ST1, ST3, ST5)

Further separate guidance is provided about the methodology, required frequencies and standards of these assessments.

FRCPath examination
The major assessments will be the FRCPath Part 1 examination which can be taken towards the end, of the general competency section (ST1 and ST2). If the trainee were to fail the FRCPath Part 1 examination at this time progression to ST3 would still be permitted subject to evidence of satisfactory progress otherwise, as assessed at ARCP. FRCPath Part 2 examination must be passed before completion of the training programme.

The expectation for medical candidates in UK GMC-approved training programmes is that they should normally pass the FRCPath Part 2 examination within seven years of passing the FRCPath Part 1. However, there will be circumstances where the guidelines will need to be applied flexibly and candidates who feel that they will not be able to comply with this timescale should contact the RCPath Examinations Department for further advice.

Examination results are evaluated after each session and an annual review of validity and reliability is undertaken and reported to the Examinations Committee.

Evidence of competence
Annual Review of Competence Progression
The ARCP is an annual opportunity for evidence gathered by a trainee, relating to the trainee's progress in the training programme, to document the competencies that are being gained. Evidence of competence will be judged based on a portfolio of documentation, culminating in an Educational Supervisors Structured Report.

Separate ARCP guidance is available on the College website. A copy of all ARCP forms issued to the trainee must be provided to The Royal College of Pathologists prior to recommendation for the award of the CCT. Lack of progress, identified by the issue of an ARCP outcome 3 or 5 and necessitating repeat training to rectify deficiencies will lead to the extension of training. Training leading to the issue of an ARCP 3 or 5 and necessitating repeat training will not be recognised towards the award of the CCT.

Evidence of ARCP outcome 6 is required as part of the evidence for the award of the CCT.

8. CURRICULUM REVIEW AND UPDATING

The curriculum will be evaluated and monitored by The Royal College of Pathologists as part of continuous feedback from STCs, TPDs, trainers and trainees.

In reviewing the curriculum, opinions will be sought from all relevant RCPath committees; and for the RCPath, the Trainee Advisory Committee (TAC), the Lay Advisory Committee (LAC) and its members and Registered Trainees.

Any significant changes to the curriculum will need the approval of The Royal College of Pathologists' Council and the GMC.

9. EQUALITY AND DIVERSITY

The following is an extract from The Royal College of Pathologists' *Diversity and Equality Policy and approach*. A full copy of the policy is available on the College website.

The Royal College of Pathologists is committed to the principle of diversity and equality in employment, membership, academic activities, examinations and training. As part of this commitment we are concerned to inspire and support all those who work with us directly and indirectly.

Integral to our approach is the emphasis we place on our belief that everyone should be treated in a fair, open and honest manner. Our approach is a comprehensive one and reflects all areas of diversity, recognising the value of each individual. We aim to ensure that no one is treated less favourably than another on the grounds of sex, race, age, sexual orientation, gender reassignment, disability, pregnancy & maternity, religion and belief and marriage and civil partnership. Our intention is to reflect not only the letter but also the spirit of equality legislation.

Our policy will take account of current equality legislation and good practice as outlined in the Equality Act 2010 which supersedes/includes all previous legislation.

The Training Department collects information about the gender and ethnicity of trainees as part of their registration with the College. This information is recorded by the College and statistics published on an annual basis in the annual report. Further information about the monitoring activities of the College trainees, candidates and Fellows are available in the College policy.

10. ACKNOWLEDGEMENTS

Dr Ken Mutton and Dr Zahir Babiker.

COMMON COMPETENCES

1. GOOD CLINICAL CARE

Objective: To demonstrate adequate knowledge and skills and appropriate attitudes in routine clinical work.

Specialty trainees will:

- have the breadth of knowledge and skills to take responsibility for safe clinical decisions and demonstrate good communication and interaction with patients.
- have the self-awareness to acknowledge where the limits of their competence lie and when it is appropriate to refer to senior colleagues for advice
- have the potential (or the ability) to take responsibility for clinical governance activities, risk management and audit in order to improve the quality of service provision

History taking

To develop the ability to elicit a relevant focused history from patients with increasingly complex issues and in increasingly challenging circumstances
To record the history accurately and synthesise this with relevant clinical examination, establish a problem list increasingly based on pattern recognition including differential diagnosis(es) and formulate a management plan that takes account of likely clinical evolution

Knowledge	Assessment Methods	GMP
Define the patterns of symptoms found in patients presenting with infection	CbD	1,2
Outline the issues around capacity and competence, and the Mental Capacity Act	CbD	1,2,4
Describe the appropriate content of clinical records	CbD	1
Explain the problems faced by people for whom English is not a first language	CbD	1,2
Explain the problems faced by people with educational and/or physical disabilities	CbD	1,2
Describe the relevance of data protection pertaining to patient confidentiality	CbD	1
Skills		
Take and analyse a clinical history in a relevant, succinct and logical manner	CbD	1
Communicate promptly and accurately with clinicians and patients and their relatives/carers	MSF	1,3
Communicate effectively with people with language difficulties	CbD, MSF	1,3

associated with physical and mental impairment, and with those suffering from stigmatising conditions, discrimination and severe anxiety		
Use interpreters and advocates appropriately	CbD, MSF	1
Behaviours		
Show empathy with patients	MSF	1,3,4
Recognise the importance of psychological factors for patients and relatives/carers	CbD, MSF	1,3
Recognise the interaction of social factors and the patient's illness	CbD, MSF	1,3
Use medical secretaries and electronic communication to communicate in an appropriate manner	MSF, CbD	1,3
Show respect towards colleagues in a multidisciplinary team	MSF	1,3

Examination

To develop the ability to perform focused, relevant and accurate clinical examination in patients with increasingly complex issues and in increasingly challenging circumstances To relate physical findings to history in order to establish diagnosis(es) and formulate a management plan		
Knowledge	**Assessment Methods**	**GMP**
Define the pathophysiological basis of physical signs	FRCPath, CbD	1
Define the clinical signs found in infection	CbD	1
Skills		
Perform a reliable and appropriate clinical assessment	CbD	1,2
Behaviours		
Respect patients' dignity and confidentiality	CbD, MSF	1,3,4
Acknowledge cultural issues	CbD, MSF	1,3
Appropriately involve relatives/carers	CbD, MSF	1,3,4
Recognise situations where there is the need for a chaperone	CbD, MSF	1,3

Investigations including imaging

To develop the ability to request focussed and relevant investigations (including imaging, to balance their risks and potential benefits and correctly interpret the results		
Knowledge	**Assessment Methods**	**GMP**
Define the pathophysiological basis of investigations	FRCPath, CbD	1
Define the indications for investigations	FRCPath, CbD	1
Define the risks and benefits of investigations	CbD	1
Identify the clinical and cost effectiveness of individual investigations	CbD	1
Skills		
Recommend appropriate investigations	CbD	1,3
Interpret the results of investigations	CbD, DOPS	1
Perform appropriate clinical investigations competently where relevant	CbD	1,2
Discuss investigations with colleagues and advise them appropriately	CbD, MSF	1,2,3
Behaviours		
Explain the importance of working with other healthcare professionals and team working	MSF	1,3
Explain the rationale for investigations, and possible unwanted effects	MSF	1,3

Decision Making and Clinical Reasoning

To develop the ability to formulate a diagnostic and therapeutic plan for a patient according to the clinical information available To develop the ability to prioritise the diagnostic and therapeutic plan To be able to communicate a diagnostic and therapeutic plan appropriately		
Knowledge	**Assessment Methods**	**GMP**
Define the steps of diagnostic reasoning: • interpret history and clinical signs • conceptualise clinical problems in a medical and social context • describe the psychological component of disease and illness presentation • generate hypothesis(es) within context of clinical likelihood • test, refine and verify hypotheses • develop problem list and action plan	CbD	1

Recognise how to use expert advice, clinical guidelines and algorithms	CbD	1
Recognise and appropriately respond to sources of information accessed by patients	CbD	1
Recognise the need to determine the best value and most effective treatment both for the individual patient and for a patient cohort	CbD	1,2
Define the concepts of disease, natural history and assessment of risk	CbD	1
Recall methods and associated problems of quantifying risk e.g. cohort studies	CbD	1
Describe the concepts and drawbacks of quantitative assessment of risk or benefit e.g. numbers needed to treat	CbD	1
Describe commonly used statistical methodology	CbD	1
Describe how relative and absolute risks are derived and the meaning of the terms' predictive value, sensitivity and specificity in relation to diagnostic tests	CbD	1
Demonstrate appropriate knowledge of clinical disease, and associated biochemical and haematological changes, to enable integration of clinical and laboratory findings for patient management	CbD	1
Demonstrate clinical acumen and knowledge of advances and changes in clinical practice	CbD	1
Skills		
Interpret clinical features, their reliability and relevance to clinical scenarios including recognition of the breadth of presentation of common disorders	CbD	1
Incorporate an understanding of the psychological and social elements of clinical scenarios into decision making through a robust process of clinical reasoning	CbD	1
Recognise critical illness and responds with due urgency	CbD	1
Generate plausible hypothesis(es) following patient assessment	CbD	1
Construct a concise and applicable problem list using available information	CbD	1
Construct an appropriate management plan in conjunction with the patient, carers and other members of the clinical team and communicates this effectively to the patient, relatives/carers	CbD	1,3,4

where relevant		
Define the relevance of an estimated risk of a future event to an individual patient	CbD	1
Use risk calculators appropriately	CbD	1
Apply quantitative data of risks and benefits of therapeutic intervention to an individual patient	CbD	1
Search and select appropriate medical literature to guide reasoning	CbD	1
Interpret correctly test results and the patient's clinical condition in the context of available clinical information	CbD	1
Behaviours		
Discuss the difficulties of prediction of future events, and benefit/risk balance of therapeutic intervention	CbD	3
Adapt and adjust approaches according to the beliefs and preferences of the patient and/or carers	CbD	3
Facilitate patient choice appropriately within the content of their clinical care	CbD	3
Select appropriate evidence to support clinical decision making	CbD	1,4
Identify one's own biases and inconsistencies in clinical reasoning	CbD	1,3

Treatment (therapeutics)

To progressively develop your ability to advise of prescribing, review and monitor appropriate medication relevant to clinical practice including therapeutic and preventative indications		
Knowledge	**Assessment Methods**	**GMP**
Outline scientific theory relating to pharmacology and the pathophysiology of therapeutic interventions	FRCPath, CbD	1,3
Skills		
Assess accurately the patient's needs	CbD,	1,2,3
Correctly advise on prescribing and administration of therapeutics	DOPS	1,2
Explain important interactions and adverse drug effects	FRCPath	1,2,3,4
Use IT prescribing tools where available to improve safety	DOPS	1,2
Explain treatments clearly and openly, the side effects of drugs, and the risks and benefits of alternative treatment options (including no treatment)	MSF	1,3
Behaviours		
Remain open to advice from other health professionals on medication issues	CbD	1,3
Recognise the importance of resources when prescribing, including the role of a Drug Formulary	CbD	1,2
Share prescribing information promptly and accurately between a patient's health providers, including between primary and secondary care	CbD	1,3
Demonstrate knowledge of up to date therapeutic alerts, and respond appropriately	CbD	1

Note-keeping, letters, etc.

To understand the importance of optimal record-keeping and correspondence, and the issues around information governance		
Knowledge	**Assessment Methods**	**GMP**
Describe how to correctly write summaries, letters, medico-legal reports	CbD	1,2
Define the structure, function and legal implications of medical records and medico-legal reports	CbD	1,2
Describe the principles of how to retrieve and utilise data recorded in clinical systems	CbD	1
Demonstrate the principles of literature searching using medical databases	CbD	1
Explain the range of possible uses for clinical data and information and appreciate the dangers and benefits of aggregating clinical data	CbD	1,2
Describe the legal and good practice basis of Information Governance, including the Data Protection Act, the Freedom of Information Act and Caldicott Principles	CbD	1
Skills		
Record concisely, accurately, confidentially and legibly the appropriate elements of the history, examination, results of investigations, differential diagnosis and management plan	CbD	1,2,3
Write summaries, letters, medico-legal reports	CbD	1,2,3
Demonstrate competent use of database, word processing and statistics programmes	CbD	1
Perform searches (including literature searches) and access websites and health related databases	CbD	1
Apply the principles of confidentiality in the context of IT	CbD	1,3,4
Behaviours		
Explain the importance of timely dictation, cost effective use of medical secretaries and electronic communication	CbD, MSF	1,3
Demonstrate the need for prompt and accurate communication with primary care and other agencies and patients or their relatives/carers	CbD, MSF	1,3
Demonstrate respect towards medical secretaries and clerical staff	CbD, MSF	1,3
Demonstrate optimal use of IT in clinical practice maximum use	CbD, MSF	1,3,4

of IT		
Be able to share information on computer with the patient in a constructive manner	CbD	1,3
Demonstrate proactive and enquiring attitude to new technology	CbD, MSF	1,3

Management of chronic disease

To understand chronic diseases and their impact on patients and carers		
Knowledge	**Assessment Methods**	**GMP**
Define the clinical presentation and natural history of chronic diseases	CbD	1
Demonstrate knowledge of: the epidemiology, natural history and clinical management of important chronic infections such as TB and hepatitis B and C including drug resistant strains	CbD	1,2
Skills		
Develop long-term management plans for control/treatment of chronic disease	CbD	1,3,4
Diagnose illness including atypical presentations using clinical and epidemiological skills	CbD	1,3
Select suitable hepatitis patients for treatment	CbD	1
Monitor therapy and ensuring compliance with treatment	CbD	1
Counsel patients on matters of infection risk, transmission and control	CbD	1,3,4
Develop and agree a holistic management plan with the patient and relatives/carers, ensuring awareness of alternative therapies and means of patient support	CbD	1,4
Behaviours		
Treat each patient as an individual	MSF	1,2,3
Explain the effects of chronic disease states on patients and their relatives/carers	CbD, MSF	1,3
Explain the importance of co-operation with primary care	CbD, MSF	1,3
Explain the importance of multi-disciplinary working	CbD	1
Demonstrate awareness of patient support groups	CbD	1

Patient safety

To understand that patient safety depends on the effective and efficient organisation of care, and health care staff working well together		
Knowledge	**Assessment Methods**	**GMP**
Outline the features of a safe working environment and the hazards of medical equipment in common use	CbD	1
Recall side effects and contraindications of medications prescribed	CbD	1
Recall the components of safe working practice in the personal, clinical and organisational settings including local procedures for reporting, investigating and learning from clinical errors	CbD	1
Describe the investigation of significant events, serious untoward incidents and near misses	CbD	1
Outline factors adversely affecting a doctor's and team performance and methods to rectify these	CbD	1
Describe the elements of clinical governance	CbD, MSF	1
Outline the use of patient early warning systems to detect clinical deterioration where relevant to the trainee's clinical specialty	CbD	1
Skills		
Recognise when a patient is not responding to treatment and reassesses the situation; encourage others to do the same	CbD	1
Demonstrate a high level of safety awareness and consciousness at all times	CbD	1,2
Demonstrate encouragement of feedback from all members of the team on safety issues	CbD, MSF	1,2,3
Demonstrate encouragement of an open environment to foster and explore concerns and issues about the functioning and safety of team working	CbD, MSF	2,3
Behaviours		
Demonstrate awareness of one's own limitations, and operates within them competently	CbD	1
Demonstrates personal commitment to improving one's own performance in the light of feedback and assessment	CbD, MSF	3
Demonstrate engagement with an open no blame culture	CbD, MSF	3

2. MAINTAINING GOOD MEDICAL PRACTICE

Objective: To keep knowledge and skills and appropriate attitudes up to date.

