The Royal College of Pathologists

Pathology: the science behind the cure

CURRICULUM FOR SPECIALTY TRAINING IN **MEDICAL VIROLOGY**

AUGUST 2021

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1. Introduction

Medical virology (MV) is a specialty that provides diagnostic and clinical advice essential for the delivery of clinical care across all specialties and areas of the health service. A medical virologist may be involved at all stages of diagnosis and management pathway in patients with proven or suspected viral infections. Most National Health Service (NHS) organisations and medical microbiologists have access to a medical virologist for expert virological advice. A UK network of clinical virologists can provide advice, particularly around issues such as organ transplantation work ups, blood transfusion screening or diagnostic service for a newly emerging pathogen (e.g. pandemic influenza A H1N1 virus).

Training is possible in medical virology as a mono-specialty or with infectious diseases (also see infectious diseases curricula).

2. Purpose

2.1 Purpose statement

Medical virologists work closely with medical microbiologists, infectious diseases physicians, general practitioners (GPs), midwives, occupational health and wellbeing practitioners, intensivists, transplantation services, public health experts, epidemiologists, infection control nurses, pharmacists and laboratory staff. They advise on appropriate diagnostic tests when viral infections are suspected, provide leadership and advice on the interpretation of test results, and clinical management of patients infected with viruses. They work closely with laboratory staff to ensure their safety in the case of high-risk organisms and advise on routine serological and direct tests for viral pathogens. They work closely with medical microbiology and physician colleagues providing expertise on prevention, control, diagnosis and management of a number of globally important viral respiratory infections such as influenza. They may also advise on complex transplant-related viral infections, viral hepatitis, influenza and laboratory issues such as track-based serology systems, molecular diagnostics, automation and antiviral genotyping/resistance testing. Imported and emerging infections also include suspected high-consequence infections such as viral haemorrhagic fevers (e.g. Ebola or Lassa), or respiratory agents such as Middle East respiratory syndrome (MERS) and avian influenza. Medical virologists provide emergency infection prevention and control advice, and facilitate rapid (often overnight) diagnostics and crucial leadership in antimicrobial stewardship and infection control.

Medical virologists and medical microbiologists provide leadership in infection prevention and control, and support the director of infection prevention and the Infection Control Team. Responsibilities may include supporting reduction programmes for *C difficile*, *Methicillin-resistant Staphylococcus aureus* (MRSA) and multi-resistant Gram-negative infection, and advice on infection surveillance, flu vaccination, needlestick accidents, decontamination, hospital design, water safety, outbreak management and antimicrobial stewardship. In some centres, the infection control lead may be an infectious diseases physician.

Medical virologists provide clinical leadership and support to the laboratory including advising on quality improvements and service developments. Being a small specialty, virologists are more likely to provide management leadership in large laboratories together with administrative, scientific and biomedical colleagues. There are increasing numbers of privatised off-site laboratories, moves towards hub and spoke models of laboratory service delivery and increasing automation. Medical virologists may be required to provide both on-site virological support to such laboratories, and advice to medical microbiologists and others who manage essential services (‘hot’) labs and clinical services in NHS trusts.

The purpose of the curriculum is to set the standards for attainment of the award of the Certificate of Completion of Training (CCT) or Certificate of Eligibility for Specialist Registration (CESR) via the Combined Programme (CP) in medical virology and to ensure that trainees are fully prepared to lead a full clinical and laboratory virology service at consultant level in the NHS.

This purpose statement has been endorsed by the General Medical Council's (GMC) Curriculum Oversight Group and confirmed as meeting the needs of the health services of the countries of the UK.

2.2 High-level curriculum outcomes: capabilities in practice

The 13 capabilities in practice (CiPs) describe the professional tasks or work within the scope of medical virology. Six CiPs are generic, with applicability to doctors in all specialties, and seven are specific to specialists in infection. Each CiP has a set of descriptors associated with that activity or task. Descriptors are intended to help trainees and trainers recognise the minimum level of knowledge, skills and attitudes which should be demonstrated for an entrustment decision to be made. By the completion of training and award of CCT, the doctor must demonstrate that they are capable of unsupervised practice in all generic and specialty CiPs.

The six generic CiPs cover the universal requirements of all specialties as described in the generic professional capabilities (GPC) framework. Assessment of the generic CiPs will be underpinned by the GPC descriptors. Satisfactory sign-off will indicate that there are no concerns before the trainee can progress to the next part of the assessment of clinical capabilities.

The seven specialty CiPs describe the laboratory and clinical tasks or activities which are essential to the practice of medical virology. The specialty CiPs have also been mapped to the GPC domains and subsections to reflect the generic professional capabilities required to undertake the clinical tasks. Satisfactory sign-off requires demonstration that, for each of the CiPs, the trainee's performance meets or exceeds the minimum level of performance expected for completion of this stage of medical virology training, as defined in the curriculum.

The generic and speciality CiPs are common across all the infection curricula, however the entrustment levels (1–4) required CiP to gain a CCT vary and are specified for each curriculum. See tables 5 and 6 in sections 8.2 and 8.3 respectively, for descriptions of entrustment levels and levels required in medical microbiology (MM), MV, dual medical microbiology/infectious diseases (MM/ID) and dual medical virology/infectious diseases (MV/ID) training.

Please see section 8 for more details of the assessment programme.

Table 1: The six generic and seven speciality capabilities in practice

Learning outcomes – CiPs
Generic CiPs
1. Able to function successfully within NHS organisational and management systems. 2. Able to deal with ethical and legal issues related to clinical practice. 3. Communicates effectively and is able to share decision making, while maintaining appropriate situational awareness, professional behaviour and professional

judgement.
4. Is focused on patient safety and delivers effective quality improvement in patient care.
5. Able to carry out research and managing data appropriately.
6. Acts as a teacher and clinical supervisor.

Specialty CiPs

7. Able to provide clinical leadership and support to the laboratory.
8. Able to use the laboratory service effectively in the investigation, diagnosis and management of infection.
9. Able to advise on infection prevention, control and immunisation.
10. Able to manage and advise on important clinical syndromes where infection is in the differential diagnosis.
11. Able to lead and advise on treatment with and stewardship of antimicrobials.
12. Able to provide continuity of care to inpatients and outpatients with suspected or proven infection.
13. Able to manage and advise on imported infections.

2.3 Generic professional capabilities and good medical practice

The GMC has developed the GPC framework with the Academy of Medical Royal Colleges (AoMRC) to describe the fundamental, career-long, generic capabilities required of every doctor. The framework describes the requirement to develop and maintain key professional values and behaviours, knowledge and skills, using a common language. GPCs also represent a system-wide, regulatory response to the most common contemporary concerns about patient safety and fitness to practise within the medical profession. The framework will be relevant at all stages of medical education, training and practice.

The nine domains of generic professional capabilities

Good medical practice (GMP) is embedded at the heart of the GPC framework. In describing the principles, duties and responsibilities of doctors, the GPC framework articulates GMP as a series of achievable educational outcomes to enable curriculum design and assessment.

The GPC framework describes nine domains with associated descriptors outlining the 'minimum common regulatory requirement' of performance and professional behaviour.

These attributes are common, minimum and generic standards expected of all medical practitioners achieving a CCT or its equivalent.

The 20 domains and subsections of the GPC framework are directly identifiable in the medical virology curriculum. They are mapped to each of the generic and specialty CiPs, which are in turn mapped to the syllabus, and to the assessment blueprints. This is to emphasise those core professional capabilities that are essential to safe clinical practice and that must be demonstrated at every stage of training as part of the holistic development of responsible professionals.

This approach will allow early detection of issues most likely to be associated with fitness to practise, and aims to minimise the possibility that any deficit is identified during the final phases of training.

2.4 Training pathway

Trainees in the specialty will initially develop knowledge of laboratory work, together with supervised clinical liaison and validation of results, and direct clinical care. Following completion of the FRCPath Part 1 examination (typically after 18–24 months of training), they will continue to develop their skills in the laboratory (including assessment of new tests and guideline development) and in clinical management/advice, with greater responsibility and less direct supervision. After passing the FRCPath Part 2 examination, trainees will continue to develop their skills with support; they may also develop a specialist interest.

Figure 1. Structure of training in medical virology, including indicative training time.

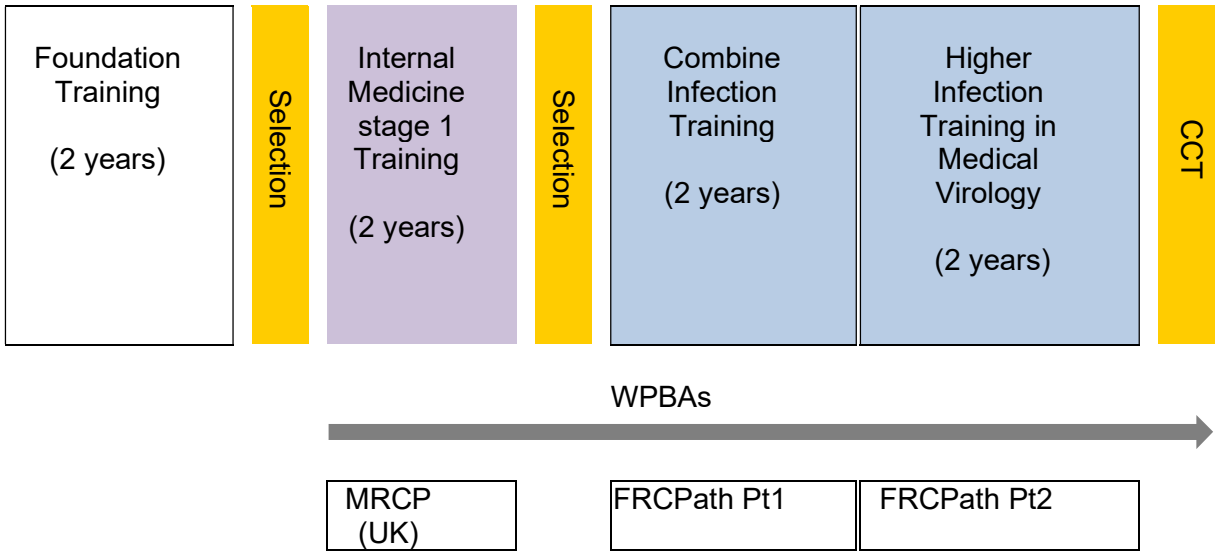
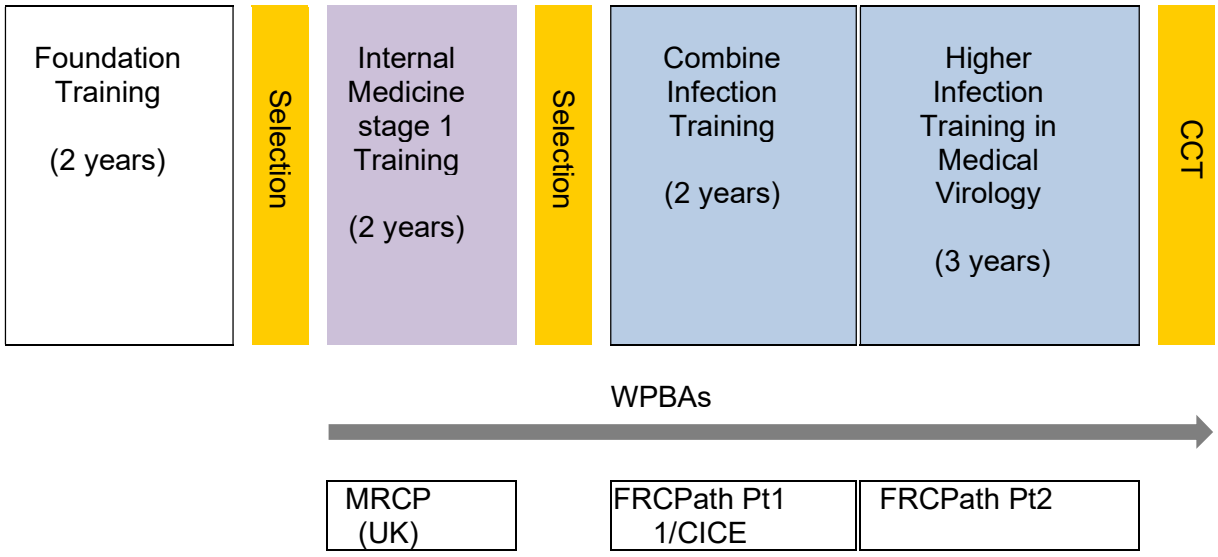


Figure 1a. Structure of training in infectious diseases with medical virology.



