The Royal College of Pathologists

Pathology: the science behind the cure

Curriculum for specialty training in medical virology

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Comments	In accordance with the College's publications policy, the original version of this document was placed on the Fellows and Members' area of the College website for consultation from 26 November to 10 December 2009. A total of 4 responses were received. The authors considered the feedback and amended the document accordingly. Please email **publications@rcpath.org** if you wish to see the authors' responses to the feedback. This curriculum is the split version of the joint medical microbiology and virology curriculum (V3). This version has had very minor amendments made as a result of suggestions from the CATTs, changes to the College's Royal Charter and changes to the College's house style. **Dr Peter Cowling** **Director of Communications**

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INTRODUCTION

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

The curriculum and assessment system meets the Postgraduate Medical Education and Training Board's (PMETB) Standards for Curricula and Assessment Systems (July 2008). In addition, the curriculum complies with the training framework described at http://www.mmc.nhs.uk/specialty_training_2010/gold_guide.aspx (*A Reference Guide for Postgraduate Specialty Training in the UK, The Gold Guide 2009, Third Edition* June 2009, Section 7).

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

- a blueprint for the virology assessment systems (this demonstrates how the College assessments and examinations test the structure of the virology curriculum)
- regulations and guidelines for workplace-based assessment
- multi-source feedback
- Year 1 Medical Microbiology and Virology Assessment
- regulations and guidelines for the Fellowship examinations
- access to e-learning mapped to the virology curriculum
- Learning Environment for Pathology Trainees (LEPT) which provides an electronic means of recording progress in training
- Annual Review of Competence Progression (ARCP) guidance

Doctors applying for a CESR in virology must be able to demonstrate equivalence to the requirements for the award of a virology CCT. Such doctors are strongly advised to read PMETB's *Guidance on applying for a CESR under Article 14*. In addition, the following guidance is available from the College and should also be carefully followed in the preparation of a CESR application:

- General guidance on evidence to submit with applications for a CESR (Article 14) in Medical Microbiology or Medical Virology (specialty specific guidance)
- Guidance for CESR applicants in specialties and subspecialties overseen by The Royal College of Pathologists
- CESR curriculum vitae guidance.

Entry requirements

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

Trainees will be appointed to a virology training programme. Stage A of the training programme will be common to both medical microbiology and virology trainees. After satisfactory completion of Stage A, trainees will then undertake either the medical microbiology or the virology training programme, following the relevant curriculum.

Duration of training

The Royal College of Pathologists anticipates that 5 years would normally be required to satisfactorily complete the virology curriculum to the required depth and breadth. However, in order to ensure flexibility, the College advises that the minimum duration of training as identified in Schedule 3 of the General and Specialist Medical Practice (Education, Training and Qualification) Order 2003 is 4 years but that all provisional CCT or CESR(CP) dates should be set at 5 years in the first instance.

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

- evidence of satisfactory completion of the requirements of the virology curriculum (including workplace-based assessments)
- the minimum training period
- satisfactory outcomes in the requisite number of workplace-based assessments (including multi-source feedback)
- satisfactory assessment outcome in the College's Year 1 Medical Microbiology and Virology Assessment
- attainment of FRCPath by examination in Virology
- acquisition of ARCP outcome 6.

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

Joint training in virology and infectious diseases

Trainees may wish to dually train and accredit in virology and infectious diseases to achieve two CCTs. In this case they must have applied for and successfully entered a training programme which was advertised openly as a dual training programme. Trainees in this programme will need to achieve the competencies as described in both curricula and there must be jointly agreed assessments [proposed by the Virology CATT or the Specialty Advisory Committee (SAC) in Infectious Diseases, and approved by PMETB]. Postgraduate Deans wishing to advertise such programmes should ensure that they meet the requirements of the relevant CATT and SAC. The organisation of training for trainees in virology and infectious diseases is extended by 1 year to enable incorporation of the requirements of the infectious diseases curriculum, which is the responsibility of the Joint Royal Colleges of Physicians Training Board (JRCPTB).

The minimum duration of virology and infectious diseases training is 6 years plus 2 years CMT.

The CCTs or CESR(CP) in virology and infectious diseases will be awarded on the joint recommendation of The Royal College of Pathologists and the JRCPTB following:

- membership of The Royal College of Physicians (MRCP), MRCP(I) or equivalent
- evidence of satisfactory completion of the medical microbiology and infectious diseases curricula and the minimum training period
- satisfactory outcomes in the requisite number of workplace-based assessments (including multi-source feedback)
- attainment of the College's Year 1 Medical Microbiology and Virology Assessment
- FRCPath by examination
- acquisition of ARCP outcome 6.

Further details regarding joint training in virology and infectious diseases are available separately.

Training regulations

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

Less than full-time training

'Less than full-time training' is the term used to describe doctors undertaking training on a basis that is less than full-time, normally between five and eight sessions per week. 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*.

PMETB guidance on approval of flexible training states that from 1 December 2007, "deaneries, in conjunction with Royal Colleges/Faculties, will take responsibility for ensuring that all less than full-time training of any kind is undertaken in prospectively approved posts and programmes and that it meets the statutory requirements of the General and Specialist Medical Practice (Education, Training and Qualifications) Order 2003". Prior to beginning their less than full-time training, trainees must inform the Training and Educational Standards Department at The Royal College of Pathologists in order that the Virology College Advisory Training Team (CATT) can ensure that their less than full-time training programme will comply

with the requirements of the CCT programme. The documentation towards a less than full-time training application will be collected and checked to ensure compliance and a revised provisional CCT date issued. Separate guidance and an application form are available on the College website for this purpose.

Research

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

Research undertaken prior to entry to a virology training programme

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

Research undertaken during entry to a virology training programme

Trainees who undertake a period of out-of-programme research (OOPR) after entering a virology training programme and obtaining their National Training Number (NTN) can have up to 1 year accepted by the Virology CATT towards their CCT. **In order to be eligible to have this period of research recognised towards the award of the CCT, trainees must have their OOPR approved prospectively by PMETB before beginning their research.** Prior to beginning the period of research, trainees must agree the OOPR with their Deanery and inform the Training and Educational Standards Department at The Royal College of Pathologists in order that the Virology CATT can ensure that the trainee will comply with the requirements of the CCT programme. The period of research must include clinical or laboratory work directly relevant to the virology curriculum. The documentation towards a CCT recommendation will be collected by the Training and Educational Standards Department at the College, checked to ensure compliance and a revised provisional CCT date issued. It must be ensured that, following Deanery agreement and acceptance from the Virology CATT, PMETB prospectively approves the OOPR in order that the period can count towards a CCT. Separate guidance and an application form are available on the College website for this purpose.

Trainees must have their OOPR agreed by the relevant Deanery, accepted by the Virology CATT and approved by PMETB before beginning their research.

Academic trainees

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

Overseas training

Overseas training undertaken prior to entry to a virology training programme

Some trainees may have undertaken a period of virology and/or microbiology training overseas prior to entering a virology training programme in the UK. Such trainees must enter a virology training programme at ST1. Trainees can have this period recognised towards an entry on the Specialist Register but their route of entry to the Specialist Register will be through the CESR.

Overseas training undertaken during entry to a virology training programme

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

Trainees must have their OOPT agreed by the relevant Deanery, accepted by the Virology CATT and approved by PMETB before beginning their overseas training.

Clinical training

Some trainees may have undertaken clinical training in a UK training programme approved by PMETB prior to entering specialist training in virology and obtained competencies which can be mapped directly to the virology curriculum. Such trainees must enter a virology training programme at ST1. Following satisfactory completion of Year 1 training, trainees may apply to have the relevant competencies gained in previous clinical training accepted by the Virology CATT. It is expected that the trainee's educational supervisor should assess their progress to determine the suitability of their previous clinical training to be approved. Any clinical training to be approved should be agreed by the Programme Director who will be required to make a recommendation to the Virology CATT. The College will approve up to 1 year of such training. An application for approval should include evidence of approval status, the knowledge, skills and behaviours satisfactorily obtained and agreement by the Virology Programme Director who will be required to make a recommendation to the Training and Educational Standards Department at the College.

Clinical training undertaken overseas prior to entering specialist training in virology cannot contribute towards the award of the CCT unless it has been prospectively approved by PMETB. The Virology CATT may approve relevant competencies gained during previous clinical training overseas but the route of entry to the Specialist Register for such trainees will normally be via CESR.

RATIONALE

Purpose of the curriculum

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

The educational programme provides:

- a broad understanding of the diagnosis and management of infectious disease from a clinical and laboratory perspective
- the diagnostic techniques required in the practice of clinical virology and where relevant microbiology
- understanding of the areas of clinical microbiology and medical virology detailed in the curriculum
- knowledge of specialist areas in medical virology; these include infection control, medical microbiology and public health to a level dependent on the background and career aspirations of the trainee and the ability to provide a specialist opinion within areas of competency
- the communication skills required for the practice of medical virology and the teaching skills necessary for effective practice
- the acquisition of management skills required in the running of the virology or microbiology laboratory
- knowledge of the health protection aspects of medical virology and clinical microbiology
- experience of research and development projects including critical assessment of published work so as to contribute as an individual and as a team member to the development of the service
- the acquisition of life-long habits of reading, literature searches, consultation with colleagues, attendance at scientific meetings and the presentation of scientific work that are essential for continuing professional development (CPD)
- experience of the practice of clinical governance and audit (specialist and multidisciplinary) through evaluation of practice against the standards of evidence-based medicine, which underpin medical virology practice.

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

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

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

objectives. The curriculum will facilitate regular assessment of trainees' progress by trainees and their educational supervisor(s).

Curriculum development

The curriculum was originally developed in 2005 by the Virology CATT and with input from the Specialty Advisory Committee (SAC) on Medical Microbiology, the Virology Sub-Committee and the Examination Panel of The Royal College of Pathologists. The curriculum was subsequently reviewed and amendments made in 2007, 2008 and 2009. In addition, the College's Lay Advisory Committee (LAC) has been consulted and a draft version of the curriculum was published on The Royal College of Pathologists' website for consultation with College members and Registered Trainees on 26 November 2009 for a 2-week period.

The infectious diseases curriculum is developed by the Infectious Diseases SAC of the JRCPTB. The joint training programme in virology and infectious diseases is developed in consultation with the Infectious Diseases SAC, Virology CATT and other appropriate committees and bodies.

The content of the curriculum was derived from current UK hospital and laboratory practice in virology. Educational supervisors and trainees were involved in curriculum development via their representation on various College committees such as the Virology CATT, Virology Sub-committee and the Trainees Advisory Committee (TAC).

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

The curriculum was agreed by the Virology CATT on 23 September 2009, the Medical Microbiology CATT on 14 October 2009 and the Joint Committee on Pathology Training (JCPT) on 16 October 2009 and approved by the Council of The Royal College of Pathologists on 14 January 2010.

The curriculum was approved by PMETB on 25 March 2010 and formally published in May 2010.

Stages of training and learning

There are four stages in the virology curriculum. Trainees may not progress to the next stage of training until they have satisfactorily completed the preceding stage. This section should be read in conjunction with the illustrative timetable of virology training at Appendices 3a and 3b (see pages 112–113).

At each stage, and where relevant at each new employment or rotation in a training cycle, there will be a thorough induction introducing the trainee to the employing organisation, and the specialty training unit.

Stage A

The trainee has a comprehensive understanding of the principles and practices of medical microbiology and virology under direct supervision.

Stage A of training is 12 months whole-time equivalent. This stage of the curriculum (see page 58) will begin with a formal introduction to the basic

principles of medical microbiology and virology. Following the introductory period, the trainee will receive instruction and practical experience in further aspects of medical microbiology and virology. This stage of training will be formally assessed by The Royal College of Pathologists' Year 1 Medical Microbiology and Virology Assessment.

In order to satisfactorily complete stage A of virology training, trainees must have:

- satisfactorily completed stage A of the virology curriculum and a minimum training period of 12 months (whole-time equivalent)
- achieved satisfactory outcomes in the requisite number of medical microbiology and/or medical virology workplace-based assessments
- undertaken a multi-source feedback assessment
- performed satisfactorily in The Royal College of Pathologists' Year 1 Medical Microbiology and Virology Assessment
- obtained a satisfactory outcome in the ARCP.

Stage B

The trainee has a good general knowledge and understanding of most principles and practices under indirect supervision. They should be able to deal with most of the day-to-day issues in a hospital microbiology or virology laboratory to an adequate level but will still require consultant input with regard to complex management and clinical issues.

Stage B of training is undertaken between month 13 and month 36 of whole-time equivalent training. During Stage B of training, the trainee will continue to broaden their experience and understanding of virology and relevant microbiology. The knowledge gained during this stage of training will be assessed by the FRCPath Part 1 examination in Medical Microbiology and Virology.

In order to complete stage B of virology training, trainees must have:

- satisfactorily completed a total of at least 24 months of training (whole-time equivalent) of which at least 12 months should be in Stage B
- achieved satisfactory outcomes in the requisite number of medical microbiology and/or medical virology workplace-based assessments
- passed the FRCPath Part 1 examination in medical microbiology and virology
- obtained one or more satisfactory outcomes in the ARCP to indicate satisfactory progress in training.

Stage C

Stage C of training is undertaken between month 25 and month 48 of whole-time equivalent training. This stage of the curriculum enables the trainee to undertake further specialised virology training. This stage of training will in part be summatively assessed by the FRCPath Part 2 examination in Virology.

In order to complete stage C of virology training, trainees must have:

- satisfactorily completed a total of at least 42 months of training (whole-time equivalent) of which at least 12 months should be in Stage C
- achieved satisfactory outcomes in the requisite number of medical microbiology and/or medical virology workplace-based assessments
- passed the FRCPath Part 2 examination in virology
- obtained one or more satisfactory outcomes in the ARCP to indicate satisfactory progress in training.

Stage D

Stage D of training is undertaken usually between month 43 and month 60 of whole-time equivalent training. This stage of the curriculum prepares the trainee for a consultant post. The ARCP undertaken at the end of Stage C should identify goals for the trainee to achieve during their final year of training. The trainee has an in-depth knowledge and understanding of the principles of virology. They should be competent to discuss and deal with the subject (or, where appropriate, perform the task/procedure), demonstrating a level of clinical or professional judgement commensurate with independent professional practice at consultant level. It is anticipated that a trainee at this level should have consultant input readily available at all times where required. By the end of Stage D, the trainee should be able to demonstrate a level of knowledge and skill indicating suitability for independent professional practice in virology.

In order to complete stage D of virology training, trainees must have:

- satisfactorily completed a total of at least 60 months of training (whole-time equivalent) of which at least 12 months should be in Stage D
- achieved satisfactory outcomes in the requisite number of medical microbiology and/or medical virology workplace-based assessments
- satisfactorily completed all areas of the virology curriculum including completion of all the portfolio assignments detailed in the curriculum
- obtained an ARCP outcome 6 to indicate that all clinical (and research where relevant) competences have been achieved, leading to the award of the CCT.

In addition to the above, trainees will also be required to undertake a universal pathology-focussed MSF assessment in ST3 and ST5. Depending on the trainees' individual progress, the ST3 MSF will normally take place in either Stages B or C. The ST5 MSF will normally take place in Stage D.

Training programmes

Training programmes will be quality assured by PMETB and training posts and programmes will be recommended for approval by the relevant Postgraduate Deanery with input from The Royal College of Pathologists.

The training period will begin with a formal introduction to laboratory aspects of microbiology and virology. There will also be an introduction to the management and organisational structures within which the microbiology and virology service operates, both at the laboratory and Trust or Local Health Board levels. It will be important for trainees to understand, at an early stage, the pathology and public health environments in which the diagnostic service and the prevention of infection and infection control operate, and the multidisciplinary nature of this environment. Following the induction period, the trainee will receive instruction and practical experience in further aspects of bacteriology, virology, mycology and parasitology, both laboratory and clinical. The emphasis will be on acquiring basic microbiological and virological knowledge and practical bench skills in a routine laboratory and clinical setting.

During Stage B, the trainee will continue to broaden experience and understanding of common infectious problems and their management. The knowledge gained during this stage of training will be assessed by the FRCPath Part 1 examination. Medical microbiology trainees should normally undertake 6–12 months training in virology, at least 1 month of which should take place before the FRCPath Part 1 examination. The delivery of the virology training is a local matter. Medical virology trainees should normally undertake at least 6 months training in medical microbiology, at least 2 months of which should take place before the FRCPath Part 1 examination. The delivery of the medical microbiology training is a local matter.

The trainee entering Stage C of the training programme will have a sound theoretical and practical knowledge of microbiological and virological practice but will not have had a great deal of unsupervised experience in applying that knowledge. Stage C (and D) of training is thus devoted to acquiring self-sufficiency in the specialty during this period. The trainee will be expected to have specific instruction in infection control and prevention, epidemiology and public health/health protection medicine and may have optional additional medical microbiology training

The structure and operation of the training programme is the responsibility of an STC, which will ensure that every trainee is provided with an appropriate range of educational experience to complete their training.

The local Programme Director and Regional Specialty Advisor are responsible for the overall progress of the trainee and will ensure that the trainee satisfactorily covers the entire curriculum by the end of the programme.

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

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

CONTENT OF LEARNING

The curriculum details the level of knowledge and skill that a trainee should acquire to provide a high quality service at consultant level in the NHS. This includes both professional and specialty practice. The professional practice aspect of the curriculum aims to ensure that doctors in the NHS trained to a Royal College of Pathologists-developed curriculum in Virology are developed to be practitioners, partners and leaders. It also aims to ensure an understanding of issues of inequality around health and healthcare. Doctors must take the opportunity to positively influence health determinants and inequalities. The *Good Medical Practice* and core content of the curriculum is outlined below.

