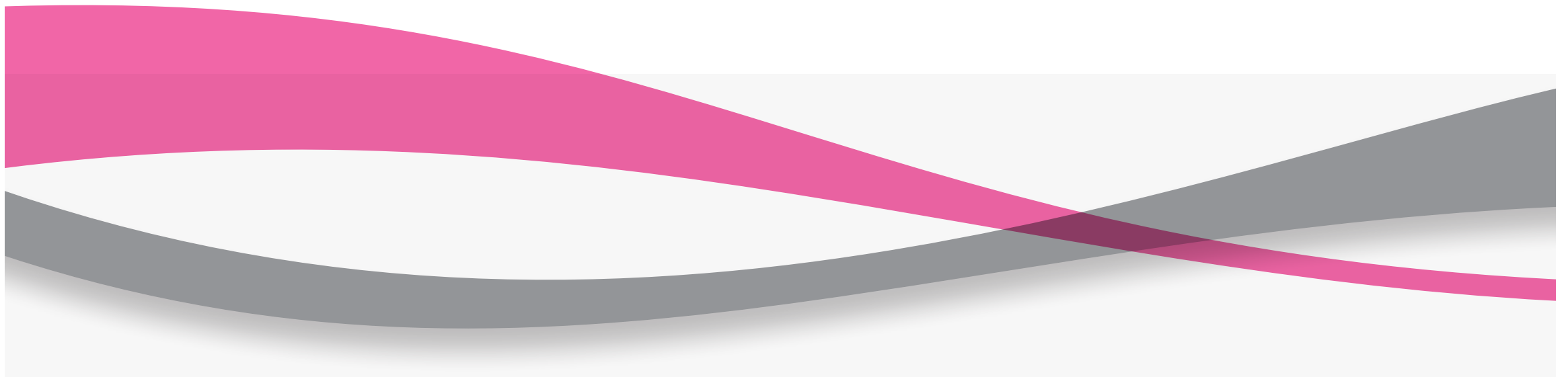The Royal College of Pathologists
Pathology: the science behind the cure

Curriculum for specialty training in medical microbiology

May 2010

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	This curriculum is the split version of the joint medical microbiology and virology curriculum (V3).
	This version has had 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.
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CONTENTS

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INTRODUCTION

Medical microbiology 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 medical microbiology, 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 medical microbiology assessment systems (this demonstrates how the College assessments and examinations test the structure of the medical microbiology 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 medical microbiology and 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 Medical Microbiology must be able to demonstrate equivalence to the requirements for the award of a medical microbiology 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 medical microbiology training programme following satisfactory completion of a UK foundation training programme or equivalent.

Duration of training

The Royal College of Pathologists anticipates that five years would normally be required to satisfactorily complete the medical microbiology 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 four years but that all provisional CCT or CESR(CP) dates should be set at five years in the first instance.

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

- evidence of satisfactory completion of the requirements of the medical microbiology curriculum (including workplace-based assessments) 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
- attainment of FRCPath by examination in medical microbiology and 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 medical microbiology and infectious diseases

Trainees may wish to dually train and accredit in medical microbiology 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. This programme will need to achieve the competencies as described in both curricula and there must be jointly agreed assessments (proposed by the Medical Microbiology 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 medical microbiology and infectious diseases is extended by one 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 medical microbiology and infectious diseases training is six years plus two years CMT.

The CCTs or CESR(CP)s in medical microbiology 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 medical microbiology and infectious diseases are available separately.

Training regulations

This section of the curriculum outlines the training regulations for medical microbiology. 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' (previously referred to as flexible training) is the term used to describe doctors undertaking training on a basis that is not full-time, normally between five and eight sessions per week. 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 Medical Microbiology 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 medical microbiology training as out-of-programme research (OOPR).

Research undertaken prior to entry to a medical microbiology training programme

Trainees who have undertaken a period of research that includes *clinical or laboratory work directly relevant to the medical microbiology curriculum*, prior to entering a medical microbiology 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 medical microbiology training programme

Trainees who undertake a period of out-of-programme research (OOPR) after entering a medical microbiology training programme and obtaining their National Training Number (NTN) can have up to one year accepted by the Medical Microbiology 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 Medical Microbiology 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 medical microbiology 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 Medical Microbiology CATT, PMETB prospectively approve the OOPR in order that the period can count towards a CCT. Separate guidance and an application form are available on the College website for this purpose.

Trainees must have their OOPR agreed by the relevant Deanery, accepted by the Medical Microbiology 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 medical microbiology. Such trainees will normally be clinical lecturers and hold an NTN(A). It is expected that such trainees should complete the requirements of the medical microbiology curriculum in addition to their academic work. However, the content of their training, while meeting the requirements of the curriculum, will have to take into account their need to develop their research and the provisional CCT date should be amended accordingly. NTN(A) holders in medical microbiology should consult the Training and Educational Standards Department at the College on an individual basis with regard to the agreement of their provisional CCT date.

Overseas training

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

Some trainees may have undertaken a period of medical microbiology training overseas prior to entering a medical microbiology training programme in the UK. Such trainees must enter a medical microbiology 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 medical microbiology training programme

Some trainees may wish to spend a period of training overseas as out of programme training (OOPT) after entering a medical microbiology 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 Medical Microbiology 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 Medical Microbiology CATT, PMETB prospectively approve the OOPT in order that the period can count towards a CCT. Separate guidance and an application form are available on the College website for this purpose.

Trainees must have their OOPT agreed by the relevant Deanery, accepted by the Medical Microbiology 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 medical microbiology and obtained competencies which can be mapped directly to the medical microbiology curriculum. Such trainees must enter a medical microbiology 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 Medical Microbiology 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 Medical Microbiology CATT. The College will approve up to one year of such training. An application for approval should include evidence of approval status, the knowledge, skills and attitudes satisfactorily obtained and agreement by the Medical Microbiology 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 medical microbiology cannot contribute towards the award of the CCT unless it has been prospectively approved by PMETB. The Medical Microbiology 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 medical microbiology 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 medical microbiology and to ensure that trainees are fully prepared to lead a full medical microbiology 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 microbiology
- understanding of the areas of clinical microbiology detailed in the curriculum
- knowledge of specialist areas for medical microbiology – infection control, virology, mycology, parasitology and public health
- the communication skills required for the practice of clinical microbiology and the teaching skills necessary for effective practice
- the acquisition of management skills required in the running of the microbiology laboratory
- knowledge of the health protection aspects of clinical microbiology

- experience of research and development projects and critical assessment of published work so as to contribute in a team and individually 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 microbiology practice.

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

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

The award of the CCT or CESR(CP) will indicate suitability for independent professional practice as a consultant in medical microbiology. 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 Medical Microbiology CATT and with input from the 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 16 November 2009 for a two week period.

The infectious diseases curriculum is developed by the Infectious Diseases SAC of the JRCPTB. The joint training programme in medical microbiology and infectious diseases is developed in consultation between the Infectious Diseases SAC, Medical Microbiology CATT and other appropriate committees and bodies.

The content of the curriculum was derived from current UK hospital and laboratory practice in medical microbiology. Educational supervisors and trainees were involved in curriculum development via their representation on various College committees such as the Medical Microbiology CATT, Medical Microbiology SAC and the Trainees Advisory Committee (TAC).