This curriculum will deliver a generalist medical virologist who can integrate into the local structure and be flexible enough to complement other staff and cooperate to deliver the required service. Therefore, the proportion of clinical and laboratory work will vary widely according to local need, but trainees should have the capability and readiness for either.

This curriculum supports a flexible approach to training with broad entry routes from post-foundation core training programmes, whose clinical experience will closely mirror the range of clinical specialties supported by medical virologists and medical virology services.

2.5 Duration of training

The Royal College of Pathologists anticipates that four 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 combined infection training section of the curriculum and two years to complete higher infection training (HIT) in medical virology.

Training in dual medical virology and infectious diseases is anticipated to require an indicative duration of two years combined infection training, followed by three years of HIT in medical virology and infectious diseases.

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

- evidence of satisfactory completion of the requirements of the medical virology curriculum
- satisfactory completion of the requisite number of workplace-based assessments (including multi-source feedback (MSF))
- attainment of FRCPath by examination in medical virology
- acquisition of the Annual Review of Competence Progression (ARCP) outcome 6.

Dual trainees are governed by the Joint Royal College of Physicians Training Board (JRCPTB) and have the same criteria as above for a medical virology CCT.

2.6 Flexibility

Medical virology training offers excellent opportunities to contribute to research and service development across the whole field of medicine, as well as providing opportunities for training in other related specialties, and in a range of settings. GPCs will promote flexibility in postgraduate training as these common capabilities can be transferred from specialty to specialty.

2.7 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 or JRCPTB so that the Medical Training Committees 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 will be 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.

3. Learning and teaching

3.1 The training programme

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 the GMC can lead towards the award of the CCT. Training that has not been prospectively approved by the GMC can still be considered, but the trainee's route of entry to the Specialist Register changes to CESR (CP) route.

The organisation and delivery of postgraduate training is the responsibility of the Health Education England (HEE) and its Local Education and Training Boards (LETBs), NHS Education for Scotland (NES), the Health Education and Improvement Wales (HEIW) and the Northern Ireland Medical & Dental Training Agency (NIMDTA). A training programme director will be responsible for coordinating local infection training programmes. In England, the local organisation and delivery of training is overseen by a school of medicine.

Progression through the programme will be determined by the ARCP process and the training requirements for each indicative year of training are summarised in the combined infection training ARCP decision aid (see JRCPTB or RCPath websites) and the HIT medical virology ARCP decision aid (available on the RCPath website). The successful completion of the programme will be dependent on achieving the expected level in all CiPs and GPCs. The programme of assessment will be used to monitor and determine progress through the programme. Training will normally take place in a range of district general hospitals and teaching hospitals.

The sequence of training should ensure appropriate progression in experience and responsibility. The training to be provided at each training site is defined to ensure that, during the programme, the entire syllabus is covered and also that unnecessary duplication and educationally unrewarding experiences are avoided. However, the sequence of training should ideally be flexible enough to allow the trainee to develop a special interest.

3.2 Entry requirements

Trainees are eligible for entry to combined infection training following satisfactory completion of post-foundation core training programmes.

- Two years of internal medicine (IM) stage 1 plus Membership of the Royal Colleges of Physicians of the United Kingdom (MRCP(UK))
- Acute care common stem (ACCS) plus MRCP(UK)

3.3 Teaching and learning methods

Models of learning

There are three broad categories of learning which trainees employ throughout run-through training: the instructionalist model, the constructionist model and the social learning model. The models of learning can be applied to any stage of training in varying degrees. Most of the curriculum will be delivered through work-based experiential learning, but the environment within the 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, for example, making use of the e-learning tool or providing reference textbooks, etc. It is the trainee's responsibility to seek opportunity for experiential learning.

The more academically inclined trainees will be encouraged to take time out from their training to include a more sustained period of grant-funded research working towards an MSc, MRes/MD or PhD.

Learning for knowledge, competence, performance and independent action will be achieved by assessment, which will be set by the Royal College of Pathologists in the form of workplace-based assessment including MSF and the FRCPath examination.

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.

Learning experiences

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

- **Routine work:** the most important learning experience will be day-to-day work.
- **Textbooks and online resources:** medical virology is a subject requiring a great deal of background learning and reading, as well as the practical experience gained within day-to-day working, and trainees should take every opportunity to 'read around' their subject.
- **Regional training courses:** these are valuable learning opportunities. Trainees should be released from service duties to attend.
- **Other training courses:** individual training programmes may recommend particular external training courses to supplement local and regional training.
- **Scientific meetings:** research and the understanding of research are essential to the practice of medical virology. Attendance at scientific meetings is one of the ways to achieve this and trainees should be encouraged to attend and present their work at relevant meetings.
- **Discussion with biomedical scientists (BMS):** BMS staff and laboratory managers can provide excellent training, particularly in relation to laboratory methods, health and safety, service delivery, procurement and human resources.
- **Multidisciplinary team meetings (MDTs):** attendance at and contribution to MDTs and clinicopathological conferences offer the opportunity for trainees to develop an understanding of clinical management and appreciate the impact of laboratory diagnosis on patient care. The MDT is also an important arena for the development of interprofessional communication skills.
- **Attachment to specialist departments:** attachments of this kind may be required within a training programme, at the discretion of each deanery. They may also be beneficial for those trainees in their final year of training who wish to develop a special interest before taking up a consultant post.
- **E-learning**
- **Learning with peers**
- **Medical clinics including specialty clinics**
- **Practical laboratory experience**
- **Formal postgraduate teaching**
- **Formal study**

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

3.4 Time out of training

The GMC has provided guidance on the management of absences from training and their effect on a trainee's 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 they 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 (OOP) 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 and timing of the absence, 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 the CCT date will reflect the trainee's demonstration of competence.

3.5 Acting up as a consultant (AUC)

A doctor in training can apply to the dean to take time out of programme for up to three months 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 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.

3.6 Out-of-programme research (OOPR)

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

Research undertaken prior to entry to a medical virology training programme

Trainees who have undertaken a period of research prior to entering a medical virology training programme can apply to have this period recognised towards a CCT or CESR (CP), if it includes clinical or laboratory work directly relevant to the medical virology curriculum and there is prospective approval from the GMC.

Research undertaken during a medical virology training programme

Trainees who undertake a period of OOPR after entering a medical virology training programme and obtaining their National Training Number (NTN) may have a period of research recognised towards the award of the CCT or CESR (CP). Trainees must ensure that their OOPR is approved prospectively before beginning their research, which must include clinical or laboratory work directly relevant to the medical virology curriculum and 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 deanery and apply to the Training Department at The Royal College of Pathologists or the JRCPTB (dual trainees) in order that the Medical Microbiology and Virology College Specialty Training Committee (CSTC) can ensure that the trainee will comply with the requirements of the CCT programme and issue a revised provisional CCT date if necessary. It must be ensured that, following deanery agreement and acceptance from the Medical Microbiology and Virology CSTC, the GMC prospectively approve the OOPR in order that the period can count towards a CCT or CESR (CP).

Separate guidance and an application form are available on the College website for this purpose.

3.7 Academic training

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 Fellows or lecturers and hold an academic NTN. It is expected that such trainees should complete the requirements of the medical virology or dual 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 or MV/ID should consult the Training Department at the relevant college on an individual basis with regard to the agreement of their provisional CCT date.

3.8 Out-of-programme training (OOPT)

The GMC must prospectively approve clinical training out of programme if it is to be used towards a CCT or CESR (CP) award. This could include posts inside or outside the UK that are not already part of a GMC-approved programme in the same specialty. Further approval from the GMC is not required if the OOPT is already part of a GMC-approved programme in the same specialty.

Trainees can have up to one year of OOPT recognised towards the award of the CCT. Prior to beginning the period of OOPT, trainees must agree the OOPT with their deanery and inform the Training Department at the Royal College of Pathologists or the JRCPTB (ID/MM trainees) that they will be undertaking OOPT so that the Medical Microbiology and Virology CSTC can ensure that the trainee will comply with the requirements of the CCT programme.

The postgraduate dean is required to submit an application for prospective GMC approval for any OOPT that is to count towards a CCT or CESR (CP) on behalf of the trainee and this application is required to include support from the Royal College of Pathologists. If prospective approval for OOPT is not sought from the GMC, then it cannot count towards a CCT or CESR (CP). Where the OOPT is in a GMC approved programme in the same specialty, an application for further GMC approval is not required.

Trainees must have their OOPT agreed by the relevant deanery, accepted by the Medical Microbiology and Virology CSTC and approved by GMC before beginning their OOPT.

Separate guidance and an application form are available on the College website for this purpose.

3.9 Out-of-programme clinical experience (OOPE)

Trainees may seek agreement for OOP to undertake clinical experience that has not been approved by the GMC and that will not contribute to the award of a CCT or CESR (CP). In these circumstances, it is likely that the CCT date will need to be extended. Trainees should contact the relevant College for further guidance.

4. Quality management

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 training programme director (TPD) and their 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. Heads of Pathology School (HOPS) 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 the GMC's agreed curriculum and is provided to the standards set by the College and the GMC.

It is the responsibility of the GMC to quality assure training programmes and the responsibility of the Royal College of Pathologists and the JRCPTB through the Combined Infection Training Committees, the Medical Microbiology and Virology CSTC and the Infectious Diseases Specialty Advisory Committee (SAC) 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 College on appointment to a medical virology (RCPath) or MV/ID (JRCPTB) training programme. It is the trainee's responsibility to become familiar with the curriculum, inclusive of the generic and specialty CiPs, 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 MSF 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. Intended use of curriculum by trainers and trainees

This curriculum, and the combined infection training and medical virology decision aids, are available from the Royal College of Pathologists via the website www.rcpath.org. The infectious diseases curriculum is available on the JRCPTB website www.jrcptb.org.uk.

Clinical and educational supervisors should use the curriculum and decision aid as the basis of their discussion with trainees, particularly during the appraisal process. Both trainers and trainees are expected to have a good knowledge of the curriculum and should use it as a guide for their training programme.

Each trainee will engage with the curriculum by maintaining an ePortfolio via the relevant college ePortfolio system. The trainee will use the curriculum to develop learning objectives and reflect on learning experiences.

The trainee's main responsibilities are to ensure the ePortfolio is kept up to date, to arrange assessments and ensure they are recorded, prepare drafts of appraisal forms, maintain their personal development plan, record their reflections on learning and record their progress through the curriculum.

The supervisor's main responsibilities are to use ePortfolio evidence such as outcomes of assessments, reflections and personal development plans to inform appraisal meetings. They are also expected to update the trainee's record of progress through the curriculum, write end-of-attachment appraisals and supervisor's reports.

Deaneries, training programme directors, college tutors and ARCP panels may use the ePortfolio to monitor the progress of trainees for whom they are responsible.

All appraisal meetings, personal development plans and workplace-based assessments (including MSF) should be recorded in the ePortfolio. Trainees are encouraged to reflect on their learning experiences and to record these in the ePortfolio. Reflections can be kept private or shared with supervisors.

Reflections, assessments and other ePortfolio content should be used to provide evidence towards acquisition of curriculum capabilities. Trainees should add their own self-assessment ratings to record their view of their progress. The aims of the self-assessment are to:

- provide the means for reflection and evaluation of current practice
- inform discussions with supervisors to help both gain insight and create personal development plans
- identify shortcomings between experience, competency and areas defined in the curriculum so as to guide future clinical exposure and learning.

6. Equality and diversity

Trainees in medical virology will be governed by the *Diversity and equality policy and approach* set out by the Royal College of Pathologists. 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 and 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's trainees, candidates and Fellows are available in the College policy.