Specialty trainees will:

- take responsibility for and keep up-to-date in their own relevant professional and self-development, and facilitate that of others
- acknowledge that the balance of their skills and expertise will change as their careers progress and they specialise in certain areas of clinical practice

Lifelong learning

To recognise the importance of, and develop systems for, lifelong learning		
Knowledge	**Assessment Methods**	**GMP**
Demonstrate the importance of continuing professional development	CbD	1
Skills		
Recognise and use learning opportunities	CbD	1
Use the potential of study leave to keep up to date	CbD	1
Produce and keep up to date a professional portfolio	CbD	1
Select information efficiently from a range of sources including paper-based, computer-based and audio-visual	CbD	1,3
Monitor own performance through audit and feedback	CbD	1,2
Behaviours		
Demonstrate self-motivated and eager to learn	CbD, MSF	1,2,3
Demonstrate willingness to learn from colleagues and to accept constructive feedback	CbD, MSF	1,2,3

Self – Development

To recognise the importance of self-development, reflection and a commitment to continual improvement		
Knowledge	**Assessment Methods**	**GMP**
Describe the local processes for dealing with and learning from clinical errors	CbD	1,2
Explain the importance of best practice, transparency and consistency	CbD	1,2
Skills		
Use a reflective approach to practice with an ability to learn from previous experience	CbD	1
Use assessment, appraisal, complaints and other feedback to discuss and develop an understanding of own development needs	CbD	1,3,4
Behaviours		
Demonstrate acceptance of responsibility	CbD, MSF	1,2,4
Demonstrate commitment to continuing professional development which involves seeking training and self-development opportunities, learning from colleagues and accept constructive criticism	CbD, MSF	1,2,3,4

Principles of Quality and Safety Improvement

To recognise the desirability of monitoring performance, learning from mistakes and adopting no blame culture in order to ensure high standards of care and optimise patient safety		
Knowledge	**Assessment Methods**	**GMP**
Explain the elements of clinical governance	CbD	1
Recognise that governance safeguards high standards of care and facilitates the development of improved clinical services	CbD	1, 2
Define local and national significant event reporting systems relevant to specialty	CbD	1
Recognise importance of evidence-based practice in relation to clinical effectiveness	CbD	1
Outline local health and safety protocols (fire, manual handling etc.)	CbD	1
Explain risk associated with specialty work including biohazards and mechanisms to reduce risk	CbD	1

Outline the use of patient early warning systems to detect clinical deterioration where relevant to the clinical specialty	CbD	1
Demonstrate awareness of national patient safety initiatives including NPSA, NCEPOD reports, NICE guidelines etc	CbD	1
Skills		
Demonstrate adoption of strategies to reduce risk	CbD	1, 2
Demonstrate contribution to quality improvement processes e.g. • audit of personal and departmental/directorate/practice performance • errors/discrepancy meetings • critical incident and near miss reporting • unit morbidity and mortality meetings • local and national databases	CbD	2
Produce a portfolio of information and evidence, drawn from own medical practice	CbD	2
Reflect regularly on own standards of medical practice in accordance with GMC guidance on licensing and revalidation	CbD	1,2,3,4
Behaviours		
Participate in safety improvement strategies such as critical incident reporting	CbD, MSF	3
Develop reflection in order to achieve insight into own professional practice	CbD, MSF	3
Demonstrate personal commitment to improve own performance in the light of feedback and assessment	CbD, MSF	3
Demonstrate engagement with an open no blame culture	CbD, MSF	3
Demonstrate positive response to outcomes of audit and quality improvement	CbD, MSF	1,3
Demonstrate co-operation with changes necessary to improve service quality and safety	CbD, MSF	1,2

Clinical audit

To develop a detailed understanding of the process of audit, undertake clinical audits, and appreciate the benefits obtainable		
Knowledge	**Assessment Methods**	**GMP**
Describe the process of clinical audit	ECE	1
Explain the audit process (including how to register an audit)	ECE	1
Skills		
Demonstrate audit and evaluate; personal and departmental activities, existing and new tests, techniques or clinical services	ECE	1
Use clinical audit with the purpose of highlighting resources required	ECE	1,2
Demonstrate experience in designing, registering, data collection analysing and implementing an audit	ECE	1
Behaviours		
Demonstrate a close rapport and understanding with laboratory staff	ECE	1,3
Demonstrate constructive response to change	ECE, CbD	1,2,4
Demonstrate appropriate behaviours in multidisciplinary team working	ECE, MSF	1,3
Demonstrate leadership qualities	ECE, MSF	1,3
Demonstrate prompt and relevant decision making with clear communication	ECE, MSF	1,3
Recognise the need for change, and principles involved	ECE, MSF	1,3
Demonstrate open mindedness	ECE, MSF	1,2

Evidence and Guidelines

To develop the ability to make the optimal use of current best evidence in making decisions about the care of patients
To develop the ability to construct evidence based guidelines and protocols in relation to medical practise

Knowledge	Assessment Methods	GMP
Describe the application of statistics in scientific medical practice	CbD	1
Describe the advantages and disadvantages of different study methodologies (randomised control trials, case control, cohort etc.)	CbD	1
Explain the relative strengths and limitations of both quantitative and qualitative studies, and the different types of each	CbD	1
Explain the principles of critical appraisal	CbD	1
Explain levels of evidence and quality of evidence	CbD	1
Explain the role and limitations of evidence in the development of clinical guidelines and protocols	CbD	1
Explain the advantages and disadvantages of guidelines and protocols	CbD	1
Explain the processes that result in nationally applicable guidelines (e.g. NICE, SIGN, UK SMI)	CbD	1
Skills		
Select appropriately the medical literature, including the use of online databases	CbD	1
Apply conclusions from critical appraisal to clinical care	CbD	1
Identify the limitations of research	ECE	1
Demonstrate contribution to the construction, review and updating of local (and national) guidelines of good practice using the principles of evidence based medicine	ECE, DOPS	1
Behaviours		
Keeps up to date with national reviews and guidelines of practice (e.g. NICE, SIGN and UK SMI)	CbD	1,2
Demonstrate commitment to best clinical practice (clinical effectiveness) at all times, responding to evidence-based medicine	CbD	1,2
Recognise the occasional need to practise outside clinical	CbD	1,2

guidelines		
Demonstrate encouragement of discussion amongst colleagues on evidence-based practice	CbD, MSF	1,2

Structure of the NHS and the principles of management

To understand the structure of the NHS and the management of local healthcare systems in order to be able to participate fully in managing healthcare provision		
Knowledge	**Assessment Methods**	**GMP**
Describe the structure of the NHS in the relevant jurisdiction of the UK	CbD	1
Describe the finance issues in general in the NHS, especially budgetary management and commissioning	CbD	1
Describe the importance of a health service for the population	CbD	1
Explain commissioning, funding and contracting arrangements relevant to the specialty	CbD	1
Explain the principles of: • clinical coding • European Working Time Regulations including rest provisions • National Service Frameworks • Health regulatory agencies (e.g., NICE, Scottish Government) • NHS Structure and relationships • NHS finance and budgeting • consultant contract and the contracting process • resource allocation • the role of the Independent sector as providers of healthcare • patient and public involvement processes and role	CbD	1
Skills		
Demonstrate developing skills in managing change and managing people	CbD	1,3
Demonstrate developing interviewing techniques including those required for performance reviews	CbD	1,3
Demonstrate contribution to the writing of a business plan	CbD	1
Behaviours		
Demonstrate awareness of equity in healthcare access and delivery	CbD	
Demonstrate appropriate response to health service objectives	CbD	1, 2

and targets and take part in the development of services		
Demonstrate recognising the role of patients and relatives/carers as active participants in healthcare systems and service planning	CbD	1, 2, 3
Demonstrate willingness to improve managerial skills (e.g. management courses) and engage in management of the service	CbD, MSF	1
Demonstrate commitment to the proper use of public money and take action when resources are not used efficiently or effectively	CbD, MSF	1, 2,3
Demonstrate awareness that in addition to patient specific clinical records, clinical staff also have responsibilities for other records (e.g. research)	CbD, MSF	1,2,3

Time management

To demonstrate increasing ability to prioritise and organise clinical and clerical duties in order to optimise patient care		
Knowledge	**Assessment Methods**	**GMP**
Explain that effective organisation is key to time management	CbD	1
Explain how some tasks are more urgent and/or more important than others	CbD	1
Explain the need to prioritise work according to urgency and importance	CbD	1
Demonstrate focus on individual patient needs whilst balancing multiple competing pressures	CbD	1
Explain that some tasks may have to wait or be delegated to others	CbD	1
Explain the roles, competences and capabilities of other professionals and support workers	CbD	1
Outline techniques for improving time management	CbD	1
Explain the importance of prompt investigation, diagnosis and treatment in disease and illness management	CbD	1,2
Skills		
Identify clinical and clerical tasks requiring attention or predicted to arise	CbD	1,2
Estimate the time likely to be required for essential tasks and plan accordingly	CbD	1

Group together tasks when this will be the most effective way of working	CbD	1
Recognises the most urgent/ important tasks and ensures that they managed expediently	CbD,	1
Review and re-prioritise personal and team work load regularly	CbD	1
Organise and manage workload effectively and flexibly	CbD	1
Demonstrate appropriate use of other professionals and support workers	CbD	1
Behaviours		
Demonstrate ability to work flexibly and deal with tasks in an effective and efficient fashion	CbD, MSF	3
Recognises when you or others are falling behind and take steps to rectify the situation	CbD, MSF	3
Demonstrate communication of changes in priority to others	MSF	1
Demonstrates calm in stressful or high pressure situations and adopts a timely, rational approach	MSF	1
Recognises and handles uncertainty appropriately within the consultation	MSF	1

Teaching and Training

To develop the ability to teach to a variety of different audiences in a variety of different ways
To be able to assess the quality of the teaching
To be able to train a variety of different trainees in a variety of different ways
To be able to plan and deliver a training programme with appropriate assessments

Knowledge	Assessment Methods	GMP
Describe how to identify adult learning principles	CbD	1
Describe how to identify learner needs	CbD	1
Outline how to structure a teaching activity	CbD	1
Explain varied teaching strategies	CbD	1
Describe how to identify learning styles	CbD	1
Describe principles of evaluation	CbD	1
Skills		
Demonstrate facilitation of learning process	CbD, ECE	1
Identify learning outcomes	CbD, ECE	1
Construct educational objectives	CbD, ECE	1
Design and deliver an effective teaching event	CbD, ECE	1
Communicate effectively with the learners	CbD, ECE, MSF	1
Use effective questioning techniques	CbD, ECE	1
Teach large and small groups effectively	CbD, ECE, MSF	1
Select and use appropriate teaching resources	CbD, ECE	1
Demonstrate constructive effective feedback	CbD, ECE, MSF	1,3
Evaluate programmes and events	CbD, ECE	1,3
Use teaching media that is appropriate to the teaching setting	CbD, ECE	1,3
Behaviours		
Demonstrate a willingness and enthusiasm to teach	CbD, ECE, MSF	1,3
Demonstrate respect for the learner	CbD, ECE, MSF	1,3
Demonstrate a professional attitude towards teaching	CbD, ECE, MSF	1,3
Demonstrate commitment to teaching	CbD, ECE, MSF	1,3

Demonstrate a learner centred approach to teaching	CbD, ECE, MSF	1,3

Ethical Research projects

To be able to plan and analyse a research project
To ensure that research is undertaken using relevant ethical guidelines