Generic skills required for virology, in accordance with *Good Medical Practice*, the Medical Leadership curriculum, common competencies curriculum and the Health Inequalities curriculum (see pages 23–57)

Core medical microbiology and virology curriculum (Stage A) (pages 58–65)

Developing independent practice (pages 66–67)

Core medical virology curriculum (Stages B–D)

1. Basic virology (pages 70–74)

2. **Medical virology** (pages 74–88)

3. **Management** (pages 89–90)

4. **Health and safety** (pages 90–94)

5. **Understanding research and development in virology** (pages 94–96)

6. **Public health and epidemiology** (pages 96–107)

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

The curriculum outlines the knowledge, skills, behaviours and expertise that a trainee is expected to obtain in order to achieve the award of the CCT or CESR(CP). It is expected that every trainee should undertake the core Stage A training, but it is recognised that the order of learning and experience will differ according to the programme. The curriculum maps components of *Good Medical Practice* against the clinical components of virology.

The recommended learning experiences are listed on page 18. The intended outcomes of learning are benchmarked to identifiable stages of training.

The Royal College of Pathologists is committed to supporting self-care, promoting well-being and community engagement, prevention and early intervention, with services designed around the patient/service user rather than the needs of the patient/service user being forced to fit with the services offered. The following common core principles of self-care are therefore supported. These are:
Principle 1: Empower people who use services/patients to make informed choices to manage their condition and care needs more effectively
Principle 2: Communicate effectively to enable people who use services/patients to develop and gain confidence in their self-care skills
Principle 3: Enable and support people who use services/patients to use technology to support self-care
Principle 4: Enable and support people who use services/patients to develop skills in self-care
Principle 5: Enable and support people who use services/patients to participate in service planning and to access support networks.

Further details are available in *Supporting People with Long Term Conditions to Self Care: A guide to developing local strategies and best practice (2005)*.

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

- appropriate attitudes in order to be able to work as an independent professional practitioner in virology
- good working relationships with colleagues and the appropriate communication skills required for the practice of virology
- the knowledge, skills, attitudes and behaviour to act in a professional manner at all times

- the knowledge, skills, attitudes and behaviour to provide appropriate teaching and to participate in effective research to underpin virology practice
- an understanding of the context, meaning and implementation of clinical governance
- a knowledge of the structure and organisation of the NHS
- the acquisition of management skills required for the running of a virology laboratory
- familiarity with health and safety regulations, as applied to the work of a virology department.

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 virology is to:

- indicate suitability of choice at an early stage of the chosen career path
- help to identify trainees who should change direction or leave the specialty
- indicate the capability and potential of a trainee through tests of applied knowledge and skill relevant to the specialty
- demonstrate readiness to progress to the next stage(s) of training having met the required standard of the previous stage
- provide feedback to the trainee about progress and learning needs
- support trainees to progress at their own pace by measuring a trainee's capacity to achieve competencies for their chosen career path
- drive learning demonstrated through the acquisition of knowledge and skill
- enhance engagement in medical leadership
- 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 virology assessment system is available on the PMETB website.

Methods of assessment

Trainees will be assessed in a number of different ways during their training. Satisfactory completion of all assessments and examinations will be monitored as part of the ARCP process and will be one of the criteria upon which eligibility to progress will be judged. A pass in the Year 1 Medical Microbiology and Virology Assessment and the FRCPath examinations are required as part of the eligibility criteria for the award of the CCT or CESR(CP).

Year 1 Medical Microbiology and Virology Assessment

Trainees must pass the Year 1 Medical Microbiology and Virology Assessment as one of the requirements for satisfactory completion of Stage A of training.

Workplace-based assessment

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

These will comprise:

- Case-based discussion (CbD) (minimum of 6 satisfactory outcomes required per year)
- Directly observed practical skills (DOPS) (minimum of 6 satisfactory outcomes required per year)
- Multi-source feedback (MSF) (minimum of 3 during training)

Further separate guidance is provided about the method and required frequencies of these assessments.

FRCPath examination

The major assessments will occur during Stage B of training in the shape of the FRCPath Part 1 examination and summatively towards the end of Stage C of training in the shape of the FRCPath Part 2 examination.

The results of workplace-based assessments and examinations are evaluated by the JCPT as part of their role in monitoring training. Examination results are evaluated after each session and an annual review of validity and reliability is undertaken and reported to the Examinations Committee.

Evidence of competence

Annual Review of Competence Progression

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

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

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

MODELS OF LEARNING

There are three broad categories of learning which trainees employ throughout run-through training – instructionalist model, constructionist model and the social learning model. The models of learning can be applied to any stage of training in varying degrees. The majority of the curriculum will be delivered through work-based experiential learning, but the environment within the departments will encourage independent self-directed learning. It is the trainee's responsibility to seek opportunity for experiential learning. The rotations are also arranged in such a way that trainees have time available for participation in research projects as part of their training. The more academically inclined trainees will be encouraged to take time out from the training time to include a more sustained period of grant-funded research working towards an MSc or PhD.

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

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 providing reference textbooks and journal access. It is the trainee's responsibility to seek opportunity for experiential learning. The rotation should also be arranged in such a way that trainees have time available for participation in research projects as part of their training. The more academically inclined trainees will be encouraged to take time out from the training time to include a more sustained period of grant-funded research working towards a higher degree.

LEARNING EXPERIENCES

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

a. Observation of, assisting and discussion with senior medical staff
b. Working under consultant supervision
c. Task specific on the job training
d. Observation of laboratory methods
e. Discussion with clinical scientists and senior BMS staff
f. Practical bench work
g. Personal study
h. Appropriate postgraduate education courses
i. Tailored clinical experience
j. Laboratory and clinical team and directorate meetings
k. Discussion with Infection Control Nurses and/or a Consultant in Communicable Disease Control (CCDC)/CHP and/or Regional Epidemiologist (RE)
l. Attendance and participation at relevant Trust/local Health Board committees
m. Attending non-promotional selected training available through equipment and kit manufacturers
n. Attending ward round and multidisciplinary team meetings
o. Telephone advice to clinicians
p. Teaching undergraduates and other health professionals
q. Awareness of appropriate guidelines
r. Attending regional, national and international medical or scientific conferences
s. Interaction with/attachment to specialist reference laboratories
t. E-learning
u. Learning with peers
v. Work-based experiential learning
w. Medical clinics including specialty clinics
x. Personal ward rounds
y. Consultant-led ward rounds
z. Practical laboratory experience
aa. Formal postgraduate teaching
bb. Independent self-directed learning
cc. Formal study

SUPERVISION AND FEEDBACK

Specialty training must be appropriately supervised by the senior medical and scientific staff and nursing staff (e.g. infection control nurses, health protection nurses) on a day-to-day basis under the direction of a designated educational supervisor and a Specialist 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 or CESR(CP). The College also acknowledges that the process of gaining competence in supervision starts at an early stage in training with foundation doctors supervising medical students and specialty registrars supervising more junior trainees.

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

The role of the educational supervisor is to:

- have overall educational and supervisory responsibility for the trainee in a given post
- ensure that the trainee is familiar with the curriculum relevant to the year/stage of training of the post
- ensure that the trainee has appropriate day-to-day supervision appropriate to their stage of training
- ensure that the trainee is making the necessary clinical and educational progress during the post
- ensure that the trainee is aware of the assessment system and undertakes it according to requirements
- act as a mentor to the trainee and help with both professional and personal development
- agree a training plan (formal educational contract) with the trainee and ensure that an induction (where appropriate) has been carried out soon after the trainee's appointment
- discuss the trainee's progress with each trainer with whom a trainee spends a period of training
- undertake regular formative/supportive appraisals with the trainee (at least two per year, approximately every 6 months) and ensure that both parties agree to the outcome of these sessions and keep a written record
- regularly inspect the trainee's training record, inform trainees of their progress and encourage trainees to discuss any deficiencies in the training programme, ensuring that records of such discussions are kept
- keep the STC Chair informed of any significant problems that may affect the trainee's training.

In order to become an educational supervisor, a consultant must have a demonstrated interest in teaching and training, appropriate access to teaching resources, be involved in and liaise with the appropriate regional training committees, be involved in annual reviews and liaise closely with the College Regional Specialty Adviser. The Deaneries organise extensive training programmes for educational supervisor 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.

MANAGING CURRICULUM IMPLEMENTATION

The curriculum outlines the minimum virology training requirements for delivery in a regional 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 Programme Director and their Deanery, with the assistance of the regional STC and supported by the Regional Specialty Advisor, to ensure that the programme delivers the depth and breadth of virology training outlined in the curriculum. The Programme Director must ensure that each post or attachment within the programme is approved by PMETB. 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 PMETB agreed curriculum and is provided to the standards set by the College and PMETB.

It is the responsibility of PMETB to quality assure training programmes and the responsibility of The Royal College of Pathologists through the Virology CATT and JCPT 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 that 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 section of training, to ensure structured and goal-oriented delivery of training.

Trainees must register with The Royal College of Pathologists on appointment to a Virology training programme or if they are appointed to a Locum Appointment for Training (LAT) or Fixed Term Specialty Training Appointment (FTSTA). It is the trainee's responsibility to familiarise themselves with the curriculum and assessment requirements both for the satisfactory completion of each stage of training and the award of the CCT or CESR(CP). They must be familiar with all aspects of the assessment system; workplace-based assessment including multi-source feedback, the Year 1 Medical Microbiology and Virology Assessment and the FRCPath examinations. It is the trainee's responsibility to ensure that they apply in good time for any assessments and examinations that demand an application. Trainees must also make appropriate use of the LEPT system and e-learning.

CURRICULUM REVIEW AND UPDATING

The curriculum will be evaluated and monitored by The Royal College of Pathologists as part of continuous feedback from STCs, Programme Directors, Regional Specialty Advisors, trainers and trainees.

The curriculum will be reviewed in the first instance by the Medical Virology CATT within 2 years of publication. In reviewing the curriculum, opinions will be sought from the College's SAC on Medical Microbiology, its related subspecialty sub-committees**,** the Trainees Advisory Committee, the Lay Advisory Committee and its Fellows and Registered Trainees.

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

EQUALITY AND DIVERSITY

Extract from The Royal College of Pathologists' *Diversity and equality policy and approach* (December 2006):

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 ethnic origin, nationality, age, disability, gender, sexual orientation, race or religion. 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. Key legislation includes:

- The Race Relations Act 1976, The Race Relations Act 1976 (Amendment) Regulations 1976, The Race Relations Amendment Act (RRAA) 2000
- The Disability Discrimination Act 1995 and the Disability Discrimination Amendment Act 2005
- The Sex Discrimination Act 1975 and 1986 and the 1983 and 1986 Regulations
- The Equal Pay Act 1970 and the Equal Pay Act 1970 (Amendment) Regulations 1983, 1986, 2003
- The Human Rights Act 1998
- The Employment Equality (Sexual Orientation) Regulations 2003
- The Employment Equality (Religion or Belief) Regulations 2003
- The Employment Equality (Age) Regulations 2006
- Gender Recognition Act 2004.

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

ACKNOWLEDGEMENTS

Dr Ken Mutton (current Chair of Virology College Advisory College Team [CATT]), Professor Goura Kudesia (immediate past Virology CATT Chair), members and deputies of the Virology CATT and Medical Microbiology CATT, Professor Shelley Heard (current Director of Training and Educational Standards), Dr Hani Zakhour (immediate past Director of Training and Educational Standards), Joanne Brinklow (Head of Educational Standards) and Sandra Dewar (Acting Head of Educational Standards/Assessment Manager).

PROFESSIONAL PRACTICE CURRICULUM FOR VIROLOGY

This section outlines the generic knowledge, skills and behaviours that are tailored to and required for specialist training in virology and the competencies acquired in relation to the practice of virology. These are needed in day-to-day working to comply with good medical practice and underpin virology practice. It is intended that trainees follow this curriculum for their entire training period in virology. This section will be complemented by training and courses organised by the local Deanery holding the trainee NTN. It is the responsibility of the educational supervisor to liaise with the local Programme Director and the Postgraduate Dean to ensure that the trainee has access to the necessary training opportunities, including attendance at courses to enable them to acquire the competencies as outlined in this curriculum.

1. GOOD CLINICAL CARE

Objective: to demonstrate adequate knowledge and skills and appropriate behaviours in routine clinical work.

New specialists will:

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

Subject	Knowledge	Skills	Attitudes and behaviours
Patient medical (or clinical) history	Define the patterns of symptoms found in patients presenting with infection	Take and analyse a clinical history in a relevant succinct and logical manner Overcome difficulties of communication due to language, or associated with physical and mental impairment Use interpreters and advocates appropriately	Show empathy to patients Appreciate the importance of psychological factors for patients and relatives Appreciate the interaction of social factors and the patient's illness
Examination	Define the pathophysiological basis of physical signs Identify the clinical signs found in infectious diseases	Perform a reliable and appropriate clinical examination	Respect patients' dignity and confidentiality Acknowledge cultural diversity and identify situations where this can affect the way in which clinical examination is undertaken Involve patients' relatives as appropriate Identify situations where there is the need for a chaperone
Investigations including imaging	Describe the scientific and pathological basis of investigations Define the indications for investigations Describe the risks and benefits of particular investigations Know the clinical value and cost effectiveness of individual investigations	Initiate appropriate investigations Interpret the results of investigations Perform appropriate clinical investigations competently where relevant Discuss investigations with colleagues and advise them appropriately	Understand the importance of working with other healthcare professionals and team working Provide explanations to patients as to rationale for investigations, and possible unwanted effects

Subject	Knowledge	Skills	Attitudes and behaviours
Treatment (therapeutics)	Outline the scientific theory relating to pharmacology Discuss the mechanisms through which therapeutic interventions affect the progress of infection	Accurately assess the patient's needs	Clearly and openly explain treatments including: • side effects of drugs • their likely efficacy • alternative approaches to therapy
Note-keeping, letters, etc.	Write case summaries, letters, medico-legal reports Define the structure, function and legal implications of medical records and medico-legal reports Explain the relevance of the Data Protection Act pertaining to patient confidentiality	Record concisely, accurately, confidentially and legibly the appropriate elements of the history, examination, results of investigations, differential diagnosis and management plan Write summaries, letters, medico-legal reports Date and sign all records	Appreciate the importance of timely dictation, cost-effective use of medical secretaries and the growing use of electronic communication Demonstrate prompt and accurate communication with primary care and other agencies as well as with patients and/or their families Show courtesy towards medical secretaries and clerical staff
Management of chronic disease	Define the clinical presentation and natural history of chronic infections	Maintain hope whilst setting long-term realistic goals Develop long-term management plans for control of chronic infection	Treat each patient as an individual Appreciate the effects of chronic disease states on patients and their relatives Appreciate the importance of cooperation with primary care

Subject	Knowledge	Skills	Attitudes and behaviours
Time management	Prioritise patients and tasks appropriately	Start with the most important tasks Work more efficiently as clinical skills develop Recognise when falling behind and re-prioritise or call for help	Have realistic expectations of tasks to be completed by self and others Show willingness to consult with others and to work as part of a team
Decision-making	Apply the proper clinical priorities for investigation and management	Analyse and advise on clinical infection problems	Show flexibility and willingness to change in the light of changing conditions Ask for help when necessary

Health determinants and inequalities

Subject	Knowledge	Skills	Attitudes and behaviours
Nationality and culture	Recognise that good health includes both mental and physical health Recognise the relationship between health inequalities and wealth inequalities Be aware of social and cultural issues and practices such as: • the impact of cultural beliefs and practices on health outcomes • health determinants that affect patients and communities • the effects of social and cultural issues on access to healthcare, including an understanding of health issues of migrants and refugees Be aware of the national and international situation regarding the distribution of disease, the factors that determine health and disease, and major population health responses Be aware of the impact of globalisation on health, major causes of global morbidity and mortality, and effective and affordable interventions to reduce these Be aware of the impact on health of armed conflict, natural disasters and other social upheavals	Communicate effectively with patients from diverse backgrounds and those with special communication needs, such as the need for interpreters, etc. Communicate effectively and respectfully with parents, carers, etc.	Recognise issues of health that are related to social class

Subject	Knowledge	Skills	Attitudes and behaviours
Inequality and discrimination/ stigmatisation	Understand the implications of disability discrimination legislation for healthcare Recognise how health systems can discriminate against patients from diverse backgrounds, and how to work to minimise this discrimination. For example, in respect of age, gender, race, culture, disability, spirituality, religion and sexuality Recognise the stigmatising effects of some illnesses and work to help in overcoming stigma Recognise that people can be denied employment opportunities unnecessarily through myths, stigma, dogma and insufficient advocacy and support; be aware of the role of doctors and other services in combating this inequality Recognise the effects of exclusion and discrimination on physical and mental health Be aware of the role that individuals (including patients and carers as well as healthcare professionals) and services can play in combating inequality and discrimination and contribute appropriately to this work	Respect diversity and recognise the benefits it may bring, as well as associated stigma Be aware of the possible influence of and sensitively include questions about socio-economic status, household poverty, employment status and social capital in taking a medical history Assess the patient's ability to access various services in the health and social system and offer appropriate assistance Help to empower patients and negotiate complex systems to improve health and welfare including, where appropriate, the right to work Where values and perceptions of health and health promotion conflict, facilitate balanced and mutually respectful decision-making Identify and communicate effectively with influential decision-makers/ facilitators of change	Respect diversity of status and values in patients and colleagues Adopt assessments and interventions that are inclusive, respectful of diversity and patient-centred