Dual medical virology/infectious diseases trainees will be governed by the equality and diversity policy of the Royal College of Physicians. An extract from this policy is below. The full policy is available on the College website.

The Royal Colleges of Physicians will comply, and ensure compliance, with the requirements of equality and diversity legislation set out in the Equality Act 2010.

The Federation of the Royal Colleges of Physicians believes that equality of opportunity is fundamental to the many and varied ways in which individuals become involved with the Colleges, either as members of staff and officers; as advisers from the medical profession; as members of the Colleges' professional bodies or as doctors in training and examination candidates.

LETBs/deaneries' quality assurance will ensure that each training programme complies with the equality and diversity standards in postgraduate medical training as set by the GMC. They should provide access to a professional support unit or equivalent for trainees requiring additional support.

7. Content of learning

7.1 Capabilities in practice

Capabilities in practice (CiPs) describe the professional tasks or work within the scope of medical virology. CiPs are based on the format of entrustable professional activities which are a method of using the professional judgement of appropriately trained, expert assessors as a key aspect of the validity of assessment and a defensible way of forming global judgements of professional performance.

Each CiP has a set of descriptors associated with that activity or task. Descriptors are intended to help trainees and trainers recognise the minimum level of knowledge, skills and attitudes which should be demonstrated by medical virologists. Trainees may use these capabilities to provide evidence of how their performance meets or exceeds the minimum expected level of performance for their year of training. The descriptors are not a comprehensive list and there are many more examples that would provide equally valid evidence of performance.

Many of the CiP descriptors refer to patient-centred care and shared decision making. This is to emphasise the importance of patients being at the centre of decisions about their own treatment and care, by exploring care or treatment options and their risks and benefits, and discussing choices available.

Additionally, the specialty CiPs repeatedly refer to the need to demonstrate professional behaviour with regard to patients, carers, colleagues and others. Good doctors work in partnership with patients and respect their rights to privacy and dignity. They treat each patient as an individual. They do their best to make sure all patients receive good care and treatment that will support them to live as well as possible, whatever their illness or disability. Appropriate professional behaviour should reflect the principles of GMP and GPC.

In order to complete training and be recommended to the GMC for the award of CCT and entry to the Specialist Register, the doctor must demonstrate that they have achieved the required levels for the relevant curriculum in all generic and specialty CiPs.

Satisfactory sign-off at the end of medical virology training requires demonstration that, for each of the CiPs, the trainee's performance meets or exceeds the minimum expected level of performance expected for completion (see table in section 8.3.

This section of the curriculum details the 13 generic and specialty CiPs for medical virology with expected levels of performance, mapping to relevant GPCs and the evidence that may be used to make an entrustment decision.

7.1.1 Generic capabilities in practice

The six generic CiPs cover the universal requirements of all specialties as described in GMP and the GPC framework. Assessment of the generic CiPs will be underpinned by the descriptors for the nine GPC domains and evidenced against the performance and behaviour expected at that stage of training. Satisfactory sign-off will indicate that there are no concerns before the trainee can progress to the next part of the assessment of clinical capabilities. It will not be necessary to assign a level of supervision for these non-clinical CiPs.

In order to ensure consistency and transferability, the generic CiPs have been grouped under the GMP-aligned categories used in the foundation programme curriculum plus an additional category for wider professional practice:

- professional behaviour and trust
- communication, team-working and leadership
- safety and quality
- wider professional practice.

For each generic CiP, there is a set of descriptors of the observable skills and behaviours which would demonstrate that a trainee has met the minimum level expected. The descriptors are not a comprehensive list and there may be more examples that would provide equally valid evidence of performance.

Table 2: Generic CiPs and descriptors

Category 1: Professional behaviour and trust	
1. Able to function successfully within NHS organisational and management systems.	
Descriptors	• Demonstrates awareness of and adherence to the GMC professional requirements • Demonstrates recognition of public health issues including population health, social detriments of health and global health perspectives • Demonstrates effective clinical leadership • Practises promotion of an open and transparent culture • Demonstrates up-to-date practice through learning and teaching • Demonstrates engagement in career planning • Demonstrates capabilities in dealing with complexity and uncertainty • Demonstrates awareness of the role and processes for commissioning
Generic professional capabilities	Domain 1: Professional knowledge Domain 3: Professional values and behaviours • Professional requirements • National legislative requirements • The health service and healthcare systems in the four countries Domain 9: Capabilities in research and scholarship
Evidence to inform decision	MCR MSF ECE Active role in governance structures Management course End of placement reports Educational supervisor (ES) report

2. Able to deal with ethical and legal issues related to clinical practice.	
Descriptors	• Demonstrates awareness of national legislation and legal responsibilities, including safeguarding vulnerable groups • Demonstrates behaviour in accordance with ethical and legal requirements • Demonstrates ability to offer apology or explanation when appropriate • Demonstrates leadership of the clinical and laboratory team in ensuring that medical legal factors are considered openly and consistently • Demonstrates ability to advise clinicians and other health professionals on medico-legal issues related to pathology
Generic professional capabilities	Domain 1: Professional knowledge Domain 3: Professional values and behaviours • Professional requirements

	• National legislative requirements • The health service and healthcare systems in the four countries Domain 4: Capabilities in health promotion and illness prevention Domain 7: Capabilities in safeguarding vulnerable groups Domain 8: Capabilities in education and training Domain 9: Capabilities in research and scholarship
Evidence to inform decision	MCR MSF CbD DOPS Mini-CEX ALS certificate End of life care and capacity assessment End of placement reports FRCPath ECE

Category 2: Communication, team-working and leadership	
3. Communicates effectively and is able to share decision making, while maintaining appropriate situational awareness, professional behaviour and professional judgement.	
Descriptors	• Demonstrates effective communication with clinical and other professional colleagues • Demonstrates clear communication with patients and carers in a variety of settings • Identifies and manages barriers to communication (e.g. cognitive impairment, speech and hearing problems, capacity issues, cultural issues) • Demonstrates effective consultation skills including effective verbal and nonverbal interpersonal skills • Practises effective decision making by informing the patient, prioritising the patient's wishes, and respecting the patient's beliefs, concerns and expectations • Practises effective decision making with children and young people • Demonstrates effective management and team working skills appropriately, including influencing, negotiating, re-assessing priorities and effectively managing complex, dynamic situations
Generic professional capabilities	Domain 2: Professional skills • Practical skills • Communication and interpersonal skills • Dealing with complexity and uncertainty • Clinical skills (history taking, diagnosis and medical management; consent; humane interventions; prescribing medicines safely; using medical devices safely; infection control and communicable disease) • The health service and healthcare systems in the four countries Domain 5: Capabilities in leadership and team working
Evidence to inform decision	MCR MSF PS CbD Mini-CEX Management course End of placement reports ES report

Category 3: Safety and quality	
4. Is focused on patient safety and delivers effective quality improvement in patient care.	
Descriptors	• Identifies patient safety as a priority in clinical practice • Raises and escalates concerns where there is an issue with patient safety or quality of care • Demonstrates commitment to learning from patient safety investigations and complaints • Applies good practice appropriately • Contributes to and delivers quality improvement • Identifies basic Human Factors principles and practice at individual, team, organisational and system levels • Recognises the importance of non-technical skills and crisis resource management • Recognises and works within limit of personal competence
Generic professional capabilities	Domain 1: Professional knowledge Domain 2: Professional skills • Practical skills • Communication and interpersonal skills • Dealing with complexity and uncertainty • Clinical skills (history taking, diagnosis and medical management; consent; humane interventions; prescribing medicines safely; using medical devices safely; infection control and communicable disease) Domain 3: Professional values and behaviours • Professional requirements • National legislative requirements • The health service and healthcare systems in the four countries Domain 4: Capabilities in health promotion and illness prevention Domain 5: Capabilities in leadership and team working Domain 6: Capabilities in patient safety and quality improvement • Patient safety • Quality improvement
Evidence to inform decision	MCR MSF ECE FRCPath End of placement reports

Category 4: Wider professional practice	
5. Able to carry out research and manage data appropriately.	
Descriptors	• Describes and explains principles of research and academic writing • Describes and explains legal and ethical frameworks underlying research in the UK • Describes and explains structures supporting health service research • Demonstrates awareness of sources of finance to support research • Demonstrates ability to manage clinical information/data appropriately • Demonstrates ability to carry out critical appraisal of the literature • Demonstrates ability to design and perform a research project • Demonstrates ability to follow guidelines on ethical conduct in research and consent for research • Identifies public health epidemiology and global health patterns
Generic professional capabilities	Domain 1: Professional knowledge Domain 3: Professional values and behaviours • Professional requirements • National legislative requirements • The health service and healthcare systems in the four countries Domain 7: Capabilities in safeguarding vulnerable groups Domain 9: Capabilities in research and scholarship
Evidence to inform decision	MCR MSF GCP certificate (if involved in clinical research) Evidence of literature search and critical appraisal of research Use of clinical guidelines Quality improvement and audit Evidence of research activity FRCPath End of placement reports

6. Acts as a teacher and clinical supervisor.	
Descriptors	• Demonstrates effective teaching and training to medical students, junior doctors, laboratory staff and other healthcare professionals • Demonstrates ability to deliver effective feedback to trainees, with appropriate action plan • Demonstrates ability to effectively supervise healthcare professionals, including medical staff, in earlier stages of training • Demonstrates ability to act as a clinical supervisor to healthcare professionals, including medical staff, in earlier stages of training
Generic professional	Domain 1: Professional knowledge

capabilities	Domain 8: Capabilities in education and training
Evidence to inform decision	MCR MSF TO ECE Relevant training course End of placement reports

7.1.2 Specialty capabilities in practice

The seven specialty CiPs describe the tasks or activities that are essential to the practice of medical virology. These CiPs have been mapped to the nine GPC domains to reflect the professional generic capabilities required to undertake these tasks.

Table 3: Specialty CiPs and descriptors for medical virology

7. Able to provide clinical leadership and support to the laboratory.	
Descriptors	• Demonstrates awareness of developments, both scientific and managerial, that may affect the delivery of diagnostic virology (bacteriology, virology, mycology and parasitology) services • Understands legislation relevant to diagnostic virology laboratories including that related to health and safety • Demonstrates knowledge and understanding of methods of microbiological investigation • Demonstrates ability to select and advise on appropriate microbiological tests for clinical investigation and to oversee appropriate turnaround times • Demonstrates knowledge and understanding of microbiological (bacteriology, virology, mycology and parasitology) method validation and verification, and the concepts of sensitivity and specificity as applied to microbiological tests • Demonstrates ability to effectively use and oversee internal quality control (IQC) and external quality assurance (EQA) data to assure the overall quality of microbiological diagnostics • Demonstrates knowledge and understanding of laboratory information management systems (LIMS) and other healthcare information technology systems, including understanding relevant information governance legislation • Demonstrates ability to work effectively and provide clinical leadership in a multidisciplinary team within the diagnostic virology laboratory • Able to evaluate and oversee the introduction of novel laboratory tests
Generic professional capabilities	Domain 1: Professional knowledge Domain 2: Professional skills • Practical skills • Communication and interpersonal skills • Dealing with complexity and uncertainty Domain 3: Professional values and behaviours

	• Professional requirements • National legislative requirements • The health service and healthcare systems in the four countries Domain 5: Capabilities in leadership and team working Domain 6: Capabilities in patient safety and quality improvement
Evidence to inform decision	CbD Mini-CEX ECE QIPAT TO MCR ES report FRCPath Part 1 DOPs FRCPath Part 2