Knowledge	Assessment Methods	GMP
Outline the GMC guidance on good practice in research	CbD	1
Explain the principles of research governance	CbD	1
Explain the differences between audit and research	CbD	1
Describe how clinical guidelines are produced	CbD	1
Demonstrate a knowledge of research principles	CbD	1
Outline the principles of formulating a research question and designing a project	CbD	1
Comprehend principal qualitative, quantitative, bio-statistical and epidemiological research methods	CbD	1
Outline sources of research funding	CbD	1
Explain the difference between population-based assessment and unit-based studies and evaluate outcomes for epidemiological work	CbD	1
Skills		
Develop critical appraisal skills and apply these when reading literature	CbD	1
Describe the method for applying for appropriate ethical research approval	CbD	1
Demonstrate the use of literature databases	CbD	1
Demonstrate good verbal and written presentations skills	CbD, DOPS	1
Behaviour		
Demonstrate adherence to guidelines on ethical conduct in research and consent for research	CbD	1
Demonstrate willingness to promote research	CbD	1

Policy, research and change management

To understand the principles behind policy, research and change management		
Knowledge	**Assessment Methods**	**GMP**
Describe current UK screening, immunisation and reporting programmes that relate to infection	CbD	1
Describe the current guidance for the clinical care of infection patients	CbD	1
Demonstrate awareness and maintenance of an up to date knowledge of research evidence relating to infection	CbD, ECE	1
Apply a variety of methodologies for developing creative strategies for improving services	CbD	1
Explain how to access and use local health data	CbD	1
Explain how to access resources for action and advocacy (e.g. resources, legislation, policy documents)	CbD	1
Explain the function and responsibilities of national bodies such as DH, CQC, NICE, NPSA, NCAS; Royal Colleges and Faculties, specialty specific bodies, representative bodies; regulatory bodies; educational and training organisations relevant to the particular developed administration in which practising	CbD	1
Skills		
Demonstrate access and make use of appropriate population, demographic, socio-economic and health data	CbD	1
Show adjustment to central policy and guidance for local circumstances and conditions	CbD	1,2
Demonstrate implementation of policy and directives applicable to local and global practice	CbD	1
Discuss the local, national and UK health priorities and how they impact on the delivery of health care relevant to the specialty	CbD	1
Identify trends, future options and strategy relevant to the specialty and delivering patient services	CbD	1
Question existing practice in order to improve services	CbD	1,2
Apply creative thinking approaches (or methodologies or techniques) in order to propose solutions to service issues	CbD	1,2
Behaviours		
Demonstrate openness to directives, policy and advice from	CbD	1

government, specialist society, local management and others		
Comply with national guidelines that influence healthcare provision	CbD	1
Demonstrate strategic ideas willing and use effective influencing skills	CbD	1
Demonstrate a commitment to implementing proven improvements in clinical practice and services	CbD	1

3. RELATIONSHIPS WITH PATIENTS

Objective: to ensure that the trainee has the knowledge, skills and attitudes to act in a professional manner at all times.

New specialists will:

- be able to build relationships with patients and their families when required
- follow the principles and legal aspects of consent and confidentiality
- be able to support clinical colleagues in the management of complex situations with patients and their families
- be able to effectively deal with the management of complaints

The Patient as Central Focus of Care

To develop the ability to prioritise the patient's agenda encompassing their beliefs, concerns, expectations and needs		
Knowledge	**Assessment Methods**	**GMP**
Understand the variation in health priorities of different patient groups and ethnic minorities	CbD	1
Respond to questions honestly and seek advice if unable to answer	MSF	3
Recognise the importance of patient choice and encourage patients to voice their preferences where appropriate	MSF	3
Behaviours		
Demonstrate concern for patients beliefs, ideas and expectations	MSF	1, 3, 4
Recognise the duty of the medical professional to act as patient advocate	CbD, MSF	3, 4
Demonstrate that all decisions and actions are in the best interests of the patient and the public good	CbD	1

Continuity of care

To understand and proactively encourage continuity of care		
Knowledge	**Assessment Methods**	**GMP**
Explain the relevance of continuity of care	CbD	1
Skills		
Demonstrate satisfactory completion of reasonable tasks at the end of the shift/day with appropriate handover	CbD	1,2
Produce appropriate documentation for handover	CbD	1,2,3
Prepare adequately to cover leave	CbD	1,2,3

Behaviours		
Demonstrate the importance of punctuality and attention to detail	CbD, MSF	1,3
Demonstrate effective of communication with colleagues	CbD, MSF	1,3

Valid consent

To understand the necessity of obtaining valid consent from the patient and how to obtain it		
Knowledge	**Assessment Methods**	**GMP**
Describe the process for gaining informed consent	CbD, DOPS, MSF	1
Describe the legal aspects of consent	CbD, MSF	1
Skills		
Present balanced information to patients (and relatives/carers) in a format they understand	CbD	1, 3
Behaviours		
Respects a patient's rights of autonomy, even in situations where their decision might put them at risk of harm	CbD	1
Does not exceed the scope of authority given by a competent patient to their attending physician	CbD	1
Does not withhold information relevant to proposed care or treatment in a competent patient	CbD	1, 3, 4

Principles of Medical Ethics and Confidentiality

To know, understand and apply appropriately the principles, guidance and laws regarding medical ethics and confidentiality		
Knowledge	**Assessment Methods**	**GMP**
Demonstrates knowledge of the principles of medical ethics	CbD	1
Outline and follow the guidance given by the GMC on confidentiality	CbD	1
Define the provisions of the Data Protection Act and Freedom of Information Act	CbD	1
Define the principles of Information Governance	CbD	1
Define the role of the Caldicott Guardian and Information Governance lead within an institution, and outlines the process of attaining Caldicott approval for audit or research	CbD	1, 4
Outline situations where patient consent, while desirable, is not required for disclosure e.g. serious communicable diseases, public interest	CbD	1, 4
Outline the procedures for seeking a patient's consent for disclosure of identifiable information	CbD	1
Recognise the obligations for confidentiality following a patient's death	CbD	1, 4
Recognise the problems posed by disclosure in the public interest, without patient's consent	CbD	1, 4
Recognise the factors influencing ethical decision making, including religion, personal and moral beliefs, cultural practices	CbD	1
Recognise the role and legal standing of advance directives	CbD	1
Outline the principles of the Mental Capacity Act	CbD	1
Demonstrate an understanding of adolescents' and young adults' right to confidentiality and the importance of safeguarding	CbD	1
Skills		
Use and share information with the highest regard for confidentiality, and encourages such behaviour in other members of the team	CbD, MSF	1, 2, 3
Use and promote strategies to ensure confidentiality is maintained e.g. anonymisation	CbD	1

Behaviours		
Demonstrate willingness to seek advice of peers, legal bodies, and the GMC in the event of ethical dilemmas over disclosure and confidentiality	CbD, MSF	1
Demonstrate respect for patient's requests for information not to be shared, unless this puts the patient, or others, at risk of harm	CbD	1, 4
Demonstrate willingness to share information regarding care with patients as appropriate	CbD	1, 3

Complaints

To recognise the causes of error and to learn from them; to realise the importance of honesty and effective apology and to take a leadership role in the handling of complaints		
Knowledge	**Assessment Methods**	**GMP**
Describe the local complaints procedure	CbD, MSF	1
Identify the factors likely to lead to complaints (poor communication, dishonesty, clinical errors, adverse clinical outcomes etc.)	CbD, MSF	1
identify the appropriate colleague to be informed when something has gone wrong	CbD, MSF	1
Skills		
Demonstrate appropriate handling of complaints including fact finding and report writing	ECE, MSF	1
Behaviours		
Contribute to a fair and transparent culture around complaints and errors	CbD, MSF	1
Recognise the rights of patients, family members and relatives/carers to make a complaint	CbD, MSF	1, 4
Willingness to learn from complaints and implement practice improvements	MSF	1

4. WORKING WITH COLLEAGUES

Objective: To demonstrate good working relationships with colleagues and appropriate communication skills.

New specialists will:

- strive for continuing improvement in all aspects of their work and that of colleagues while mindful of priorities and high standards
- have effective interpersonal skills which enable them to bring out the best in colleagues, to resolve conflicts when they arise and to develop working relationships within the team
- support teams that bring together different professions and disciplines and other agencies, to provide high quality healthcare
- develops an understanding of leadership by drawing on values, strengths and abilities to deliver high standards of care

Communication with Colleagues and Cooperation

To recognise and accept the responsibilities and role of the doctor in relation to other healthcare professionals **To communicate succinctly and effectively with other professionals as appropriate**		
Knowledge	**Assessment Methods**	**GMP**
Describe and explain the section in 'Good Medical Practice' on Working with Colleagues, in particular: • the roles played by all members of a multi-disciplinary team • the features of good team dynamics • the principles of effective inter-professional collaboration to optimise patient, or population, care	CbD, MSF	1
Describe and explain the principles of confidentiality that provide boundaries to communication	CbD, MSF	1
Skills		
Demonstrate accurate, clear, prompt communication with relevant colleagues by means appropriate to the urgency of a situation (telephone, email, letter etc.), especially where responsibility for a patient's care is transferred	CbD	1, 3
Utilise the expertise of the whole multi-disciplinary team as appropriate, ensuring when delegating responsibility that appropriate supervision is maintained	CbD, MSF	1, 3
Demonstrate skills required for out of hours hospital learning	CbD, MSF	
Demonstrate participation in and co-ordination of an effective hospital-at-night or hospital out-of-hours team where relevant	CbD, MSF	1
Demonstrate effective communication with administrative bodies and support organisations	CbD, MSF	1, 3

Demonstrate behavioural management skills with colleagues to prevent and resolve conflict and enhance collaboration	CbD, MSF	1, 3
Behaviours		
Demonstrate awareness of the importance of and takes part in multi-disciplinary teamwork, including adoption of a leadership role when appropriate but also recognising where others are better equipped to lead	CbD, MSF	3
Foster a supportive and respectful environment where there is open and transparent communication between all team members	CbD, MSF	1, 3
Demonstrate maintenance of appropriate confidence with any member of the team	CbD, MSF	1, 3
Recognise the need for a healthy work/life balance for the whole team, including self, but takes any leave only after giving appropriate notice to ensure that cover is in place	CbD, MSF	1
Demonstrate acceptance of additional duties in situations of unavoidable and unpredictable absence of colleagues, ensuring that the best interests of the patient are paramount	CbD, MSF	1

Acting with integrity

Knowledge	Assessment Methods	GMP
Describe the professional, legal and ethical codes of the GMC, e.g. Fitness to Practise and any other codes pertaining to the trainee's specialty	CbD	1
Summarise the key issues of prejudice and preferences within self, others, society and cultures	CbD	1
Skills		
Recognise, analyse and appropriately deal with unprofessional behaviours in clinical practice, taking into account local and national regulations	CbD	1,4
Create open and non-discriminatory professional working relationships with colleagues	CbD	1,3,4
Demonstrate awareness of the need to prevent bullying and harassment	CbD	1,3,4
Behaviours		
Accept professional regulation	CbD, MSF	1,2
Demonstrate promotion of professional attitudes and values	CbD, MSF	1,2,3,4
Act with probity and the willingness to be truthful and to admit errors	CbD, , MSF	1,2,3,4

5. PERSONAL BEHAVIOUR

Objective: To understand the importance of the personal behaviour of the doctor.

- act quickly and effectively if there is reason to believe that their own or a colleague's conduct, performance or health may put patients at risk

Personal Behaviour

To develop the behaviours that will enable the doctor to become a senior leader able to deal with complex situations and difficult behaviours and attitudes
To work increasingly effectively with many teams and to be known to put the quality and safety of patient care as a prime objective
To develop the attributes of someone who is trusted to be able to manage complex human, legal and ethical problems
To become someone who is trusted and is known to act fairly in all situations

Knowledge	Assessment Methods	GMP
Understands the overall approach of value-based practice and how this relates to ethics, law and decision-making	CbD, MSF	1, 2, 3, 4
Outline the relevance of professional bodies (Royal Colleges, JRCPTB, GMC, Postgraduate Deans, BMA, specialist societies, medical defence societies)	CbD	1
Skills		
Practise with professionalism including: • integrity • compassion • altruism • continuous improvement • aspiration to excellence • respect for cultural and ethnic diversity • regard to the principles of equity	CbD, MSF	1, 2, 3, 4
Demonstrate promotion of awareness of awareness of the doctor's role in utilising healthcare resources optimally and within defined resource constraints	CbD, MSF	1, 3
Recognise and respond appropriately to unprofessional behaviour in others	CbD	1
Demonstrate an understanding of the need to work with the Press Office or local equivalent in dealing with enquires from the press and other media	CbD, DOPS	1, 3
Demonstrate ability to prepare rotas, delegate, organise and lead teams	CbD	1, 3
Demonstrate ability to contribute to the recruitment and selection of staff	CbD	1, 3

Behaviours		
Recognise the need to use all healthcare resources prudently and appropriate	CbD	1, 2
Recognise situations when it is appropriate to involve professional and regulatory bodies	CbD	1
Demonstrate willingness to act as a leader, mentor, educator and role model	CbD, MSF	1
Take part in 360 degree feedback as part of appraisal	CbD, MSF	1, 2, 4
Recognise need for reliability and accessibility throughout the healthcare team	CbD, MSF	1

GENERAL MEDICAL MICROBIOLOGY AND VIROLOGY TRAINING FOR ST1 and ST2

This section outlines the core scientific and clinical training which underpins and prepares trainees for specialist training in medical virology, and the competencies acquired in relation to the practice. This section will be complemented by training and courses organised by the local Deanery holding the trainee's NTN. It is the responsibility of the educational supervisor to liaise with the local Programme Director and the Postgraduate Dean to ensure that the trainee has access to the necessary training opportunities, including attendance at courses, to enable them to acquire the competencies as outlined in this curriculum.