The curriculum will allow 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 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 medical microbiology curriculum. Trainees may not progress to the next stage of training until they have satisfactorily completed the preceding stage. Please read this section in conjunction with the illustrative timetable of medical microbiology training at Appendices 3a and 3b (see pages 102–103).

Stage A

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

Stage A of training is 12 months whole-time equivalent. This stage of the curriculum (see page 56) will begin with a formal introduction to the basic principles of medical microbiology and virology. Following the induction 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 medical microbiology training, trainees must have:
- satisfactorily completed stage A of the curriculum and a minimum training period of 12 months (whole-time equivalent)
- achieved satisfactory outcomes in the requisite number of medical microbiology 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 laboratory to an adequate level but will still require consultant input with regard to complex management and clinical issues.

Stage B of training is 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 medical microbiology. The knowledge gained during this stage of training will be assessed by the FRCPath Part 1 examination.

In order to complete stage B of medical microbiology 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 workplace-based assessments
• passed the FRCPath Part 1 examination in medical microbiology
• obtained one or more satisfactory outcomes in the ARCP to indicate satisfactory progress in training.

Stage C

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

In order to complete stage C of medical microbiology 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 workplace-based assessments
• passed the FRCPath Part 2 examination in medical microbiology
• obtained one or more satisfactory outcomes in the ARCP to indicate satisfactory progress in training.

Stage D

Stage D of training is between month 43 and month 60 of whole-time equivalent training. This stage of the curriculum prepares the trainee for their 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 medical microbiology. 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 medical microbiology.

In order to complete stage D of medical microbiology 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 workplace-based assessments
- satisfactorily completed all areas of the medical microbiology 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 service operates. It will be important for trainees to understand, at an early stage, the pathology and public health environments on which the diagnosis, prevention and control of infection depends, and the multidisciplinary nature of this environment. Following the induction period, the trainee will receive instruction and practical experience in further aspects of bacteriology, virology, mycology and parasitology, both laboratory and clinical. The emphasis will be on acquiring basic microbiological and virological knowledge and practical bench skills in a routine laboratory and clinical setting.

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 one month of which should take place before the FRCPath Part 1 examination. The delivery of the virology training is a local matter.

The trainee entering Stage C of the training programme will have a sound theoretical and practical knowledge of microbiological 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 medical microbiology trainee will be expected to have specific instruction in infection control and prevention, microbiology, virology, mycology, parasitology, epidemiology and public health/health protection medicine and will need a broad experience of medical microbiology training as it is practised in a District General Hospital (DGH).

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 or Regional Specialty Advisor is 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 Medical Microbiology 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 medical microbiology, in accordance with *Good Medical Practice*, the medical leadership curriculum, common competencies curriculum and the health inequalities curriculum (see pages 24–55)

Core medical microbiology and virology curriculum (Stage A) (see pages 56–63)

Core medical microbiology curriculum (Stages B–D)

1.   **Laboratory aspects of microbiology** (see pages 64–66)

2.   **Knowledge of health and safety** (see page 67)

3.   **Clinical skills** (see pages 68–80), including the diagnosis and management of:
     - infection in the community

- healthcare-associated infection, including hospital-acquired infection and prevention
- infection in immunocompromised patients including human immunodeficiency virus (HIV), transplantation and neutropenia
- infection in the Intensive Care Unit (ICU) and Special Care Baby Unit (SCBU), including sepsis
- outbreaks of infection in hospital and the community
- infection in the returning traveller
- sexually transmitted infection
- food- and water-borne infection
- paediatric infection
- infection in pregnancy.

4. **Specialist areas of microbiology** (see pages 81–92)
    The trainee will acquire a working knowledge, with the opportunity to sub-specialise if required, in:
    - virology (for microbiologists)
    - health protection and epidemiology
    - mycology
    - parasitology.

5. **Communication and management issues in microbiology** (see pages 93–95)

Developing independent practice (see pages 96-97)

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, attitudes 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 outlined in pages 56–63 and either the core medical microbiology training outlined in pages 64−95, 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 medical microbiology.

The recommended learning experiences are listed on pages 19–20. The intended outcomes of learning are benchmarked to identifiable stages of training and these are listed on pages 11–13.

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 medical microbiology training programme, the trainee must have acquired and be able to demonstrate:
- appropriate attitudes in order to be able to work as an independent professional practitioner in medical microbiology
- good working relationships with colleagues and the appropriate communication skills required for the practice of medical microbiology
- the knowledge, skills and attitudes to act in a professional manner at all times
- the knowledge, skills and attitudes to provide appropriate teaching and to participate in effective research to underpin medical microbiology practice
- an understanding of the context, meaning and implementation of clinical governance
- a knowledge of the structure and organisation of the NHS
- the acquisition of management skills required for the running of a medical microbiology laboratory
- familiarity with health and safety regulations, as applied to the work of a medical microbiology 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 medical microbiology is to:
- indicate suitability of choice at an early stage of the chosen career path
- indicate the capability and potential of a trainee through tests of applied knowledge and skill relevant to the specialty
- demonstrate readiness to progress to the next stage(s) of training having met the required standard of the previous stage
- provide feedback to the trainee about progress and learning needs
- support trainees to progress at their own pace by measuring a trainee's capacity to achieve competencies for their chosen career path
- help to identify trainees who should change direction or leave the specialty

- drive learning demonstrated through the acquisition of knowledge and skill
- enable the trainee to collect all necessary evidence for the ARCP
- gain Fellowship of The Royal College of Pathologists
- provide evidence for the award of the CCT
- assure the public that the trainee is ready for unsupervised professional practice.

A blueprint of the medical microbiology 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 examination 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 Microbiologyand 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 medical microbiology.

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 for years ST1 and ST2; minimum of 4 satisfactory outcomes required per year for years ST3, ST4 and ST5)
- Evaluation of Clinical/Management Events (ECE) (minimum of 4 satisfactory outcomes required per year for years ST1 and ST2; minimum of 6 satisfactory outcomes required per year for years ST3, ST4 and ST5)

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 based on a portfolio of documentation, culminating in an Educational Supervisors Structured Report.

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

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

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, well supervised, with the appropriate content, have a broad exposure and include laboratory 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 text books. It is the trainee's responsibility to seek opportunity for experiential learning. The rotation should also be arranged in such a way that trainees have time available for participation in research projects as part of their training. The more academically inclined trainees will be encouraged to take time out from the training time to include a more sustained period of 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 Prevention & Control Nurses and/or a Consultant in Communicable Disease Control (CCDC)/CHP and/or Regional Epidemiologist (RE)
l. attendance and participation at relevant Trust committees
m. attending training available through equipment and kit manufacturers
n. attending ward round and multidisciplinary team meetings and telephone advice to clinicians
o. teaching undergraduates and other health professionals

p.   awareness of appropriate guidelines

q.   attending regional, national and international medical or scientific conferences

r.   interaction with/attachment to specialist reference laboratories

s.   e-learning

t.   undertaking a laboratory-based project

u.   learning with peers

v.   work-based experiential learning

w.   medical clinics including specialty clinics

x.   consultant-led ward rounds

y.   practical laboratory experience

z.   formal postgraduate teaching

aa. independent self-directed learning

bb. formal study

SUPERVISION AND FEEDBACK

Specialty training must be appropriately supervised by the senior medical and scientific and nursing (infection prevention and control nurses) staff 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. The College also acknowledges that the process of gaining competence in supervision starts at an early stage in training with foundation doctors supervising medical students and specialty registrars supervising more junior trainees.