8. Able to use the laboratory service effectively in the investigation, diagnosis and management of infection.	
Descriptors	• Demonstrates understanding of the biology of micro-organisms that may cause diseases in humans and the principles of the host-pathogen interaction • Demonstrates ability to effectively advise on appropriate microbiological (bacteriology, virology, mycology and parasitology) investigations • Demonstrates an understanding of the human microbiome, colonising organisms, and the features of pathological infection • Demonstrates ability to effectively use microbiological and other data, to form an appropriate differential diagnosis • Demonstrates knowledge and understanding of national and international microbiological guidelines • Demonstrates ability to liaise effectively with other specialty diagnostic services • Able to inform and develop local guidelines and standard operating practice (SOP)
Generic professional capabilities	Domain 1: Professional knowledge Domain 2: Professional skills • Practical skills • Communication and interpersonal skills • Dealing with complexity and uncertainty Domain 3: Professional values and behaviours • Professional requirements • National legislative requirements • The health service and healthcare systems in the four countries Domain 4: Capabilities in health promotion and illness prevention Domain 5: Capabilities in leadership and team-working Domain 6: Capabilities in patient safety and quality improvement Domain 7: Capabilities in safeguarding vulnerable groups
Evidence to inform	CbD

decision	Mini-CEX ECE QIPAT TO MCR ES report FRCPath Part 1 FRCPath Part 2

9. Able to advise on infection prevention, control and immunisation.	
Descriptors	• Demonstrates knowledge and understanding of standard precautions in infection prevention and control (IP&C) and ability to advise on the appropriate use of personal protective equipment (PPE) • Demonstrates knowledge and understanding of transmission-based precautions in IP&C, including appropriate patient isolation and cohorting • Demonstrates knowledge and understanding of microbiological surveillance including patient screening methods, organism typing and genome sequencing methodologies • Applies knowledge and understanding of microbiological surveillance to prevention and control of healthcare-associated infection (HCAI) • Demonstrates ability to participate in managing outbreaks or significant cross-infection incidents in the healthcare setting • Demonstrates knowledge and understanding of the healthcare environment and equipment as potential sources of infection • Demonstrates knowledge and understanding of public health implications of specific communicable diseases and the importance of appropriate public health notification and intervention • Demonstrates knowledge and understanding of the public health aspects of vaccine-preventable infections and the benefits of vaccination • Demonstrates ability to advise appropriately on the use of active and passive immunisation, including in immunocompromised patients and in outbreaks
Generic professional capabilities	Domain 1: Professional knowledge Domain 2: Professional skills • Practical skills • Communication and interpersonal skills • Dealing with complexity and uncertainty • Clinical skills (history taking, diagnosis and medical management; consent; humane interventions; prescribing medicines safely; using medical devices safely; infection control and communicable disease) Domain 3: Professional values and behaviours Domain 4: Capabilities in health promotion and illness prevention Domain 5: Capabilities in leadership and team-working

Evidence to inform decision	CbD Mini-CEX ECE QIPAT TO MCR ES report FRCPath Part 1 DOPs FRCPath Part 2

10. Able to manage and advise on important clinical syndromes where infection is in the differential diagnosis.	
Descriptors	• Demonstrates ability to take a comprehensive patient history, including when appropriate, travel, occupational, contact, drug, transfusion and sexual history, and ensures history is accurately recorded • Demonstrates ability to perform an accurate clinical examination and to clearly record examination findings • Demonstrates ability to form an appropriate differential diagnosis based on patient history, clinical examination findings and investigations • Demonstrates ability to formulate and advise on, or implement a safe and appropriate management plan • Demonstrates ability to assess, investigate, diagnose and advise on, or directly manage all aspects of suspected or proven community-acquired infection • Demonstrates ability to assess, investigate, diagnose and advise on, or manage all aspects of suspected or proven HCAI • Demonstrates ability to assess, investigate, diagnose and advise on, or directly manage all aspects of suspected or proven infection in immunocompromised patients, including those infected with human immunodeficiency virus (HIV)
Generic professional capabilities	Domain 1: Professional knowledge Domain 2: Professional skills • Practical skills • Communication and interpersonal skills • Dealing with complexity and uncertainty • Clinical skills (history taking, diagnosis and medical management; consent; humane interventions; prescribing medicines safely; using medical devices safely; infection control and communicable disease) Domain 3: Professional values and behaviours • Professional requirements • National legislative requirements • The health service and healthcare systems in the four countries Domain 4: Capabilities in health promotion and illness prevention Domain 5: Capabilities in leadership and team working Domain 6: Capabilities in patient safety and quality improvement Domain 7: Capabilities in safeguarding vulnerable groups

Evidence to inform decision	CbD Mini-CEX ECE QIPAT TO MCR ES report FRCPath Part 1 PS DOPs ACAT FRCPath Part 2

11. Able to lead on and advise on treatment with and stewardship of antimicrobials.	
Descriptors	• Demonstrates the ability to advise on the appropriate use and stewardship of antivirals. In addition, demonstrates awareness of the usage of antibiotics, antifungals, anti-protozoal, antimicrobial and anti-parasitic agent • Demonstrates ability to provide leadership and education on the appropriate use and stewardship of antivirals, including use and implementation of evidence-based empiric and pathogen-specific antiviral guidelines • Demonstrates understanding of the global problem of increasing antimicrobial resistance (AMR) • Demonstrates ability to advise and lead on the appropriate use of an outpatient parenteral antimicrobial therapy (OPAT) service
Generic professional capabilities	Domain 1: Professional knowledge Domain 2: Professional skills • Practical skills • Communication and interpersonal skills • Dealing with complexity and uncertainty • Clinical skills (history taking, diagnosis and medical management; consent; humane interventions; prescribing medicines safely; using medical devices safely; infection control and communicable disease) Domain 3: Professional values and behaviours • Professional requirements • National legislative requirements • The health service and healthcare systems in the four countries Domain 4: Capabilities in health promotion and illness prevention Domain 5: Capabilities in leadership and team working Domain 6: Capabilities in patient safety and quality improvement
Evidence to inform decision	CbD Mini-CEX ECE QIPAT TO MCR ES report

	FRCPath Part 1 PS FRCPath Part 2

12. Able to provide continuity of care to inpatients and outpatients with suspected or proven infection.	
Descriptors	• Demonstrates ability to assess, investigate, diagnose, advise on, or directly manage patients with suspected or proven infection in the inpatient, ambulatory and outpatient settings • Demonstrates ability to assess, investigate, diagnose, advise on, or directly manage chronic infections • Demonstrates expertise in the management of infections including drug-resistant tuberculosis (TB), HIV, chronic hepatitis B and C, and travel-related conditions • When clinically appropriate, refers to alternative specialty inpatient or outpatient services • Managing patient at all stages, including end of life care
Generic professional capabilities	Domain 1: Professional knowledge Domain 2: Professional skills • Practical skills • Communication and interpersonal skills • Dealing with complexity and uncertainty • Clinical skills (history taking, diagnosis and medical management; consent; humane interventions; prescribing medicines safely; using medical devices safely; infection control and communicable disease) Domain 5: Capabilities in leadership and team working Domain 7: Capabilities in safeguarding vulnerable groups
Evidence to inform decision	CbD Mini-CEX ECE QIPAT TO MCR ES report FRCPath Part 1 DOPs PS ACAT FRCPath Part 2

13. Able to manage and advise on imported infections.	
Descriptors	• Demonstrates the ability to assess, investigate, diagnose, advise on, and directly manage patients with imported infections • Demonstrates the ability to provide leadership in clinical care, governance and service development for patients with imported infection

	• Demonstrates comprehensive knowledge and skills in pre-travel health advice • Demonstrates the ability to manage and advise on suspected imported high-consequence infections • Demonstrates a knowledge and understanding of the epidemiology, lifecycle, diagnosis, clinical presentation and management of parasitic diseases
Generic professional capabilities	Domain 1: Professional knowledge Domain 2: Professional skills • Practical skills • Communication and interpersonal skills • Dealing with complexity and uncertainty • Clinical skills (history taking, diagnosis and medical management; consent; humane interventions; prescribing medicines safely; using medical devices safely; infection control and communicable disease) Domain 3: Professional values and behaviours • Professional requirements • National legislative requirements • The health service and healthcare systems in the resource poor setting Domain 4: Capabilities in health promotion and illness prevention Domain 5: Capabilities in leadership and team working Domain 6: Capabilities in patient safety and quality improvement Domain 7: Capabilities in safeguarding vulnerable groups Domain 9: Capabilities in research and scholarship
Evidence to inform decision	MCR MSF PS QIPAT ACAT CbD ECE DOPS TO Mini-CEX Travel medicine course Publications Presentation at a meeting

KEY

ECE	Evaluation of clinical/management events
CbD	Case-based discussion
FRCPath	Fellowship examination of the Royal College of Pathologists
Mini-CEX	Mini clinical evaluation exercise
DOPs	Direct observation of practical

	skills
MSF	Multi-source feedback
PS	Patient survey
QIPAT	Quality improvement assessment tool
TO	Teaching observation
ACAT	Acute care assessment tool
MCR	Multiple consultant report

7.2 Syllabus

The scope of medical virology is broad, covering the diagnosis, treatment and prevention of the spread of viral infections in hospitals and the community. Any attempt to list all relevant methods, presentations, conditions and issues would be extensive but would inevitably be incomplete and would rapidly become out of date.

The table below details the key areas of medical virology. These are described in more detail in appendices 1 and 2. Each of these areas should be regarded as a context in which trainees should be able to demonstrate CiPs and GPCs. Trainees will need to become familiar with the relevant knowledge, skills and values/attitudes related to these areas. The patient should always be at the centre of knowledge, learning and care.

Table 4: Overview of the syllabus for combined infection training

SECTION	COMBINED INFECTION TRAINING	
A	**Basic biology of bacteria, viruses, fungi and parasites**	**CiPs: 3, 7, 8, 9**
B	**Laboratory practice** **1. Pre-analytical phase** **2. Analytical phase** **3. Post-analytical phase** **4. Laboratory management and quality assurance** **5. Health and safety**	 **CiPs: 3, 7, 8** **CiPs: 3, 4, 7, 8** **CiPs: 3, 4, 7, 8** **CiPs: 1, 4, 7** **CiPs: 4, 7, 9**
C	**Principles of public health in relation to infection**	**CiPs: 1, 3, 9**
D	**Infection prevention and control**	**CiPs: 1, 2, 3, 4, 8, 9, 11**
E	**Important clinical syndromes**	**CiPs: 3, 8, 9, 10**
F	**Use of antimicrobial agents**	**CiPs: 3, 9, 11**
G	**Vaccination**	**CiPs: 1, 2, 8**
H	**Management of HIV infection**	**CiPs: 1, 2, 3, 9, 12**
I	**Travel and geographical health**	**CiPs: 1, 2, 7, 8, 9, 10**

Table 5: Overview of the syllabus for higher infection training in medical virology

SECTION	HIGHER INFECTION TRAINING IN MEDICAL VIROLOGY

J	**Biology of viruses and prions, host-pathogen relationships, mechanisms of action of antiviral agents**	**CiPs: 3, 7, 8, 11, 12, 13**
K	**Laboratory practice in virology**	**CiPs: 1, 2, 3, 4, 5, 6, 7, 8, 13**
L	**Infection prevention and control**	**CiPs: 1, 2, 3, 4, 9, 11, 13**
M	**Vaccination**	**CiPs: 1, 2, 8, 9, 13**
N	**Health and safety**	**CiPs: 4, 7, 9, 13**
O	**Principles of public health in relation to communicable diseases)**	**CiPs: 1, 3, 4, 7, 8, 9, 13**
P	**Important clinical syndromes**	**CiPs: 1, 3, 4, 8, 10, 11, 13**
Q	**Hepatitis**	**CiPs: 3, 8, 9, 10, 11, 12**
R	**Understanding use of agents active against viruses**	**CiPs: 3, 4, 5, 8, 11, 12, 13**
S	**Infection in the immunocompromised**	**CiPs: 3, 8, 9, 10, 11, 12**
T	**Research and development in medical virology**	**CiPs: 5**

8. Programme of assessment

8.1 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:

- indicate suitability of choice at an early stage of the chosen career path
- 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 a trainee's capacity to achieve competencies for their chosen career path
- help to identify trainees who should change direction or leave the specialty
- drive learning 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 which is mapped to GMP can be viewed in section 8.9.

8.2 Programme of assessment

The programme of assessment refers to the integrated framework of exams, assessments in the workplace and judgements made about a learner during their approved programme of training. The purpose of the programme of assessment is to robustly evidence, ensure and clearly communicate the expected levels of performance at each stage of training, and to demonstrate satisfactory completion of training as required by the curriculum.