6. BASIC BIOLOGY OF BACTERIA, VIRUSES, FUNGI AND PARASITES; HOST-PATHOGEN RELATIONSHIPS

To understand the basic biology of micro-organisms that may cause disease in humans, and how they cause disease		
Knowledge	**Assessment Methods**	**GMP**
Explain basic biology, including structure, function, genetics, and pathogenesis, of major bacterial, viral, fungal and parasitic agents	FRCPath, CbD, ECE	1
Explain the principles of microbiological and clinical classification of microorganisms	FRCPath, CbD	1
Explain local and global epidemiology of major infectious agents and their disease associations	FRCPath, CbD	1
Explain the principles of the immune response to infection and the role of innate and adaptive immunity	FRCPath, CbD	1
Explain the basis of different types of host-parasite relationships, e.g. the importance and evolution of normal flora, viral latency and quasispecies evolution	FRCPath, CbD	1
Explain the principles of active and passive immunisation	FRCPath, CbD	1
Skills		
Demonstrate application of knowledge of basic biology and host-pathogen relationship to inform clinical management of infection	FRCPath, CbD	1,2
Behaviours		
Enthusiastic approach to learning	MSF	1,4
Appropriately involve appropriate multi-disciplinary specialties, in the management of infection	MSF	1,3

7. MICROBIOLOGY/VIROLOGY LABORATORY PRACTICE

Objective:

- to be competent in the use of the laboratory in the investigation, management and prevention of infection

Pre analytical phase

To appreciate the range of investigation and diagnostics available in different clinical scenarios, the optimal samples to send and the conditions in which to send them

Knowledge	Assessment Methods	GMP
Describe the repertoire of investigations available for a given clinical scenario, and understand their merits and limitations	FRCPath, CbD	1
Refer to the local laboratory standard operating procedures (SOPs) for guidance on the nature of the sample and the tests performed	FRCPath, DOPS	1
Explain the correct sample type, volume (where relevant) and optimal conditions for storage and transport that are required for the individual test	FRCPath, DOPS	1
Skills		
Select the most appropriate investigations for the individual patient	FRCPath, CbD	1
Behaviours		
Demonstrate ability to liaise closely with laboratory staff	MSF	3
Demonstrate willingness to communicate with, guide, inform and educate other clinicians	MSF	3

Analytical Phase

To understand and appreciate the advantages, limitations and use of investigations and diagnostics, and the role and use of reference laboratories
To appreciate the methods and risks of routine laboratory diagnostics

Knowledge	Assessment Methods	GMP
Describe health and safety aspects of laboratory diagnostic procedures and bio-safety level classification when dealing with pathogens (See Health and Safety section)	FRCPath, CbD, ECE	1
Explain the principles, uses and limitations of laboratory diagnostic procedures (manual, automated and Point-of-Care) – including microscopy, culture, protein/nucleic acid-based, serological/other assays of host-response, and more novel diagnostics	FRCPath, CbD, ECE	1
Explain the repertoire and use of reference laboratories when	FRCPath, CbD	1

dealing with pathogens		
Skills		
Demonstrate the ability to follow an SOP/examination procedure and use time effectively and efficiently to achieve an optimal turnaround time	MSF, DOPS	1,2
Behaviours		
Demonstrate a close rapport and understanding with laboratory staff and reference centres	MSF	3
Observe good laboratory practice	MSF, DOPS	1,2
Demonstrate willingness to learn from members of a multi-disciplinary team and to accept constructive feedback	MSF	3

Post-analytical Phase

To understand and appreciate the importance of correctly recording, interpreting and relaying the results of laboratory investigations and diagnostics		
Knowledge	**Assessment Methods**	**GMP**
Explain the importance of keeping concise, accurate, confidential, and legible records of laboratory investigations	CbD, MSF	1,2
Interpret laboratory investigations and their results accurately	FRCPath, CbD	1,1
Explain the results comprehensively with results from other specimens and other investigations such as radiology, biochemistry and haematology	FRCPath, CbD	1
Skills		
Demonstrate producing a laboratory report containing correct results and appropriate interpretative comments using appropriate IT systems	MSF, CbD, DOPS	1,2
Behaviours		
Communicate promptly and accurately with clinician	MSF	3
Ensure patient confidentiality	MSF	3
Demonstrate ability to place the patient and the clinical condition at the centre of all deliberations and interpret laboratory results accordingly	MSF	3

Laboratory Management and Quality assurance

To appreciate the requirements for laboratory quality assurance and accreditation, and the methods used to assess the adequacy of the laboratory processes		
Knowledge	**Assessment Methods**	**GMP**
Explain the principles of internal and external quality assurance, and laboratory accreditation	FRCPath, CbD, DOPS, ECE	1,2
Explain the importance of good record keeping	FRCPath, CbD, MSF	1,2
Skills		
Demonstrate performing horizontal, vertical, and examination audits, as appropriate to level of training	FRCPath, CbD, DOPS	1,2
Behaviours		
Demonstrate commitment to maintaining high standards of laboratory practice	CbD, DOPS	1,2
Establish a close rapport with and mutual respect for laboratory staff	MSF	3

8. HEALTH AND SAFETY

Health & Safety

To obtain an in-depth understanding of health and safety issues both locally and nationally in order to practise safely in a laboratory and in a clinical or other setting, and to advise on safe practice
To obtain an understanding of risk assessment for dealing with category 3 and 4 pathogens and be familiar with the requirements for handling of such pathogens and of patients potentially infected with them

Knowledge	Assessment Methods	GMP
Outline current legislative framework underpinning Health & Safety (H&S) at work	FRCPath	1,2,3
Explain basic laboratory hazards and precautions against them	FRCPath, DOPS	1
Explain principles of universal precautions, hazard groups and containment levels	FRCPath, ECE, DOPS, CbD	1
Skills		
Explain infection-prevention and control risk assessment procedures	FRCPath, CbD, ECE	1,2
Work safely in a laboratory at appropriate Advisory Committee on Dangerous Pathogens (ACDP) level, including the use of appropriate sterilisation, disinfection and waste disposal techniques	FRCPath, DOPS	1
Behaviours		
Demonstrate awareness of the principles of Good Medical Practice	MSF	1,2,3,4

9. PRINCIPLES OF PUBLIC HEALTH IN RELATION TO COMMUNICABLE DISEASES

Principles of Public Health in relation to Infection

To understand the importance of control of communicable diseases and be able to evaluate effectiveness of services to prevent, diagnose and treat infection		
Knowledge	**Assessment Methods**	**GMP**
Describe public health issues related to infectious diseases, including identifying and describing the key communicable disease threats: aetiology; how these diseases spread; how they are prevented	FRCPath, CbD, ECE	1,3
Outline modes of transmission, incubation period, period of communicability of common agents with public health importance	FRCPath, CbD, ECE	1,3
Describe basic epidemiological methods	FRCPath, CbD, ECE	1,3
Describe the requirements for statutory and 'good practice' notification of infectious disease	CbD, ECE	1,3
Explain the function of the health protection and environmental health officers (or their equivalents), and their relationship with key infection control personnel in the hospital and community	CbD, ECE	1,3
Outline the role of the UK's health protection agencies and other NHS and governmental organisations at local, national and international levels in the control of, and emergency planning for, outbreaks of infection	FRCPath, CbD, ECE	1,3
Explain the role of vaccination in vaccine preventable communicable diseases	FRCPath, CbD, ECE	1,3
Skills		
Notify with infectious disease (statutory requirements and 'good practice' notifications) when required	CbD, DOPS	1,3
Demonstrate provision of appropriate vaccine advice	FRCPath, CbD, ECE	1,3
Behaviours		
Demonstrate good working relationships with Consultants in Communicable Disease Control (CsCDC) and environmental health officers (or equivalents) and other colleagues who provide health protection functions	CbD	1,3

10. INFECTION PREVENTION AND CONTROL

Objective: To understand the principles of infection prevention and control in order to reduce risk of acquiring infection and to control its spread.

Organisation of Infection Prevention & Control responsibilities

To understand the legislative and organisational frameworks of infection prevention and control		
Knowledge	**Assessment Methods**	**GMP**
Explain the responsibilities of healthcare institutions for IPC under relevant legislations and guidelines	ECE, CbD	1,2
Describe the roles and responsibilities of individual members of healthcare institutions in monitoring, responding to, and resourcing IPC needs	ECE, CbD	1,2
Explain the role of public health bodies as well as reference laboratories in relation to the management of healthcare associated infections (HCAIs)	ECE, CbD	1,3
Recognise the benefits of adhering to scientifically sound practices of IPC to patients and staff as well as the adverse outcomes resulting from failure to comply with them	ECE, CbD	1,2,3
Skills		
Demonstrate complying with current national legislation and guidance on IPC	FRCPath, CbD, ECE	1
Behaviours		
Demonstrate willingness to learn	ECE, CbD, MSF	1
Demonstrate appreciation of the nature of the Multi-Disciplinary team working in infection prevention and control	ECE, MSF	3

Principles of Infection Prevention and Control

To understand the principles underpinning the principles and practices of infection prevention and control		
Knowledge	**Assessment Methods**	**GMP**
Explain the basic biology of common agents implicated in HCAIs and their pathogenesis	FRCPath, CbD	1
Explain the mode of spread and optimum prevention and control strategies of HCAIs	FRCPath, CbD	1
Explain the concept of "The Chain of Infection": Pathogen or infectious agent; Reservoir (patient, healthcare worker, environment); Portal of exit; Portal of entry; Mode of transmission; Susceptible host risk factors	FRCPath, CbD	1
Explain the concepts of colonisation, infection and disease	FRCPath, CbD	1
Explain the mechanisms by which organisms acquire antimicrobial resistance and how to use this knowledge to inform appropriate antimicrobial prescribing	FRCPath, CbD	1
Explain the concepts of: • universal precautions • protecting Healthcare workers from infection in the work place; including prevention of sharps/splash incidents • source and protective isolation • antibiotic stewardship • aseptic non-touch technique (ANTT) • single use items	FRCPath, CbD, ECE	1
Describe specific control measures employed to prevent transmission of infection to include hand hygiene, Personal Protective Equipment (PPE) and Isolation and Cohorting Strategies	FRCPath, CbD, ECE	1
Explain the basic principles of environmental control measures to include cleaning, disinfection, sterilization of patient care equipment and environmental cleaning (housekeeping)	FRCPath, CbD	1
Explain the role of the local authority in relation to infection control	ECE, CbD	1,3
Skills		
Recognise potential for transmission of infection in clinical settings	ECE, CbD	1, 2
Demonstrate counselling patients on matters of infection risk, transmission, and control	CbD	2,3,4

Demonstrate following local infection prevention and control procedures	CbD, ECE	1,2
Demonstrate performing practical clinical procedures using aseptic technique	DOPs	1,2
Demonstrate prescribing antibiotics according to local antibiotic guideline	CbD	1,2
Demonstrate infection prevention and control practices	ECE, CbD	1, 2
Behaviours		
Demonstrate leading by example for all staff, patients, students and relatives to observe infection control principles	ECE, MSF	1,2,3,4

Management and reporting health-care associated infections (HCAIs)

To understand the epidemiological and clinical aspects of healthcare-associated infections (HCAIs)		
Knowledge	**Assessment Methods**	**GMP**
Describe the important clinical syndromes of HCAIs, risk factors, organisms involved, clinical presentation, diagnosis, treatment, prevention and control	FRCPath, CbD	1
Explain the principles of Root Cause Analysis (RCA) and reporting infection-related adverse events including 'serious untoward incidents' (SUI)	FRCPath, CbD, ECE	1,2
Explain the principles of infection control audits and their importance to maintaining good medical practice	ECE, CbD	1,2
Skills		
Report and interpret IPC surveillance data accurately	ECE, CbD, MSF	1,2,3,4
Demonstrate undertaking an IPC related audit	ECE, MSF	1,2,3
Behaviours		
Demonstrate conforming with good infection control practice	ECE, MSF	1,2,4
Demonstrate appreciation of the nature of the Multi-Disciplinary team working in infection prevention and control	ECE, MSF	3

Outbreaks and Surveillance

To understand the principles of diseases outbreak management		
Knowledge	**Assessment Methods**	**GMP**
Describe the role of the laboratory in investigating disease outbreaks	FRCPath, CbD, ECE	1,3
Describe the key principles underpinning outbreak investigation, control, and reporting	FRCPath, CbD, ECE	1,3
Skills		
Demonstrate utilising laboratory resources appropriately when investigating an outbreak	ECE, CbD	1
Behaviours		
Demonstrate effectively working within a team	ECE, MSF	3
Demonstrate appreciation of roles of other health professionals	ECE, MSF	3
Demonstrate an alert and vigilant mind	MSF	1,2

11. IMPORTANT CLINICAL SYNDROMES

Important clinical syndromes

To be able to diagnose and manage important clinical syndromes where infection is in the differential diagnosis		
Knowledge	**Assessment Methods**	**GMP**
Demonstrate a detailed knowledge (incorporating epidemiology, pre-disposition, presentation, clinical features, investigations, differential diagnosis, management and prognosis) of key clinical syndromes including community-acquired and healthcare-associated infections such as: • sepsis and systemic inflammatory response syndrome (SIRS) • pyrexia of unknown origin • blood borne virus infections (e.g. HIV, viral hepatitis) • tuberculosis and other mycobacterial infections • multisystem infections • cardiovascular infections • skin and soft tissue infections • bone and joint infections • upper and lower respiratory tract infections • gastro-intestinal, hepatic, pancreatic and biliary infections • urinary tract and genital infections including Sexually Transmitted Infections (STIs) • neurological infections • ocular infections • device-associated infections • zoonotic infections • exanthemata • Pregnancy-associated infections	FRCPath, CbD, ECE	1,2
Explain how to assess infection risk and recommend appropriate prophylactic or pre-emptive therapy	FRCPath, CbD, ECE	1,2
Explain the nature of infection in special populations including the complexities associated with their management e.g. excessive alcohol and drug users, the elderly, pregnant and postpartum women, neonates, primary and secondary immunodeficiency	FRCPath, CbD, ECE	1,2
Explain the types of immunodeficiency, how they affect susceptibility to and control of infections, and the infections specifically related to primary or secondary immunodeficiencies	FRCPath, CbD, ECE	1,2
Skills		
Perform clinical assessment including evaluation of relevant history, physical findings and investigations to establish a differential diagnosis	CbD, DOPS	1,2