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

The role of the educational supervisor is to:

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

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

MANAGING CURRICULUM IMPLEMENTATION

The curriculum outlines the minimum medical microbiology 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 medical microbiology 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 Medical Microbiology 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 their post meets the requirements of the relevant section(s) of the curriculum. The educational supervisor must undertake regular educational appraisal with their trainee, at the beginning, middle and end of a section of training, to ensure structured and goal-oriented delivery of training.

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

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 Microbiology CATT within two 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 and the Race Relations Amendment Act (RRAA) 2000
- the Disability Discrimination Act 1995 and subsequent amendments
- the Sex Discrimination Act 1975 and 1986 and the 1983 and 1986 Regulations
- the Equal Pay Act 1970 and the Equal Pay (Amendment) Regulations 1983 and 1986
- the Human Rights Act 1998
- the Employment and Equality (Sexual Orientation) Regulations 2003
- the Employment and Equality (Religion or Belief) Regulations 2003
- Gender Recognition Act 2004
- the Employment Equality (Age) Regulations 2006.

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 and members is available in the College policy.

ACKNOWLEDGEMENTS

PROFESSIONAL PRACTICE CURRICULUM FOR MEDICAL MICROBIOLOGY

This section outlines the generic knowledge, skills and attitudes that are tailored to and required for specialist training in medical microbiology and virology and the competencies acquired in relation to the practice of medical microbiology needed in day-to-day practice to comply with good medical practice and underpin medical microbiology practice. It is intended that trainees follow this curriculum for their entire training period in medical microbiology. 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 attitudes 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	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 Communicate with people with language difficulties associated with physical and mental impairment Use interpreters and advocates appropriately	Show empathy with patients Appreciate the importance of psychological factors for patients and relatives Appreciate the interaction of social factors and the patient's illness

Subject	Knowledge	Skills	Behaviours
Examination	Define the pathophysiological basis of physical signs Define the clinical signs found in infectious diseases	Perform a reliable and appropriate clinical examination	Respect patients' dignity and confidentiality Acknowledge cultural issues Appropriately involve relatives Appreciate situations where there is the need for a chaperone
Investigations including imaging	Define the pathophysiological basis of investigations Define the indications for investigations Define the risks and benefits of investigations Know the clinical and cost effectiveness of individual investigations	Start appropriate investigations Interpret the results of investigations Perform appropriate clinical investigations competently where relevant Liaise and discuss investigations with colleagues and advise them appropriately	Understand the importance of working with other healthcare professionals and team working Be able to provide explanations to patients as to the rationale for investigations, and possible unwanted effects
Treatment (therapeutics)	Outline scientific theory relating to pharmacology and the pathophysiology of therapeutic interventions for infection	Assess accurately the patient's needs	Clearly and openly explain treatments and side effects of drugs

Subject	Knowledge	Skills	Behaviours
Note-keeping, letters, etc.	Write summaries, letters, medico-legal reports Define the structure, function and legal implications of medical records and medico-legal reports Describe 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 Be aware of the need for prompt and accurate communication with primary care and other agencies and patients 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 co-operation with primary care
Time management	Explain which patients/tasks take priority	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 Willingness to consult and work as part of a team
Decision making	Identify clinical priorities for investigation and management	Analyse and advise on clinical infection problems	Be flexible and willing to change in the light of changing conditions Be willing to ask for help

Health determinants and inequalities

Subject	Knowledge	Skills	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 global-isation 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 disas-ters 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	Behaviours
Inequality and discrimination/stigmatising	• 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 • Take account of 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	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	• Be confident and positive in one's own professional values • Accept uncertainty • Be aware of 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, explain to parents who smoke the health risk that this poses to their children, including those exposed to the effects of smoking *in utero*	• 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	Behaviours
Policy, research and change	• Be aware of current UK screening, immunisation and reporting programmes that relate to infection • Be aware of issues that might affect health inequalities that are currently under debate regarding changes in the NHS, including the public policy process • Be aware of and 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)	• Be able 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	Behaviours
Overall clinical judgement	Demonstrate sufficient clinical and biochemical knowledge to enable integration of clinical and laboratory features	Interpret correctly test results in the context of available clinical information	Willingness to use the available clinical and laboratory data in coming to diagnostic/treatment decisions
Recognise own limitations	Know the extent of one's own limitations and know when to ask for advice		Willingness to ask for advice and to admit mistakes
Written records	Describe the appropriate content of clinical records Explain the problems faced by people for whom English is not a first language Explain the problems faced by people with educational and/or physical disabilities Describe the relevance of data protection pertaining to patient confidentiality	Produce accurate letters/reports and other written correspondence with clear conclusions	Willingness to communicate in an appropriate manner to medical secretaries and electronic communication Willingness to communicate promptly and accurately with clinicians and patients and their families Show courtesy towards medical secretaries and clerical staff

Subject	Knowledge	Skills	Behaviours
Decision making	Know the 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	Know the importance of continuing professional development	Recognise and use learning opportunities Use the potential of study leave to keep up to date Produce a professional portfolio Be able to collect 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
Good use of information technology (IT)	Demonstrate how to use email, internet, fax and the telephone appropriately Describe the principles of how to retrieve and utilize data recorded in clinical systems Demonstrate the principles of literature searching using medical databases Explain the range of possible uses for clinical data and information and appreciate the dangers and benefits of aggregating clinical data Demonstrate the main features, responsibilities and liabilities in the UK and Europe pertaining to confidentiality	Perform competent use of database, word processing and statistics programmes Perform searches (including literature searches) and access websites and health-related databases Apply the principles of confidentiality in the context of IT	Demonstrate the acquisition of new attitudes in patient consultation in order to make maximum use of IT Be able to share information on computer with the patient in a constructive manner Adopt a proactive and enquiring attitude to new technology

Subject	Knowledge	Skills	Behaviours
The organisational framework for clinical governance and its application in practice	Describe 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 Describe the benefits a patient might reasonably expect from clinical governance	Be an active participant in clinical governance Produce medical and clinical audit Be actively involved in audit cycles Be active in research and development Critically appraise medical data research 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 Be prepared to learn from mistakes, errors and complaints Recognise the importance of teamwork Share best practice with others

Subject	Knowledge	Skills	Behaviours
Risk management	Explain about health and safety policy, policies on needle stick injuries, note keeping, communications and staffing numbers, in relation to risk Describe risk management issues pertinent to laboratory processing Describe about 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 to obtain informed consent Assess risks and benefits with patients and colleagues	Respect and accept patients' views and choices Be truthful and to admit error to patients, relatives and colleagues
Evidence	Describe: • the principles of evidence-based medicine • types of clinical trial • types of evidence	Critically appraise evidence Be competent 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 how to use the audit cycle, data sources and data confidentiality Describe the principles of internal and external quality assurance	Analyse and produce results in ongoing audit Demonstrate the ability to 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)