Each of the six generic and seven specialty CiPs has descriptors which align to the medical virology syllabus (appendix 1). During their training, trainees should gather a range of evidence for each CiP picked from the options listed in tables 2 and 3. Other evidence may be allowable at the discretion of the educational supervisor and ARCP panel. On the basis of this evidence, the educational supervisor can make a judgement as to the entrustability of that trainee to perform each capability.

Table 6: Level descriptors for specialty CiPs

Level	Descriptor
Level 1	Entrusted to observe only – no provision of clinical care.
Level 2	Entrusted to act with direct supervision: The trainee may provide clinical care, but the supervising physician is physically within the hospital or other site of patient care and is immediately available if required to provide direct bedside supervision.
Level 3	Entrusted to act with indirect supervision: The trainee may provide clinical care when the supervising physician is not physically present within the hospital or other site of patient care, but is available by means of telephone and/or electronic media to provide advice, and can attend at the bedside if required to provide direct supervision.
Level 4	Entrusted to act unsupervised.

8.3 Assessment of CiPs

Assessment of CiPs involves looking across a range of different skills and behaviours to make global decisions about a learner's suitability to take on particular responsibilities or tasks, as do decisions about the satisfactory completion of presentations/conditions and procedural skills set out in this curriculum. The outline grid in section table 7 sets out the level of supervision expected for each of the specialty CiPs.

Table 7: Outline grid of levels expected for medical virology specialty CiPs

		Combined infection training		Medical virology		Dual option (MV and ID)		
		CIT year 1	CIT year 2	HIT year 3 MV	HIT year 4 MV	HIT year 3 ID/MV	HIT year 4 ID/MV	HIT year 5 ID/MV
1.	Able to provide clinical	2	2	3	4	3	3	4

	leadership and support to the laboratory.							
2.	Able to use the laboratory service effectively in the investigation, diagnosis and management of infection.	2	2	3	4	3	3	4
3.	Able to advise on infection prevention, control and immunisation.	2	2	3	4	3	3	4
4.	Able to manage and advise on important clinical syndromes where infection is in the differential diagnosis.	2	3	3	4	3	3	4
5.	Able to lead and advise on treatment with and stewardship of antimicrobials.	2	3	3	4	3	3	4
6.	Able to provide continuity of care to inpatients and outpatients with suspected or proven infection.	2	3	3	3	3	3	4
7.	Able to manage and advise on imported infections.	2	2	2	2	3	3	4

8.4 Methods of assessment (evidence)

There are several types of assessment. These include summative and formative workplace-based assessments and the FRCPath examination. A range of assessments is needed to generate the necessary evidence required for global judgements to be made about satisfactory performance, entrustment levels and completion of, training.

Workplace-based assessment (WPBAs)

The programme of assessment emphasises the importance and centrality of professional judgement in making sure learners have met the learning outcomes and expected levels of performance set out in the approved curricula. Assessors will make accountable, professional judgements. The programme of assessment includes how professional judgements are used and collated to support decisions on progression and satisfactory completion of training.

The assessments will be supported by structured feedback for trainees. Assessment tools will be both formative and summative and have been selected on the basis of their fitness for purpose.

Reflection and feedback should be an integral component to all WPBAs. In order for trainees to maximise benefit, reflection and feedback should take place as soon as possible after an event. Every clinical encounter can provide a unique opportunity for reflection and feedback and this process should occur frequently. Feedback should be of high quality and should include an action plan for future development for the trainee. Both trainees and trainers should recognise and respect cultural differences when giving and receiving feedback.

In general, WPBAs are designed to be formative in nature; as such they are best suited to determine educational progress in different contexts. To this end, it is strongly recommended that they are carried out regularly throughout training to assess and document a trainee's progress.

WPBAs will indicate to the trainee and their educational supervisor how they are progressing in relation to that stage of training. To support this, WBPAs and multiple consultant reports will include global assessment anchor statements as follows.

Global assessment anchor statements

- Below expectations for this year of training; may not meet the requirements for critical progression point.
- Meeting expectations for this year of training; expected to progress to next stage of training.
- Above expectations for this year of training; expected to progress to next stage of training.

A minimum number of 'satisfactory' WPBAs should be completed during each stage of training (see ARCP decision aid) but they should also be used as additional evidence to inform assessments of progress in entrustment levels.

WPBAs will include:

- case-based discussion (CbD)
- directly observed practical skills (DOPS)
- evaluation of clinical events (ECE)
- mini clinical evaluation exercise (Mini-CEX)
- multi-source feedback (MSF)
- acute care assessment tool (ACAT)
- quality improvement project assessment tool (QIPAT)
- teaching observation (TO).

Further guidance is provided in the ARCP decision aid about the method and required frequencies of these assessments.

FRCPath examination

The FRCPath examination is the major summative assessment of competence in medical virology. FRCPath Part 1 is the same examination as the combined infection certificate examination (CICE).

FRCPath Part 1

- It is recommended, for all infection trainees, that FRCPath Part 1 is attempted for the first time during year two of combined infection training or at the beginning of the first year of HIT.
- For mono-specialty medical virology trainees, FRCPath Part 1 should be obtained by the end of the first year of HIT. If the trainee were to fail the FRCPath Part 1

examination at this time, progression would still be permitted subject to evidence of satisfactory progress otherwise, as assessed at ARCP.
- For dual specialty trainees (medical virology/infectious diseases), FRCPath Part 1 should be obtained by the end of the second year of HIT in order to progress to the third (final) year of training.

FRCPath Part 2
- It is recommended that FRCPath Part 2 is attempted for the first time towards the end of the first year of HIT.
- The FRCPath Part 2 examination must be passed before completion of the training programme.

The precise timing for each trainee should be based on their individual progress and agreed with educational and clinical supervisors.

8.5 Critical progression points

There will be two critical progression points during medical virology training. The first is at entry to combined infection training and the second is at award of the CCT.

The outline grid (table 6) sets out the **expected** level of supervision and entrustment for the specialty CiPs at each stage of medical virology training and is used as a guide to inform ARCP decisions (see section 8.6 below).

8.6 Evidence of progress

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 supervisor's structured report.

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 outcome 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.

The responsibilities of the trainee, educational supervisors and ARCP panels are summarised below.

Responsibilities of trainees

Towards the end of the training year, trainees will make a self-assessment of their progression for each CiP and record this in the ePortfolio with signposting to the evidence to support their rating. In advance of the ARCP, trainees will then need to obtain an educational supervisor's structured report. For this they will need to show the following on their ePortfolio:
- Evidence that they have completed the minimum requirements for the specialty, including workplace- and knowledge-based assessments for the preceding clinical year (see the ARCP decision aid for further guidance). These need to be completed contemporaneously during each training module during the year. They should be done pro rata for those who are only in-programme for part of the year or are less than full time.

- Sufficient evidence that they are reaching the expected entrustment level (see table 6) for that year of training for each of the six generic and seven speciality capabilities in practice. See table 2 and table 3 for evidence that can be used to inform this decision.

Evidence to inform entrustment levels can be selected with a 'pick and mix' approach from these tables but should be sufficient to demonstrate an entrustment level to the educational supervisor and ARCP panel.

Responsibilities of educational supervisors
Educational supervisors should meet with trainees regularly to check progress. In advance of the ARCP, they should do the following:

- check that the trainee has achieved the minimum requirements for the relevant decision aid(s)
- review the ePortfolio to ensure there is sufficient additional evidence including WPBAs, feedback received from clinical supervisors (via the multiple consultant report) and the trainee's self-assessment to make a recommendation for entrustment level for each generic and speciality CiP
- decide a recommendation for the entrustment level (1–4; see table 6) for each CiP
- complete an educational supervisor's structured report on the ePortfolio.

All trainees will need an educational supervisor's structured report to inform the ARCP. For trainees who are dual training in infectious diseases/medical microbiology or infectious diseases/medical virology, this can be with a single report covering both specialties or, when there are separate educational supervisors, with two reports – one for medical microbiology and one for infectious diseases.

Failure to reach the expected entrustment levels in every CiP can still allow progression at the discretion of the ARCP panel taking into account the individual and the programme. For an outcome 6 (final outcome leading to the award of a CCT), all required entrustment levels must be met as this is a critical progression point.

Complete ARCP outcome forms for each specialty. Dual trainees will require two ARCP outcome forms each year.

8.7 Decisions on progress

The decisions made at ARCPs and upon completion of training should be clear and defensible. They must be fair and robust and make use of evidence from a range of assessments, potentially including exams and observations in practice or reflection on behaviour by those who have appropriate expertise or experience. They can also incorporate commentary or reports from longitudinal observations, such as from supervisors or formative assessments demonstrating progress over time.

Periodic (at least annual) review should be used to collate and systematically review evidence about a doctor's performance and progress in a holistic way and make decisions about their progression in training. The ARCP process supports the collation and integration of evidence to make decisions about the achievement of expected outcomes.

LETBs/deaneries are responsible for organising and conducting ARCPs. The evidence to be reviewed by ARCP panels should be collected on the ePortfolio.

In order to guide trainees, supervisors and the ARCP panel, the College has produced an ARCP decision aid which sets out the requirements for a satisfactory ARCP outcome at the

end of each training year and critical progression point. The ARCP decision aid is available on the College website.

8.8 Assessment blueprint

The table below shows the possible methods of assessment for each learning outcome (competency in practice). It is not expected that every method will be used for each competency and additional evidence may be used to help make a judgement on capability.

KEY

ECE	Evaluation of clinical/management events
CbD	Case-based discussion
FRCPath	Fellowship examination of the Royal College of Pathologists
Mini-CEX	Mini clinical evaluation exercise
DOPs	Direct observation of practical skills
MSF	Multi-source feedback
PS	Patient survey
QIPAT	Quality improvement assessment tool
TO	Teaching observation
ACAT	Acute care assessment tool
MCR	Multiple consultant report

Table 8: Evidence that can be used to inform each CiP

Capabilities in practice (CiPs)	ACAT	CbD	ECE	DOPS	MCR	Mini-CE	MSF	PS	QIPAT	TO	FRCPath Part 1	FRCPath Part 2
Generic CiPs												
Able to function successfully within NHS organisational and management systems			✓		✓		✓					
Able to deal with ethical and legal issues related to clinical practice		✓	✓	✓	✓	✓	✓					✓
Communicates effectively and is able to share decision making, while maintaining appropriate situational awareness, professional behaviour and professional judgement		✓			✓	✓	✓	✓				
Is focused on patient safety and delivers effective quality improvement in patient care			✓		✓		✓					✓
Able to carry out research and managing data appropriately					✓		✓		✓			✓
Acts as a clinical teacher and clinical			✓		✓		✓			✓		

Capabilities in practice (CiPs)	ACAT	CbD	ECE	DOPS	MCR	Mini-CE	MSF	PS	QIPAT	TO	FRCPath Part 1	FRCPath Part 2
supervisor												
Specialty CiPs												
Able to provide clinical leadership and support to the laboratory		✓	✓	✓	✓	✓	✓		✓	✓	✓	✓
Able to use the laboratory service effectively in the investigation, diagnosis and management of infection		✓	✓		✓	✓	✓		✓	✓	✓	✓
Able to advise on infection prevention, control and immunisation		✓	✓	✓	✓	✓	✓		✓	✓	✓	✓
Able to manage and advise on important clinical syndromes where infection is in the differential diagnosis	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Able to lead and advise on treatment with and stewardship of antimicrobials		✓	✓		✓	✓	✓	✓	✓	✓	✓	✓
Able to provide continuity of care to inpatients and outpatients with suspected or proven infection	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Managing end of life care and applying palliative care skills (for ID/MM and ID/MV trainees only)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
Able to manage and advise on imported infections	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		

8.9 Supervision and feedback

Specialty training must be appropriately delivered by the senior medical and scientific 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.

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/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 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 (two per year, approximately every six months), 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 individual's training
- prepare for the ARCP (see section 8.7 above).

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 and be involved in annual reviews and liaise closely with the TPD. The deaneries organise extensive training programmes for educational supervisors' 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.

9. 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.