Recommend and interpret appropriate investigations and subsequently interpret the results to guide the management of infection	FRCPath, CbD, ECE	1,2
Use relevant local, regional, national guidelines especially those from specialty societies to manage infection	FRCPath, CbD, ECE	1,2
Adjust management plan in light of progress and developments	FRCPath, CbD	1,2
Behaviours		
Establish rapport with other clinical staff	MSF	3
Interpret and explain results and treatments simply and effectively to both clinicians and patients	FRCPath, MSF	3
Appreciate the importance of being adaptable and open in the face of new or changing information	MSF	3,4
Maintain confidentiality	MSF	3,4
Maintain non-judgemental attitude to disease and its acquisition	MSF	3,4

12. UNDERSTANDING USE OF ANTIMICROBIAL AGENTS

Properties of antimicrobial agents

Acquire a basic understanding of the use of antimicrobial agents for treatment and prophylaxis and their use in clinical settings		
Knowledge	**Assessment Methods**	**GMP**
Explain the concept of broad and narrow spectrum antibiotics	FRCPath, CbD, ECE	1
Explain the key properties of the classes of antimicrobial agents active against bacteria, fungi, parasites and viruses, including: • mechanism of action • spectrum of activity • route of administration • dosing regimen • penetration • side-effects • resistance patterns • cost	FRCPath, CbD, ECE	1
Explain mechanisms of resistance to antimicrobial agents	FRCPath, CbD, ECE	1
Explain the mechanism of action and role of monoclonal antibodies, antitoxins, and immunoglobulins in prophylaxis and treatment of infections	FRCPath, CbD, ECE	1
Describe the pharmacodynamic and pharmokinetics of antimicrobials, and how these affect choice and dosing of antimicrobials	FRCPath, CbD, ECE	1
Explain in vitro methods used to detect antimicrobial resistance and their limitations	FRCPath, CbD, ECE	1
Skills		
Demonstrate appropriate prescribing and/or advice on prescribing antimicrobial drugs	FRCPath, CbD	1
Demonstrate adherence to evidence based guidance	FRCPath, CbD	1,2
Behaviours		
Demonstrate seeking expert advice when necessary	CbD, MSF	1,3
Demonstrate awareness of new developments and knowledge and apply this to clinical practice	CbD, MSF	1

Use of antimicrobials agents in Clinical Management

To be able to use antimicrobial agents rationally based on evidence and existing policies		
Knowledge	**Assessment Methods**	**GMP**
Explain the principles of empirical use of antimicrobials for common infections and syndromic presentations, before laboratory results are available	FRCPath, CbD, ECE	1
Explain the selection of optimal antimicrobials, including combination therapy, for treatment of infection based on susceptibility report, the clinical scenario and results of other investigations	FRCPath, CbD, ECE	1
Explain the optimal duration of appropriate therapy and when to escalate/ de-escalate	FRCPath, CbD, ECE	1
Explain the importance of measuring blood levels of certain antimicrobial agents to ensure clinical efficacy and reduce toxicity	FRCPath, CbD, ECE	1
Explain contraindications to antimicrobial use	FRCPath, CbD, ECE	1
Skills		
Demonstrate appropriate use of antimicrobial drugs	FRCPath, CbD	1,2
Demonstrate appropriate use of local antibiotic polices and national guidelines	CbD, ECE	1,2
Behaviours		
Demonstrate establishing a rapport and understanding with both laboratory and clinical staff	MSF	1,3
Keep accurate and legible records	MSF	1,2
Demonstrate ability to apply theoretical knowledge to practical situations	MSF, CbD	1

Safe use of antimicrobial agents

To be able to use antimicrobial agents safely and competently		
Knowledge	**Assessment Methods**	**GMP**
Explain the importance of the safe use of antimicrobial agents	FRCPath, CbD, ECE	1
Explain symptoms and signs of antimicrobial toxicity	FRCPath, CbD, ECE	1
Explain the adverse consequences of antimicrobials, including effects on normal microbial flora, toxicity and interactions with other drugs	FRCPath, CbD, ECE	1

Describe the importance of measuring blood levels of certain antimicrobial agents to avoid toxicity	FRCPath, CbD, ECE	1
Skills		
Use the most effective and non-toxic antimicrobial regimes	FRCPath, CbD	1,2
Demonstrate caution for potential side effects and monitor appropriately	FRCPath, CbD	1,2
Demonstrate prescribing inpatients particularly in relation to allergy, in pregnancy, in children and in individuals with deranged liver or kidney function	FRCPath, CbD	1,2
Behaviours		
Demonstrate enthusiastic approach to learning	MSF	3
Demonstrate establishing a rapport with both laboratory and clinical staff	MSF, CbD	3
Demonstrate ability to seek expert advice when necessary	MSF, CbD	3

Antimicrobial stewardship and control

To understand the evidence that underpins policy development and stewardship		
Knowledge	**Assessment Methods**	**GMP**
Describe and explain Department of Health and other regulatory bodies' requirements for antimicrobial stewardship	FRCPath, CbD, ECE	1
Explain the importance of antimicrobial formularies, and prescribing control policies and processes	CbD, ECE	1
Explain how local antimicrobial resistance patterns should be used to direct antimicrobial usage	CbD, ECE	1
Explain the role of the Medicines Management Committees (or equivalent) and antimicrobial pharmacist	CbD, ECE	1
Skills		
Demonstrate communicating effectively on antibiotic policy and stewardship with antimicrobial pharmacist	MSF	3
Behaviours		
Demonstrate enthusiastic approach to learning	MSF	3
Demonstrate appreciation of roles of other healthcare professionals especially the antimicrobial pharmacist or equivalent	MSF	3
Demonstrate theoretical knowledge to practical situations	MSF, CbD	1,2,3
Demonstrate liaising and supporting other healthcare professionals	MSF	3

13. VACCINATION

Ability to advise on vaccination against infectious diseases		
Knowledge	**Assessment Methods**	**GMP**
Explain:		
• the advantages and disadvantages of live attenuated, inactivated and recombinant vaccines and conjugate vaccines	FRCPath	1
• the use of licensed vaccines in prevention of disease caused by viral infection, bacterial infection and bacterial toxins	FRCPath, CbD	1
• the UK and the WHO schedules for immunisation against infectious diseases	FRCPath, ECE, CbD	1
• recommendations for immunisation of healthcare workers	FRCPath, CbD, ECE	1
• the immunisation protocols for patients with reduced splenic function	FRCPath, CbD	1
• the use of vaccines in postexposure prophylaxis e.g. rabies, hepatitis A, hepatitis B, tetanus	FRCPath, CbD, ECE	1
• the use of vaccines to boost pre-existing immunity e.g. VZ	FRCPath, CbD, DOPS	1
• the safety of vaccines and their adverse effects	FRCPath, CbD, ECE	1,2
• testing for immunity pre- and post-vaccination, the methods available for measuring this and their limitations	FRCPath, CbD, DOPS, ECE	1
• the effects of vaccination on a population e.g. herd immunity, age shifts in natural infection	FRCPath, ECE	1
• how diseases can be eradicated by vaccination	FRCPath	1
Skills		
Demonstrate ability to:		
• select and interpret laboratory tests for immunity	CbD, DOPS	1
• explain clearly the advantages and disadvantages of vaccination including assessment of safety profiles	CbD, ECE	1,2
• advise appropriately on the use of active and passive immunisation in prevention of infection, including in the management of outbreaks	FRCPath, CbD, ECE, MSF	1,3
• apply national guidance on vaccination relevant to common clinical scenarios	FRCPath, CbD	1
Behaviours		
Enthusiastic approach to learning	MSF	3
Enthusiastic in promoting increased uptake of vaccination	MSF	1,3
Respect for and ability to work with immunisation coordinators, nursing staff, public health colleagues and others responsible for vaccine policy and delivery	MSF	3

14. THE MANAGEMENT OF HIV INFECTION

Ability to recognise and manage infection including opportunistic infections in the HIV positive patient, and to manage infection risk

Knowledge	Assessment Methods	GMP
Explain the function of the intact immune system	FRCPath, CbD, ECE	1,2
Explain pathophysiology of HIV infection	FRCPath, CbD, ECE	1,2
Explain epidemiology and natural history of HIV	FRCPath, CbD, ECE	1,2
Demonstrate providing relevant counselling to patients, carers and relatives, and to individuals potentially exposed to HIV	FRCPath, CbD, ECE	1,2
Demonstrate knowledge of therapeutic options in HIV management	FRCPath, CbD, ECE	1,2
Explain risk/benefit analysis of therapies for HIV and for prophylaxis against HIV and opportunistic infections	FRCPath, CbD, ECE	1,2
Recognise the clinical features of infections and other disease processes in the HIV infected host	FRCPath, CbD, ECE	1,2
Recognise the relevance of specific aspects of history and specific physical signs (and their absence)	FRCPath, CbD, ECE	1
Explain the utility of appropriate laboratory investigations	FRCPath, CbD, ECE	1
Skills		
Demonstrate recognising clinical and laboratory manifestations of immune deficiency	ECE	1,3
Demonstrate interpreting test results relating to the direct management of HIV infection and explain their significance to the patient	ECE, DOPS	1,3
Demonstrate advising on risk reduction for opportunistic infections in the HIV-infected individual, through behavioural change, chemoprophylaxis and vaccination	FRCPath, CbD	1,3
Demonstrate providing information on HIV transmission and strategies for risk reduction	FRCPath, CbD	1,3
Behaviours		
Demonstrate a consideration of the interaction of psychological and social well being on physical symptoms	CbD	1
Recognise the need for empathy and appreciation of patient anxieties	MSF, CbD	1,3
Demonstrate awareness of patient's rights (including confidentiality) and responsibilities	CbD, MSF	1,4

Demonstrate non-judgemental attitude to risk activities of the patient	CbD, MSF	1
Demonstrate the ability to work as part of a multidisciplinary team for the benefit of the patient with colleagues in, for example, sexual health, oncology, hepatology	MSF, CbD	1,3
Recognise social, cultural, sexual and religious factors that may impact on HIV management	MSF, CbD	1

Specific HIV Diagnostics

Competence in the use of specific HIV diagnostics		
Knowledge	**Assessment Methods**	**GMP**
Explain current diagnostic techniques	FRCPath, CbD, ECE	1,2
Skills		
Demonstrate appropriate use of current diagnostic techniques	FRCPath, CbD, DOPS	1,3
Behaviours		
Recognise and appreciate patient wishes and concerns	CbD	1
Demonstrate communicating effectively with regard to the infection and need for treatment	CbD	3

Specific Therapies in HIV-infected Patients

Ability to institute and manage specific therapies in immune compromised patients		
Knowledge	**Assessment Methods**	**GMP**
Explain antiretroviral drugs including: • pharmacokinetics, modes of action, interactions, side effects of the commonly used agents • indications for and use of antiretroviral drugs in treating HIV infection • laboratory tests used in monitoring response and in informing use of certain drugs • mechanisms of resistance and cross resistance • awareness of current treatment guidelines • post-exposure prophylaxis of HIV • anti-retroviral agents in the prevention of mother-to-child transmission	FRCPath, CbD, ECE	1,2
Skills		
Demonstrate applying guidelines and recommend appropriate treatment and interventions	CbD	1,3
Recognise and monitor side effects and drug interactions	CbD	1,2
Demonstrate engaging patients to support adherence and facilitate treatment decisions	CbD	1,3
Behaviours		
Demonstrate appropriate application of knowledge to the clinical situation	CbD, MSF	1

15. TRAVEL AND GEOGRAPHICAL HEALTH

Objectives:

- to be competent in the recognition and management of imported infection
- to be competent in giving advice about pre travel precautions including vaccination

Recognition and treatment of imported infections		
Knowledge	**Assessment Methods**	**GMP**
Explain clinical and epidemiological features of imported diseases, including severe communicable diseases such as viral haemorrhagic fevers	FRCPath, CbD	1,2
Describe availability and limitations of specialised diagnostic tests	CbD	1,2
Demonstrate familiarity with current guidelines and availability of tertiary care and information resources	CbD	1
Understand the management of malaria and other imported infections	FRCPath, CbD	1
Skills		
Elicit and record appropriate travel history, and develop a differential diagnosis	CbD	1,3
Select and interpret appropriate diagnostic tests	FRCPath, CbD	1
Perform a risk assessment for severe communicable diseases and advise on infection control issues (e.g. viral haemorrhagic fevers)	FRCPath, CbD, ECE	1
Recognise when tertiary level care/advice is needed and to seek it	CbD, MSF	1
Behaviours		
Demonstrate limitations and know when to seek specialist advice	CbD, MSF	1

Provision of health advice for travellers		
Knowledge	**Assessment Methods**	**GMP**
Describe and explain the geographical patterns of disease, risk factors for their acquisition, and the availability of paper, electronic and other resources (e.g. vaccination guides, websites, National Travel Health Network and Centre NaTHNaC))	FRCPath, CbD	1,2
Use, availability, efficacy and safety of vaccines	FRCPath, CbD	1,2
Use, efficacy and safety of antimalarial prevention measure	FRCPath, CbD	1,2
Skills		
Perform appropriate pre travel risk assessment	CbD	1
Recommend appropriate pre travel vaccination and prophylaxis	CbD	1,4
Behaviours		
Demonstrate commitment to maintaining up to date information	CbD	1
Demonstrate insight to determine when to seek specialist advice	CbD, MSF	1