Subject	Knowledge	Skills	Behaviours
Guidelines	Describe the advantages and disadvantages of guidelines	Use guidelines Produce guidelines with the help of others	Show regard for individual patient needs when using guidelines Show willingness to use guidelines as appropriate
Structure of the NHS and the principles of management including change management	Describe the structure of the NHS in the relevant jurisdiction of the UK, including Primary Care Trusts and Hospital Trusts, Health Boards and Authorities Describe the local Trust's management structure (including chief executive, medical directors, clinical directors and the pathology laboratory) Describe finance issues in general in the NHS, especially budgetary management and commissioning Describe the importance of a health service for the population	Demonstrate developing skills in managing change and managing people Demonstrate developing interviewing techniques including those required for performance reviews Contribute to the writing of a business plan	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	Behaviours
Relevance of outside bodies	Explain the role and relevance to professional life of: • the medical royal colleges • Postgraduate Dean and Deaneries • General Medical Council (GMC) • PMETB • Modernising Medical Careers (MMC) • British Medical Association (BMA) • defence unions • specialist societies Describe central government health regulatory agencies and their equivalents in different jurisdictions (e.g. National Institute for Health and Clinical Excellence [NICE], Care Quality Commission (CQC), NHS Quality Improvement Scotland, National Patient Safety Agency [NPSA]), health protection agencies, Veterinary Laboratories Agency)	Recognise situations when these bodies and individuals need to be involved	Be open to constructive criticism Accept professional regulation
Media awareness	Describe 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 or other relevant parties, e.g. public health specialists	Act professionally Be willing to ask for help

Subject	Knowledge	Skills	Behaviours
Planning	Describe: • 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 a department, unit or practice relevant to the specialty	Write and implement protocols and guidelines Analyse feedback and comments and integrate them into plans for the service	Demonstrate an awareness of equity in healthcare access and delivery
Managing resources	Explain: • efficient use of clinical resources in order to provide care • commissioning, funding and contracting arrangements relevant to the specialty • management of financial pressures experienced by department and organisation	Use clinical audit with the purpose of highlighting resources required Manage time and resources effectively in terms of delivering services to patients	Show a commitment to the proper use of public money and take action when resources are not used efficiently or effectively Demonstrate awareness that in addition to patient-specific clinical records, clinical staff also have responsibilities for other records (e.g. research)

Subject	Knowledge	Skills	Behaviours
Managing people	Describe: • Relevant legislation (e.g. Equality and Diversity, Health and Safety, Employment Law) and local Human Resource policies • The duties, rights and responsibilities of an employer, and of a co-worker (e.g. looking after occupational safety of fellow staff) • Individual performance review purpose, techniques and processes, including differences between appraisal, assessment and revalidation	Demonstrate the ability to: • 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: • Organisational performance management techniques and processes • 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 Take steps to improve services following evaluation/performance management	Respond constructively to the outcome of reviews, assessments or appraisals of performance Demonstrate an understanding of the needs and priorities of non-clinical staff

Subject	Knowledge	Skills	Behaviours
Identifying the contexts for change	Summarise: • the responsibilities of the Executive Board members and Clinical Directors or leaders • function and responsibilities of national bodies, e.g. DH, CQC, NICE, NPSA, NCAS; Royal Colleges and Faculties, specialty, representative and regulatory bodies; educational and training organisations	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 strategies relevant to the specialty and delivering patient services	Comply with national guidelines that influence healthcare provision Willingly articulate strategic ideas and use effective influencing skills
Applying knowledge and evidence	Describe: • patient outcome reporting systems within the specialty, and organisation and how they relate to national programmes • research methods and how to evaluate scientific publications including the use and limitations of different data-collecting methodologies	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
Making decisions	Demonstrate understanding of: • how decisions are made by individuals, teams and the organisation • effective communication strategies within organisations	Prepare for meetings – reading agendas, understanding minutes, action points, doing background research on agenda items Work collegiately and collaboratively with a wide range of people outside the immediate clinical setting	Demonstrate: • an appreciation of 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	Behaviours
Evaluating impact	Explain: • 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 Demonstrate an understanding of the wider impact of implementing change in healthcare provision and the potential for opportunity costs	Demonstrate a commitment to implementing proven improvements in clinical practice and services Obtain an adequate 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	Behaviours
To have the skills, attitudes and practices of a competent teacher	Describe how to identify adult learning principles Describe how to identify learner needs Outline how to structure a teaching activity Explain varied teaching strategies Describe how to identify learning styles Describe 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 To contribute to relevant teaching resources, e.g. RCPath Pathopedia Give constructive effective feedback Evaluate programmes and events Use different media for teaching that are appropriate to the teaching setting	Demonstrate a willingness and enthusiasm to teach Show respect for the learner Demonstrate a professional attitude towards teaching Show commitment to teach Demonstrate a learner-centred approach to teaching

Subject	Knowledge	Skills	Behaviours
To be able to plan and analyse a research project	Describe: • 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 • principles of research funding and how to obtain funding	Undertake systematic critical review of scientific literature, e.g. for the National Map of Medicine or Pathopedia Ability to frame questions to be answered by a research project Develop protocols and methods for research Use databases Accurately analyse data Write a scientific paper Have good written and verbal presentation skills	Demonstrate curiosity and a critical spirit of enquiry Ensure patient confidentiality Demonstrate knowledge of the importance of ethical approval and patient consent for clinical research Humility
Appraisal and assessment	Describe the concepts of appraisal and assessment Conduct an appraisal interview or assessment	Maintain an appraisal portfolio Undertake an effective appraisal or assessment	Demonstrate a positive attitude to appraisal Be aware of equality and diversity issues as they relate to appraisal

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
- manage difficult and complex situations with patients and their families, to advise them appropriately and to manage complaints effectively.

Subject	Knowledge	Skills	Behaviours
Patient safety	Describe: • issues around patient safety and the role of the NPSA • NPSA National Reporting and Learning System	Demonstrate awareness of patient safety in a practical situation	Show regard for patient safety
Continuity of care	Explain the relevance of continuity of care	Ensure satisfactory completion of reasonable tasks at the end of the shift/day with appropriate handover Ensure appropriate documentation of/for handover Make adequate arrangements to cover leave	Recognise: • importance of punctuality and attention to detail • importance of communication with patients/carers
Informed consent	Describe: • process for gaining informed consent • principles of consent relating to clinical practice and research • how to gain consent for a research project	Give appropriate information in a manner patients understand and be able to gain informed consent from patients Demonstrate appropriate use of written material	Respect for patients' and relatives' points of view and wishes Consider the patient's needs as an individual

Subject	Knowledge	Skills	Behaviours
Confidentiality	Describe relevant strategies to ensure confidentiality Outline situations when confidentiality might be broken	Use and share all information appropriately. Avoid discussing one patient in front of another. Be prepared to seek patient's wishes before disclosing information.	Respect the right to confidentiality
Within a consultation	Demonstrate how to structure the interview to identify the patient's: • concerns/problem list/priorities • expectations • understanding • acceptance	Listen Use 'open' questions followed by appropriate 'closed' questions Avoid jargon and use familiar language Communicate both verbally and in writing to patients whose first language may not be English in a manner that they understand Use interpreters appropriately Give clear information and feedback to patients and share information with relatives when appropriate Reassure 'worried well' patients	Demonstrate an understanding of the need for: • involving patients in decisions • offering choices • respecting patients' views • dress and appearance that are appropriate to the clinical situation and patient