The curriculum will be formally reviewed in the first instance by the Medical Virology Curriculum Working Group within two years of publication. In reviewing the curriculum, opinions will be sought from the College's Combined Infection Training SAC, its related subspecialty sub-committees, the Trainees Advisory Committee, the Lay Governance Group and its Fellows and Registered Trainees.

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

10. Transitional arrangements

With the exception of trainees in the final year of training prior to the award of the CCT, all medical virology trainees who meet the entry requirements for this curriculum will transfer to this curriculum.

Trainees in the final year of training will remain on their current curriculum.

Appendix 1: Syllabus

The scope of medical virology is broad, including laboratory diagnostics (bacteriology, virology, parasitology, mycology), laboratory support/leadership, the ability to deliver high-quality clinical advice, infection prevention and control and antimicrobial stewardship. Complex infections occur in any healthcare settings so the role of the medical virologist spans primary, secondary and tertiary care. Medical virologists need to be able to manage complex infections such as those in immunocompromised hosts (e.g. haematology-oncology and transplant patients, those with diabetes and frail patients), in device-related infections (such as infected lines, orthopaedic devices, prosthetic heart valves), those due to multi-drug-resistant organisms and imported/emerging infections. They need to have an understanding of antiviral treatments (e.g. in HIV, viral hepatitis, influenza). They need to be able to provide leadership in the effective use of the laboratory, clinical infection services, rational antimicrobial prescribing and guideline development. The syllabus aims to provide broad training in all areas within the scope of practice of a consultant medical virologist.

The table below details the key areas of medical virology. Each of these areas should be regarded as a context in which trainees should be able to demonstrate CiPs and GPCs. Trainees will need to become familiar with the relevant knowledge, skills and values/attitudes related to these areas.

COMBINED INFECTION TRAINING (CIT)	
A. Basic biology of bacteria, viruses, fungi and parasites	**CiPs: 3, 7, 8, 9**
Knowledge	**Skills**
• Describes and explains basic biology, including structure, function, genetics, and pathogenesis, of major bacterial, viral, fungal and parasitic agents • Explains the principles of microbiological and clinical classification of micro-organisms • Explains local and global epidemiology of major infectious agents and their disease associations • Explains the principles of the immune response to infection and the role of innate and adaptive immunity • Explains the basis of different types of host-parasite relationships, e.g. the importance and evolution of normal flora, viral latency and quasispecies evolution • Explains the principles of active and passive immunisation	• Demonstrates application of knowledge of basic biology and host-pathogen relationship to inform clinical management of infection

B. Laboratory practice	**CiPs: 3, 4, 7, 8, 9**
Knowledge	**Skills**
Pre-analytical phase • Explains the range of investigation and diagnostics available in different clinical scenarios, the optimal samples to send and the conditions in which to send them • Describes the repertoire of investigations available for a given clinical scenario, and understand their merits and limitations • Demonstrates ability to refer to the local laboratory SOPs for guidance on the nature of the sample and the tests performed • Explains the correct sample type, volume (where relevant) and optimal conditions for storage and transport that are required for the individual test	• Demonstrates ability to select the most appropriate investigations for the individual patient
Analytical phase • Demonstrates ability to understand and appreciate the advantages, limitations and use of investigations and diagnostics, and the role and use of reference laboratories • Describes health and safety aspects of laboratory diagnostic procedures and bio-safety level classification when dealing with pathogens • Explains the principles, uses and limitations of laboratory diagnostic procedures (manual, automated and point of care) – including microscopy, culture, sensitivity testing, European Committee on Antimicrobial Susceptibility Testing (EUCAST) guidelines, protein/nucleic acid-based tests, serological/other assays of host-response, and more novel diagnostics • Explains the repertoire and use of reference laboratories when dealing with pathogens	• Demonstrates ability to follow an SOP/examination procedure and use time effectively and efficiently to achieve an optimal turnaround time • Demonstrates ability to perform a wide range of routine practical laboratory procedures
Post-analytical phase	

• Explains the importance of keeping concise, accurate, confidential, and legible records of laboratory investigations • Demonstrates ability to interpret laboratory investigations and their results accurately • Explains results comprehensively, and demonstrates ability to integrate with results from other specimens and other investigations such as radiology, biochemistry and haematology	• Demonstrates producing a laboratory report containing correct results and appropriate interpretative comments using appropriate IT systems
Laboratory management and quality assurance • Explains the principles of internal and external quality assurance, and laboratory accreditation • Explains research methods relevant to service development • Demonstrates the ability to identify and investigate laboratory errors • Demonstrates 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 • Demonstrates 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 • Demonstrates knowledge of current legislative framework underpinning health and safety at work • Explains basic laboratory hazards and precautions against them • Explains principles of universal precautions, hazard groups and containment levels	• Demonstrates performing horizontal, vertical, and examination audits, as appropriate to level of training • Explains the importance of good record-keeping • Explains the principles of validation/verification of new laboratory tests • Explains infection prevention and control risk assessment procedures • Demonstrates ability to 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
C. Principles of public health in relation to infection	**CiPs: 1, 3, 9**
Knowledge	**Skills**

• Describes 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 • Describes modes of transmission, incubation period, period of communicability of common agents with public health importance • Describes basic epidemiological methods • Describes the requirements for statutory and 'good practice' notification of infectious disease • Explains 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 • Explains 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 • Explains the role of vaccination in vaccine-preventable communicable diseases	• Demonstrates ability to notify with infectious disease (statutory requirements and 'good practice' notifications) when required • Demonstrates provision of appropriate vaccine advice
D. Infection prevention and control	**CiPs: 1, 2, 3, 4, 8, 9, 11**
Knowledge	**Skills**
Legislative and organisational frameworks • Explains the responsibilities of healthcare institutions for infection prevention and control (IPC) under relevant legislations and guidelines • Describes the roles and responsibilities of individual members of healthcare institutions in monitoring, responding to, and resourcing IPC needs • Explains the role of public health bodies as well as reference laboratories in relation to the management of healthcare-associated infections (HCAIs) • Demonstrates an understanding of the	• Demonstrates complying with current national legislation and guidance on IPC • Demonstrates awareness of and involvement in the complaints process • Demonstrates recognition of potential for transmission of infection in clinical settings • Demonstrates counselling patients on matters of infection risk, transmission, and control

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	
Principles of infection prevention and control • Explains the basic biology of common agents implicated in HCAIs and their pathogenesis • Explains the mode of spread and optimum prevention and control strategies of HCAIs Explains 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. • Explains the concepts of colonisation, infection and disease • Explains the mechanisms by which organisms acquire antimicrobial resistance and how to use this knowledge to inform appropriate antimicrobial prescribing Explains the concepts of: • universal precautions • protecting healthcare workers from infection in the workplace, including prevention of sharps/splash incidents • source and protective isolation • antibiotic stewardship • aseptic non-touch technique (ANTT) • single-use items. • Describes specific control measures employed to prevent transmission of infection to include hand hygiene, PPE and isolation and cohorting strategies • Explains the basic principles of environmental control measures to include cleaning, disinfection, sterilisation of patient care equipment and environmental cleaning (housekeeping) • Explains the basic principles of food hygiene	• Demonstrates following local infection prevention and control procedures • Demonstrates performing practical clinical procedures using aseptic technique • Demonstrates prescribing antibiotics according to local antibiotic guideline • Demonstrates infection prevention and control practices • Demonstrates critical evaluation of disinfectants, cleaning products and equipment as part of making an informed choice for an organisation

in relation to catering, food production and distribution in the hospital setting, and associated aspects e.g. hazard analysis critical control point (HACCP) analysis • Demonstrates understanding of the role of the hospital laundry service in the prevention and management of outbreaks • Explains the role of the local authority in relation to infection control • Explains the role of the Occupational Health department in managing staff screening during outbreaks, pre-employment screening, selection of PPE items and handwashing products, and in the Reporting of Injuries, Diseases and Dangerous Occurrences Regulations (RIDDOR) process **Management and reporting HCAIS** • Describes the important clinical syndromes of HCAIs, risk factors, organisms involved, clinical presentation, diagnosis, treatment, prevention and control • Explains the principles of root cause analysis (RCA) and reporting infection-related adverse events including 'serious untoward incidents' (SUI) • Explains the principles of infection control audits and their importance to maintaining good medical practice **Outbreaks and surveillance** • Describes the role of the laboratory in investigating disease outbreaks • Describes the key principles underpinning outbreak investigation, control, and reporting	• Interprets and reports IPC surveillance data accurately • Demonstrates undertaking an IPC-related audit • Able to advise on appropriate PPE and demonstrate effective donning and doffing of PPE • Demonstrates utilising laboratory resources appropriately when investigating an outbreak
E. Important clinical syndromes	**CiPs: 3, 8, 9, 10**
Knowledge	**Skills**
Demonstrates 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:	• Demonstrates ability to take relevant clinical/infection history, perform clinical examination, and use relevant investigations (including imaging) to establish a differential diagnosis • Interprets and recommends appropriate

• pyrexia of unknown origin • sepsis syndromes • multisystem infections • paediatric infections • pregnancy-associated infections • blood borne virus infections (e.g. HIV, viral hepatitis) • needlestick injuries • tuberculosis and other mycobacterial infections • cardiovascular infections • skin and soft tissue infections • bone and joint infections • device-associated 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 • zoonotic infections • exanthemata. • Explains how to assess infection risk and recommend appropriate prophylactic or pre-emptive therapy Explains the nature of infection in special populations including the complexities associated with their management including: • pregnant and postpartum women • children • neonates • those with primary and secondary immunodeficiencies • those with alcohol abuse • in persons who inject drugs (PWIDs). • Explains the types of immunodeficiency, including primary immunodeficiencies, HIV, haematology/oncology patients and solid organ transplants • Understands how the immunodeficiency affects susceptibility to infectious agents • Explains prevention and control of infections in immunodeficiency	investigations and subsequently interpret the results to guide the management of infection • Demonstrates ability to use relevant local, regional, and national guidelines, especially those from specialty societies to manage infection • Demonstrates ability to adjust management plan in light of progress and developments • Demonstrates an understanding of acute and chronic pain management, palliative care and end of life pathways • Demonstrates how to have ‘do not attempt cardiopulmonary resuscitation’ discussions and how to document decisions
F. Use of antimicrobial agents	**CiPs: 3, 9, 11**

Knowledge	Skills
Properties of antimicrobial agents • Explains the concept of broad and narrow spectrum antibiotics Explains 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. • Explains mechanisms of resistance to antimicrobial agents • Explains the mechanism of action and role of monoclonal antibodies, antitoxins and immunoglobulins in prophylaxis and treatment of infections • Describes the pharmacodynamic and pharmokinetics of antimicrobials, and how these affect choice and dosing of antimicrobials. Understands the differences in some patient groups including in children, pregnancy and burns patients • Explains in vitro methods used to detect antimicrobial resistance and their limitations **Use of antimicrobial agents in clinical management** • Explains the principles of empirical use of antimicrobials for common infections and syndromic presentations, before laboratory results are available • Explains the selection of optimal antimicrobials, including combination therapy, for treatment of infection based on susceptibility report, the clinical scenario, hypersensitivities, and potential interactions • Explains the optimal duration of appropriate therapy and when to escalate/de-escalate • Explains the importance of measuring blood	• Demonstrates appropriate prescribing and/or advice on prescribing antimicrobial drugs • Demonstrates adherence to evidence-based guidance • Demonstrates participation in hospital antimicrobial stewardship rounds and antimicrobial advice committee • Demonstrates appropriate use of local antibiotic polices and national guidelines • Demonstrates audit of the use of antimicrobial agents and adherence to local and national guidance

levels of certain antimicrobial agents to ensure clinical efficacy and reduce toxicity • Explains contraindications to antimicrobial use **Safe use of antimicrobial agents** • Explains the importance of the safe use of antimicrobial agents in adults and children • Explains symptoms and signs of antimicrobial toxicity • Explains the adverse consequences of antimicrobials, including effects on normal microbial flora, toxicity and interactions with other drugs • Describes the importance of measuring blood levels of certain antimicrobial agents to avoid toxicity **Antimicrobial stewardship and control** • Describes and explains Department of Health and other regulatory bodies' requirements for antimicrobial stewardship • Explains the importance of antimicrobial formularies, and prescribing control policies and processes • Explains how local antimicrobial resistance patterns should be used to direct antimicrobial usage • Explains the role of the Medicines Management Committees (or equivalent) and antimicrobial pharmacist	• Demonstrates the use of the most effective and non-toxic antimicrobial regimes • Demonstrates caution for potential side effects and monitor appropriately • Demonstrates prescribing inpatients particularly in relation to allergy, in pregnancy, in children and in individuals with deranged liver or kidney function • Demonstrates communicating effectively on antibiotic policy and stewardship with antimicrobial pharmacist
G. Vaccination	**CiPs: 1, 2, 8**
Knowledge	**Skills**
• Explains the use of licensed vaccines in prevention of disease caused by viral infection, bacterial infection and bacterial toxins • Explains the advantages and disadvantages of live attenuated, inactivated and recombinant vaccines and conjugate vaccines	• Demonstrates ability to select and interpret laboratory tests for immunity • Demonstrates ability to explain clearly the advantages and disadvantages of vaccination including assessment of safety profiles • Demonstrates ability to advise appropriately on the use of active and passive