Subject	Knowledge	Skills	Attitudes and behaviours
Personal beliefs and biases	Recognise that personal beliefs and biases exist and understand their impact (positive and negative) on the delivery of health services Be aware of similarities and distinctions between the beliefs and values of the doctor, the patient and the policy-makers	Recognise in routine practice the doctor's role as advocate and manager Advocate and facilitate appropriate self-care Recognise and be able to address the social, biological and environmental determinants of health (the bio-psycho-social model or the bio-socio- psycho-existentialist model) and collaborate with other professionals	Show confidence and positivity in one's own professional values Accept uncertainty Have insight into one's own behaviour and how it might impact on patients' health issues
Values, ethics and law	Ensure that all decisions and actions are in the best interests of the patient and the public good Be familiar with and uphold the rights of children and vulnerable adults Be familiar with and uphold the rights of disabled people to participate in healthy and rewarding employment Practise in accordance with an appropriate knowledge of contemporary legislation Act with appropriate professional and ethical conduct in challenging situations	Seek out and utilise opportunities for health promotion and disease prevention Based on an understanding of risk, be able to apply epidemiological principles and public health approaches so as to reduce and prevent disease and improve the health of populations Recognise important issues in preventative healthcare, for example in sexual health, substance abuse, etc., and take opportunities to raise these issues in health promotion, for example, explaining to parents who refuse vaccination against childhood infections the health risks that this poses to their children	Respond to people in an ethical, honest and non-judgmental manner Use appropriate methods of ethical reasoning to come to a balanced decision where complex and conflicting issues are involved

Subject	Knowledge	Skills	Attitudes and behaviours
Policy, research and change	Show awareness of current UK screening programmes Assess critically issues that might affect health inequalities that are currently under debate regarding changes in the NHS, including the public policy process Maintain an up to date knowledge of research evidence regarding the most important determinants of health Know how to access and use local health data Know how to access resources for community action and advocacy (e.g. resources, legislation, policy documents)	Demonstrate the ability to access and make use of appropriate population, demographic, socio-economic and health data Conduct an assessment of community health needs, and where appropriate apply these in practice	

2. MAINTAINING GOOD MEDICAL PRACTICE

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

New specialists will:

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

Subject	Knowledge	Skills	Attitudes and behaviours
Overall clinical judgement	Demonstrate sufficient clinical, microbiological and virological knowledge to enable integration of clinical and laboratory features	Accurately interpret test results in the context of available clinical information	Critically appraise the available clinical and laboratory data in coming to diagnostic/treatment decisions
Recognise own limitations	Work within own limitations and ask for advice when necessary		Show a willingness to consult Admit mistakes and give and accept feedback on them
Written records	Demonstrate knowledge of the appropriate content of clinical records Demonstrate an understanding of the problems faced by people for whom English is not a first language Demonstrate an understanding of the problems faced by people with educational and/or physical disabilities Explain the relevance of data protection pertaining to patient confidentiality and put that knowledge into practice	Produce accurate letters/reports and other written correspondence with clear conclusions Produce and store documentation/information with due regard to patient confidentiality	Appreciate the importance of timely dictation, cost-effective use of medical secretaries and the growing use of electronic communication Facilitate prompt and accurate communication with clinicians and patients and where relevant their families Ensure the legibility and accuracy of written communications Show courtesy towards medical secretaries and clerical staff

Subject	Knowledge	Skills	Attitudes and behaviours
Decision-making	Take a lead in deciding clinical priorities for investigation and management	Analyse clinical and laboratory problems effectively	Be flexible and willing to change in the light of changing conditions Be willing to ask for help
Lifelong learning	Understand the importance of continuing professional development and comply with the requirements of professional bodies in maintaining this at an appropriate level	Recognise and use learning opportunities Use the potential of study leave to keep up to date Maintain a professional portfolio Gain information efficiently from a range of sources including paper-based, computer-based and audiovisual Monitor own performance through audit and feedback	Be self-motivated and eager to learn Show willingness to learn from colleagues and to accept constructive feedback

Subject	Knowledge	Skills	Attitudes and behaviours
Good use of information technology (IT)	Use email, internet, fax and the telephone for communication, showing understanding of their limitations and advantages Demonstrate the ability to retrieve and utilise data recorded in clinical systems Know the principles of literature searching using medical databases Demonstrate an understanding of the range of possible uses for clinical data and information and appreciate the dangers and benefits of aggregating clinical data Explain the relevance of data protection pertaining to patient confidentiality and put that knowledge into practice	Demonstrate competent use of database, word processing and statistics programmes Plan and undertake searches (including literature searches) and access websites and health-related databases Apply the principles of confidentiality in the context of IT Demonstrate safe and confidential communication by telephone and fax	Demonstrate the acquisition of new attitudes in patient consultation in order to make maximum use of IT Demonstrate appropriate techniques to be able to share information on computer with the patient in a constructive manner Adopt proactive and enquiring attitude to new technology

Subject	Knowledge	Skills	Attitudes and behaviours
The organisational framework for clinical governance and its application in practice	Possess an understanding of the important aspects of clinical governance: • medical and clinical audit • research and development • integrated care pathways • evidence-based practice • clinical effectiveness • clinical risk systems • to define the procedures and the effective action when things go wrong in one's own practice or that of others • complaints procedures • risk assessments Understand the benefits a patient might reasonably expect from clinical governance	Participate actively in clinical governance Undertake medical and clinical audit Show active involvement in audit cycles Carry out research and development projects Critically appraise medical data in the research setting Practise evidence-based medicine Aim for clinical effectiveness (best practice) at all times Educate self, colleagues and other healthcare professionals Deal with complaints in a focused and constructive manner Learn from complaints Report critical incidents Take appropriate action if you suspect you or a colleague may not be fit to practice Develop and institute clinical guidelines and integrated career pathways	Make the care of your patient your first concern Respect patients' privacy, dignity and confidentiality Learn from mistakes, errors and complaints Recognise the importance of teamwork Share best practice with others

Subject	Knowledge	Skills	Attitudes and behaviours
Risk management	Comply with regulations and procedures on such matters as health and safety policy, policies on needle stick injuries, note keeping, communications and staffing numbers Adopt risk management procedures pertinent to laboratory processing Describe risk assessment, perception and relative risk Explain the complications and side effects of treatments and investigations	Confidently and authoritatively discuss relevant risks with patients and obtain informed consent Balance risks and benefits with patients	Show willingness to respect and accept patients' views and choices Be truthful and admit error to patients, relatives and colleagues
Evidence	Outline: • the principles of evidence-based medicine • the types of clinical trial • the types of evidence	Critically appraise evidence Show competence in the use of databases, libraries and the internet Discuss the relevance of evidence with individual patients or their families	Display a keenness to use evidence in the support of patient care and own decisions therein
Clinical audit	Describe the audit cycle, data sources and data confidentiality Outline the principles of internal and external quality assurance	Contribute to ongoing audit Undertake clinical audit, normally by performing at least one clinical audit project per year	Consider the relevance of clinical audit to benefit patient care and individual performance (i.e. to clinical governance)
Guidelines	Summarise the advantages and disadvantages of guidelines	Demonstrate the ability to utilise guidelines Be able to contribute to the evolution of guidelines	Show regard for individual patient needs when using guidelines Use guidelines appropriately

Subject	Knowledge	Skills	Attitudes and behaviours
Structure of the NHS and the principles of management including change management	Describe the structure of the NHS, primary care groups and hospital Trusts and Health Boards Outline the local Trust's/Health Board's management structure (including chief executives, medical directors, clinical directors and the pathology laboratory) Outline finance issues in general in the NHS, especially budgetary management and commissioning Understand the importance of a health service for the population	Develop skills in managing change and managing people Develop interviewing techniques and those required for performance reviews Build a business plan Utilise one's position in the NHS to best effect	Show an awareness of equity in healthcare access and delivery Demonstrate an understanding of the importance of a health service for the population Show respect for others, ensuring equal opportunities

Subject	Knowledge	Skills	Attitudes and behaviour
Relevance of outside bodies	Explain the relevance to professional life of: • the medical Royal Colleges • the Academy of Medical Royal Colleges • Postgraduate Dean and Deaneries • General Medical Council (GMC) • PMETB • Modernising Medical Careers (MMC) • Medical Education England (MEE) • British Medical Association (BMA) • defence unions • specialist societies, particularly the UK Clinical Virology Network • the bodies responsible for accreditation of laboratories, i.e. Clinical Pathology Accreditation (UK); UK Accreditation Service (UKAS) Describe the central government health regulatory agencies [e.g. National Institute for Health and Clinical Excellence (NICE), Healthcare Commission (HCC), NHS Quality Improvement Scotland, National Patient Safety Agency (NPSA)], Health Protection Agency (HPA), Veterinary Laboratories Agency	Recognise situations when appropriate to involve these bodies and individuals Refer to guidance issued by the professional bodies and government agencies on professional, clinical and laboratory matters	Be open to constructive criticism Accept professional regulation

Subject	Knowledge	Skills	Attitudes and behaviours
Media awareness	Explain the importance of media awareness and public communications training and where to obtain it	Recognise situations when it may be appropriate to implement such training and/or seek further advice from the Trust/local Health Board or other relevant parties, e.g. public health professionals	Act professionally
Planning	Demonstrate knowledge of: • the structure, financing and operation of the NHS and its constituent organisations • ethical and equality aspects relating to management and leadership, e.g. approaches to use of resources/ rationing; approaches to involving the public and patients in decision-making • business management principles: priority setting and basic understanding of how to produce a business plan • the requirements of running of a department, unit or practice relevant to the specialty	Demonstrate the ability to: • develop protocols and guidelines and implementation of these • analyse feedback and comments and integrate them into plans for the service	Demonstrate an awareness of equity in healthcare access and delivery

Subject	Knowledge	Skills	Attitudes and behaviours
Managing resources	Demonstrate a working knowledge of: • efficient use of clinical resources in order to provide care • commissioning, funding and contracting arrangements relevant to the specialty • how financial pressures experienced by the specialty department and organisation are managed	Use clinical audit with the purpose of highlighting resources required Manage time and resources effectively in terms of delivering services to patients	Demonstrate: • commitment to the proper use of public money, showing a commitment to taking action when resources are not used efficiently or effectively • awareness that in addition to patient specific clinical records, clinical staff also have responsibilities for other records (e.g. research)
Managing people	Summarise relevant legislation (e.g. Equality and Diversity, Health and Safety, Employment Law) and local Human Resource policies Outline the duties, rights and responsibilities of an employer, and of a co-worker (e.g. looking after occupational safety of fellow staff) Describe individual performance review purpose, techniques and processes, including difference between appraisal, assessment and revalidation	Prepare rotas; delegate; organise and lead teams Contribute to the recruitment and selection of staff Contribute to staff development and training, including mentoring, supervision and appraisal	Demonstrate: • a willingness to supervise the work of less experienced colleagues • commitment to good communication whilst also inspiring confidence and trust
Managing performance	Describe and appropriately apply organisational performance management techniques and processes Describe how complaints arise and how they are managed	Use and adhere to clinical guidelines and protocols, morbidity and mortality reporting systems, and complaints management systems Help to improve services following evaluation/performance management	Respond constructively to the outcome of reviews, assessments or appraisals of performance Show an understanding of the needs and priorities of non-clinical staff

Subject	Knowledge	Skills	Attitudes and behaviours
Identifying the contexts for change	Summarise the responsibilities of the various Executive Board members and Clinical Directors or leaders Outline the function and responsibilities of national bodies such as DH, HCC, NICE, NPSA, NCAS; Royal Colleges and Faculties, specialty-specific bodies, representative bodies; regulatory bodies; educational and training organisations	Discuss the local, national and UK health priorities and how they impact on the delivery of health care relevant to the specialty Identify trends, future options and strategy relevant to the specialty and delivering patient services	Demonstrate: • compliance with national guidelines that influence healthcare provision • willingness to articulate strategic ideas and use effective influencing skills
Applying knowledge and evidence	Describe and use patient outcome reporting systems within the specialty, and the organisation and how these relate to national programmes Use appropriate research methods and evaluate scientific publications, including the use and limitations of different methodologies for collecting data	Compare and benchmark healthcare Services Use a broad range of scientific and policy publications relating to delivering healthcare services	Consider issues and potential solutions before acting
Making decisions	Describe how decisions are made by individuals, teams and the organisation Identify effective communication strategies within organisations	Prepare appropriately for meetings − reading agendas, understanding minutes, action points and background research on agenda items Work collegiately and collaboratively with a wide range of people outside the immediate clinical setting	Demonstrate: • appreciating the importance of involving the public and communities in developing health services • willingness to participate in decision-making processes beyond the immediate clinical care setting

Subject	Knowledge	Skills	Attitudes and behaviours
Evaluating impact	Describe: • impact mapping of service change • barriers to change • qualitative methods to gather the experience of patients and carers	Evaluate outcomes and re-assess the solutions through research, audit and quality assurance activities Identify the wider impact of implementing change in healthcare provision and the potential for opportunity costs	Demonstrate: • commitment to implementing proven improvements in clinical practice and services • obtain the evidence base before declaring effectiveness of changes • adopt attitudes and behaviours that assist dissemination of good practice

3. TEACHING AND TRAINING, APPRAISING AND ASSESSING

Objective: to demonstrate the knowledge, skills and attitudes to provide appropriate teaching and to participate in effective research.

New specialists will:

- be able to demonstrate the potential to teach and train effectively at all levels of undergraduate and postgraduate education where required
- demonstrate skills and strategies in the process of feedback to colleagues and trainees, ensuring positive and constructive outcomes
- be capable of judging competence and professional attributes in others.

Subject	Knowledge	Skills	Attitudes and behaviours
Having the skills, attitudes and practices of a competent teacher	Identify • adult learning principles • learner needs • structure of a teaching activity • varied teaching strategies • learning styles • principles of evaluation	Facilitate learning process Identify learning outcomes Construct educational objectives Design and deliver an effective teaching event Communicate effectively with the learners Use effective questioning techniques Teach large and small groups effectively Select and use appropriate teaching resources Give constructive effective feedback Evaluate programmes and events Use different media for teaching appropriate to the teaching setting	Demonstrate: • a willingness and enthusiasm to teach • respect for the learner • professional attitude towards teaching • commitment to teaching • a learner centred approach to teaching

Subject	Knowledge	Skills	Attitudes and behaviours
Plan and analyse a research project	Know: • the principles of performing a research study • how to use appropriate statistical methods • the principles of research ethics and the structure and function of local research ethics committees • how to write a scientific paper Outline: • the need for and the structures required for research governance • the role of a principal investigator Understand principles of research funding and how to obtain funding	Undertake systematic critical review of scientific literature Frame questions/hypothesis to be answered by a research project Develop protocols and methods for research Produce an outline suitable for ethics committee approval Show ability to: • use databases • use statistics • accurate analysis of data • secure storage of data Write a scientific paper Demonstrate good written and verbal presentation skills	Demonstrate curiosity and a critical spirit of enquiry Demonstrate knowledge of the importance of ethical approval and patient consent for clinical research. Ensure patient confidentiality Seek independent advice in designing studies especially with regard to statistics
Appraisal and assessment	Outline: • the concepts of appraisal and assessment • the conduct of an appraisal interview or assessment	Maintain an appraisal portfolio Gather evidence of practice to fulfil revalidation requirements Undertake an effective appraisal or assessment	Contribute to successful appraisals through: • a positive attitude • identifying equality and diversity issues

4. RELATIONSHIPS WITH PATIENTS

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

New specialists will:

- be skilled in building relationships of trust with patients and their families, through effective interpersonal skills, a courteous and compassionate approach, and respect for their privacy, dignity and cultural and religious beliefs
- follow the principles and legal aspects of consent and confidentiality
- be able to manage difficult and complex situations with patients and their families, to advise them appropriately and to manage complaints effectively.