Subject	Knowledge	Skills	Behaviours
Complaints	Describe: • the local complaints procedures • 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	Explain all aspects of a professional relationship Establish the limiting boundaries surrounding the consultation Explain how to deal with challenging behaviour in patients who 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

Subject	Knowledge	Skills	Behaviours
Educating patients about: • **disease** • **investigations** • **therapy**	Outline: • procedures including possible alternatives and choices • 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
Environmental and lifestyle risk factors	Outline 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	Describe the methods of data collection and their limitations Formally notify diseases where this is required Apply 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: • positive and negative aspects of prevention • importance of patient confidentiality Respect patient choice
Ensuring patient safety	Describe risk management issues pertinent to infection, potential sources of risk and risk management tools, techniques and protocols	Report clinical incidents Assess and analyse situations, services and facilities in order to minimise risk to patients and the public	Demonstrate actively seeking advice/assistance whenever concerned about patient safety

Subject	Knowledge	Skills	Behaviours
Ensuring patient safety (continued)	How healthcare governance influences patient care, research and educational activities at a local, regional and national level	Monitor the quality of equipment and safety of the environment relevant to the specialty	Willingness to take respon-sibility for clinical governance activities, risk management and audit in order to improve the quality of the service
Critically evaluating	Describe: • quality improvement methodologies including a range of methods of obtaining feedback from patients, the public and staff • 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 Deal with complaints in a sensitive and co-operative manner Act as an advocate for the service
Encouraging innovation	Apply a variety of methodologies for developing creative strategies for improving services	Question existing practice in order to improve services Apply creative thinking approaches (or methodologies or techniques) in order to propose solutions to service issues	Demonstrate: • being open minded to new ideas • a proactive approach to new technologies and treatments • supporting colleagues to voice ideas
Facilitating transformation	Outline: • the implications of change on systems and people • project management methodology	Demonstrate the ability to: • provide medical expertise in situations beyond those involving direct patient care • make effective written and verbal presentations	Demonstrate: • being positive about improvement and change • striving 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	Behaviours
Working with clinical teams	Describe how a team works effectively Summarise the roles and responsibilities of team members, especially within the department and within multidisciplinary teams Outline the roles of other clinical specialties 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 Respect skills and contribution of colleagues Recognise and work within own limitations Delegate appropriately Show leadership Supervise safely	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 Demonstrate team approach and willingness to consult and work as part of a team

Subject	Knowledge	Skills	Behaviours
Working with clinical teams (continued)		Work in collaboration with external agencies to manage the potential for infection prevention and control within the wider community including communicating effectively with the general public and liaising with regional and national bodies where appropriate Take responsibility including to delegate and supervise safely	
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 and how best to contact 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

Subject	Knowledge	Skills	Behaviours
Interactions between: • **hospital and GP** • **hospital and other agencies, e.g. social services medical and surgical specialties**	Explain the roles and responsibilities of team members Describe how a team works effectively	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 co-operatively Respect colleagues, including non-medical professionals, and recognise good advice Recognise and work within own limitations
Creating an environment in which mistakes and mismanagement of patients can be openly discussed and lessons learned		Be aware of the advantages and disadvantages of guidelines Report and investigate critical incidents Take appropriate action if you suspect you or a colleague may not be fit for practice	
Self awareness	Describe: • ways in which individual behaviours impact on others; personality types, group dynamics, learning styles, leadership styles • methods of obtaining feedback from others	Maintain and routinely practise critical self-awareness, including ability to discuss strengths and weaknesses with supervisor, recognise external influences and change 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

Subject	Knowledge	Skills	Behaviours
Self-management	Appropriately apply tools and techniques for managing stress Recognise the role and responsibility of occupational health and other support networks Recognise 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
Self-development	Describe the local processes for dealing with and learning from clinical errors Acknowledge the importance of best practice, transparency and consistency	Use a reflective approach to practise 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	Describe the professional, legal and ethical codes of the GMC, e.g. Fitness to Practice and any other codes pertaining to the trainee's specialty Summarise the key issues of prejudice and preferences within self, others, society and cultures	Recognise, analyse and appropriately deal with unprofessional behaviours in clinical practice, taking into account local and national regulations Create open and non-discriminatory professional working relationships with colleagues awareness of the need to prevent bullying and harassment	Accept of professional regulation Promote professional attitudes and values Act with probity and the willingness to be truthful and to admit errors

Subject	Knowledge	Skills	Behaviours
Developing networks	Describe: • the role of team dynamics in the way a group, team or department functions • 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	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 promoting values based on non-prejudicial practice Use authority appropriately and assertively; willing to follow when necessary
Encouraging contribution	Appropriately use facilitation and conflict resolution methods	Enable individuals, groups and agencies to implement plans and decisions Identify and prioritise tasks and responsibilities including to 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	Behaviours
Identifying the contexts for change	Describe the responsibilities of the various Executive Board members and Clinical Directors or leaders Summarise the function and responsibilities of national bodies such as DH, CQC, NICE, NPSA, NCAS; Royal Colleges and Faculties; specialty, representative and regulatory bodies; educational and training organisations	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	Behaviours
Personal health	Describe the use of occupational health services Describe one's responsibilities to the public Know 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	Describe the effects of stress Describe 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	Behaviours
Service information	Legal framework for advertisements		Recognise absolute importance of accuracy and impartiality
Writing reports and giving evidence			Honesty and integrity Timeliness
Research		Obtain ethical approval.	Put safety and care of patients first Conduct research with honesty and integrity
Financial dealings			Not induce patients to accept private medical care Manage funds for the purpose for which they are intended Declare conflicts of interest

SPECIALTY-SPECIFIC MEDICAL MICROBIOLOGY 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.

During this period there will be training in 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 three to four months and is designed to equip the trainee with the fundamental knowledge and skills for the practice of medical microbiology, including necessary 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.