• Explains the UK and the World Health Organization (WHO) schedules for immunisation against infectious diseases • Explains recommendations for immunisation of healthcare workers • Explains the immunisation protocols for patients with reduced splenic function • Explains the use of vaccines in post-exposure prophylaxis e.g. rabies, hepatitis A, hepatitis B, tetanus • Explains the use of vaccines to boost pre-existing immunity e.g. VZ • Explains the safety of vaccines and their adverse effects • Explains testing for immunity pre- and post-vaccination, the methods available for measuring this and their limitations • Explains the effects of vaccination on a population e.g. herd immunity, age shifts in natural infection • Explains how diseases can be eradicated by vaccination	immunisation in prevention of infection, including in the management of outbreaks apply national guidance on vaccination relevant to common clinical scenarios
H. Management of HIV infection	**CiPs: 1, 2, 3, 9, 12**
Knowledge	**Skills**
• Explains the function of the intact immune system • Explains pathophysiology of HIV infection • Explains epidemiology and natural history of HIV • Demonstrates providing relevant counselling to patients, carers and relatives, and to individuals potentially exposed to HIV • Demonstrates knowledge of therapeutic options in HIV management • Explains risk/benefit analysis of therapies for HIV and for prophylaxis against HIV and opportunistic infection	• Demonstrates recognising clinical and laboratory manifestations of immune deficiency • Demonstrates interpreting test results relating to the direct management of HIV infection and explains their significance to the patient • Demonstrates advising regarding risk reduction for opportunistic infections in the HIV-infected individual, through behavioural change, chemoprophylaxis and vaccination • Demonstrates communication skills that allow patients, relatives/carers and others, including those at HIV risk, to participate in management decisions

• Recognises the clinical features of infections and other disease processes in the HIV-infected host • Recognises the relevance of specific aspects of history and specific physical signs (and their absence) • Explains the utility of appropriate laboratory investigations **Specific HIV diagnostics and therapies** • Explains current diagnostic techniques Explains 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 • indications for and use of pre-exposure prophylaxis (PrEP).	• Demonstrates providing information on HIV transmission and strategies for risk reduction • Demonstrates appropriate use of current diagnostic techniques • Demonstrates applying guidelines and recommend appropriate treatment and interventions • Recognises and monitors side effects and drug interactions • Demonstrates engaging patients to support adherence and facilitate treatment decisions • Participates in HIV MDT discussions
I. Travel and geographical health	**CiPs: 1, 2, 7, 8, 9, 10**
Knowledge	**Skills**
Recognition and treatment of imported infections • Explains clinical and epidemiological features of imported diseases, including viral haemorrhagic fevers and other high-consequence infections • Describes availability and limitations of specialised diagnostic tests • Demonstrates familiarity with current guidelines and availability of tertiary care and information resources • Describes management of malaria and other imported infections	• Demonstrates ability to record appropriate travel history, and develop a differential diagnosis • Interprets and selects appropriate diagnostic tests • Demonstrates managing malaria and other common imported infection • Recognises when tertiary level care/advice is needed and to seek it • Demonstrates dealing with suspected and confirmed high-consequence infections (e.g.

	viral haemorrhagic fevers) and their infection control issues • Demonstrates recording accurate pre-travel medical and travel history
Provision of health advice for travellers • Describes and explains the geographical patterns of disease, risk factors for their acquisition, and the availability of paper, electronic and other resources (e.g. vaccination guides, websites, the National Travel Health Network and Centre (NaTHNaC), Imported Fever Service) • Describes and explains the use, availability, efficacy and safety of vaccines • Describes and explains the use, efficacy and safety of antimalarial prevention measures	• Demonstrates performing risk assessment appropriate to the traveller, including consideration of specific groups (e.g. the elderly, immunosuppressed) and the hazards of specific types of travel • Demonstrates formulating and communicating appropriately verbal and written advice for traveller, and to motivate them to apply the advice • Demonstrates prescribing and administering immunisations as appropriate • Demonstrates ability to prescribe antimalarials as appropriate
Infection-related problems of immigrants • Outlines health needs of particular populations, e.g. ethnic minorities, and recognises the impact of health beliefs, culture and ethnicity in presentations of physical and psychological conditions • Explains epidemiological and clinical features of imported infection in immigrant groups	• Recognises barriers to effective communication • Recognises both acute and chronic infections, including those that are asymptomatic, in immigrants • Demonstrates knowledge of new entrant screening programmes for TB and blood-borne virus infections

HIGHER INFECTION TRAINING IN MEDICAL VIROLOGY	
J. Biology of viruses and prions, host-pathogen relationships, mechanisms of action of antiviral agents	**CiPs: 3, 7, 8, 11, 12, 13**
Knowledge	**Skills**
• Demonstrates knowledge of virus structure and function Describes and explains:	Describes and explains: • the breadth of virus morphology including conventional viruses, giant viruses and viroids

- 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.

- Describes replication of viruses

- Describes and explains the routes of transmission of viruses

- Describes host responses to virus infections

Describes and explains:
- 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.

- Describes and explains the role of the immune response in pathogenesis of viral disease

- Identifies the mechanisms of activity of antiviral agents

Describes and explains:
- 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.

- 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 including whole genome sequencing
- virus protein structure
- the functions of virus-encoded structural and non-structural proteins.

Describes and explains:
- the principles of phylogenetic analysis
- the molecular epidemiology of virus infections.

Describes and explains:
- the interactions of viruses and cellular receptors
- the mechanisms by which viruses enter cells
- the replication strategies of DNA viruses
- the replication strategies of RNA viruses – negative sense, positive sense and ambisense
- the replication strategies of retroviruses and hepadnaviruses
- how cellular resources are diverted to viral replication.

Describes and explains:
- 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.

- Applies knowledge of the immune response to the understanding of the processes leading to disease

Describes and explains:
- 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.

	• Applies knowledge of pathogenesis to inform management of infection Describes and explains 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. • Describes the principles of targeted development of direct-acting antiviral agents • Describes the interaction of prions and the host in producing disease
K. Laboratory practice in virology	**CiPs: 1, 2, 3, 4, 5, 6, 7, 8, 13**
Knowledge	**Skills**
Pre-analytical phase Identifies: • 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. **Analytical phase** • Describes 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	• Demonstrates ability to appraise users of laboratory services of appropriate test selection and specimens for different clinical scenario • Demonstrates clear communication of requirements of the laboratory including transport of samples • Demonstrates engagement with users and encouraging their involvement in maintaining and expanding the existing test repertoire according to need • Develops a business case to introduce an additional test or to alter an existing protocol Demonstrates ability to interpret results of: • EIA, CLIA • agglutination assay • immunoblot CFT • IFA • immunochromatographic assays • immunoblot • particle agglutination test.

Describes and explains:
- the immunoassay performance characteristics
- the advantages and disadvantages of different immunoassay formats, e.g. direct, indirect and capture
- the effect of different antigen types, e.g. recombinant and whole virus lysate
- the problems of interpretation of assays, e.g. factors (including rheumatoid factor) that influence IgM assay results, prozone, hook effect and edge effect.

Describes and explains the need for confirming:
- antigen, antibody and combined antigen/antibody detection assay results
- reproducibility of a significant result on additional samples.

Describes and explains the need for additional tests and reflex testing to aid interpretation of initial results, e.g. by:
- testing earlier and later samples
- IgM/IgG/IgA testing
- avidity testing
- immunoblot.

- Demonstrates understanding of the methods of direct virus detection and their place in the diagnostic virology laboratory

- Demonstrates appreciation of the historical role of embryonated eggs and organ culture in virus detection

Demonstrates an awareness of cell culture techniques including:
- cytopathic effects
- haemadsorption, haemagglutination
- neutralisation.

- Identifies the principles and practice of transmission electron microscopy

- Identifies the principles and practice of direct immunofluorescence in virus detection

- Identifies the principles and practice of the range of nucleic acid amplification techniques employed in diagnostic virology for direct virus detection, including

Demonstrates ability to assess test validity using quality control parameters for:
- individual test run
- series of test runs over time.

Demonstrates ability to 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.

- Recognises negatively stained viruses of medical importance in electron micrographs

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

- Demonstrates an understanding of nucleic acid amplification tests for the detection of viruses and other organisms

- Demonstrates an understanding of the techniques of virus genome sequencing for virus identification/typing

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

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

Describes and explains:
- 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

safeguards against contamination, controls including those for recognition of inhibition of amplification • Identifies the principles and the practice of quantitation of nucleic acid in virus diagnostic work • Identifies the principles and practice of genome sequencing in virus identification and genotyping • Describes the potential for new approaches to virus detection and the principles behind them, e.g. mass spectrometry • Demonstrates knowledge of artificial intelligence and machine learning infrastructure in diagnostic virology • Demonstrates knowledge of the methods used to ensure quality of examinations performed in the in virology laboratory	• 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. • Demonstrates ability to interpret laboratory results and communicate this information clearly and promptly • Recognises importance of handling patient information confidentially, sensitively and securely • Demonstrates familiarity with reporting mechanisms and how to use them securely and confidentially – electronic, written, fax, verbal communication • Demonstrates ability to record advice accurately in laboratory systems • Demonstrates sound management of clinical problems guided by laboratory results • Demonstrates ability to prioritise result reporting, identifying critical results that need urgent discussion with other clinicians and/or bedside management of the patient • Demonstrates ability to maintain chain of evidence for medico-legal specimens • Recognises and acts on results that have potential infection prevention and control implications, or are of public health or medico-legal significance
Post-analytical phase Identifies: • 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 the GMC guidance underpinning this.	• Recognises the importance of fulfilling the statutory obligations of clinical laboratories to report relevant diagnostic results as specified in the Health Protection (Notification) Regulations 2010 • Demonstrates ability to establish and audit turnaround times
Laboratory management	• Demonstrates effective clinical leadership to

• Summarises how virology laboratory services are organised, funded and managed, and explain pressures for change in the configuration of laboratory services • Understands the principles of how to prepare a business case Describes: • the process of laboratory accreditation • the role of IT in the laboratory, from sample requesting to issuing of reports, and summarises the problems and limitations of IT in laboratory services • medical appraisal and revalidation • the nature and importance of clinical governance in virology. Demonstrates 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 for Microbiological Investigations • National Institute for Health and Care Excellence • Care Quality Commission • Food Standards Agency • the 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. Summarises legal and regulatory issues relevant to clinical and laboratory practice in Virology, including the: • Data Protection Act and GDPR • 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.	a virology service • Demonstrates ability to work effectively with senior laboratory staff to ensure the laboratory is run in an efficient, safe and cost-effective way • Demonstrates ability to work effectively with senior laboratory colleagues to deal with staffing or financial problems • Demonstrates ability to lead the management and investigation of errors or adverse events in the laboratory, especially when these may pose a clinical risk • Demonstrates provision of a clinical lead on service development/improvement, including making and presenting a business case, and evaluation of new techniques or practices • Demonstrates provision of clinical input into the procurement and configuration of pathology IT systems • Demonstrates ability to manage changing configuration of laboratory services • Demonstrates ability to, appraise and mentor staff, and deal with staff in difficulty • Demonstrates ability to audit existing laboratory or clinical practices in order to improve services • Demonstrates good presentation, speaking and negotiation skills