Subject	Knowledge	Skills	Attitudes and behaviours
Patient safety	Understand the issues around patient safety and the role of the NPSA Be aware of the NPSA National Reporting and Learning System	Demonstrate awareness of patient safety in a practical situation	Show regard for patient safety
Continuity of care	Outline the importance of continuity of care	Ensure: • satisfactory completion of reasonable tasks at the end of the shift/day with appropriate handover • appropriate documentation of/for handover • adequate arrangements to cover leave	Recognise: • the importance of punctuality • the need for attention to detail • the importance of appropriate communication with patients/carers

Subject	Knowledge	Skills	Attitudes and behaviours
Informed consent	Know: • the process for gaining informed consent • the principles of consent issues relating to clinical practice and research • how to gain consent for a research project	Give: • appropriate information in a manner patients understand • appropriate written material, e.g. as a patient information sheet Understand guidance and principles behind obtaining informed consent from patients	Respect: • patients' and relatives' points of view and wishes • the patient's needs as an individual
Confidentiality	Discuss: • relevant strategies to ensure confidentiality • situations when confidentiality might be broken	Use, share and store all information appropriately, including paper records and electronic information Be prepared to seek patient's wishes before disclosing information	Avoid discussing one patient in front of another Respect the right to confidentiality

Subject	Knowledge	Skills	Attitudes and behaviours
Within a consultation		Communicate with those whose first language might not be English through: • verbal and written communication using language that may be understandable • using interpreters where appropriate • sensitive use of family members if appropriate Give clear information and feedback to patients and share information with relatives when appropriate Reassure 'worried well' patients	
Breaking bad news	Know how to structure the interview and where it should take place Be aware of the normal bereavement process and behaviour Have awareness of organ donation procedures and role of local transplant coordinators	Be able to break bad news in steps appropriate to the understanding of the individual and be able to support distress Avoid jargon and use familiar language Encourage questions Maintain appropriate hope whilst avoiding inappropriate optimism	Act with empathy, honesty and sensitivity

Subject	Knowledge	Skills	Attitudes and behaviours
Complaints	Have awareness of the local complaints procedures Have awareness of systems of independent review	Manage dissatisfied patients/relatives Anticipate potential problems	Act promptly and with honesty and sensitivity Be prepared to accept responsibility
Doctor−patient relationship	Understand all aspects of a professional relationship Establish the limiting boundaries surrounding the consultation Deal with challenging behaviour in patients that transgress those boundaries, e.g. aggression, violence, racism and sexual harassment.	Help the patient appreciate the importance of cooperation between patient and doctor Develop the relationship that facilitates solutions to patient's problems Deal appropriately with behaviour falling outside the boundary of the agreed doctor-patient relationship in patients, e.g. aggression, violence, sexual harassment	Adopt a non-discriminatory attitude to all patients and recognise their needs as individuals Seek to identify the healthcare belief of the patient Acknowledge patient rights to accept or reject advice
Educating patients about: • **disease** • **investigations** • **therapy**	Know investigation procedures including possible alternatives and choices Be aware of strategies to improve adherence to therapies	Give information to patients clearly in a manner that they can understand, including written information Encourage questions Negotiate individual treatment plans including action to be taken if patient deteriorates or improves	Consider involving patients in developing mutually acceptable investigation plans. Encourage patients to access: • further information • patient support groups

Subject	Knowledge	Skills	Attitudes and behaviours
Environmental and lifestyle risk factors	Understand the risk factors for disease including: • diet • exercise • social deprivation • occupation • substance abuse • behaviour	Advise on lifestyle changes. Involve other healthcare workers as appropriate	Suppress any display of personal judgement
Epidemiology and screening	Know the methods of data collection and their limitations Know diseases that are notifiable Know principles of primary and secondary prevention and screening	Assess an individual patient's risk factors Encourage participation in appropriate disease prevention or screening programmes	Consider the: • positive and negative aspects of prevention • importance of patient confidentiality. Respect patient choice
Ensuring patient safety	Identify risk management issues pertinent to specialty, understanding of potential sources of risk and risk management tools, techniques and protocols Explain how healthcare governance influences patient care, research and educational activities at a local, regional and national level	Report clinical incidents Assess and analyse situations, services and facilities in order to minimise risk to patients and the public Monitor the quality of equipment and safety of environment relevant to the specialty	Actively seek advice/assistance whenever concerned about patient safety Take responsibility for clinical governance activities, risk management and audit in order to improve the quality of the service

Subject	Knowledge	Skills	Attitudes and behaviours
Critically evaluating	Utilise quality improvement methodologies including a range of methods of obtaining feedback from patients, the public and staff Apply the principles and processes of evaluation, audit, research and development, clinical guidelines and standard setting in improving quality	Undertake an audit project Contribute to meetings which cover audit; critical incident reporting, patient outcomes	Listen to and reflect on the views of patients and carers, dealing with complaints in a sensitive and cooperative manner Act as an advocate for the service
Encouraging innovation	Use a variety of methodologies for developing creative solutions to improving services	Demonstrate the ability to: • question existing practice in order to improve services • apply creative thinking approaches (or methodologies or techniques) in order to propose solutions to service issues	Be open minded to new ideas Adopt a proactive approach to new technologies and treatments Support colleagues to voice ideas
Facilitating transformation	Describe the implications of change on systems and people Outline project management methodology	Provide medical expertise in situations beyond those involving direct patient care Show effective presentation skills (written and verbal)	Be positive about improvement and change Strive for continuing improvement in delivering patient care services

5. WORKING WITH COLLEAGUES

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

New specialists will:

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

Subject	Knowledge	Skills	Attitudes and behaviours
Working with clinical teams	Describe how a team works Outline the roles and responsibilities of team members, especially within the department and within multidisciplinary teams Explain how a team works effectively Describe the roles of other clinical specialties and their limitations Demonstrates knowledge of a wide range of leadership styles and approaches and the applicability to different situations and people	Communicate effectively and seek advice if unsure. Recognise when input from another specialty is required for individual patients Work effectively with other healthcare professionals Show leadership and supervise safely Implement plans and decisions Accept responsibilities including delegating appropriately and supervising safely	Show respect for others' opinions Be conscientious and work cooperatively Respect colleagues, including non-medical professionals and recognise good advice Respect skills and contribution of colleagues Recognise when to delegate Recognise and work within own limitations Adopt a team approach and show willingness to consult and work as part of a team

Subject	Knowledge	Skills	Attitudes and behaviours
Communication with colleagues	Communicate with other members of the pathology department, other departments and other members of the multidisciplinary team Communicate appropriately in writing, through letters and reports Justify when to phone a general practitioner (GP) or other healthcare professional	Use appropriate language Select an appropriate communication method	Be prompt and respond courteously and fairly
Complaints	Have awareness of the local complaints procedures Have an awareness of systems of independent review	Anticipate potential problems. Manage dissatisfied colleagues	Act with honesty and sensitivity and promptly Be prepared to accept responsibility
Interactions between: • **hospital and GP** • **hospital and other agencies, e.g. social services** • **medical and surgical specialties**	Describe: • the roles and responsibilities of team members • how a team works effectively. • the roles of other clinical specialties and their limitations	Delegate, show leadership and supervise safely Communicate effectively Handover safely Seek advice if unsure Recognise when input from another specialty is required for individual patients Work effectively with GPs, other medical and surgical specialists and other healthcare professionals	Show respect for others opinions Be conscientious and work cooperatively Respect colleagues, including non-medical professionals, and recognise good advice Recognise and work within own limitations

Subject	Knowledge	Skills	Attitudes and behaviours
Creating an environment in which mistakes and mismanagement of patients can be openly discussed and lessons learned		Recognise the advantages and disadvantages of guidelines Report and investigate critical incidents Use root cause analysis in investigating incidents Take appropriate action if you suspect you or a colleague may not be fit to practise	
Self-awareness	Describe ways in which individual behaviours impact on others; personality types, group dynamics, learning styles, leadership styles Outline methods of obtaining feedback from others	Maintain and routinely practice critical self-awareness including ability to discuss strengths and weaknesses with supervisor, recognising external influences and changing behaviour accordingly Show awareness of and sensitivity to the way in which cultural and religious beliefs affect approaches and decisions, and respond respectfully	Adopt a patient-focused approach to decisions that acknowledges the right, values and strengths of patients and the public Recognise and show respect for diversity and differences in others
Self-management	Demonstrate knowledge of: • tools and techniques for managing stress • the role and responsibility of occupational health and other support networks • the limitations of self professional competence	Recognise the manifestations of stress on self and others and know where and when to look for support Balance personal and professional roles and responsibilities Prioritise tasks, having realistic expectations of what can be completed by self and others	Be conscientious, able to manage time and delegate Recognise personal health as an important issue

Subject	Knowledge	Skills	Attitudes and behaviours
Self-development	Demonstrate knowledge of: • Local processes for dealing with and learning from clinical errors • The importance of best practice, transparency and consistency	Practice with an ability to learn from previous experience Use assessment, appraisal, complaints and other feedback to discuss and develop an understanding of own development needs	Be prepared to accept responsibility Show commitment to continuing professional development which involves seeking training and self-development opportunities, learning from colleagues and accepting constructive criticism
Acting with integrity	Demonstrate knowledge of: • the professional, legal and ethical codes of the GMC, e.g. Fitness to Practice and any other codes pertaining to the trainee's specialty • prejudice and preferences within self, others, society and cultures	Recognise, analyse and know how to deal with unprofessional behaviours in clinical practice, taking into account local and national regulations Create open and non-discriminatory professional working relationships with colleagues Recognise awareness of the need to prevent bullying and harassment	Accept professional regulation Promote professional attitudes and values Act with probity Be truthful and admit errors

Subject	Knowledge	Skills	Attitudes and behaviours
Developing networks	Describe the role of team dynamics in the way a group, team or department functions Outline team structures and the structure, roles and responsibilities of the multidisciplinary teams within the broader health context relevant to the specialty, including other agencies	Take on differing and complementary roles within the different communities of practice within which they work Support bringing together different professionals, disciplines and other agencies to provide high quality healthcare	Interact effectively with professionals in other disciplines and agencies Respect the skills and contributions of colleagues
Building and maintaining relationships	Identify and use specific techniques and methods that facilitate effective and empathic communication	Develop effective working relationships with colleagues and other staff through good communication skills, building rapport and articulating own view Communicate effectively in the resolution of conflicts, providing feedback, and identifying and rectifying team dysfunction	Recognise good advice and continuously promote values based on non-prejudicial practice Use authority appropriately and assertively; be willing to follow when necessary
Encouraging contribution	Demonstrate a good working knowledge of: facilitation and conflict resolution methods	Enable individuals, groups and agencies to implement plans and decisions Identify and prioritise tasks and responsibilities Delegate and supervise safely	Show recognition of a team approach and willingness to consult and work as part of a team Respect colleagues, including non-medical professionals.

Subject	Knowledge	Skills	Attitudes and behaviours
Identifying the contexts for change	Describe the responsibilities of the various Executive Board members and Clinical Directors or leaders Outline the function and responsibilities of national bodies such as DH, HCC, NICE, NPSA, NCAS; Royal Colleges and Faculties, specialty specific bodies, representative bodies; regulatory bodies; laboratory accreditation bodies; educational and training organisations Outline the function and relevant expertise and responsibilities of international agencies such as ECDC, WHO	Discuss the local, national and UK health priorities and how they impact on the delivery of healthcare relevant to the specialty Identify trends, future options and strategy relevant to the specialty and delivering patient services	Comply with national guidelines that influence healthcare provision Be willing to articulate strategic ideas and use effective influencing skills
Applying knowledge and evidence	Describe and correctly use the patient outcome reporting systems within the specialty, and the organisation and how these relate to national programmes Based on an understanding of research methods evaluate scientific publications, including the use and limitations of different methodologies for collecting data	Compare and benchmark healthcare services Use a broad range of scientific and policy publications relating to delivering healthcare services	Evaluate issues and potential solutions before acting

6. HEALTH

Objective: to understand the importance of the personal health of the doctor.

New specialists will:

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

Subject	Knowledge	Skills	Attitudes and behaviours
Personal health	Know: • the role of occupational health services • one's responsibilities to the public • not to treat oneself or one's family	Recognise when personal health takes priority over work pressures and to be able to take the necessary time off	Recognise personal health as an important issue
Stress	Recognise the effects of stress Have knowledge of support facilities for doctors	Develop appropriate coping mechanisms for stress and ability to seek help if appropriate	Recognise the manifestations of stress on self and others

7. PROBITY

Objective: to be able to demonstrate probity in all aspects of professional practice.

New specialists will:

- always act in their personal and professional lives to maintain public trust in the profession
- undertake duties such as writing reports, giving evidence and completing and signing documents in a timely, honest and conscientious way
- through their leadership encourage the development and practice of these qualities in their colleagues.

Subject	Knowledge	Skills	Attitudes and behaviours
Service information	Comply with the legal framework for advertisements		Recognise absolute importance of accuracy and impartiality
Writing reports and giving evidence	Explain the requirements of a satisfactory medical report	Conscientiously collect material to produce an accurate and comprehensive report	Perform duties with honesty and integrity Produce work in a timely fashion
Research	Outline the research process Comply with research governance	Obtain ethical approval Carry out research designed to a high standard	Put safety and care of patients first Conduct research with honesty and integrity
Financial dealings			Avoid inducing patients to accept private medical care without compelling medical reasons Manage funds for the purpose for which they are intended Declare conflicts of interest

SPECIALTY-SPECIFIC MEDICAL VIROLOGY CURRICULUM (STAGE A)

INTRODUCTION

For many trainees, this period of training represents their first exposure to laboratory medicine (microbiology and virology) and how it is applied to common microbiology and virology problems.

This period represents joint training and is suitable for both career microbiologists and virologists. It offers flexibility to those trainees who are undecided about their career choice and should provide all trainees with a basic understanding of all aspects of medical microbiology and virology. A formal period of instruction under supervision takes place at the beginning of this block and aims to provide an introduction to laboratory infection. This introductory period will last approximately 3−4 months and is designed to equip the trainee with the fundamental knowledge and skills for the practice of medical microbiology and virology. Knowledge will also be acquired through attendance at regional courses and by self-directed learning. Skills will be acquired through a formal training programme supervised by educational supervisors.

The curriculum for this stage is divided into two sections:

- fundamental skills
- core knowledge.

Fundamental skills are essential to the practice of laboratory medicine (in this case in microbiology and virology) and provide the foundation on which to develop. By the end of this stage of training, the trainee should have reached a decision about the suitability of medical microbiology or medical virology as their career of choice.

1. FUNDAMENTAL SKILLS

Objective: to acquire sufficient knowledge of laboratory techniques to underpin clinical practice.

By the end of this stage, and before proceeding to Stage B of training, the trainee should:

- have gained a thorough understanding of laboratory health and safety practice
- have gained experience in the safe handling of clinical samples in the laboratory
- have gained a basic understanding of quality assurance in the diagnostic laboratory
- have developed, under supervision, core reporting skills
- have sufficient understanding of microbiology, mycology, virology and parasitology to offer basic advice on the interpretation of laboratory results
- be able to manage common medical emergencies relevant to their clinical practice
- understand the importance of infectious disease notifications and the relationship of the laboratory with the local CCDC/CHP/Consultant in Public Health (CPH)
- understand the role of the CCDC/CHP and CPH

- be aware of national guidelines and where to find them (see separate documents for websites)
- function as part of a multidisciplinary team
- recognise critical incidents and start to understand how to manage them
- understand the importance of clinical audit and risk management.

2. CORE KNOWLEDGE

Objective: to achieve sufficient understanding of laboratory microbiology and virology to offer basic advice on relevant investigations, infection control procedures and interpretation of results.

Subject	Skills	Attitudes and behaviours
Basic biology	Describe at a basic level: • biology (including structure, genetics, taxonomy) of major bacterial, viral, fungal and parasitic agents • the immune response to infection • differences between innate and cellular and humoral immunity • how vaccines work • the principles of molecular biology • genetic susceptibility to pathogens and disease • the epidemiology of infectious diseases • the role of environmental factors in spread of infection (e.g. food, water, air)	Present an enthusiastic approach to learning.

Subject	Skills	Attitudes and behaviours
Host−pathogen relationships	Describe: • the different types of host−parasite relationships, e.g. symbiosis, bacterial colonization, infection and disease, viral latency, etc. • the pathogenesis of infectious diseases • how the immune system protects against infection, and how it may contribute to pathogenesis of infectious diseases • the types of immunodeficiency and how they affect susceptibility to and control of infection	
Laboratory safety	Identify the requirements for functioning safely in a laboratory	Observe safe working practices
ACDP classification of pathogens	Understand principles of standard precautions, hazard groups and containment levels	
Standards of practice	Understand: • importance and relevance to good laboratory practice of evidence-based standard operating procedures (SOPs)/examination procedures (EPs) • the importance of audit and quality control to establish validity	Establish: • rapport with both laboratory and clinical staff • familiarity with laboratory procedures

Subject	Skills	Attitudes and behaviours
Basic principles of diagnostic microbiology and virology	Explain: • the range of tests available, and the circumstances in which they are used • sample processing for microbiology and virology according to SOPs/EPs • how to distinguish between sterile and contaminated/colonised body sites • how to identify common viral/microbial pathogens with confirmation of identity • the distinction between significant and non-significant pathogens • the basic techniques for serodiagnosis in infectious diseases • the basics of molecular techniques such as polymerase chain reaction (PCR) • the principles of antimicrobial and antiviral susceptibility testing and their interpretation • the basic principles behind therapeutic drug monitoring and its uses	Establish: • rapport with both laboratory and clinical staff • familiarity with laboratory procedures

Subject	Skills	Attitudes and behaviours
Clinical syndromes – advice and management	Outline: • the principles of epidemiology • the presentation, diagnosis and management of clinical syndromes Compare and contrast community-acquired and nosocomial infections Demonstrate competence in taking relevant clinical/infection history Organise investigation and management (under supervision) of the following: • genitourinary tract infection including sexually transmitted infections (STIs) • respiratory tract infection • gastrointestinal infections • skin and soft tissue infection • eye infection • post-operative infection • sharps injuries • encephalitis/meningitis • hepatitis including serological test interpretation • rashes and rash contacts (pregnant and non pregnant) • infections in pregnancy, including methods of diagnosis, and implications of infection for mother and foetus • congenital infection and infection acquired perinatally • infections in the immunocompromised • deep infection (e.g. septicaemia, endocarditis, bone infection) • common nosocomial infections (e.g. device-associated infection) • infection in travellers (e.g. malaria)	Establish rapport with clinical and primary care staff Interpret results accurately Explain results simply and effectively to both clinicians and patients

Subject	Skills	Attitudes and behaviours
Treatment and prevention strategies	Explain: • the range of therapies available for infectious disease, with the clinical indications for their use and their side effects • the classification of antimicrobial agents • in detail the mechanism of action of aciclovir and beta-lactam antibiotic agents and mechanisms for development of resistance to these agents • in broad terms other antimicrobial agents, their uses and limitations • the principles of prophylaxis, both with antimicrobials and with immune globulins • the use of existing vaccines and schedules of immunisation	Show enthusiastic approach to learning