Infection related problems of immigrants		
Knowledge	**Assessment Methods**	**GMP**
Outline health needs of particular populations, e.g. ethnic minorities, and recognise the impact of health beliefs, culture and ethnicity in presentations of physical and psychological conditions	FRCPath, CbD, ECE	1,2
Explain epidemiological and clinical features of imported infection in immigrant groups	FRCPath, CbD	1
Skills		
Recognise barriers to effective communication	CbD, MSF	1
Recognise both acute and chronic infections, including those that are asymptomatic, in immigrants	FRCPath, CbD	1
Behaviours		
Recognise the indications for use of a chaperone	CbD, MSF	1
Recognise the duty of the medical professional to act as patient advocate	CbD, MSF	1,4

HIGHER SPECIALTY TRAINING (ST3-ST5)

16. BIOLOGY OF VIRUSES AND PRIONS, HOST-PATHOGEN RELATIONSHIPS, MECHANISMS OF ACTION OF ANTIVIRAL AGENTS

To understand the structure of viruses, and how this information is gained

Knowledge

Demonstrate knowledge of virus structure and function

Skills

Describe and explain:

- the breadth of virus morphology including conventional viruses, giant viruses, and viroids
- virus helical and icosahedral symmetry
- the nature of virus envelopes
- the ways in which virus genetic information is encoded and organised
- the principles of methods used to determine virus characteristics including electron microscopy, X-ray crystallography, neutralisation, deep sequencing
- virus protein structure
- the functions of virus-encoded structural and non-structural proteins

Behaviours and attitudes

Demonstrate an enthusiastic approach to learning

Develop a programme of self-directed learning

To understand the classification of viruses that infect humans, and their phylogenetic relationships

Knowledge

Virus classification and phylogeny

Describe and explain:

- the role of the International Committee on Taxonomy of Viruses (ICTV)
- the ICTV criteria used for virus classification using the terms orders, families, subfamilies, genera, species
- the Baltimore classification of viruses

Skills

Critically review:

- the principles of phylogenetic analysis
- the molecular epidemiology of virus infections

Behaviours and attitudes

Demonstrate an enthusiastic approach to learning

Develop and complete a programme of self-directed learning

Accurately use virus nomenclature in accordance with ICTV criteria

To understand how viruses replicate

Knowledge

Describe replication of viruses

Skills

Describe and explain the replication of viruses

Behaviours and attitudes

Demonstrate an enthusiastic approach to learning

Develop and complete a programme of self-directed learning

To understand how viruses spread

Knowledge

Describe and explain the routes of transmission of viruses

Skills

Describe and explain:

- the release of viruses from cells
- the mechanisms by which viruses spread to other cells
- the routes of spread of virus from one host to another

Behaviours and attitudes

Demonstrate an enthusiastic approach to learning

Develop and complete a programme of self-directed learning

To understand the immune response to virus infection

Knowledge

Describe host responses to virus infections

Describe and explain:

- the components and functions of the innate and adaptive immune systems, particularly in relation to virus infections
- the mechanisms of antigen processing and recognition by the humoral and cellular arms of the adaptive immune response
- the effector pathways triggered by antigen recognition, including induction of antibodies, cytokines (including the mechanisms of action of interferons) and cellular cytotoxicity
- virus strategies to evade host immune responses
- causes and consequences of primary and secondary immunodeficiency
- the role of the immune response in pathogenesis of viral disease

Describe and explain the role of the immune response in pathogenesis of viral disease

Skills

Apply knowledge of the immune response to the understanding of the processes leading to disease

Behaviours and attitudes

Demonstrate an enthusiastic approach to learning

Develop and complete a programme of self-directed learning

To understand how virus infection may lead to disease

Knowledge

Describe pathogenesis of virus infection and disease

Skills

Describe and explain:

- the role of host and virus factors in pathogenesis of disease including host defences, viral virulence, immunopathogenesis
- how a range of factors determine the outcome of exposure to a pathogen including entry into the host, routes of spread within the host, cell tropism, virus-cell interaction, host immune responses, shedding of virus from host

Apply knowledge of pathogenesis to inform management of infection

Behaviours and attitudes

Demonstrate an enthusiastic approach to learning

Develop and complete a programme of self-directed learning

To understand how pharmaceutical agents affect virus replication and disease processes

Knowledge

Identify the mechanisms of activity of antiviral agents

Skills

Describe and explain for both current licensed antiviral agents and for those known to be in development:

- the mechanisms of action of agents with direct antiviral effects
- the mechanisms of action of those with indirect antiviral effects through immune modulation

Describe the principles of targeted development of direct acting antiviral agents

Behaviours and attitudes

Demonstrate an enthusiastic approach to learning

Develop and complete a programme of self-directed learning

To understand the nature of proteinaceous infectious particles – prions – and the diseases with which they are associated

Knowledge

Review:

- current understanding of the nature of prions and their structure
- the pathogenesis of prion diseases
- the clinical presentation of prion diseases
- how syndromes associated with prions may be sporadic, familial and transmissible infections
- the role of host genome polymorphisms in outcomes of prion diseases
- diagnostic tests in prion disease
- approaches to anti-prion therapy

Skills

Describe the interaction of prions and the host in producing disease

Behaviours and attitudes

Demonstrate an enthusiastic approach to learning

Develop and complete a programme of self-directed learning

17. LABORATORY PRACTICE IN VIROLOGY AND SEROLOGY

(This section builds further on the content of section 7 in the common competencies section of the curriculum)

Pre-analytical phase

Knowledge

Identify

- the range of tests required for diagnosis of important clinical syndromes, including their limitations and potential problems
- appropriate sample types and volumes, collection, transport and storage requirements
- criteria for specimen acceptance and rejection, and how to deal with samples that fail to meet the criteria
- the ways in which service users can be involved in establishing the test repertoire
- the ways in which workload and financial pressures on the laboratory can be managed
- criteria for safe collection of specimens together with appropriate categorisation of risk, packaging, and transportation

Skills

Appraise users of laboratory services of appropriate test selection and specimens for different clinical scenario

Communicate clearly requirements of the laboratory including transport of samples

Engage with users and encourage their involvement in maintaining and expanding the existing test repertoire according to need

Write a business case to introduce an additional test or to alter an existing protocol

Behaviours and attitudes

Adopt an enthusiastic approach to learning

Show:

- ability to work as a member of a team
- respect for and appreciation of the work of laboratory colleagues including scientific, technical, administrative, clerical and ancillary staff

Analytical phase: immunoassays

Knowledge

Describe the principles of immunoassays for antigen and antibody detection including complement fixation test (CFT), manual and automated enzyme immunoassays (EIA) and chemiluminescent immunoassays (CLIA), immunochromatographic assays, immunofluorescence (IFA), immunoblots, agglutination tests.

Describe and explain:

- the immunoassay performance characteristics
- the advantages and disadvantages of different immunoassay formats e.g. direct, indirect, capture
- the effect of different antigen types e.g. recombinant, whole virus lysate

- the problems of interpretation of assays e.g. factors (including rheumatoid factor) that influence IgM assay results, prozone, hook effect, edge effect

Skills

Perform:

- EIA, CLIA
- agglutination assay
- immunoblot

Interpret results of:

- CFT
- IFA
- EIA, CLIA
- immunochromatographic assays
- immunoblot
- particle agglutination test

Assess test validity using quality control parameters for:

- individual test run
- series of test runs over time

Behaviours and attitudes

Demonstrate:

- conscientiousness in following instructions and SOPs
- willingness to concentrate on practical laboratory work
- a positive approach to team working
- appreciation of scientific and technical staff
- tidy and neat working
- safe working
- positive approach to learning theoretical and practical skills
- positive approach to problem solving

Analytical; To understand how to improve the information gained from immunoassays through additional tests

Knowledge

Describe and explain the need for confirming:

- antigen, antibody and combined antigen/antibody detection assay results
- reproducibility of a significant result on additional samples

Describe and explain the need for additional tests to aid interpretation of initial results for example by:

- testing earlier and later samples
- IgM/IgG/IgA testing
- avidity testing
- immunoblot

Skills

Interpret results of:

- neutralisation tests for confirmation e.g. HBsAg, HIV p24Ag
- confirmation by additional serological or molecular tests e.g. multiple serological

assays, PCR
- avidity tests
- immunoblot

Behaviours and attitudes

Demonstrate:
- positive approach to learning theoretical and practical skills
- positive approach to problem solving

Analytical phase: Direct virus detection

Knowledge

Understanding the methods of direct virus detection and their place in the diagnostic virology laboratory

Appreciation of the historical role of embryonated eggs and organ culture in virus detection

Understanding of cell culture techniques including:
- types of cell lines and their susceptibility to viruses
- cytopathic effects
- haemadsorption, haemagglutination
- neutralisation

Identify the principles and practice of transmission electron microscopy

Identify the principles and practice of direct immunofluorescence in virus detection

Identify the principles and practice of the range of nucleic acid amplification techniques employed in diagnostic virology for direct virus detection, including safeguards against contamination, controls including those for recognition of inhibition of amplification

Identify the principles and the practice of quantitation of nucleic acid in virus diagnostic work

Identify the principles and practice of genome sequencing in virus identification and genotyping

Describe the potential for new approaches to virus detection and the principles behind them e.g. mass spectometry

Skills

Recognise negatively stained viruses of medical importance in electron micrographs

Recognise in photomicrographs in the appropriate clinical context immunofluorescent staining of cells infected with viruses of medical importance

Perform nucleic acid amplification tests for virus detection

Perform virus genome sequencing for virus identification/typing

Interpret results of nucleic acid amplification tests and data obtained by genome sequencing

Explain the types of assay controls and how they are used in a laboratory setting

Behaviours and attitudes

Demonstrate:

- positive approach to learning theoretical and practical skills
- positive approach to laboratory working and result interpretation
- positive approach to interpretation of results
- ability to communicate results verbally, electronically, and in written form
- willingness to attend specialist centres and training courses

Analytical phase: To understand how quality is maintained in the laboratory

Knowledge

Demonstrate knowledge of the methods used to ensure quality of examinations in virology and serology

Skills

Describe and explain:

- the need to validate or verify the performance of assays and how this is done
- how quality of assay performance is maintained through use of internal and external controls and quality assurance specimens
- advantages and disadvantages of the range of diagnostic laboratory techniques including considerations such as cost, throughput, automation, technology, false reactivity
- the measures of diagnostic accuracy, including test sensitivity, specificity, positive and negative predictive values, and likelihood ratio
- uncertainty of measurement
- the need for accurate calibration of equipment
- the importance of confirmatory assays where appropriate
- limitations of an individual laboratory and the need for appropriate referral for specialist tests

Behaviours and attitudes

Adopt an enthusiastic approach to learning

Organise and achieve a programme of self-directed learning

Post-analytical phase

Knowledge

Identify:

- the clinical implications of laboratory results for the individual, for infection prevention and control, and for public health
- the need for confidential handling of patient data and the legislation and GMC guidance underpinning this

Skills

Interpret laboratory results and communicate this information clearly and promptly

Handle patient information confidentially, sensitively, and securely

Be familiar with reporting mechanisms and how to use them securely and confidentially –

electronic, written, fax, verbal communication

Record advice accurately in laboratory systems

Provide sound management of clinical problems guided by laboratory results

Prioritise result reporting, identifying critical results that need urgent discussion with other clinicians and/or bedside management of the patient

Ensure chain of evidence is maintained for medicolegal specimens

Recognise and act on results that have potential infection prevention and control implications, or are of public health or medicolegal significance

Fulfil the statutory obligations of clinical laboratories to report relevant diagnostic results as specified in The Health Protection (Notification) Regulations 2010

Establish and audit turnaround times

Behaviours and attitudes

Maintain rapport with laboratory, clinical and clerical and managerial staff

Laboratory Management

Knowledge

Summarise how virology and serology laboratory services are organised, funded and managed, and explain pressures for change in the configuration of laboratory services

Describe:

- the process of laboratory accreditation
- the role of Information Technology in the laboratory, from sample requesting to issuing of reports; summarise the problems and limitations of IT in laboratory services
- medical appraisal and revalidation
- the nature and importance of clinical governance in virology

Demonstrate familiarity with external organisations that provide regulation or guidance on medical and laboratory practice, for example:

- Public Health England and equivalent bodies in Scotland, Wales and Northern Ireland
- UK Standards in Microbiological Investigations
- National Institute for Health and Care Excellence
- Care Quality Commission
- Food Standards Agency
- Royal College of Pathologists
- Scottish Intercollegiate Guidelines Network
- British Infection Association
- British Association for Sexual Health and HIV
- European Association for the Study of the Liver
- Advisory Committee on Dangerous Pathogens

Summarise legal and regulatory issues relevant to clinical and laboratory practice in Microbiology, including the:

- Data Protection Act
- Human Tissue Act
- Health and Safety at Work Act
- Health & Social Care Act 2008
- Public Health (Control of Infectious Diseases) Act 1984
- equivalent legislation in Scotland, Wales and Northern Ireland

Skills

Provide effective clinical leadership to a microbiology service

Effectively work with senior laboratory staff to ensure the laboratory is run in an efficient, safe and cost-effective way

Effectively work with senior laboratory colleagues to deal with staffing or financial problems

Lead the management and investigation of errors or adverse events in the laboratory, especially when these may pose a clinical risk

Provide a clinical lead on service development/improvement, including making and presenting a business case, and evaluation of new techniques or practices

Provide clinical input into the procurement and configuration of pathology IT systems