L. Infection prevention and control	CiPs: 1, 2, 3, 4, 9, 11, 13
Knowledge	**Skills**
Organisation of infection prevention and control responsibilities • Assesses and evaluates the responsibilities of healthcare institutions and primary care for IPC under the Health and Social Care Act 2012 • Describes and explains the roles and responsibilities of staff in the institution involved in delivering an infection prevention and control programme • Describes the political context of an infection prevention and control programme within an institution • Recognises the interactions between different organisations in relation to the management of HCAIs • Describes the role of infection control in the procurement of new equipment and facilities • Describes and explains the principles and processes of IPC in community settings such as in general practice and general dental practice, nursing homes, hospices, residential homes, mental health institutes etc.	• Demonstrates ability to apply national legislation and guidance to IPC and to contribute, evaluation and change practice if indicated • Develops appropriate leadership skills in preparation for a leadership role in IPC on completion of training • Demonstrates ability to undertake root cause analysis in investigating cross-infection • Develops policy documents related to common and important aspects of IPC in hospital and community-based healthcare systems • Develops evidence-based policy documents and guidance in the event of infections with novel or imported agents • Demonstrates knowledge of surveillance methods to make effective judgements on advantages and disadvantages before making a recommendation on the most appropriate surveillance methodology • Demonstrates ability to suggest appropriate interventions based on surveillance data interpretation
Principles of infection prevention and control • Describes and explains the science and evidence base that underpins IPC • Describes and explains various surveillance methodologies, data extraction, analysis • Demonstrates awareness of reporting of viral HCAIs (including mandatory reporting) • Describes and explains the processes involved in undertaking IPC inspections and their interpretation	• Designs, leads, analyses and disseminates results of in-depth audits of policies and practices related to IPC • Demonstrates undertaking IPC inspections, analysing the findings and providing a judgement on the quality of the processes adopted by the institution • Demonstrates good report and policy writing skills • Appraises evidence critically when creating policy documents

• Explains engineering and design concepts relevant to IPC as published by the Department of Health (Health Building Notes and Health Technical Memoranda) Demonstrates 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 makes recommendations on choice of product • management of sharps and splash injuries and the principles of post-exposure prophylaxis. • Demonstrates an understanding of needs for pre-employment screening of healthcare workers (HCW) and able to advise occupational health staff on post-exposure prophylaxis and monitoring and treatment of HCW across all viruses that are relevant	• Demonstrates organisational, leadership and mentoring skills in taking a project to completion • Generates accurate and detailed clinical records • Demonstrates ability to undertake in-depth audits of clinical practice • Demonstrates high standards of clinical governance • Demonstrates skills related to teaching, training and mentoring • Demonstrates ability to lead and chair root cause analyses and infection-related adverse events including 'serious untoward incidents' (SUIs)
Management of virus infections in the healthcare setting • Describes how to risk-assess and manage cases of complex virus infections in vulnerable patient groups including those in augmented care environments • Describes and explains the implications of antimicrobial drug resistance for infection control practice, in particular, emerging and drug-resistant viruses Describes and explains: • 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	• Demonstrates the ability to tackle complex problems and provide clear, evidence-based guidance and advice in managing viral infections in the healthcare setting • Demonstrates leadership in working with diverse professional colleagues in outbreak management • Demonstrates ability to advise appropriately on investigations and management, including closure of hospital beds, hospital wards, institutions such as schools • Demonstrates excellent communication skills in liaising with all healthcare staff in matters

in virus transmission and appropriate intervention strategies. Describes and explains: • 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.	related to an outbreak Demonstrates: • good organisation • clear and concise report writing • clear communication in dealing with media, clinical colleagues, and the public.
M. Vaccination	**CiPs: 1, 2, 8, 9, 11**
Knowledge	**Skills**
Describes and explains: • the role of the UK Joint Committee on Vaccination and Immunisation (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, Ebola, 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-	• Demonstrates ability to advise appropriately on the use of active vaccination in prevention of infection, including in the management of outbreaks • Demonstrates participation in surveillance programmes for vaccine-preventable infections • Demonstrates participation in initiatives in the healthcare setting to set and to meet targets for vaccination

induced pathology • the potential of therapeutic vaccines.	

N. Health and safety	**CiPs: 4, 7, 9, 13**
Knowledge	**Skills**
• Demonstrates ability to competently manage health and safety issues arising both in the laboratory and clinical settings • Demonstrates ability to prepare written reports on health and safety issues/incidents • Demonstrates ability to locate new legislative documents relating to health and safety at work • Demonstrates an up-to-date knowledge of health and safety issues and how this can be translated into local best practice	• Prepares infection, prevention and control written risk assessments • Generates both vertical and horizontal audits to identify health and safety issues within both laboratory and clinical settings • Demonstrates ability to use incident reporting and corrective actions in response to health and safety issues

O. Principles of public health in relation to communicable diseases	**CiPs: 1, 3, 4, 7, 8, 9, 13**
Knowledge	**Skills**
• Explains the key principles of outbreak investigation in the community • Describes the principles of hypothesis-generation and testing when investigating an outbreak • Employs basic statistical methods and describes the concepts of mathematical modelling in designing interventions during an outbreak • Describes and explains public health aspects of vaccine-preventable infections and the benefits of vaccination • Explains the concepts of herd immunity in relation to vaccine failure • Describes and explains virology and epidemiology of food and waterborne infections • Describes how to provide virology support in a public health emergency	• Demonstrates leadership on the virological investigation and management of community outbreak, including chairing outbreak or incident meetings as appropriate • Demonstrates ability to work with relevant authorities in organising an emergency response • Analyses data and provides daily updates and situation reports • Generates clear and concise briefing notes as an aide to communication with colleagues in the wider healthcare environment • Demonstrates provision of clear and evidence-based specialist virology advice to public health and other clinical colleagues including GPs

• Describes the features of agents of deliberate release in terms of clinical presentation, potential for spread and methods for detection and control **Outbreak management** • Describes and explains the steps involved in recognising, investigating and controlling outbreaks of infection • Describes and explains the current laboratory, including molecular, epidemiological methods utilised for outbreak investigations and how to access them • Explains statistical methods used in outbreak recognition, investigation and management	• Demonstrates ability to lead the investigation of an outbreak ensuring utilisation of expertise and resources • Interprets statistical data and makes recommendations for interventions for outbreak control • Demonstrates ability to provide guidance to the diagnostic laboratory and utilise reference laboratory and other expert resources appropriately when investigating an outbreak • Demonstrates clear and concise report writing skills
P. Important clinical syndromes	**CiPs: 1, 3, 4, 8, 10, 11, 13**
Knowledge	**Skills**
Demonstrates 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, measles, 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 and on biologics) • transmissible spongiform encephalopathies • viral infections in paediatric patients including neonates • infections in pregnant women and the	• Demonstrates ability to take relevant clinical/infection history, perform clinical examination, and use relevant investigations (including imaging) to establish a likely diagnosis • Selects appropriate investigations and interpret the results accurately • Applies information from history, examination and investigations to appropriately manage the infection • Demonstrates ability to use relevant local, regional, national guidelines especially those from specialty societies to manage infection • Demonstrates ability to adjust management plan depending on progress and developments

foetus (including toxoplasmosis) • travel-related, non-UK endemic and epidemic viral infections (including arboviruses, e.g. Dengue and Zika virus as well as high-consequence infectious diseases such as MERS, SARS, SARS-CoV-2, COVID-19, monkey pox, avian influenza, viral haemorrhagic fever (VHF) agents e.g. Ebola virus, Crimean Congo haemorrhagic fever virus) • infections in adult and paediatric intensive care units (ICU) and special care baby units (SCBU) • viral and non-viral infections of the central nervous system, especially meningitis and encephalitis • viral and non-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 zoonoses, novel parvoviruses, emerging arbovirus infections. • Describes prevention of these infectious syndromes • Describes management of these infectious syndromes • Describes and explains the differential diagnosis of these infections including relevant bacteriological and fungal infections and autoimmune diseases	
Q. Hepatitis	**CiPs: 3, 8, 9, 10, 11, 12**
Knowledge	**Skills**
Describes and explains: • 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 patients	• Selects and interprets accurately laboratory tests used in diagnosis and monitoring of viral hepatitis • Explains in clear terms the significance of results and their limitations • Demonstrates ability to issue laboratory reports with clear interpretation of results • Demonstrates ability to report new diagnoses

and other immunocompromised groups and in blood/organ donors • 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 due to viral hepatitis.	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 • Demonstrates ability to perform laboratory tests used in management of viral hepatitis including immunoassays for antibody and antigen, point of care tests, nucleic acid amplification and sequencing Describes and explains: • 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 patients with HBV and/or HIV-HCV co-infection 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.
R. Understanding use of agents active against viruses	**CiPs: 3, 4, 5, 8, 11, 12, 13**
Knowledge	**Skills**
Antiviral therapy Demonstrates 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	• Identifies the most appropriate antiviral or combination of antiviral agents for management of viral infection Explains and advises 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

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. Demonstrates knowledge of tests for resistance to antiviral agents: • phenotypic • genotypic. • Demonstrates knowledge of, and ability to access, current guidelines on antiviral drugs and their use in practice • Describes reference laboratories for antiviral resistance testing, and for drug level measurement **Immunuglobulins and monoclonal antibodies** Demonstrates 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	• monitoring for and recognising development of resistance to antiviral agents • alternative agents when resistance appears • therapeutic drug monitoring. • Demonstrates ability to interpret sequence data showing mutations conferring resistance to antivirals Selects immunoglobulin and monoclonal antibody preparations to provide: • prophylaxis against viral infections • adjunctive therapy in treatment of virus disease. Describes and explains: • the use of immunoglobulin in therapy

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 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. • Demonstrates knowledge of, and ability to access, current guidelines on immunoglobulin and their use in practice • Demonstrates knowledge of monoclonal antibodies used in the management of virus infection e.g. rituximab	• 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.

S. Infection in the immunocompromised	**CiPs: 3, 8, 9, 10, 11, 12**
Knowledge	**Skills**
Describes and explains: • 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.	Demonstrates 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. • Demonstrates appropriate test selection for diagnosis of viral infection and for monitoring

Explains: • 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. posttransplant lymphoproliferative disorder, progressive multifocal leukoencephalopathy, haemophagocytic lymphohistiocytosis. Explains: • 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.	
The HIV-positive patient Describes and explains: • 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.	• Accurately selects and interprets laboratory tests used in HIV diagnosis and monitoring • Explains in clear terms the significance of results and their limitations • Demonstrates ability to perform laboratory tests used in HIV management, including immunoassays for antibody and antigen, point of care tests, nucleic acid amplification and sequencing
Prevention and management of HIV exposure Describes and explains: • 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	• Describes the risk after sexual and nonsexual exposure • Explains in clear terms the rationale for advising or not advising PEP • Explains management of those at risk of multiple HIV exposures

• risks of HIV transmission after exposure to HIV by sexual and nonsexual exposure • rationale for post-exposure prophylaxis (PEP) • appropriate drug regimens for post-exposure 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 post-exposure prophylaxis against HIV, e.g. DH EAGA, BHIVA • follow-up after PEP • restrictions on working and risks associated with HIV-infected healthcare workers. **Antiretroviral therapy** Describes and explains: • 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. **Management of HIV in those with concurrent viral hepatitis** Describes and explains: • the epidemiology of viral hepatitis including hepatitis A, B, C, D and 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.	Describes and explains: • 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. Describes and explains: • the use of resistance data resources to inform treatment decisions • side effects of treatment regimens • how to safely start and stop antiretroviral therapy and therapy for viral hepatitis • how to interpret laboratory test results in the HIV-infected individual.
T. Research and development in	**CiPs: 5**

virology	
Knowledge	**Skills**
Demonstrates 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.	Demonstrates 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.