Subject	Skills	Attitudes and behaviours
Infection prevention and control	Analyse routes of transmission and methods of preventing nosocomial spread in a range of clinical syndromes, and for common and/or important infecting organisms and unusual infective agents. Examples include: • meticillin-resistant *Staphylococcus aureus* • glycopeptide-resistant enterococci • multi-drug resistant *M .tuberculosis* • extended-spectrum beta-lactamase-producing organisms (ESBLs) • multiply-resistant *Acinetobacter baumannii* • *Clostridium difficile*-associated diarrhoea • varicella zoster virus • enteric infections including gastroenteritis viruses • respiratory tract infections • blood-borne viruses • prions Identify issues surrounding the isolation of the febrile traveller, especially the risk of viral haemorrhagic fever Identify measures needed in response to pandemic infection Describe the principles and practice of surveillance and public health with particular regard to food-borne and vaccine-preventable infections and STIs	Liaise effectively with infection control, (CCDC/CPHM) and the clinicians and coordinate screening of contacts if indicated Show respect for confidentiality

Subject	Skills	Attitudes and behaviours
Sterilisation and disinfection	Define terms including sterilisation, disinfection Describe different methods available to sterilise and disinfect. Discuss the importance of removal of pathogenic organisms in the prevention of infection in: • pre-operative sterilisation • aseptic technique • decontamination of environmental sources	Demonstrate enthusiastic approach to learning Establish close rapport and understanding with laboratory staff Liaise effectively with infection control

DEVELOPING INDEPENDENT PRACTICE

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

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

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

Since the trainee will have reduced supervision during this form of training, to ensure patient safety and to optimise the benefits of this training, the following criteria must be met before it starts:

- The trainee must have been assessed by clinical and educational supervisors to be capable of safe practice with reduced supervision in the areas of clinical, laboratory, infection prevention & control and public health work. They must therefore be in full compliance with the educational processes of RITA or ARCP (as appropriate), i.e. ready to start more independent practice.
- Before starting this training, the trainee must have a formal induction to ensure that they are familiar with the clinical, laboratory, infection prevention & control, public health, occupational health and administrative/management aspects of the work to be performed. This induction must be relevant to the time at which the work is to be performed, and for the organisations for which it is to be performed. It will include relevant local policies.
- The supervisor must ensure that the trainee understands the professional obligations of this form of practice, including availability and confidentiality.
- The trainee must have demonstrated to clinical and educational supervisors through previous directly supervised practice, competence in managing common clinical, laboratory, infection prevention & control, public health, occupational health problems of the kind likely to be encountered in the virology service, relevant to the setting in which the trainee will undertake this form of practice. Such competence will include, for example, the investigation and management of serious sepsis acquired in healthcare institutions and the community; the investigation and management of outbreaks of infection in healthcare institutions; statutory and 'good practice' notification of infectious disease; and the management of inoculation incidents in healthcare institutions and the community.
- Arrangements for 'handover' of clinical responsibility during this form of practice must be explicit.

Arrangements for cover by clinical supervisor

The ultimate responsibility for the quality of patient care and the quality of training lies with the supervisor. However, the trainee will be expected to exercise professional judgement in recognising the limits of their capabilities and in involving senior colleagues in complex or challenging issues/decisions. The arrangements for obtaining such help and advice, at any time during this training period, must be formal and explicit. Although

the purpose of this training is to enable independent working, the trainee must not be discouraged from asking for help from a clinical supervisor during this period at any time.

After a period of independent practice, the trainee must be debriefed by the clinical supervisor. The purpose of this debrief is to ensure that patients are being managed safely, and that prompt feedback is provided on the trainee's performance against the relevance competencies for this form of training (see below) and other competencies in the curriculum. The debriefing session may take the form of 'handover' to colleagues.

This training is evaluated using Case-based Discussion (CbDs) and/or 'out-of-hours' logbook or similar record of equivalent experience as an independent practitioner.

Competencies to be demonstrated

Subject	Knowledge	Skills	Behaviours
Independent practice and working out-of-hours	Demonstrate: • increasing familiarity with laboratory and clinical aspects (including infection prevention and control, public and occupational health) of bacterial, viral and related infections • knowledge of what must be dealt with urgently and what may be dealt with less urgently	Recognise and work within own limitations in knowledge Liaise and communicate with a wide range of healthcare workers involved in the diagnosis, management, prevention and control of infection Communicate effectively in person and by telephone Refer to more experienced colleagues as appropriate Provide continuity of care Prioritise work according to urgency. Deal with difficult situations independently Recognise and analyse the overall effects of competing pressures on healthcare resources, e.g. availability of laboratory tests, availability of beds Collect, analyse and interpret information from a variety of sources Make safe decisions when clinical, laboratory or epidemiological information is incomplete or evolving Work with clinical and laboratory colleagues under pressure	Show flexibility in responding to change depending on the clinical situation Show confidence to work progressively independently Recognise when to seek appropriate senior advice Take responsibility for decision-making Demonstrate willingness to be available as needed Show ability to communicate effectively with other healthcare workers Collaborate effectively with other healthcare workers including over use of resources

SPECIALTY-SPECIFIC MEDICAL VIROLOGY CURRICULUM (STAGES B–D)

INTRODUCTION

This period of training in medical virology will consist of consolidation of clinical and laboratory work started in Stage A up to consultant level. The trainee will have a sound theoretical and practical knowledge of virological practice but will not have had a great deal of unsupervised experience in applying that knowledge. These stages of training are thus devoted to acquiring self-sufficiency in the specialty. It is meant to be a guide for both the educational supervisor and trainee on the learning topics and themes that should be covered during these stages of training. It is recommended that the educational supervisor and the trainee sit down together at the beginning of each stage and plan the training as much as possible.

Use should be made of the College's training portfolio for recording progress in training. It is a modular curriculum, consisting of core and optional components. **All medical virology trainees must complete the core components**. The optional components are designed to provide the trainee with options to choose from if they have completed the mandatory requirements of the curriculum prior to their CCT and that best reflect their needs and aspirations. In many instances, the optional component may need to be arranged anything up to a year before the anticipated start date.

In-course assessment is included; this may range from an assessment of skills to the production of a piece of written work, e.g. outbreak management, case reports, etc. A copy should be retained in the portfolio, which is submitted to the College for assessment towards the FRCPath Part 2 examination. A list of the in-course assessments for each of the core components is given at the end of each core component. FRCPath Part 2 will comprise both in-course assessment and a summative examination. Candidates will be required to pass each section.

Wherever possible, no time limit has been set for any of the components because it is envisaged that many of the components may be running concurrently, e.g. dealing with management issues and contributing to the clinical service.

It is expected that training will occur as an appropriately supervised apprenticeship and therefore 50–80% of training would normally be delivered by in-service training. It should be with a readily available consultant, well supervised, with the appropriate content, have a broad exposure and include laboratory issues.

As for the Stage A curriculum, the knowledge, skills, attitudes and behaviours are given for each module (if relevant).

Experience gained by the provision of independent practice (which ideally includes 'out-of-hours' working) should continue for a period of training sufficient to enable the trainee to give independent 'out-of-hours' clinical advice in relation to the practice of this specialty (see Section above – Development of Independent Practice).

CORE COMPONENTS

The core components are designed to equip the trainee with competencies required for the acquisition of a CCT or CESR(CP) in Virology and to allow practice of medical virology at consultant level. They consist of the following:

1 Basic virology
2 Clinical virology
  2.1 Laboratory techniques
  2.2 Medical/clinical aspects
3 Management
4 Health and safety
5 Understanding research and development in virology
6 Public health and epidemiology

In-course assignments are an integral part of the FRCPath virology examination. The assignment for each of the components must be completed and assessed to be satisfactory before the trainee will be permitted to sit for the FRCPath Part 2 examination. It is the responsibility of the educational supervisor to ensure that the trainee's assignment(s) meet the guidelines for the FRCPath examination for virology, before they are submitted to the College for assessment. The assignments and the responsibility of the trainee and their educational supervisor are listed at the end of each of the essential components.

OPTIONAL COMPONENTS

These components are designed to complement the essential modules undertaken by the trainee in Stages B−D. They allow trainees to develop a specialist interest and are suitable for those trainees who have achieved core components quickly. The time at which these optional components are taken depends on the progress of trainee through the core components. They may be undertaken at any stage of the training. These optional modules are designed to build upon the core competencies already acquired by the trainee as a result of undergoing the training outlined in the core components.

Trainees should select from the following modules which best suits their training requirements and career aspirations. As these are optional, only guidance on the aims and objectives of each module can be given. Optional components may also be designed by the trainee. These need to be written in conjunction with the educational supervisor and should be submitted to the Postgraduate Dean (if necessary) and Chairman of the CATT for approval. As time goes on, extra optional components may be added.

1 Clinical attachment
2 Supraregional attachment
3 Microbiology attachment
4 Attachment to another virology centre, e.g. reference laboratory (to expand and consolidate clinical virology module)
5 Exotic and dangerous virus infections

CORE COMPONENTS

1. BASIC VIROLOGY

This module should equip the trainee with a detailed understanding of basic virology and the pathogenesis of virus infections.

Objectives:

1. To obtain in-depth knowledge and understanding of the basic principles of virus biology, the host immune response to infection and the pathogenesis of viral diseases. This will provide a firm basis for application to the practice of clinical virology.

2. To provide suitable background preparation for future research.

3. To gain sufficient in-depth knowledge in the following areas to apply to the known important human pathogens and to have sufficient knowledge to underpin an approach to those that emerge in the future as regards the practice of clinical virology.

Knowledge	Skills	Attitudes and behaviours
Demonstrate up to date knowledge of virus structure and function	Describe: • the ways in which virus genetic material is organised • the functions of virally-encoded proteins (structural and non-structural) • the nature of viral envelopes • how virus structure is studied, e.g. electron microscopy, X-ray crystallography • the nature of virus morphology including helical and icosahedral symmetry • the chemical composition of viruses including protein structure	Adopt an enthusiastic approach to learning Organise and achieve a programme of self-directed learning

Knowledge	Skills	Attitudes and behaviours
Develop understanding of virus classification and phylogeny	Describe the criteria used for virus classification, and the terms virus orders, families/subfamilies, genera and species Show awareness of the role of the International Committee on Taxonomy of Viruses Critically review the principles of phylogenetic analysis, and the molecular epidemiology of virus infections	Demonstrate an enthusiastic approach to learning Organise and achieve a programme of self-directed learning
Understand the mechanisms involved in virus replication	Review the ways in which a virus can divert cellular resources for viral replication. Describe: • the Baltimore classification of virus replication. • the replication strategies of deoxyribonucleic acid (DNA) viruses • the replication strategies of ribonucleic acid (RNA) viruses both positive sense and negative sense • the unique replication strategies of hepadnaviruses and retroviruses	
Demonstrate knowledge of the modes of transmission of virus infections	Describe the ways in which infectious virus particles may be shed at the cellular level and the host level, and the routes through which infection of other individuals may occur	

Knowledge	Skills	Attitudes and behaviours
Maintain up to date knowledge of host responses to virus infections	Describe: • 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 the interferons) and cellular cytotoxicity • virus strategies to evade the host immune response • common causes and consequences of primary and secondary immunodeficiency disorders	Demonstrate an enthusiastic approach to learning Organise and achieve a programme of self-directed learning
Demonstrate a working knowledge of the pathogenesis of virus diseases	Show understanding of the multifactorial nature of pathogenesis as determined by characteristics of both host and virus Describe the processes underlying the different outcomes of virus infection including: entry into the host, spread within the host, virus tropism, virus−host cell interaction, host immune responses and immunopathology, and shedding of virus from the host	Demonstrate an enthusiastic approach to learning Organise and achieve a programme of self-directed learning

Knowledge	Skills	Attitudes and behaviours
Demonstrate knowledge of the pharmacology and clinical use of anti-viral drugs	Review the mechanisms of action of currently licensed anti-viral agents Explain the ways in which viruses may become resistant to these agents Discuss the principles of therapeutic drug monitoring Outline the principles behind drug discovery, drug development, and the different stages of clinical trials of new drugs	Demonstrate an enthusiastic approach to learning Organise and achieve a programme of self-directed learning
Maintain up to date knowledge of: • **virus vaccines** • **immunoglobulins**	Compare and contrast the use of active and passive protection against virus infections Describe: • the nature of different types of vaccines • the immunoglobulins available for both prophylactic and therapeutic use • the mechanisms whereby prophylactic viral vaccines may lead to protection against infection	Demonstrate an enthusiastic approach to learning. Organise and achieve a programme of self-directed learning
Outline understanding of prions and prion diseases	Explain current understanding of the nature of these agents giving evidence for their controversial nature Compare and contrast the diseases associated with prions, including sporadic and transmissible entities	Demonstrate an enthusiastic approach to learning Organise and achieve a programme of self-directed learning

Responsibilities of the educational supervisor

- Encourage trainee to become a member of learned societies, e.g. Society for General Microbiology (SGM), European Society for Clinical Virology (ESCV)
- Encourage/facilitate attendance at local/national/international meetings
- Help trainee organise time and information regarding relevant courses
- Approve attendance at meetings/courses so that funding of study leave can be applied for from the relevant quarters
- Supervision and encouragement of acquisition of portfolio evidence of competence and completion of the written assignments.

In-course assessment

Write one review article of up to 3000 words (format as per *Reviews in Medical Virology*). The following list provides examples of suitable general topics to choose from, but candidates are encouraged to devise their own, in consultation with their educational supervisors:

- Mechanisms underlying the establishment and maintenance of viral latency
- Mechanisms underlying viral carcinogenesis
- Viral strategies for interfering with cellular apoptosis
- Viral avoidance of adaptive immune responses
- Identification of novel viral targets for anti-viral therapy
- Development of a vaccine against hepatitis C virus infection
- Rational design of therapeutic vaccines
- The use of phylogeny in the investigation of viral evolution
- The pathogenesis of transmissible spongiform encephalopathy (TSE)
- The pathogenesis of chronic viral hepatitis.

2. MEDICAL VIROLOGY

This section has been divided into two distinct but complementary sub-sections.

2.1 Laboratory techniques

This component should provide the trainee with sufficient laboratory skills to be able to appreciate the significance of, and to critically evaluate, results generated in the laboratory. A minimum period of 6 months 'on the benches' is recommended, when the trainee should function as a trainee BMS whilst completing the assignments associated with this part of their training.

Objective: to obtain in-depth knowledge and understanding of the laboratory aspects of medical virology. To obtain an in-depth understanding of quality and accreditation issues as applied to laboratory practice.

Laboratory techniques (general)

Knowledge	Skills	Attitudes and behaviours
Demonstrate broad knowledge of technical management of a section of the laboratory Recognise advantages/disadvantages and strength/weaknesses of the techniques in use Be familiar with testing algorithms and selection of investigations, including rapid diagnostic methods Understand the importance of confirmatory assays Demonstrate understanding of laboratory health and safety issues **(see also relevant core module)**	Show manual dexterity Work as part of a team Organise work and demonstrate time management of practical bench work. Refer to relevant SOPs/EPs Function as an independent worker at the bench, and be able to critically assess own and others results Perform assays independently	Demonstrate: • conscientiousness in following instructions and SOPs • a positive approach to teamworking • appreciation of BMS and MLA staff, scientists, etc. • tidy and neat working • willingness to report laboratory incidents

Laboratory techniques (specific): in-depth understanding of the following techniques available in a routine diagnostic laboratory

Knowledge	Skills	Attitudes and behaviours
Demonstrate knowledge of serological assays [ELISA, immunofluorescence (IF), automated EIA serology, neutralisation, CFT, latex and gel particle agglutination, immunoblot] **Show understanding of the basic principles of assays:** • **terms and composition of solid phase** • **conjugate, substrate, optical density** • **assay format (direct/indirect, competitive, capture) advantages and disadvantages of each** • **sources of antigens (e.g. viral lysate, recombinant, synthetic peptide)** • **problems of immunoglobulin M (IgM) and immunoglobulin G (IgG) assays, including role of rheumatoid factor** **Define terms relating to parameters of assays, i.e. sensitivity, specificity, positive and negative predictive values, determination of uncertainty**	Perform enzyme-linked immunoassays (EIA), assess run validity and be able to implement internal quality control programme Perform agglutination tests	Demonstrate • conscientiousness in following instructions and SOPs • willingness to concentrate on practical 'bench' work • a positive approach to teamworking • appreciation of BMS and MLA staff, scientists, etc. • tidy and neat working • positive approach to learning both theoretical and practical skills and positive approach to problem solving

Knowledge	Skills	Attitudes and behaviours
Understand confirmation of serology-based antigen assays, including by neutralisation **Undertake confirmation of antibody assays where applicable**		Show: • willingness to concentrate on practical 'bench work' • positive approach to learning both theoretical and practical skills
Demonstrate working knowledge of the principles of virus detection and characterisation by: **a) cell culture, conventional and shell vial, including (i) understanding of primary, secondary, continuous cell lines with examples and virus susceptibility, (ii) cytopathic effects, (iii) haemadsorption, (iv) interference, (v), infectious dose,(vi) plaque reduction** **b) electron microscopy, including understanding of the principles and practical aspects of transmission EM, including negative staining** **c) Antigen detection, including direct immunofluorescence (on clinical samples and cell culture isolates) and immunoassay** **d) Molecular tests including nucleic acid amplification and sequencing** **e) appreciation of clinical importance of quantitative assays and genotyping** **Show understanding of importance and type of assay controls, risks of contamination and how prevented, and need for designated laboratory areas**	Demonstrate ability to detect viruses of importance in the UK, including exotic viruses, by: • cell culture • electron microscopy • molecular techniques • rapid virus antigen detection Demonstrate knowledge of quality assurance for cell culture, electron microscopy, molecular techniques and rapid virus detection Independently be able to grow and split cell cultures, with due regard to the importance of aseptic techniques Inoculate cell cultures, read and recognise changes consistent with viral growth Confirm presence and identity of virus by neutralisation or other appropriate techniques Perform rapid direct antigen detection by immunoassays including immunofluorescence and EIA Perform molecular amplification techniques (including nucleic acid sequencing) in current use with critical review of results	Demonstrate: • positive approach to learning • tidy and neat working • willingness to concentrate on practical 'bench work' • willingness to attend specialist centres or training courses in certain of these techniques if not available in trainee's base laboratory

Laboratory techniques (interpretation)

Knowledge	Skills	Attitudes and behaviours
Demonstrate competence in interpretation and clinical authorisation of laboratory results	Scrutinise the technical process behind the results to distinguish the significant positive and negative results Be able to look back on previous results and to decide the need for further tests/samples, including instigation of confirmation tests and referral to other laboratories where appropriate Correctly match the clinical information with the result Recognise and communicate results of urgent significance Recognise self-limitation and seek advice	Demonstrate: • willingness to develop alert and vigilant mind • positive communication skills and good capacity for liaison with clinical colleagues • ability to adapt and change working practices according to best latest practice or new guidelines

In-course assessment assignments

Continuous assessment will be occurring throughout the laboratory-based period, recorded in the logbook. Specific assessments include the following:

1. A critical review of an assay currently in use in the laboratory (approximately 1000 words)
2. An audit of an assay currently in use in the laboratory, concentrating on the laboratory performance aspects
3. An audit of the clinical utility of an assay

The specific content of these assessments should be agreed with the educational supervisor.