Manage changing configuration of laboratory services

Train, appraise and mentor staff, and deal with staff in difficulty

Audit existing laboratory or clinical practices in order to improve services

Demonstrate good presentation, speaking and negotiation skills

Behaviours and attitudes

Adopt an enthusiastic approach to learning

Maintain good rapport with senior management

Work with clinical colleagues to ensure safe & effective delivery of a clinical microbiology service including out-of-hours cover

Willingness to lead effectively, including setting priorities for the service, delegating, communicating and liaising appropriately

Accept and respond to change within the laboratory services

18. INFECTION PREVENTION AND CONTROL

Organisation of Infection Prevention and Control responsibilities

To build on areas covered in the common competence section of the curriculum and demonstrate the ability to apply concepts learned to the delivery of an Infection Prevention and Control (IPC) Programme

Knowledge

Evaluate and assess the responsibilities of healthcare institutions and primary care for IPC under The Health and Social Care Act 2012

Describe and explain the roles and responsibilities of staff in the institution involved in delivering an infection prevention and control programme

Describe the political context of an infection prevention and control programme within an institution

Recognise the interactions between different organisations in relation to the management of healthcare associated infections (HCAIs)

Describe the role of infection control in the procurement of new equipment and facilities

Describe and explain the principles and processes of IPC in community settings such as in General Practice and General Dental Practice, in nursing homes, hospices, residential homes etc

Skills

Apply national legislation and guidance to IPC and to contribute, evaluation and change practice if indicated

Develop appropriate leadership skills in preparation for a leadership role in IPC on completion of training

Undertake root cause analysis in investigating cross- infection

Behaviours and attitudes

Contribute positively to the institution's adherence to the framework of the Care Quality Commission, 2010

Willingness to make difficult decisions in a team setting and take responsibility for them

Demonstrate reliability in completion of tasks

Demonstrate a high degree of organisation

Demonstrate good communication skills when working with a multi-disciplinary team

Principles of infection prevention and control

To evaluate and assess an IPC programme, using the principles of infection prevention and control learned under the common competencies section of the curriculum

Knowledge

Describe and explain the science and evidence base that underpins IPC

Describe and explain various surveillance methodologies, data extraction, analysis

Be aware of reporting of bacterial HCAIs (including mandatory reporting)

Describe and explain the processes involved in undertaking IPC inspections and their interpretation

Explain engineering and design concepts relevant to IPC as published by the Department of Health (Health Building Notes and Health Technical Memoranda)

Have a working knowledge of how to evaluate infection control risks associated with

- ventilation in augmented care areas
- design and ventilation of source and protective isolation facilities
- design of central sterile services departments including evaluation and assessments of the processes of sterilisation and disinfection
- endoscopy design, maintenance and monitoring including the use of appropriate high level disinfecting agents
- assess and commission new and refurbished facilities in a healthcare environment
- safe injection practices and make recommendations on choice of product
- management of sharps and splash injuries and the principles of post-exposure prophylaxis

Skills

Create policy documents related to common and important aspects of IPC in hospital and community based healthcare systems

Create evidence based policy documents and guidance in the event of infections with novel or imported agents

Use knowledge of surveillance methods to make effective judgements on advantages and disadvantages before making a recommendation on the most appropriate surveillance methodology

Suggest appropriate interventions based on surveillance data interpretation

Design, lead, analyse and disseminate results of in-depth audits of policies and practices related to IPC

Undertake IPC inspections, analysing the findings and providing a judgement on the quality of the processes adopted by the institution

Demonstrate good report and policy writing skills

Critically appraise the evidence when creating policy documents

Demonstrate organisational, leadership and mentoring skills in taking a project to completion

Behaviours and attitudes

Recognise and help overcome barriers to adopting good infection prevention and control practice

Be a role model for good infection control practice

Respect the contribution of all healthcare staff in maintaining good infection prevention and control practice

Management of virus infections in the healthcare setting

To manage HCAIs and/or incidents of increasing complexity

Knowledge

Describe how to risk-assess and manage cases of complex virus infections in vulnerable patient groups including those in augmented care environments

Describe and explain the implications of antimicrobial drug resistance for infection control practice, in particular, emerging and drug resistant viruses

Skills

Maintain accurate and detailed clinical records

Undertake in-depth audits of clinical practice

Demonstrate high standards of clinical governance

Demonstrate skills related to teaching, training and mentoring

Lead and Chair Root Cause Analyses (RCA's) and infection-related adverse events including 'serious untoward incidents' (SUI's)

Demonstrate the ability to tackle complex problems and provide clear, evidence based guidance and advice in managing viral infections in the healthcare setting

Behaviours and attitudes

Be available and approachable to all staff in dealing with infection control issues

Multi-Disciplinary Team working in dealing with infection control issues

To demonstrate leadership ability in managing outbreaks of infection, and to use infection surveillance data

Knowledge

Describe and explain:

- surveillance methodologies for viral infections in the hospital and community
- global viral surveillance programmes e.g. influenza, arboviruses
- data analysis to offer interpretation of trends in virus transmission and appropriate intervention strategies

Describe and explain:

- the steps involved in recognising, investigating and controlling outbreaks of infection
- epidemiological methods particularly molecular typing methods used in outbreak investigations
- statistical methods used in outbreak recognition, investigation and management, including the design of studies such as case control studies

Skills

Demonstrate leadership in working with diverse professional colleagues in outbreak management

Advise appropriately on investigations and management, including closure of hospital beds, hospital wards, institutions such as schools

Demonstrate excellent communication skills in liaising with all healthcare staff in matters related to an outbreak

Demonstrate:

- good organisation
- clear and concise report writing
- clear communication in dealing with media, clinical colleagues, and the public

Behaviours and attitudes

Willingness to take responsibility in dealing with complex infection problems and outbreaks

Willingness to work effectively in a team

Maintains accurate records

Respects the contributions of all groups of staff in managing outbreaks

Communicates effectively

19. VACCINATION

Ability to advise on vaccination against infectious diseases - building on section 12 in the common competencies section of the curriculum

Knowledge

Describe and explain:

- the role of the UK Joint Committee on Vaccination and Immunization (JCVI) in assessing information and setting vaccination policy
- reporting of vaccine-related incidents to appropriate bodies e.g. MHRA
- the technology of vaccine production and the advantages and disadvantages of various types of vaccines e.g. live attenuated, inactivated, recombinant, DNA vaccines, e.g. derived, cell culture derived, transgenic vaccines
- use of viruses as vaccine vectors
- surveillance programmes and their role in vaccine preparedness e.g. global influenza A networks
- the use of ring vaccination in outbreak control
- approaches to vaccine development, including rapid development of vaccines in response to emerging infections e.g. pandemic influenza, novel coronavirus infections
- initiatives for vaccination for infections where no effective vaccines are in use at present e.g. CMV, HSV, HIV, HCV
- immunisation use and efficacy in the immunocompromised
- clinical trial processes for vaccines
- the nature of vaccine adjuvants
- the effects of vaccination on viruses e.g. antibody selection pressure
- the mechanisms underlying vaccine-induced pathology
- the potential of therapeutic vaccines

Skills

Advise appropriately on the use of active vaccination in prevention of infection, including in the management of outbreaks

Demonstrate participation in surveillance programmes for vaccine preventable infections

Demonstrate participation in initiatives in the health care setting to set and to meet targets for vaccination

Behaviours and attitudes

Enthusiastic approach to learning

Enthusiastic in promoting increased uptake of vaccination

Willingness to report adverse reactions to vaccination

Respect for and ability to work with immunisation coordinators, nursing staff, public health colleagues and others responsible for vaccine policy and delivery

20. HEALTH AND SAFETY

To demonstrate an ability to competently manage health and safety issues arising both in the laboratory and clinical settings
To demonstrate an ability to prepare written reports on health and safety issues/incidents

Knowledge

Locate new legislative documents relating to Health and Safety at work

Demonstrate an up-to-date knowledge of health and safety issues and how this can be translated into local best practice

Skills

Prepare infection, prevention and control written risk assessments

Generate both vertical and horizontal audits to identify health and safety issues within both laboratory and clinical settings

Use incident reporting and corrective actions in response to health and safety issues

Behaviours and attitudes

Effectively work in a multi-disciplinary team

21. PRINCIPLES OF PUBLIC HEALTH IN RELATION TO COMMUNICABLE DISEASES

Principles of Public Health in relation to Infection

To be able to apply the Principles of Public Health Management in matters related to prevention and control of communicable diseases

Knowledge

Explain the key principles of outbreak investigation in the community

Describe the principles of hypothesis-generation and testing when investigating an outbreak

Employ basic statistical methods and describe the concepts of mathematical modelling in designing interventions during an outbreak

Describe and explain public health aspects of vaccine-preventable infections and the benefits of vaccination

Explain the concepts of herd immunity in relation to vaccine failure

Describe and explain virology and epidemiology of food and waterborne infections

Describe how to provide virology support in a public health emergency

Describe of the features of agents of deliberate release in terms of clinical presentation, potential for spread and methods for detection and control

Skills

Provide leadership on the virological investigation and management of community outbreak including chairing outbreak or incident meetings as appropriate

Work with relevant authorities in organising an emergency response

Analyse data and provide daily updates and situation reports

Write clear and concise briefing notes as an aide to communication with colleagues in the wider healthcare environment

Provide clear and evidence based specialist microbiology advice to Public Health and other clinical colleagues including GPs

Behaviours and attitudes

Work within a multi-disciplinary team comprising colleagues from healthcare facilities, reference laboratories, public health bodies and other agencies and participate in the comprehensive management of an outbreak

Demonstrate a high degree of organisation in pulling together diverse work streams

Demonstrate excellent communication and negotiation skills in dealing with a diverse body of health professionals

Respect the opinions of professionals in other disciplines and take on board other points of view

Outbreak Management

Demonstrate leadership ability in dealing with outbreak situations. Demonstrate the ability to analyse and interpret surveillance data and translate the results into policy and practice

Knowledge

Describe and explain the steps involved in recognising, investigating and controlling outbreaks of infection

Describe and explain the current laboratory, including molecular, epidemiological methods utilised for outbreak investigations and how to access them

Explain statistical methods used in outbreak recognition, investigation and management,

Skills

Lead the investigation of an outbreak ensuring utilisation of expertise and resources

Interpret statistical data and make recommendations for interventions for outbreak control

Provide guidance to the diagnostic laboratory and utilise reference laboratory and other expert resources appropriately when investigating an outbreak

Demonstrate clear and concise report writing skills

Behaviours and attitudes

Demonstrate a high degree of organisation in pulling together diverse work streams

Demonstrate excellent communication and negotiation skills in dealing with a diverse body of health professionals

Respect the opinions of professionals in other disciplines and take on board other points of view

Maintain accurate and confidential records.

Influence opinion and change practice in the interest of good infection control

22. IMPORTANT CLINICAL SYNDROMES

To be able to diagnose and manage important clinical syndromes
To be read in conjunction with Section 24 in HST Virology Curriculum: 'Infections in the Immunocompromised'

Knowledge

Gain knowledge and understanding of the principles and practice of clinical virology (and related microbiology) in important areas of infectious disease, sufficient to formulate strategies for prevention, infection control, and treatment. Examples are:

- respiratory infections in the community and in hospital, including influenza, parainfluenza, respiratory syncytial virus, metapneumovirus, adenovirus, rhinovirus, *Mycoplasma pneumoniae*, *Chlamydophila pneumoniae*, *Chlamydophila psittaci* and *Coxiella burnetii*
- infections due to endogenous and exogenous viruses and also *Toxoplasma gondii and Pneumocystis jirovecii* in immunocompromised patients (solid organ transplant recipients, haematopoietic stem transplant recipients, HIV, congenital immunodeficiencies, those on immunosuppressive therapies)
- transmissible spongiform encephalopathies
- viral infections in paediatric patients including neonates
- infections in pregnant women and the fetus (including toxoplasmosis)
- travel-related, non-UK endemic and epidemic viral infections (including arboviruses and viral haemorrhagic fever (VHF) agents)
- infections in adult and paediatric intensive care units (ICU) and special care baby unit (SCBU)
- viral infections of the central nervous system especially meningitis and encephalitis
- viral infections involving the liver especially agents of acute and chronic viral hepatitis
- sexually transmitted infections (including HIV, treponemal infections and *Chlamydia trachomatis*)
- emerging viral infections e.g. novel influenza viruses, novel coronaviruses, novel bat zoonoses, novel parvoviruses, emerging arbovirus infections

Describe prevention of these infectious syndromes

Describe management of these infectious syndromes

Describe and explain the differential diagnosis of these infections including relevant bacteriological and fungal infections and autoimmune diseases

Skills

Perform clinical assessment including evaluation of relevant history, physical findings and investigations to establish a differential diagnosis

Select appropriate investigations and interpret the results accurately

Apply information from history, examination and investigations to appropriately manage the infection

Use relevant local, regional, national guidelines especially those from specialty societies to manage infection.