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	Knowledge	Skills	Behaviours
Basic biology relevant to microorganisms and infection	Explain basic biology (structure, genetics, taxonomy, epidemiology) of major bacterial, viral, fungal and parasitic agents Explain basics of the immune response to infection Compare and contrast cellular and humoral immunity Explain the basis of how vaccines work Explain the basics of molecular biology Explain the basis of genetic susceptibility to pathogens and disease	Use knowledge of basic biology to justify investigations, infection prevention and control procedures and interpretation of results	Enthusiastic approach to learning and application of knowledge

Subject	Knowledge	Skills	Behaviours
Host pathogen relationships	Explain: • the basis of how the immune response protects against infection, and how it may contribute to pathogenesis of infectious diseases • the basis of different types of host−parasite relationships, e.g. symbiosis, viral latency, quasispecies evolution, etc. • the types of immunodeficiency and how they affect susceptibility to and control of infectious diseases • pathogenic mechanisms involved in infectious diseases and the role of host response in immunopathology	Use knowledge of host−pathogen relationships to analyse clinical presentation of infections and justify investigations and interpretations of results	Enthusiastic approach to learning and application of knowledge
Laboratory safety	Explain basic laboratory hazards and precautions against them	Work safely in a laboratory	Observe safe working practices
ACDP classification of pathogens	Explain principles of standard precautions, hazard groups and containment levels	Work safely in a laboratory at appropriate ACDP containment level	
Standards of practice	Describe the importance and relevance of standards to good laboratory practice. Understand the evidence base behind standard operating procedures (SOPs)/examination procedures (EPs) and the importance of audit and quality control to establish validity		Establish a rapport with both laboratory and clinical staff

Subject	Knowledge	Skills	Behaviours
Basic principles of diagnostic microbiology and virology	Explain: • the range of tests available, and the circumstances in which they are used • the difference between sterile and contaminated/colonised body sites • basic techniques for serodiagnosis in infectious diseases • nucleic acid-based detection system such as polymerase chain reaction (PCR) • simple antimicrobial and antiviral susceptibility testing and its interpretation • the basic principles behind drug monitoring and its uses	Skills should include: • perform sample processing for simple microbiology and virology specimens according to SOPs/EPs • identify common viral/microbial pathogens with confirmation of identity, and distinction between clinically significant and non-significant pathogens • perform simple antimicrobial and interpret the results	Establish close rapport and understanding with laboratory staff

Subject	Knowledge	Skills	Behaviours
Clinical syndromes – advice and management	Outline the principles of epidemiology, presentation, diagnosis and management of clinical syndromes: • genitourinary tract infection including sexually transmitted infections (STIs) and bacterial urinary tract infection • respiratory tract infection • gastrointestinal infections • skin and soft tissue infection • eye infection • post-operative infection • inoculation incident • encephalitis/meningitis • brain abscess • hepatitis including test interpretation • rashes and rash contacts (pregnant and non pregnant) • infections in pregnancy, including methods of diagnosis, and implications of infection for mother and fetus	Taking relevant basic clinical/infection history Manage (under supervision) of common clinical syndromes (see opposite)	Establish rapport with clinical and primary care staff Explain results and clinical management plans simply and effectively to both clinicians and patients

Subject	Knowledge	Skills	Behaviours
Clinical syndromes – advice and management (continued)	Outline the principles of epidemiology, presentation, diagnosis and management of clinical syndromes: • congenital infection and infection acquired perinatally • infections in the immunocompromised including basic understanding of how to make the diagnosis of infection and treatment options • deep infection (e.g. septicaemia, endocarditis, bone infection) • common nosocomial infection (e.g. device-associated infection) • infection in travellers (e.g. malaria) • community-acquired and nosocomial infections in which environmental factors play a role (e.g., food, water, air)		
Treatment and prevention strategies	Explain: • the range of therapies available for infectious disease, 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 • the basic principles of action and resistance for other antimicrobial agents, their uses and limitations • the basic principles of prophylaxis, both with antimicrobials and with immune globulins Describe existing vaccines and the schedules of immunisation.	Use knowledge of treatment and prevention strategies in the management of clinical infection under supervision	Enthusiastic approach to learning

Subject	Knowledge	Skills	Behaviours
Infection prevention and control	Describe routes of transmission and methods of preventing nosocomial spread of common and important infecting organisms ('alert organisms'), including: • meticillin-resistant and -sensitive *Staphylococcus aureus* • vancomycin-resistant enterococci • varicella zoster virus • enteric infections including viral diarrhoea • respiratory tract infections, including TB • blood-borne viruses • extended-spectrum beta-lactamase-producing organisms (ESBLs) • multiply-resistant *Acinetobacter baumanii* • *Clostridium difficile* – associated diarrhoea Describe issues surrounding the isolation of the febrile traveller Describe the principles and practice of surveillance and public health with particular regard to food-borne and vaccine-preventable infections and STIs	Use knowledge of infection prevention and control in the management of patients with infection	Liaise effectively with Infection Prevention & Control Team and/or CCDC/CPHM and the clinicians and coordinate infection prevention and control and public health management of patients Recognise the need for confidentiality

Subject	Knowledge	Skills	Behaviours
Sterilisation and disinfection	Describe basic terms Describe the basis of the different methods available Describe the importance of removal of pathogenic organisms in the prevention of infection in: • pre-operative sterilisation • aseptic technique • decontamination of environmental sources.		Enthusiastic approach to learning Establish close rapport and understanding with laboratory staff To liaise effectively with Infection Prevention & Control Team

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

INTRODUCTION

This period of training in medical microbiology will consist of consolidation of clinical and laboratory work started in Stage A up to consultant level. Flexibility at this stage will be encouraged to reflect the needs of the trainee and may additionally include modules such as virology, epidemiology, public health medicine, research, time in another laboratory, etc.

The precise composition of an individual training programme should be structured around the past experience and aspirations of each trainee and should set out educational objectives against which progress can be assessed. Programmes should identify how specific areas of training not covered by the departments involved will be obtained (e.g. secondment for experience in virology, communicable diseases/epidemiology, public health microbiology), together with any courses deemed necessary.

1.   LABORATORY ASPECTS OF MICROBIOLOGY

Objective: to be competent in the management of the microbiology laboratory.

Subject	Knowledge	Skills	Behaviours
Understanding of appropriate staining and culture techniques	Describe microscopy, culture and identification techniques for common pathogens	Process all routine specimens received in the laboratory and carry out further tests necessary for full identification of pathogens	Establishes close rapport and understanding with laboratory staff
Antimicrobial susceptibility testing	Describe current techniques for susceptibility testing including E-test, broth dilution and automated methodologies with appropriate quality control	Perform simple susceptibility tests Provide clinical advice based on interpretation of the results of susceptibility testing Analyse use and limitations of the antibiogram for outbreak investigation and control	Establishes close rapport and understanding with laboratory staff

Subject	Knowledge	Skills	Behaviours
Understand serologic and antigen-based techniques	Describe the basis and clinical interpretation of results of latex agglutination, enzyme-linked immunosorbent assay (ELISA), immunofluorescence, complement fixation test (CFT) and the various controls	Perform simple serological tests Provide clinical advice based on interpretation of the results of serology	Establishes close rapport and understanding with laboratory staff
Molecular diagnostic techniques	Describe the principles of current clinically used nucleic acid-based techniques Describe the selection of appropriate tests and their interpretation (advantages and limitations)	Provide clinical advice based on interpretation of the results of nucleic acid-based techniques	Establishes close rapport and understanding with laboratory staff Includes reference lab staff where appropriate
Knowledge of automated and semi-automated methodologies in microbiology	Describe automated culture and identification methodologies		
Point-of-care testing	Describe the role of clinical governance issues with and quality assurance of point-of-care testing.		
Knowledge of typing methods available	Explain the principles, advantages and limitations of various phenotypic and genotypic methods Describe the role of typing in incident/outbreak investigations	Recommend appropriate typing methods for clinical situations and interpret the results	

Subject	Knowledge	Skills	Behaviours
Reference centres	Describe the indications for referral of specimens to reference facilities Describe regulations for transportation of samples	Refer specimens to reference lab appropriately	Establishes rapport and understanding with laboratory staff
Principles of laboratory management **External bodies/Institutions relevant to service and their role**	Explain: • external quality control including National External Quality Assessment Service (NEQAS) schemes • internal quality control and internal quality assurance • commercially available laboratory computer systems • staff performance management and appraisals • wider organisational issues, e.g. pathology modernisation programmes	Team working Time management Decision making and prioritisation skills Negotiation skills managing underperformance	Establishes rapport and understanding with laboratory staff

2. KNOWLEDGE OF HEALTH AND SAFETY

Objective:

- 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.