Trainees are strongly encouraged to participate in clinical audit. The College provides advice and support to all pathologists by providing a selection of audits from the audit database to help individual members and trainees to plan their own audit. Clinical audits will help trainees to identify and promotes good practice, provide training and education opportunities, help to ensure better use of resources, encourage increased efficiency, improve working relationships, communication and liaison between staff, service users and agencies. Further information is available on the College website www.rcpath.org/index.asp?PageID=202 or by contacting the Professional Standards Unit: audit@rcpath.org

Responsibilities of the educational supervisor

- To ensure that arrangements are made for the trainee to spend dedicated time on the benches. Laboratory staff should be aware that the trainee is to be regarded as member of the diagnostic team and should be treated as a trainee BMS
- To ensure that the trainee is able to gain experience in all the areas listed. If this is not possible, arrangements for an attachment to another laboratory offering a specific technique should be arranged
- To regularly review trainee's progress with a senior BMS on the relevant bench
- To prepare the trainee for independent medical authorisation of results in a step-wise fashion, according to seniority of the trainee
- Remarks from the educational supervisor on competency and progress should be recorded at least 6-monthly in the trainee's portfolio, until the trainee is competent to report without supervision
- At least 10% of trainee reports authorised independently should be reviewed by the educational supervisor (until acquisition of Part 2) once a week; less frequently with increasing seniority
- To provide support and guidance to the trainee for completion of the in-course assessments.

2.2 Clinical/medical aspects

This module should provide the trainee with sufficient clinical experience to practise at the consultant level. It will be a major component of this period essentially running throughout a large part of the post-FRCPath Part 1 period. The learning will be through active participation in service delivery and it is expected that 50−80% of the trainee time will be spent on service commitments.

Objectives

1. To obtain in-depth knowledge and understanding of the principles and practice of clinical virology and related microbiology in the following areas (this list is not exhaustive but covers the main areas):
    - respiratory infections in the community, including mycoplasma, chlamydia/chlamydophila and *Coxiella burnetii*
    - infections (including (*Toxoplasma gondii* and *Pneumocystis jirovecii*) in immunocompromised patients (solid organ transplant recipients; bone marrow transplant recipients, HIV, congenital immunodeficiencies)
    - prion disease including vCJD
    - infections in paediatric patients including neonates
    - foetal infections and infections in pregnant women (including toxoplasmosis)
    - travel-related, non-UK endemic and epidemic viral infections [including arboviruses and viral haemorrhagic fever (VHF)]
    - infections in adult and paediatric intensive care units (ICU) and special care baby unit (SCBU)
    - viral infections of concern in specialised units e.g. neurology, infectious diseases, gastroenterology/hepatology
    - sexually transmitted infections (including HIV, treponemal infections and *Chlamydia trachomatis*).

2. To obtain in-depth knowledge of role of antivirals and immunisation (active and passive) in the management and control of viral infections.
3. To obtain in-depth knowledge on control of infection issues in both the hospital and community.
4. To obtain in-depth knowledge on occupational health and infection (including sharps injuries).
5. To be able to advise on emerging infections, e.g. West Nile, pandemic influenza, Chikungunya, etc.
6. To obtain sufficient microbiology knowledge of infections in general, (e.g. fungal, parasitic and bacterial) to enable consideration of these in differential diagnosis of viral infections in all patients but particularly in immunocompromised patients.
7. To obtain in-depth knowledge and attitudes to enable the trainee (by completion of training) to advise independently without the normal working day access to laboratory results or the support from the laboratory or colleagues (either BMS or clinical). Stage A and B complexity: Low (limited experience of independent working); Stage B and C complexity: Average (experience under close consultant supervision); Stage C and D complexity: High (demanding and complex clinical problems, by stage D should be able to advise independently with distant consultant supervision)

Typical scenarios may include but are not limited to:

- haemodialysis/organ donor microbial serological screening
- suspected virus exposure to a potentially susceptible pregnant woman or an immunocompromised adult or child
- blood-borne virus exposure following a sharps injury or human bite
- blood-borne virus exposure from unprotected sexual exposure
- animal bite in the community including overseas
- infection control scenario in a hospital/ward/nursing home setting
- complex clinical scenario.

Knowledge	Skills	Attitudes and behaviours
2.2.1 Demonstrate ability to give appropriate clinical and management advice specifically in relation to the areas as listed under objective 1, including: • in-depth knowledge of the aetiology and clinical presentation of infectious diseases • knowledge of the pathophysiology of the disease process with particular reference to those listed under objective 1 • knowledge of available diagnostic techniques and their limitations • knowledge of available therapeutic measures and preventative measures	Demonstrate: • ability to carry forward understanding of virology at basic/cellular, clinical, laboratory and epidemiological level to clinical scenarios, i.e. patient management. • ability to select and interpret relevant laboratory investigations to achieve a specific diagnosis or differential and to guide patient management • ability to choose most appropriate treatment • ability to justify to colleagues the chosen course of action in relation to patient management • ability to liaise between laboratory and clinicians, with good interpersonal skills	Demonstrate: • alert and vigilant mind • rapport with laboratory and clinical care staff • positive attitude to multidisciplinary teamwork • positive attitude towards taking responsibility and making decisions with clear communication • empathy with patient and family with a patient-focused attitude • knowledge of own limitations and understanding of when to seek advice from seniors or other appropriate colleagues

Knowledge	Skills	Attitudes and behaviours
2.2.2 Show a good working knowledge of treatment and prevention of virus infections, including: **1) Antivirals** Knowledge of the mechanisms of action of the antiviral drugs in use and under development, and the development of resistance to those drugs Knowledge of the optimum treatment of viral infections in immunocompetent and immunocompromised patients and the differences in drug dosages, route of administration and duration of treatment Knowledge of the role of antivirals in prophylaxis of viral infections in immunocompetent and immunocompromised patients, including how to access drug dosage, route of administration and duration of prophylaxis Mechanisms of development of antiviral resistance and how to reduce the risks of antiviral resistance Knowledge of how to test for antiviral resistance Knowledge of how to access current guidelines relating to antiviral drugs and their use in clinical practice	Select the most appropriate antiviral or combination of antiviral drugs for the treatment of viral infections Advise on: • use of antiviral drugs for prophylaxis of infection for outbreak control or for prevention/suppression of infection in individual patients • dosage, route of administration and duration of treatment with specific agents or combinations of antiviral drugs • recognition of and monitoring for development of resistance to the antiviral drugs in current use and advises on the use of alternative drugs. • Understands therapeutic drug monitoring	Demonstrate • willingness to keep up to date and enthusiastic approach to learning • willingness to learn from colleagues

Knowledge	Skills	Attitudes and behaviours
2) Vaccines Knowledge of : • all viral vaccines in current use and an understanding of those under development. • indications and contra-indications and differences between the types of vaccines, i.e. live attenuated, killed, recombinant, sub-unit, DNA vaccines, etc. • properties of available adjuvants • use of viral vaccines and their schedules of administration for both prevention and post-exposure prophylaxis in the community, occupational health and clinical setting and in the context of travel-related infections • efficacy of the viral vaccines in current use and the guidance on post-vaccination immunity checks **3) Immunoglobulins** Knowledge of the role of monoclonal and polyclonal human immunoglobulins for treatment, prevention and post-exposure prophylaxis of viral infections Knowledge of their efficacy and indications of use, dosage schedules and route of administration	Advise on: • administration of viral vaccine for prevention and post-exposure prophylaxis for all patient groups including those travelling to countries where infections non-endemic to the UK are prevalent. • appropriate pre- and post- vaccination immunity checks. Advise on: • use of virus-specific immunoglobulins for prevention, prophylaxis or treatment of infection • use of normal immunoglobulin for prevention, prophylaxis or treatment of infection	

Knowledge	Skills	Attitudes and behaviours
2.2.3 Demonstrate understanding of the importance of infection prevention and control in hospital and community setting, including: Knowledge of the epidemiological consequences of different diseases and of the systems available for disease control The reservoirs, sources, routes of transmission and portals of entry of common HAIs and community acquired infections Interaction between the patient, environment and viruses Disinfection and sterilisation in the hospital and primary care setting Knowledge of public health principles as applied to COI Evidence base for effectiveness of local, national and international standards guidelines for COI Relevance of audit to COI Contribution of COI to total quality management, risk and control assurance Clinical governance and review body inspections/assessments as Clinical Pathology Accreditation (CPA), Care Quality Commission, etc. Importance of non-clinical areas as clinical waste, kitchens and laundry to COI issues and hospital-acquired infection (HAI) control	Show good interpersonal skills Demonstrate: • ability to make accurate risk assessment and to recognise when COI action is required • understanding of the dynamics of viral infections causing HAIs • ability to describe the development and execution of infection prevention and control policies and processes in hospital and community setting • ability to recognise the various sterilisation and disinfection processes and their indications and advantages Describe the role of surveillance in infection prevention and control Explain how the pressure for beds in a hospital may potentially conflict with effective infection prevention and control measures	Demonstrate: • diplomacy in communicating with other healthcare professionals • appreciation of roles of other team members and cooperative working within a multidisciplinary team • assertiveness • leadership

Knowledge	Skills	Attitudes and behaviours
2.2.4 Show awareness of the role of Occupational Health, including: Knowledge of inoculation incident management, including follow-up protocols and post-exposure prophylaxis for BBVs Knowledge of local, national and international guidelines and standards in relation to occupational exposure to infection and limitation of practice/exclusion from work Knowledge of pre- and post- exposure prophylaxis regimes	Demonstrate understanding of : • ethical implications of BBVs for HCWs and for patients • the role of counselling • national guidelines • antiviral prophylactic protocols	Recognise the need for confidentiality at all times. Show empathy towards co-workers
2.2.5 Maintain up to date knowledge of emerging virus infections	Advise others on cause, epidemiology and management of emerging virus and related infections Judge the relevance of emerging infection(s) to the UK by following the literature and other relevant sources of information Collaborate at local or regional, national level to elucidate the relevance of emerging infection(s) to human health	Show: • enthusiastic approach to learning and keeping up to date • willingness to collaborate with and learn from others
2.2.6 Demonstrate a working knowledge of Clinical Microbiology, especially: Knowledge of the impact of practice of medical microbiology on virology Knowledge of basic medical microbiology to enable consideration of non-viral infections in differential diagnosis of patients presenting with suspected viral infections Knowledge of the diagnostic tests (and their limitations) available in the routine microbiology laboratory with understanding of further tests available at specialised centres	Demonstrate: • appreciation of the importance of liaising with colleagues for investigations of patients with suspected viral and non-viral infections • awareness of signs,symptoms and management implications of patients with non-viral infections • understanding of the principles behind bacterial, parasitic and fungal diagnostic techniques so as to be able to liaise with colleagues for the appropriate investigation and management of patients with microbial infections	Show: • enthusiastic approach to learning and keeping up to date • willingness to collaborate with and learn from others

Knowledge	Skills	Attitudes and behaviours
2.2.7 Demonstrate competencies for advising independently, including knowledge (dependent on stage of training) of: **Stage A and B** Knowledge of the 'out-of-hours' repertoire Knowledge of the testing protocols for assays used out of hours, including the sensitivity and specificity of the test relative to standard tests Knowledge of the limitations of the tests offered outside normal working hours **Stage C and D** Knowledge of correct interpretation of difficult test results, especially unconfirmed positive or equivocal results for BBV in source patients for NSI and in pre-transplant screens **Treatment and prophylaxis: vaccines and immunoglobulins** Knowledge of the acquisition, storage, availability and prescription of any vaccine or immunoglobulin controlled by the department that may be used at any time **Clinical advice, professional responsibilities out of hours** **Stage A and B** Familiarity with the professional responsibilities of being the first point of reference for clinical advice and sample investigation as an independent practitioner, including out of hours or similar environment	**Stage A and B** Use professional contacts appropriately − laboratory staff to arrange and discuss testing, notification of results to healthcare professionals, communication with on-call pharmacist for issue of immunoglobulin/vaccine, arranging courier Advise appropriate sample collection according to the relevance of the clinical case and the test to be undertaken Seek Consultant advice appropriately and understand and act on recommendations **Stage B and C** Advise on: • need for urgent testing versus delayed testing • appropriate tests to be undertaken • appropriate test interpretation • appropriate follow-up regimen • treatment and management options available following the out-of-hours enquiry, e.g. the appropriate use of an immunoglobulin or antiviral recommended to a pregnant or immunocompromised patient • infection control in a case (not involving ward closure)	Be willing to be available outside normal working hours while remaining compliant with European Working Time Directive Communicate effectively in 'out-of-hours' setting or similar environment Refer problems to senior colleagues appropriately Carry out professional responsibilities satisfactorily

Knowledge	Skills	Attitudes and behaviours
Stage B and C Knowledge of the relevant clinical guideline appropriate to the case or investigation **Stage C and D** Knowledge of the health and safety legislation, control of infection guidelines and public health issues appropriate to the case or investigation	**Stage C and D** Appropriately use laboratory resources when further investigations may be warranted (further tests undertaken, staff time extended to set-up, and/or complete further tests or repeat results) Participate in the recommendation, testing and reporting of investigations with a high health protection profile (e.g. avian influenza, viral haemorrhagic fevers) Communicate significant results to health protection/public health personnel Communicate with national reference laboratories Recommend giving or withholding treatment or prophylaxis in a complex clinical scenario or where laboratory results not easily accessible or where a decision has to be made on unconfirmed positive screens e.g. equivocal results for BBV in source patients for NSI and in pre-transplant screens Discuss a complex case with a clinical colleague requiring the acquisition of further advice from an expert source (outside your institution) to complete the final clinical advice given to local clinicians Satisfactorily resolve a difficult (perhaps unnecessary) demand made by a healthcare professional on the ‘out-of-hours’ service Satisfactorily discuss with senior hospital managers the implementation of infection control measures (e.g. ward closures) in a potential outbreak scenario	

In-course assessments:

- write four case reports (different areas) in which the specialty registrar was involved, of 1000 words each, including literature review and written as for publication
- critical review of an outbreak the trainee was involved in managing. If this is non-virological, e.g. an infectious diarrhoea outbreak, this should first be approved by local and regional educational supervisor. The role of the trainee in the outbreak and what was learnt should be specified
- out-of-hours' logbook or similar record of equivalent experience as an independent practitioner. All advice given when practising independently and any relevant outcomes should be recorded and kept in the portfolio or similar record. Trainees should record what they have learnt
- attendance at an infection control meeting. Trainee should write a summary of the issues raised (not more than one A4 side)

Responsibilities of the educational supervisor

General:

- to ensure the trainee is sufficiently supported to give clinical advice. In the early stages of training, consultant input will be greater. With increasing experience, the trainee can be left alone providing their work/advice is reviewed at regular intervals. The aim is to prepare the trainee for independent practice as a consultant
- to provide the trainee with sufficient learning aids such as access to computers, books, national/international guidelines and up-to-date journals
- to ensure that the trainee is keeping all relevant documentation in their portfolio and that the assignments are reviewed locally
- to aid the trainee in identifying the nature and depth required of the clinical areas indicated above
- to ensure that adequate time is provided to attend relevant courses and meetings, including the infection control committee, and to ensure that relevant clinical attachments are arranged in a timely fashion
- to provide support and guidance to the trainee for completion of the in-course assessments.

Specific:

- attachment to occupational health department (if appropriate). Ensure collection in trainee portfolio of local and national occupational health guidelines (viral and related infections)
- ensure documentation in the portfolio of clinical advice given out of hours and/or during other episodes of independent practice.

3. MANAGEMENT

This module should equip the trainee with the basic management skills required to run a modern virology laboratory. This will be achieved through on-the-job training and should include one formal management course. The module will be assessed by a formal pieces of work submitted as part of the portfolio. There are no time constraints but it is expected that the trainee will have made a major contribution to each document. The laboratory manager/educational supervisor will be expected to sign off the piece of work. The business case can reflect an ongoing issue in the laboratory or may be a title given to the trainee by the educational supervisor.