Adjust management plan depending on progress and developments

Behaviours and attitudes

Establish rapport with other clinical staff

Interpret and explain results and treatments simply and effectively

Demonstrate the importance of being adaptable and open in the face of new or changing information

Maintain confidentiality

Maintain non-judgemental attitude to disease and its acquisition

Hepatitis

How to advise on and manage laboratory testing in the patient with chronic viral hepatitis, to manage exposure risks, and to manage treatment of patients infected with chronic viral hepatitis

Knowledge

Describe and explain:

- the natural history of hepatitis B and hepatitis C infections at all ages in the immunocompetent and the immunocompromised
- the effects of other viruses such as hepatitis D and hepatitis A on chronic viral hepatitis and the effects of other factors such as ethanol use
- the role of other viruses in chronic infection e.g. hepatitis E in the transplant patient
- appropriate test selection at different stages of infection
- interpretation of diagnostic tests including immunoassays and molecular tests including false positive and negative results
- the importance of genotype information in epidemiology, natural history and therapy of hepatitis B and hepatitis C
- reporting of chronic viral hepatitis infection to Public Health England and similar bodies responsible for data collection, and referral for national surveillance where applicable
- therapeutic options in the treatment of hepatitis B and hepatitis C, both current and in development, including immunomodulatory drugs, direct-acting antiviral agents and therapeutic vaccination
- monitoring of responses to treatment
- recognition and management of adverse effects of drug therapy in these conditions
- prevention of spread of infection including the management of vertical transmission risk and risk from sharps injuries
- the management of the health care worker infected with hepatitis B or C
- prevention of spread of hepatitis B and C in the renal dialysis setting
- the natural history and management of hepatitis B and C in the immunocompromised including strategies for preventing and managing hepatitis B reactivation
- the management of the patient with a liver transplant because of viral hepatitis

Skills

Select and interpret accurately laboratory tests used in diagnosis and monitoring of viral hepatitis

Explain in clear terms the significance of results and their limitations

Issues laboratory reports with clear interpretation of results

Report new diagnoses of acute hepatitis B and C to public health agencies promptly and also reports chronic cases with an antenatal diagnoses of hepatitis B and C appropriately, advising clearly on prevention of transmission to the baby and management of the mother

Perform laboratory tests used in management of viral hepatitis including immunoassays for antibody and antigen, point of care tests, nucleic acid amplification and sequencing

Describe and explain:

- effective use of antiviral therapy in chronic viral hepatitis
- the recognition and management of side effects of therapy and adjustments to treatment that may become necessary
- the management of antiviral interactions with other drugs particularly in HIV coinfected patients and in the immunocompromised
- the management of the patient with a liver transplant and the control of viral hepatitis in that setting
- the need for compliance to treatment regimens
- the monitoring of viral load
- the use of resistance data in informing treatment decisions
- how and when to safely stop therapy
- the reasons for a detectable viral load in a treated patient

Behaviours and attitudes

Adopt an enthusiastic approach to learning

Organise and achieve a programme of self-directed learning

Demonstrates non-judgemental attitude to patients

Respect patient choice

Enthusiastic in promoting increased uptake of hepatitis testing in at risk groups

Willing to work in a multidisciplinary team including laboratory staff, clinical scientists, nursing staff, and the clinical teams involved in care of viral hepatitis

23. UNDERSTANDING USE OF AGENTS ACTIVE AGAINST VIRUSES

To understand and apply antiviral therapy

Knowledge

Demonstrate knowledge of:

- the pharmacology of anti-viral agents, both those with direct antiviral actions and those with immunomodulatory activity
- antiviral drug dosage, and pharmacokinetics, and adjustments for renal and hepatic impairment
- interactions of antivirals with each other and with other therapeutic agents
- duration of treatment, routes of administrations,
- safety and efficacy
- therapeutic drug monitoring to reduce toxicity and to optimise therapy
- the differences in antiviral use across the range of patient groups, including immunocompetent and immunocompromised, neonate, infant and child, pregnant, elderly, high dependency settings
- testing virus and host factors that may affect virus response e.g. IL-28 polymorphisms, HLA-B*5701
- monitoring response to treatment e.g. viral load monitoring
- monitoring for development if antiviral resistance
- the importance of compliance in achieving optimal antiviral therapy
- the need for informed consent for antiviral treatment where appropriate
- antiviral costs
- the responsibility for using antiviral agents ‘off licence’
- the use of parenteral antiviral therapy in the outpatient and home settings
- other drugs with anti-virus activity not generally classed as antivirals e.g. ciprofloxacin, leflunomide

Demonstrate knowledge of tests for resistance to antiviral agents:

- phenotypic
- genotypic

Demonstrate knowledge of, and ability to access, current guidelines on antiviral drugs and their use in practice

Describe reference laboratories for antiviral resistance testing, and for drug level measurement

Skills

Identify the most appropriate antiviral or combination of antiviral agents for management of viral infection

Explain and advise on:

- the use of antivirals for therapy
- dose, route of administration, and duration of treatment with antivirals alone or in combinations
- adverse effects of antivirals
- monitoring for and recognising development of resistance to antiviral agents
- alternative agents when resistance appears
- therapeutic drug monitoring

Interpret sequence data showing mutations conferring resistance to antivirals

Behaviours and attitudes

Demonstrate:

- positive approach to learning theoretical and practical skills
- willingness to keep up to date
- willingness to learn from laboratory and clinical colleague

To use immunoglobulins and monoclonal antibodies to prevent and treat virus infection

Knowledge

Demonstrate knowledge of:

- the provision of passive immunisation using immunoglobulins
- methods of preparation of immunoglobulins and the avoidance, removal and inactivation of potential pathogens in the preparations
- the properties of immunoglobulins used for prophylaxis of viral infection, monoclonal and polyclonal
- local and national accountability of immunoglobulin prophylaxis
- storage conditions for immunoglobulins
- the properties of immunoglobulins used in antiviral therapy
- immunoglobulin dosage, and pharmacokinetics
- interactions of immunoglobulins with vaccines
- duration of immunoglobulin prophylaxis in respiratory syncytial virus prevention
- duration of immunoglobulin therapy e.g. in CMV pneumonitis, in Lassa fever treatment
- immunoglobulin replacement therapy in immunodeficiency states
- routes of administration of immunoglobulin
- safety of immunoglobulins
- the need for informed consent for immunoglobulin prophylaxis and treatment where appropriate

Demonstrate knowledge of, and ability to access, current guidelines on immunoglobulin and their use in practice

Demonstrate knowledge of monoclonal antibodies used in the management of virus infection e.g. rituximab

Skills

Selection of immunoglobulin and monoclonal antibody preparations to provide:

- prophylaxis against viral infections
- adjunctive therapy in treatment of virus disease

Describe and explain:

- the use of immunoglobulin in therapy
- dose, route of administration, and duration of treatment or prophylaxis using immunoglobulins
- interactions of immunoglobulins with other preparations
- adverse effects of immunoglobulins
- use of therapeutic monoclonal antibodies in virus infection

Behaviours and attitudes

Demonstrate:

- positive approach to learning theoretical and practical skills
- willingness to keep up to date
- willingness to learn from laboratory and clinical colleagues

24. INFECTION IN THE IMMUNOCOMPROMISED

Diagnosis and management of viral and related infections in individuals with immunodeficiency other than that due to HIV infection

Knowledge

Describe and explain:

- the underlying defects causing immune deficiency both congenital and acquired
- the causes of acquired immune deficiencies including immunosuppressive drugs, transplantation, concurrent immunosuppressive infections, intensive care settings
- the infection risks in these groups of immunodeficient individuals
- the ways in which infection risk can be reduced in immunodeficient individuals including active and passive vaccination and antimicrobial prophylaxis
- the management of viral infections in immunodeficiency
- the differential diagnosis of viral infection in the immunocompromised – bacterial, parasitic, fungal
- immune reconstitution syndromes

Explain:

- specific issues in immunodeficiency that increase the complexity of management of viral infections e.g. drug interactions, on-going immune deficits resulting from chemotherapy
- specific risks in the immunocompromised associated with viral infection e.g. post-transplant lymphoproliferative disorder, progressive multifocal leukoencephalopathy, haemophagocytic lymphohistiocytosis

Explain:

- Appropriate selection and use of antiviral agents and adjunctive therapies in managing infection in the immunocompromised
- Appropriate strategies for monitoring virus response to treatment
- The recognition of adverse effects of antiviral agents
- The monitoring of antiviral drug levels to optimise therapy or reduce risk

Skills

Demonstrate clinical experience and competency in preventing and treating infection in the following patient groups:

- oncology/solid organ tumours
- haematological malignancy
- solid organ transplantation
- haematological transplantation
- chronic diseases associated with immune deficits through the disease process and/or management with immunosuppressive agents (e.g. liver, renal, rheumatology, respiratory)
- those on immunomodulating therapies

Demonstrate appropriate test selection for diagnosis of viral infection and for monitoring

Behaviours and attitudes

Demonstrate cross-disciplinary working in the management of the immunocompromised patient

Recognises own limitations and seek specialist advice where necessary

Explains complex management plans clearly to relevant clinical colleagues

Ability to advise on and manage laboratory testing in the HIV positive patient – building on section 13 in the common competencies section of the curriculum

Knowledge

Describe and explain:

- consent for testing for HIV and maintaining confidentiality
- the natural history of HIV-1 and HIV-2 infections with regard to appropriate test selection at different stages of infection
- interpretation of diagnostic tests such as immunoassays and molecular tests including false positive and negative results
- reporting of HIV infection to Public Health England and similar bodies responsible for data collection
- therapeutic options in HIV treatment
- HIV antiviral drug resistance testing
- therapeutic drug monitoring in HIV therapy

Skills

Select and interpret accurately laboratory tests used in HIV diagnosis and monitoring

Explain in clear terms the significance of results and their limitations

Perform laboratory tests used in HIV management including immunoassays for antibody and antigen, point of care tests, nucleic acid amplification and sequencing

Behaviours and attitudes

Demonstrates non-judgemental attitude to patients

Willing to discuss with relevant colleagues or national bodies ethical questions relating to HIV consent and testing

Enthusiastic in promoting increased uptake of HIV testing in at risk groups

How to advise on prevention and management of HIV exposure

Knowledge

Describe and explain:

- consent for testing for HIV and maintaining confidentiality
- the natural history of HIV-1 and HIV-2 infections with regard to appropriate test selection at different stages of infection
- the epidemiology of HIV infection and population prevalence
- risks of HIV transmission after exposure to HIV by sexual and nonsexual exposure
- rationale for postexposure prophylaxis (PEP)
- appropriate drug regimens for postexposure prophylaxis, including in specific groups such as pregnant women, and where the source virus might have resistance to certain drugs/drug classes
- availability of national guidance on postexposure prophylaxis against HIV e.g. DH EAGA, BHIVA
- follow-up after PEP

- restrictions on working and risks associated with HIV-infected health care workers

Skills

Describe the risk after sexual and nonsexual exposure

Explain in clear terms the rationale for advising or not advising PEP

Advise on management of those at risk of multiple HIV exposures

Behaviours and attitudes

Demonstrate non-judgemental attitude to individuals exposed to HIV

Deal with risks in a tactful way, showing empathy

Willing to discuss with relevant colleagues or national bodies ethical questions relating to HIV consent and testing

Willing to involve relevant services in management of postexposure HIV prophylaxis e.g. sexual health, infectious diseases, occupational health

Show willingness to work with public health colleagues locally and nationally as well as occupational health services in management of transmission of HIV in the health care setting

How to manage antiretroviral therapy

Knowledge

Describe and explain:

- monitoring in the treated patient
- the need for compliance and how patient adherence to a drug regimen can be optimised
- therapeutic drug monitoring
- genotypic resistance testing at baseline and during therapy
- available resources e.g. Stanford database to aid interpretation of resistance testing results
- indications for pharmacogenomics tests e.g. HLA B*5701
- the management of individuals with detectable HIV viral load including blips and virological failure

Skills

Describe and explain:

- the use of resistance data resources to inform treatment decisions
- the reasons for a detectable viral load in the treated patient
- the side effects of treatment regimens
- the interpretation of genotypic resistance information
- management of antiretroviral drug interactions
- how to safely stop antiretroviral therapy

Behaviours and attitudes

Willing to work in a multidisciplinary team including laboratory staff, clinical scientists, nursing staff, and the clinical teams involved in HIV care

Respect patient choice

How to manage HIV coinfection in those with concurrent viral hepatitis

Knowledge

Describe and explain:

- the epidemiology of viral hepatitis including hepatitis A,B,C,D,E
- the natural history of hepatitis B and C in the individual infected with HIV
- screening and vaccination against hepatitis viruses in individuals infected with HIV
- the ways in which HIV infection can affect laboratory tests in viral hepatitis
- the initial assessment and later monitoring of hepatitis B and C in the HIV-infected individual
- the antiviral treatment of viral hepatitis and how this may affect HIV treatment

Skills

Describe and explain:

- the use resistance data resources to inform treatment decisions
- advise on side effects of treatment regimens
- advise on safely starting and stopping antiretroviral therapy and therapy for viral hepatitis
- interpret laboratory test results in the HIV-infected individual

Behaviours and attitudes

Willing to work in a multidisciplinary team including laboratory staff, clinical scientists, nursing staff, and the clinical teams involved in HIV care

Respect patient choice

Identify risk reduction and encourage vaccination

25. RESEARCH AND DEVELOPMENT IN VIROLOGY

To understand how to undertake a research project

Knowledge

Demonstrate understanding of

- research methods
- research planning
- research governance including ethical approval and standards of Good Clinical Practice and Good Laboratory Practice
- ways in which research funding can be obtained
- dissemination of research findings

Skills

Demonstrate ability to:

- agree a suitable project with supervisor *
- undertake a literature review and critically appraise publications
- critically appraise and interpret study results including statistical data
- write a research proposal
- apply for research ethics approval if required
- acquire new laboratory skills required for a laboratory-based project
- manage project including costs
- keep clear concise accurate records of the findings
- acquire analytical skills relevant to project results
- present project satisfactorily
- write up project ideally with aim of publication

*suitable projects might include a clinical investigation using an established laboratory technique, developing or optimising a new laboratory technique, an epidemiological investigation, or a piece of basic scientific research. Trainees should be preparing for and undertaking their research project across the full four year training period.

Behaviours and attitudes

Approach research with enthusiasm

Observe safe and ethical working practices

Establish rapport with scientific and technical staff

Acknowledge the contribution of all members of the research team