Subject	Knowledge	Skills	Behaviours
Health & safety	Work within and brief others as necessary about the current legislative framework underpinning health and safety (H&S) at work, including: • Health and Safety at Work Act (1974) • Reporting of Injuries, Diseases and Dangerous Occurrences Regulations (RIDDOR) • Control of Substances Hazardous to Health (COSHH) Regulations • Genetically Modified Organisms (Contained Use) Regulations (2001) • Management of Health and Safety at Work Regulations (1999)	Perform an infection–prevention and control-oriented risk assessment when required for all procedures undertaken in the hospital, including the laboratory, for all categories of worker, including the pregnant and immunocompromised	Act in accordance with the principles of *Good Medical Practice*

3. CLINICAL SKILLS

Objective: By the end of the educational programme, trainees would be expected to advise on diagnosis, treatment and prevention of the following clinical problems:

3.1   Infection in the community
3.2   Hospital-acquired infection and infection prevention and control and prevention
3.3   Infection in immunocompromised patients including HIV, transplantation and neutropenia
3.4   Infection in critical care and sepsis
3.5   Outbreaks of infection in hospital and the community
3.6   Infection in the returning traveller
3.7   Food- and water-borne infection
3.8   Sexually transmitted diseases
3.9   Occupationally-acquired disease
3.10   Paediatric infection
3.11   Infection in pregnancy

3.1   Clinical microbiology – infection in the community

Objective: Understand infection in primary care, with reference to epidemiology, diagnosis, treatment and prevention.

Subject	Knowledge	Skills	Behaviours
Aetiology, pathophysiology and presentation of infectious diseases (including those outlined in Section 2 Core Knowledge; Subject Clinical Syndromes; Knowledge domain)	Explain aetiology and clinical presentation of infectious diseases (including those outlined in Section 2 Core Knowledge; Subject Clinical Syndromes; Knowledge domain) Explain pathophysiology of the disease process, with particular reference to common and important infections such as urinary tract infection and respiratory tract disease	Assimilate clinical, laboratory and epidemiological information and use this to differentiate between infections and other conditions Select and interpret appropriate tests Analyse data to produce specific or differential diagnosis	Consideration of diagnostic issues Establish a rapport between laboratory staff and community physicians Readiness to review and revise diagnostic matrix

Subject	Knowledge	Skills	Behaviours
Treatment of infections (including those outlined in Section 2 Core Knowledge; Subject Clinical Syndromes; Knowledge domain)	Explain the optimum treatment of infections and how to access current guidelines	Select the appropriate antimicrobial in the clinical setting Liaise between clinicians and laboratory	Collaboration with colleagues. Flexibility to respond to change in the context of the clinical situation
Spread of infectious disease and its prevention	Explain the epidemiological consequences of different diseases and of the systems available for disease control with reference to: tuberculosis (TB), viral hepatitides, genitourinary disease, immunisation strategies	Make an accurate risk assessment Demonstrate when urgent action is required based on epidemiology	Co-operative working within a multidisciplinary team

3.2 Clinical microbiology – hospital-acquired infection and infection control and prevention

Objective: Understand specific infection problems related to hospital-acquired infections (HAIs).

Subject	Knowledge	Skills	Behaviours
Sources and risk factors for the acquisition of HAIs	Describe the reservoirs, sources, routes of transmission and portals of entry of common HAIs Describe interactions between the microbe, the patient risk factors and others in the environment, e.g. device and antimicrobial exposure Explain importance of the colonised patient and infected or colonised staff Describe the epidemiology and control of common and important multi-resistant organisms, e.g. meticillin-resistant *Staphylococcus aureus* (MRSA), glycopeptide-resistant enterococci (GRE), *Clostridium difficile*	Make an accurate risk assessment Demonstrate when urgent action is required based on epidemiology	Multidisciplinary team working

Subject	Knowledge	Skills	Behaviours
Prevention of HAIs by sterilisation and disinfection	Describe the processes for disinfection and sterilisation in the hospital and primary care settings including their indications advantages and limitations	Make an accurate risk assessment Demonstrate when urgent action is required if disinfection or sterilisation fails	Enthusiastic approach to learning
Definition and prevention of speciality-associated HAIs	Describe the definitions of speciality-based HAIs Describe the evidence for current recommendations on management in specific clinical situations, e.g. particular surgical procedures, device-associated infections, adult and neonatal intensive care units, burns units, oncology and transplant units, cystic fibrosis units Describe the context of in which HAIs occur due to resistant organisms, e.g., MRSA, vancomycin-resistant enterococcus (VRE), ESBL producers Describe antimicrobial treatment or prophylaxis appropriate above contexts Describe the use of methods of isolation/cohorting to control specific HAIs or resistant organisms in specialities	Make an accurate risk assessment Use antimicrobials appropriately to treat or prevent HAIs Use isolation/cohorting of patients to prevent HAI spread, including the pragmatic use of bed management	Consistency in approach to problems Risk-based approach Multidisciplinary team working Appropriate prioritisation of healthcare resources
Physical layout of ward, departments and operating theatres	Describe ward, departmental and operating theatre design & layout relevant to infection prevention and control Demonstrate interpretation of regulations relating to hospital design and function.		Multidisciplinary team working

Subject	Knowledge	Skills	Behaviours
Ventilation	Describe the role of ventilation in operating theatres and suites, isolation rooms and other areas, e.g. pharmacy and laboratory Describe the principles and importance, e.g. in surgical site infection, prevention of spread of TB Describe the principles of operating theatre air sampling, validation of theatre ventilation commissioning tests and the regulations governing theatre ventilation Describe the actions and solutions that may be necessary when ventilation systems do not meet current requirements	Make an accurate risk assessment Demonstrate when urgent action is required	Consistency in approach to problems Risk-based approach Multidisciplinary team working Appropriate prioritisation of healthcare resources
Patient isolation	Describe when patient isolation or cohorting or ward closure, is used to control or prevent the spread of micro-organisms or infections Describe the types of patient isolation, the specific precautions they use and in what circumstance they are used	Make an accurate risk assessment Demonstrate when urgent action is required Pragmatic use of bed occupancy	Risk-based approach Multidisciplinary team working Appropriate prioritisation of healthcare resources
Reporting HAIs	Describe the requirements and mechanisms for reporting of HAIs within healthcare organisations (e.g. route cause analysis), locally and nationally, including mandatory surveillance and 'serious untoward incidents' of infection Describe the role of HAI reporting in total quality management, controls assurance, review body inspections, e.g. CQC	Demonstrate when action is required Report clearly and accurately	Risk-based approach

3.3 Clinical microbiology – immunocompromised patients including HIV, transplantation and neutropenia

Objective: Understand specific problems related to opportunist infection including preventative diagnostic and therapeutic strategies.