Objective: to understand laboratory management and how it is applied in a changing NHS.

Knowledge	Skills	Attitudes and behaviours
Demonstrate: • **Understanding of the structure of the NHS** • **Understanding the role of the virology lab in pathology as a whole (inc. reference laboratories)** • **Understanding the roles of clinical scientists, BMS, Medical Laboratory Assistant (MLA), MTOs in the laboratory and lines of accountability** • **Understanding skill mix requirements in laboratory** • **Budget management** • **Teamwork, including multidisciplinary working** • **Leadership skills** • **Time management** • **Role of pathology networks** • **Funding streams** • **Laboratory accreditation and quality management systems**	Demonstrate: • simple book-keeping • writing a business case • ability to interpret budget and financial planning • spreadsheet skills • ability to generate a rota	Establish: • a rapport with managerial staff in virology and pathology as a whole • a positive attitude to teamwork and sharing of responsibility

In-course written assessment:
Produce an annual business plan for your laboratory after consultation with the laboratory manager and head of department

or

Prepare a business case for the introduction of a new service or diagnostic test to be introduced by the department.

Responsibilities of the educational supervisor:

- to arrange attendance at local meetings and to discuss outcomes with the trainee afterwards
- to provide the trainee with sufficient time, information about financial support and information regarding relevant courses
- to discuss and plan with the trainee the formal in-course assessments attached to this module, prior to inclusion in portfolio
- to arrange for the trainee to be tutored by senior laboratory medical and BMS managers
- to provide support and guidance to the trainee for completion of the in-course assessments.

4. HEALTH AND SAFETY

This is an essential part of training throughout the 5 years. Safe working in the laboratory should be covered in the induction programme at the commencement of training. The following objectives formalise and build on this earlier knowledge and, by the end of the period of training, the trainee should be fully aware of all the major safety issues in a modern diagnostic laboratory. The assessment will consist of two parts. Records of both should be retained in the portfolio.

Objectives:

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

Knowledge	Skills	Attitudes and behaviours
Demonstrate awareness of the legislative framework underpinning H&S at work, including: • **Health and Safety at Work Act (1974)** • **Reporting of Injuries, Diseases and Dangerous Occurrences Regulations (RIDDOR)** • **COSHH** • **Genetically Modified Organisms (Contained Use) Regulations (2001)** • **Management of Health and Safety at Work Regulations (1999)** • Ionising Radiation (Medical Exposure) Regulations (2000)	Perform a risk assessment when required for any procedure undertaken in the laboratory.	Show behaviours towards laboratory work in accord with the principles of good medical practice
Be aware of the professional bodies that give guidance on health and safety matters including: • **Health and Safety Executive** • **Advisory Committee on Dangerous Pathogens** • **Gene Therapy Advisory Committee** • **the medical Royal colleges** • **Advisory Committee on Genetic Modification** • **Health Protection Agency (HPA) (see Public Health and Epidemiology module)**	Undertakes Control of Substances Hazardous to Health (COSHH) risk assessments for some chemical and biological risks encountered in the laboratory Shows self sufficiency in accessing H&S documentation including those retained by: • the laboratory where the trainee is based • the placement hospital • the hospital library websites	Show behaviours towards laboratory work in accord with the principles of good medical practice

Knowledge	Skills	Attitudes and behaviours
Become familiar with the documentation used to underpin local H&S arrangements, including: • **the departmental H&S manual** • **GM risk assessment documentation** • **COSHH risk assessments** • **manual handling risk assessments** • **visual display unit risk assessments**	Describe the need for risk assessments for work involving genetically modified organisms Show familiarity with the H&S structures operating in the host Trust/local Health Board, including the topics of risk management, adverse incident reporting, liability and indemnification	Show behaviours towards laboratory work in accord with the principles of good medical practice
Become familiar with the requirements for the packaging and safe transportation of infectious agents as required by: • **The Carriage of dangerous goods (classification, packaging and labelling) and the use of transportable pressure receptacles (1996)** • **IATA *Infectious Substances Shipping Guidelines* (2002)**	To be able to undertake a post exposure assessment of an incident involving BBVs, including responsibilities under RIDDOR (Reporting of Injuries, Diseases and Dangerous Occurrences Regulations)	Act in accordance with the principles of good medical practice
Show awareness of the role of the occupational health department in managing staff health and safety issues including exposure to BBVs and appropriate published guidelines, including those by the Department of Health (www.dh.gov.uk/Home/fs/en)	Describe a risk assessment for handling and quarantining instruments suspected of TSE contamination	Develop good communication skills and empathise with exposed members of staff, whilst understanding need for confidentiality

Knowledge	Skills	Attitudes and behaviours
Show awareness of the hospital waste management arrangements for clinical and general waste treatment and disposal, encompassing an understanding of the disinfectant and sterilisation protocols used for the treatment of surfaces and materials contaminated by bacteria, viruses and prions. The rationale for the decontamination of medical devices should also be understood, with specific reference to CSSD (Central Sterile Services Department)	Demonstrate an understanding of the principles underpinning the operation of a Category 3 and 4 facilities and the local arrangements for dealing with patients with: • viral haemorrhagic fever • biological weapons, e.g. smallpox.	Analyse national guidance with respect to local issues Recognise importance of team working and communication skills
Be aware of the exceptional safety issues posed by bioterrorism (regulated by the Anti-terrorism, Crime and Security Act 2001) and category 4 pathogens		Analyses national guidance with respect to local issues Recognises importance of team working and communication skills and demonstrates these
Show up to date knowledge of potential agents of bio-terrorism	Demonstrate awareness of the potential for abuse of laboratory organisms for bioterrorism and the current relevant legislative framework, including the Prevention of Terrorism Act 2004 Liaise with others to initiate a clinical and managerial response and institute remediation, including defining, establishing and maintaining the appropriate levels of laboratory security to ensure due diligence in the prevention of criminal misuse of organisms	Show: • multidisciplinary team working. • ability to give recognition to skills and priorities of others • willingness to seek advice and help • ability to seek expert help when necessary • behaviours towards laboratory security which are in accord with the principles of *Good Medical Practice*

In-course assessment:

- attendance on the local health and safety committee for at least 1 year. The trainee should write a summary of the issues raised in their own words and how they were resolved. This should not be more than one A4 side
- undertake a risk assessment including a COSHH assessment of a virological or non-virological method.

Responsibilities of the educational supervisor:

- to arrange for the trainee to undergo the Trust/local Health Board and departmental health and safety inductions
- to ensure that all documentation pertaining to health and safety requirements within the laboratory, to allow compliance with statute, are available for the trainee
- to ensure that all H&S documentation is up to date, especially pertaining to safe working and the prevention of infection in clinical laboratories
- to facilitate the trainee's exposure to departmental and Trust/local Health Board health and safety committees
- to arrange for an orientation period in occupational health
- to arrange and oversee risk assessments that will form part of the trainee module assessment
- to ensure all assessment documentation is retained in the trainee's portfolio
- to introduce the trainee to Internet browsing for suitable websites regarding health and safety issues, for example:
  - http://msds.chem.ox.ac.uk
  - http://www.dh.gov.uk/ab/ACDP/index.htm
  - http://www.hse.gov.uk
- provide support and guidance to the trainee for completion of the in-course assessments. For the risk assessment/COSHH exercise, the educational supervisor may need to arrange for the trainee to visit another pathology laboratory, e.g. a university or microbiology laboratory.

5. UNDERSTANDING RESEARCH AND DEVELOPMENT IN VIROLOGY

Objective: to equip the trainee with the basic skills necessary to undertake a laboratory-based research project and to understand other people's research output.

Duration: minimum of 3 months.

Special requirements: those trainees who wish to obtain an MD/PhD should make every effort to obtain a clinical fellowship. These are awarded by research councils and charities (information available from the academic representative on the Virology CATT). One year of a 3-year postgraduate programme will count towards training, and these trainees will be required to complete an OOPE form. Further advice can be sought from the academic representative on the Virology CATT if required.

Knowledge	Skills	Attitudes and behaviours
Either • **Use established laboratory techniques for the investigation of an audit/clinical/ laboratory-related project** **Or** • **Develop or optimise a novel or in-house technique to improve diagnostic or epidemiological investigative efficacy** **Or** • **Undertake a piece of original scientific research (which might lead to an MD/PhD)** • **Research governance (see relevant generic module)**	Demonstrate: • ability to undertake a preliminary literature review around the project, a summary of this literature should be retained in the portfolio • ability to write a one-page proposal outlining the study, suitable for submission to the College • basic bench work skills associated with the project • ability to keep clear concise records of results • analytical skills relevant to project results • ability to write up project in the form of a dissertation (max 6000 words), formal publication or thesis (MD/PhD only) • presentation skills	Approach research with enthusiasm Observe safe working laboratory practice Establish a rapport with scientific staff

In-course assessment:

This can be **either**:

a) paper accepted for publication

or

b) project report

or

c) MD/PhD thesis.

Responsibilities of the educational supervisor:

- to ensure the trainee has at least 3 months' protected project time. This should be in blocks of no shorter than a week at a time
- to ensure that the funding for the smaller projects is available

- to ensure that, if the funding and/or expertise are not available for adequate execution of the project, the trainee has the opportunity for secondment to a more appropriate laboratory
- it should be determined in Stage A whether the trainee wishes to have time out of programme to complete a PhD/MD. If they do, the educational supervisor should ensure that the trainee has sufficient research experience/publications to enable them to apply for relevant fellowships. Advice on academic progression should be sought from the regional specialty advisor and the academic representative on the Virology CATT
- to ensure that the study or project is feasible given the time available
- to ensure that the trainee is able to attend the local postgraduate courses, for example in statistics or database handling, to equip them for this module.

6. PUBLIC HEALTH AND EPIDEMIOLOGY

In this module, the trainee should understand the relationship between individual laboratories and public health as a whole. An awareness of both the scientific and epidemiological tools required for the investigation of outbreaks is also critical.

Objectives:

- to be able to describe and discuss the effects of viral infections on a population
- to be able to use, interpret and evaluate surveillance data
- to describe the steps in the investigation of outbreaks.

Knowledge	Skills	Attitudes and behaviours
Show familiarity with: • **Basic epidemiology, including study design** • **The principles of outbreak investigation** • **Communicable disease surveillance** • **Prevention and control of viral infections (including vaccination)** • **Prophylaxis against viral infections (including the role of vaccines, immunoglobulins and antivirals)**	Use basic statistics appropriately Use relevant laboratory investigations in outbreaks, e.g. of diarrhoea and vomiting, hepatitis, respiratory disease. Demonstrate ability to collect data and store it on spreadsheets Describe viral diversity and genotype/strain definitions (see basic virology module) Show understanding of principles of phylogenetic analysis of viral sequences	Learn from others, recognising their skills Work as part of a team Appreciate roles of other health professionals Show good interpersonal skills Develop an alert and vigilant mind

• **Both classical and molecular techniques in epidemiological investigations, e.g. outbreak investigations of hepatitis B** • **Awareness of viral pathogens in food and water microbiology** • **The role of the HPA or equivalent bodies at local, regional and national levels**	Provide authoritative advice on the use of vaccines and immunoglobulins	

In-course assessments

Either

- construction of a phylogenetic tree given sequence data and its application to a clinical problem. (NB Trainees may satisfy the requirements of this assessment locally or undertake a course provided at the HPA Centre for Infections, Colindale. Details of the course are available by contacting Dr Mary Ramsay: Mary.Ramsay@hpa.org.uk)

or

- write a report and give a presentation to the department on local laboratory generated data, e.g. influenza epidemiology over a 12-month period, highlighting similarities and differences with national data or local surveillance data.

Responsibilities of the educational supervisor:

- to provide access to computers with Internet access
- to provide time to go on courses
- to guide trainee on preparation of report/departmental presentation
- to facilitate access to phylogenetic expertise. This may be available locally or be part of a course provided by the HPA. If data for assessment are not available as part of a course, educational supervisor should liaise with colleague to provide the sequences.

Other recommended courses for the module:

- basic epidemiology and statistics course
- computer course to learn spreadsheet skills
- basic training in bioinformatics including molecular epidemiology through phylogenetic analysis
- microbiological, radiological and chemical hazards
- attendance at relevant local, national and international courses and meetings.

OPTIONAL COMPONENTS

1 Clinical attachment

This module is aimed at providing those trainees interested with more clinical exposure in a relevant specialty, such as:

- infectious diseases
- genitourinary medicine (GUM)
- HIV disease
- hepatitis
- respiratory medicine.

The exposure may be desirable to increase experience of direct patient interaction, which may be especially valuable for specialist registrars who have spent little time in direct patient care post-registration or for graduates from overseas who have not had any experience of direct patient care in the NHS. An alternative reason may be to assist liaison between laboratory and ward in specific studies, e.g. of new antivirals for HIV or hepatitis.

This can be completed in one of the following ways:

a. Regular participation in clinics (e.g. once a week) in one of the disciplines listed throughout their training (this may include the pre-Part 1 period). Trainees would see patients alone, after a period of seeing patients with the consultant/GP trainer. This period would depend upon the time previously spent in clinical work. A trainee holding the MRCP would be able to start seeing patients alone almost immediately. A trainee who had held no post-registration clinical posts might expect up to 3 months to be spent 'sitting in' with experienced clinical staff. The trainee would be responsible to the consultant in charge of the clinic. The trainee may expect to attend other relevant meeting such as clinicopathological meetings to discuss liver biopsies related to hepatitis clinics. For the module to be completed, the clinic should be attended for a minimum of 12 months.

b. A 6–12 week attachment. The format would need to be discussed with the relevant clinical consultant and virology educational supervisor.

For each of these modules, objectives would be drawn up and agreed between the trainee and clinical and virology educational supervisors before starting the module. Such objectives could include numbers of patients to be seen, relevant related courses to attend (e.g. those for hepatology run for MRCP trainees) or research objectives where relevant (e.g. to recruit a certain number of patients for a trial).

Knowledge	Skills	Attitudes and behaviours
Describe the clinical presentations resulting from virus infections **Demonstrate working knowledge of drugs including antivirals used to treat these**	Take satisfactory histories from patients Carry out clinical examination Communicate clearly, and demonstrate counselling	Develops good doctor−patient relationships

conditions and their side effects **Show familiarity with national/local guidelines for management of clinical conditions**	skills Accurately interpret results (biochemistry, histopathology, haematology, immunology as well as virology/microbiology)	

2 Supraregional /reference laboratory attachment

This module is aimed at those trainees who would like to spend time considering an aspect of virology that is only available at a limited number of specialist centres or reference laboratories. Below are some examples, but the list is not exhaustive and the trainee is encouraged to come up with their own plans for this module. These would have to be approved by the local educational supervisor, CATT and chief examiner. Time in an overseas laboratory with particular expertise would be encouraged.

Some examples might include (a) working in a laboratory offering antiviral susceptibility testing or (b) working with exotic or dangerous virus, for example in a Containment Level 4 facility.

a) Antiviral susceptibility

This module outlines regular exposure to the use of antivirals in a clinic setting. The trainee should attend and ideally build up a cohort of patients to be seen on a regular basis in either a hepatitis or HIV clinic, in addition to the experience gained in routine use of antivirals including resistance problems in such areas as influenza management and management of CMV infection in immunocompromised patients. A total of 3 months (or one clinic/week for 2 years) should be undertaken to ensure that the trainee understands the practical issues with prescribing antivirals.

Objective: to gain an in-depth understanding of antivirals, their mechanisms of action, clinical applications, development of and testing for resistance.

Knowledge	Skills	Attitudes and behaviours
Show understanding of phenotypic versus genotypic testing **Have detailed understanding of laboratory protocols, assay design, and choice of controls; limitations of assays should also be appreciated** **Have knowledge of relevant pharmacology; include knowledge of mechanisms of action, pharmacokinetics, interactions, toxicities**	Interpret resistance data and provide appropriate clinical advice Be able to manipulate and interpret genotypic data and compare it against sequences stored in databases Write clinical protocols for antiviral use	Develop an enquiring mind with respect to antiviral agents Actively keep up to date with the literature on drugs and resistance testing developments

Understand the processes for evaluation of new compounds **Understanding phase 1, 2 and 3 clinical trials** **Maintain awareness of new compounds** **Appreciate the impact of antivirals on epidemiology of viral infections** **Develop knowledge of viral dynamics and the spread of resistance within the population** **Show an understanding how a reference laboratory works**		

Responsibilities of the educational supervisor:
To identify laboratories where the necessary skills can be obtained. The following laboratories currently offer some antiviral resistance testing (not a comprehensive list):

- HPA Centre for Infections, Colindale: Antiviral Unit: HIV , HSV; influenza
- Birmingham Heartlands: HIV, HBV, CMV
- King's College Hospital: HIV, HSV, HBV
- Barts and the London: VZV HIV, HBV
- St Thomas': HIV, HBV
- University College Hospital, London: HIV, HBV
- Royal Free Hospital: HIV, HBV
- Manchester Royal Infirmary: HIV, HBV, CMV.

b) Exotic and dangerous virus infections

Objective:

- to understand the range of infections classified as requiring CL4 laboratory containment and their distribution, differential diagnosis, management and treatment
- to understand the importance of rabies and other lyssaviruses as human pathogens
- to understand the legislative framework and issues informing prevention of infection, management of the potentially infected patient and laboratory containment.

Knowledge	Skills	Attitudes and behaviours
Be aware of the legislative framework underpinning Health & Safety at Work including: • **Health & Safety At Work Act (1974)** • **RIDDOR** • **COSHH** • **Genetically Modified Organisms (Contained Use) Regulations (2001)** • **Management of Health and Safety At Work Regulations (1999)** • **Management and control of viral haemorrhagic fevers (1997)** • **Smallpox Plan (2003)** • **ACDP organism classification**	Perform a risk assessment when required for all procedures undertaken in the laboratory	Act in accordance with the principles of *Good Medical Practice*
Maintain up to date knowledge of viral haemorrhagic fevers, the agents and the management of the ill patient	Describe: • clinical, virological and epidemiological features and how they affect management • differential diagnosis and risk assessment of patients	Observe safe working laboratory practice especially with respect to sample handling Work with team

Knowledge	Skills	Attitudes and behaviours
Demonstrate working knowledge of smallpox, the virus and the disease, including an understanding of its potential as a bioterrorism agent	Describe: • clinical, virological and epidemiological features and how they affect management • differential diagnosis and risk assessment of patients	Observe safe working laboratory practice especially with respect to sample handling Work with team
Demonstrate up to date knowledge of rabies, including: • **virology** • **disease** • **epidemiological trends** • **control** **Demonstrate awareness of principles underlying CL4 laboratory design and practices**	Describe: • clinical, virological and epidemiological features and how they affect management • differential diagnosis and risk assessment of patients • appropriate prophylactic regimens • relevant content of 'Memorandum on rabies: Prevention and control' DH 2000 Describe cabinet and suited CL4 laboratory design, safety features.	Observe safe working laboratory practice especially with respect to sample handling. Work with team Show behaviour towards laboratory work in accord with *Good Medical Practice.*

Knowledge	Skills	Attitudes and behaviours
Show understanding of the principles of patient containment	Describe Trexler isolator, constraints, international alternatives	Recognise the roles of other healthcare providers Appreciate the application of national policies in a local setting
Be aware of legal, safety and practical issues around high level containment work: • **Health & Safety At Work Act (1974)** • **RIDDOR** • **COSHH** • **Genetically Modified Organisms (Contained Use) Regulations (2001)** • **Management of Health and Safety At Work Regulations (1999)** • **Viral Haemorrhagic Fever Memorandum (1990)** • **Smallpox Plan (2003)** • **ACDP organism classification**	Perform a risk assessment when required for all procedures undertaken in the laboratory	Show behaviours towards laboratory work in accord with *Good Medical Practice*

3 Microbiology attachment

Objectives:

- to build upon the understanding of laboratory and clinical aspects of microbiology acquired during the objective-based, structured specialist training prior to the FRCPath Part 1 microbiology/virology examination
- to be aware of clinical presentation of infections due to microbial agents other than viruses in the community, hospital and critical care setting
- to understand the importance of considering microbial agents other than viruses in differential diagnosis of infection
- to be able to advise on appropriate investigations and control of infection measures for commonly seen infections caused by bacteria, fungi and parasites
- to understand the basic principles of infection prevention and control for bacterial hospital-acquired infection
- to understand the role of the microbiologist in relation to public health microbiology.

Knowledge	Skills	Attitudes and behaviours
Demonstrate knowledge of laboratory aspects of clinical microbiology, including: • Understanding of appropriate staining and culture techniques • Understanding of antibiotic susceptibility testing • Understanding the role of reference centres	Discuss the process and limitations of all routine microbiology specimens received in the laboratory Understand current techniques for susceptibility testing Provide clinical advice based on interpretation of the above Determine specimen referral or comply with the indications for referral of specimens to reference facilities	Establish close rapport and understanding with laboratory staff (including reference laboratory staff where appropriate)
Show a broad knowledge of clinical aspects of microbiology, including: • A broad knowledge of the aetiology and clinical presentation of infectious diseases both in the community and hospital setting • Understanding of pathophysiology of infection-related disease processes with special reference to differences between immuno-competent adults and children, immuno-suppressed adults and children, pregnancy, etc.	Show ability to: • assimilate clinical, laboratory and epidemiological information and to use this to differentiate between infections and other conditions • select and interpret appropriate tests • liaise between clinicians and laboratory • recognise and manage specific infection problems in the critically ill	Establish rapport between laboratory and clinical staff Readiness to review and revise diagnostic matrix Collaborates with colleagues

Knowledge	Skills	Attitudes and behaviours
Clinical aspects (continued) • Knowledge of the optimum treatment (including in neonates, children and pregnant women) of commonly seen infections and how to access current guidelines • Knowledge of the relevance of assaying levels of antimicrobial agents in ensuring safe levels and effective levels • Knowledge of common infection problems in the ICU setting, e.g. ventilator-associated pneumonia, line infections, septicaemia • Pathophysiology of serious sepsis and rationale for intervention • Knowledge of the common causes of infection in returning travellers with measures for preventing such infections	Demonstrate ability to: • justify a course of action • recognise the consequences of severe infection including sepsis syndrome • investigate and arrive at diagnosis for infections in returning travellers	Demonstrate: • flexibility to respond to change in the context of the clinical situation • prompt and relevant decision making with clear communication • enthusiasm for learning
Public health and epidemiology • Epidemiology and distribution of important tropical infections, e.g. malaria, schistosomiasis, onchocerciasis, filariasis, trypanosomiasis, gastrointestinal (GIT) parasites, tuberculosis (TB), enteric fever, cholera, dysentery, etc. • Knowledge of the epidemiological consequences of different infections and of the systems available for control • Understanding of the general principles involved in immunisation programmes, occupational and travel health, agents of biological terrorism • Understand the relevance of food, environmental and water (FEW) microbiology for public health	Able to: • advise on travel vaccination and prophylaxis for prevention of specific travel related infections • make accurate risk assessments and to recognise when urgent epidemiological action is required • understand methods of vaccine delivery, surveillance of immunisation programmes and evaluation of vaccine efficacy • give basic health and travel advice and able to refer to sources of information • recognise abnormal patterns of infection and to deal with the unexpected • use the FEW microbiology to support public health measures	Demonstrate: • willingness to seek expert advice • willingness to work as a part of multidisciplinary team

Knowledge	Skills	Attitudes and behaviours
Show sound knowledge of hospital-acquired infection (HAI) and control, including: • The reservoirs, sources, routes of transmission and portals of entry of common HAIs • The interactions between the microbe and the patient, appreciating risk factors, e.g. devices, antimicrobial exposure, underlying conditions • The importance of HAI in total quality management and clinical governance. The importance of screening for HAIs and monitoring alert organisms • Disinfection and sterilisation in the hospital and primary care setting. The roles and responsibility of infection control team (ICT) and committee (ICC) • Clinical waste, laundry and kitchen: their relevance and importance in HAI prevention and control • Ventilation and airflows: importance of this in the theatre, isolation rooms and other relevant areas	Show ability to: • describe the dynamics of common HAIs • distinguish infection from colonisation • participate in, and reflect on, surveillance and audit cycles • conduct a root cause analysis in instances of HAI • describe the disinfection and sterilisation processes, their indications, advantages and disadvantages • describe the role of ICT and ICC • describe these, including audit approaches • describe the principles of HAI and their importance	Show appropriate degree of assertiveness Recognise skills and priorities of other specialties Work in multidisciplinary team.

Responsibilities of the educational supervisor:

- to arrange for a suitable attachment for the trainee
- to ensure that sufficient time is made available to the trainee for the attachment.

4 Consolidation of essential module (including attachment to another virology centre)

Objective:

To allow trainee to develop a particular interest and expertise in a core component of the curriculum. The training format is already described under the core component. This optional module, however, is to give the trainee an opportunity to add to their training experience in another centre and it is expected that this will be delivered as a short attachment (6–12 weeks) to a different virology centre.

Responsibility of the educational supervisor:

To arrange an attachment for the trainee to a different virology centre. The virology centre chosen should be on the basis of the trainee needs and the particular core component in which the trainee wishes to gain extended training.

SUMMARY OF ASSESSMENTS FOR MEDICAL CORE MODULES

Below is a table summarising the assessments that must be completed before FRCPath Part 2 is attempted. They should be done progressively throughout the training period. They are to be completed and submitted no later than four months before the closing date for entry for the FRCPath Part 2 examinations in Virology. Please see relevant module for a more comprehensive description of what is required.

Core module	Assessment	Page in curriculum
Basic virology	3000-word review article	70
Medical virology		
Laboratory techniques	A critical review of an assay currently in use in the lab (approx 1000 words) An audit of the laboratory performance of an assay An audit of the clinical utility of an assay	74
Clinical/medical aspects	Write four case reports (1000 words each) Critical review of an outbreak Out-of-hours' logbook or similar assessment of independent practice development Attendance at an infection control meeting	79
Management	Business plan for laboratory, or business case for a new service or test	89
Health and safety	Attendance on the local health and safety committee Risk assessment including COSHH of a virological or non-virological method/technique	90
Understanding research and development in virology	A piece of work related to a laboratory based project OR a higher degree	94
Public health and epidemiology	Phylogenetic analysis problem Report and departmental presentation on laboratory generated data	96

APPENDIX 1 GOOD MEDICAL PRACTICE

The following table indicates where the *Good Medical Practice* headings can be found in the curriculum. These sections are also cross-referenced with PMETB's *Criteria for Entry to the Specialist Register*.

Good Medical Practice	**Page number**
Good clinical care	23
Maintaining good medical practice	31
Teaching and training, appraising and assessing	42
Relationships with patients	44
Working with colleagues	50
Health	56
Probity	57

APPENDIX 2 ACRONYMS and ABBREVIATIONS

ARCP	Annual Review of Competence Progression
BBV	Blood-borne virus
BMA	British Medical Association
BMS	Biomedical scientist
CATT	College Advisory Training Team
CbD	Case-based discussion
CCDC	Consultant in Communicable Disease Control
CCT	Certificate of Completion of Training
CESR	Certificate of Eligibility for Specialist Registration
CFT	Complement fixation test
CMT	Core medical training
CMV	Cytomegalovirus
COSHH	Control of Substances Hazardous to Health regulations
CPA	Clinical Pathology Accreditation
CPD	Continuing professional development
CPHM	Consultant in Public Health Medicine
CSSD	Central Sterile Services Department
DNA	Deoxyribonucleic acid
DOPS	Directly observed practical skills
EIA or ELISA	Enzyme-linked immunoassay or Enzyme-linked immunosorbent assay
ESCV	European Society for Clinical Virology
FEW	Food, environmental and water
FRCPath	Fellowship of The Royal College of Pathologists
GIT	Gastrointestinal
GMC	General Medical Council
GP	General Practitioner

GUM	Genito-urinary medicine
HAI	Hospital-acquired infection
HCC	Healthcare Commission
HEV	Hepatitis E Virus
HIV	Human immunodeficiency virus
HOPS	Heads of Pathology School
HPA	Health Protection Agency
ICC	Infection Control Committee
ICT	Infection Control Team
ICU	Intensive care unit
IF	Immunofluorescence
IgG	Immunoglobulin G
IgM	Immunoglobulin M
IT	Information technology
JCPT	Joint Committee on Pathology Training
JRCPTB	Joint Royal Colleges of Physicians Training Board
LAC	Lay Advisory Committee
Mini-CEX	Mini-clinical evaluation exercise
MLA	Medical laboratory assistant
MMC	Modernising Medical Careers
MRCP	Membership of The Royal College of Physicians
MRCP(I)	Membership of The Royal College of Physicians, Ireland
MSF	Multi-source feedback
NHS	National Health Service
NICE	National Institute for Health and Clinical Excellence
NPSA	National Patient Safety Agency
NTN	National Training Number

NTN(A)	National Training Number (Academic)
OOPE	Out-of-programme experience
PCR	Polymerase chain reaction
PMETB	Postgraduate Medical Education and Training Board
RE	Regional epidemiologist
RIDDOR	Reporting of Injuries, Diseases and Dangerous Occurrences Regulations
RNA	Ribonucleic acid
SAC	Specialist Advisory Committee
SCBU	Special care baby unit
SGM	Society for General Microbiology
SOP	Standard operating procedures
ST	Specialty training
STC	Specialty Training Committee
TAC	Trainees Advisory Committee
TB	Tuberculosis
TSE	Transmissible spongiform encephalopathy
vCJD	Variant Creutzfeldt-Jakob disease
VHF	Viral haemorrhagic fever
VRE	Vancomycin-resistant enterococcus

Entry into run-through training (competitive interview)

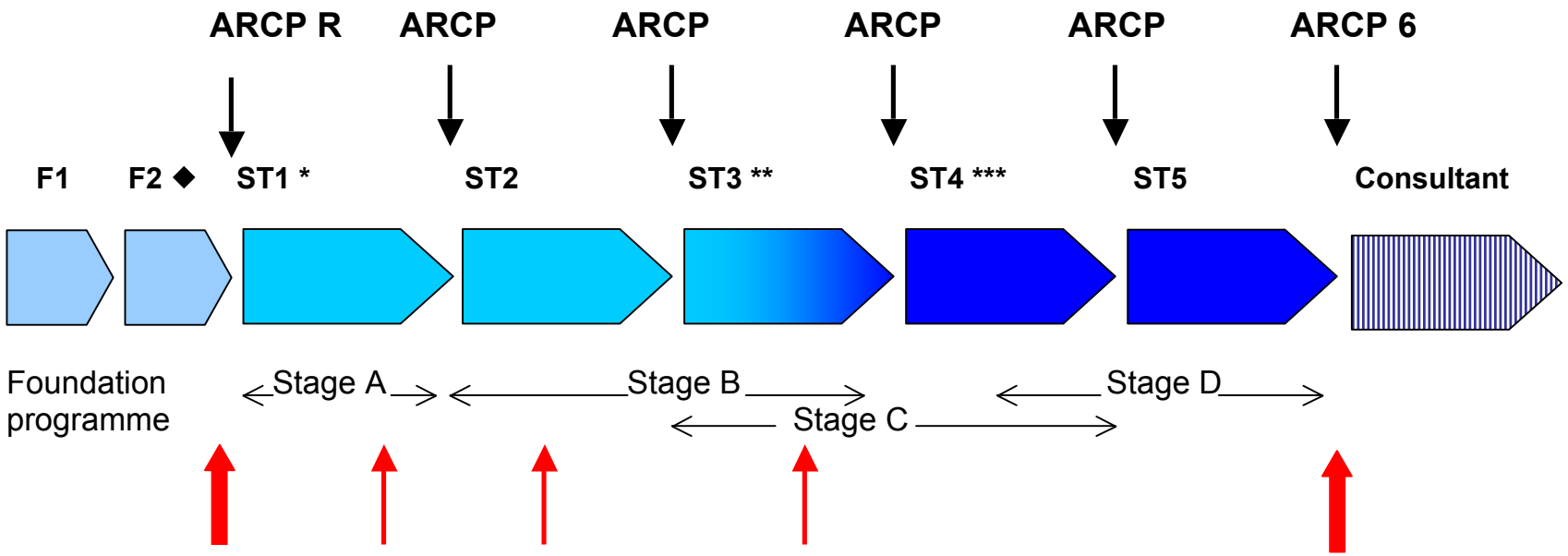
Earliest opportunity for Year 1 Assessment †

Earliest opportunity for Part 1 FRCPath

Earliest opportunity for Part 2 FRCPath

Training (CCT) or Certificate confirming Eligibility for Specialist Registration

APPENDIX 3a ILLUSTRATIVE EXAMPLE OF VIROLOGY TRAINING



◆ Entry is also possible from clinical training.

* Trainees must have passed the ST1 RCPath Assessment by the end of Stage A/ST1.
Failure to pass the Year 1 Assessment will prevent the trainee from progressing to Stage B.

** Trainees must have passed the Part 1 FRCPath examination by the end of Stage B/ST3.
Failure to pass the Part 1 examination by the end of ST3 will prevent the trainee from progressing to Stage C.

*** Trainees must have passed the Part 2 FRCPath examination by the end of Stage C/ST4.
Failure to pass the Part 2 examination by the end of ST4 will prevent the trainee from progressing to Stage D.

APPENDIX 3b ILLUSTRATIVE TIMETABLE OF VIROLOGY TRAINING

	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul
ST1	Month 1	Month 2	Month 3	Month 4	Month 5	Month 6	Month 7	Month 8	Month 9	Month 10	Month 11	Month 12
	Begin Stage A. NTN awarded							RCPath Year 1 Assessment		RCPath Year 1 Assessment		Earliest opportunity to end Stage A
ST2	Month 13	Month 14	Month 15	Month 16	Month 17	Month 18	Month 19	Month 20	Month 21	Month 22	Month 23	Month 24
	Earliest opportunity to begin Stage B		Part 1 FRCPath opportunity	Part 1 FRCPath results					Part 1 FRCPath opportunity	Part 1 FRCPath results		Earliest opportunity to exit Stage B
ST3	Month 25	Month 26	Month 27	Month 28	Month 29	Month 30	Month 31	Month 32	Month 33	Month 34	Month 35	Month 36
	Earliest opportunity to begin Stage C		Part 1 FRCPath opportunity	Part 1FRCPath results					Part 1 FRCPath opportunity	Part 1 FRCPath results		Last opportunity to exit Stage B
ST4	Month 37	Month 38	Month 39	Month 40	Month 41	Month 42	Month 43	Month 44	Month 45	Month 46	Month 47	Month 48
			Part 2 FRCPath opportunity	Part 2 FRCPath results		Earliest opportunity to exit Stage C	Earliest opportunity to begin Stage D		Part 2 FRCPath opportunity	Part 2 FRCPath results		Last opportunity to exit Stage C
ST5	Month 49	Month 50	Month 51	Month 52	Month 53	Month 54	Month 55	Month 56	Month 57	Month 58	Month 59	Month 60
												Exit Stage D. CCT awarded