Subject	Knowledge	Skills	Behaviours
Pathophysiology and clinical signs and symptoms of infection in compromised hosts **Biological and iatrogenic causes of immunodeficiency**	Describe the causes and risk factors of immunocompromise Describe clinical and laboratory manifestations of immunocompromise	Perform assessments of patients' risk of immunocompromise Integrate clinical and laboratory data to define immunocompromise in patients	Establish close rapport with clinical and laboratory staff
Diagnosis, therapy and prevention of infection in immunocompromised hosts	Explain available diagnostic techniques and their limitations Explain available therapeutic options and preventative measures	Perform and interpret investigations relevant to the patient and achieve specific or differential diagnosis and initiate appropriate treatment Perform risk−benefit analyses	Non-judgmental, multidisciplinary team working

3.4　Clinical microbiology – Infection in critical care and sepsis

Objective: Understand the specific infection problems related to the Intensive Care Unit (ICU) and the consequences of infection including sepsis syndrome.

Subject	Knowledge	Skills	Behaviours
Sepsis syndrome	Describe the pathophysiology of sepsis syndrome Describe the rationale for interventions in sepsis syndrome	Recognition of the consequences of severe infection including disseminated intravascular coagulation (DIC) and sepsis syndrome	Prompt and relevant decision making with clear communication
Clinical management of patients	Explain the diagnosis and management of common infection problems in the ICU setting, e.g. ventilator-associated pneumonia, line-infections, septicaemia Describe outcomes of infection Outline evidence base for diagnosis and management	Recognition and management of specific infection problems in the critically ill Justify a course of action to clinical teams Communication skills	Decision-making ability

3.5   Clinical microbiology – outbreaks of infection in hospital and the community

Objective: To be able to recognise and deal effectively with outbreaks of infection.

Subject	Knowledge	Skills	Behaviours
General principles of outbreak investigation and prevention and control	Describe the use of surveillance to identify incidents/outbreaks Ability to initiate investigation and control measures Describe of the role of others in outbreak management, e.g. CCDC/CHP, RE, Centre for Infections (CfI) reference laboratories	Dealing with the unexpected Initiation of investigation and control measures Recognition of abnormal patterns of infection Communication (both in writing and verbally) with colleagues, the media and the public	Working with colleagues and interacting as part of a team
Local procedures for the prevention and control of infectious diseases	Describe the local procedures for the prevention and control of infectious diseases	Ability to contact other sources of information and support when appropriate Use of appropriate IT methodologies and statistics	Know limits of knowledge
Specialist expertise	Describe the availability of expertise, including reference centres Outline modelling methods and their limitations	Ability to contact other sources of information and support when appropriate	Appreciation of the role of other team workers

3.6 Clinical microbiology – infection in the returning traveller

Objective: Understand the burden of infectious disease in developing countries and be able to advise on appropriate investigation and management of patients who have recently returned from overseas.

Subject	Knowledge	Skills	Behaviours
Common causes of infection in returning travellers	Describe the common causes of infection in returning travellers	Performing clinical/epidemiological assessment to investigate and manage patients with specific presentations, e.g. diarrhoea, fever, lymphadenopathy, soft tissue involvement	Enthusiasm and desire to diagnose and treat travellers' infections Enthusiastic approach to learning and keeping up to date Willingness to seek expert advice Willingness to seek expert advice.
Common measures for preventing infection in travellers	Describe common measures for preventing infection in travellers, e.g. travel vaccination, malaria prophylaxis, mosquito bite prevention, food and water precautions		
Malaria	Describe epidemiology, diagnosis, prevention and treatment	Using clinical and epidemiological assessment to select laboratory investigation and initial management.	
Viral haemorrhagic fever	Describe epidemiology, diagnosis, prevention and treatment	Risk assessing need for urgent action, e.g. malaria, yellow fever, enteric fever	
Emerging travellers or imported infections	Outline diagnosis, prevention and treatment of emerging travellers or imported infections, e.g. West Nile virus, other arboviruses	Statutory notification as appropriate	
Common tropical	Describe epidemiology and distribution of common tropical infections, e.g. schistosomiasis, onchocerciasis, filariasis, trypanosomiasis, gastro-intestinal parasites, dengue, yellow fever, TB, HIV, enteric fever, cholera, dysentery	Acquiring up-to-date information	

3.7   Clinical microbiology – food- and water-borne infection

Objective: Basic understanding of food- and water-borne infection and the public health and infection prevention and control requirements of such infections.

Subject	Knowledge	Skills	Behaviours
Food and water pathogens	Describe the basic biology of the common pathogens involved in food- and water-borne infections and the laboratory methods used to test for them (including the use of indicator organisms)	Selection of the appropriate laboratory tests and their interpretation Reporting to CCDC/CHP, health protection agencies and environmental health colleagues when appropriate	Establish good working relationships with CCDC/CHP, HPA and environmental health officers (EHOs)
Food and water microbiology legislation	Outline current legislation and guidelines on the microbiological testing of food and water. (Food includes milk and dairy products; water includes potable and bathing waters)		
Endoscope water-disinfector microbiology	Describe the requirements for testing endoscopy rinse water and renal unit water, and the results that should be achieved	Ability to interpret the results and take appropriate action	Establish good working relationships with the infection prevention and control team, clinicians and the Estates department

3.8 Clinical microbiology – sexually transmitted infections (STIs)

Objective: Understand STIs, including diagnostic, therapeutic and preventative strategies.

Subject	Knowledge	Skills	Behaviours
Aetiology, pathogenesis and presentation of STIs	Describe the aetiology, pathophysiology and clinical presentation of STIs Describe the changing epidemiology of STIs	Analyse clinical, laboratory and epidemiological information and to use this to differentiate between the different STIs Achieve a specific or differential diagnosis	Enthusiastic approach to learning
Diagnosis of STIs	Describe the available diagnostic tests for STIs and their limitations, including culture, serology, antigen detection and nucleic acid detection Compare and contrast the advantages and disadvantages of different diagnostic methods	Select, perform and interpret appropriate tests Rational use of resources	Establish close rapport and understanding with laboratory staff
Congenital infections	Describe the infections that can be transmitted from mother to baby during the antenatal, perinatal and postnatal period Explain the role of risk avoidance, therapeutic interventions, immunisation and Caesarian section in the prevention of congenital infections	Interpret and explain simply and effectively results to clinicians	Establish rapport with clinical and primary care staff.
Management of STIs	Describe therapeutic options and preventative measures Explain the importance of health education, contact tracing and partner notification in reducing the incidence of STIs	Select the appropriate antimicrobial in the clinical setting Liaise between clinicians, laboratory and genito-urinary medicine (GUM) staff including health advisors Coordinate laboratory testing within screening programmes if indicated	Work collaboratively within a multidisciplinary team Recognise the need for confidentiality

3.9 Clinical microbiology – occupationally-acquired disease

Subject	Knowledge	Skills	Behaviours
Occupationally-acquired infection	Outline the zoonotic infections that may be occupationally acquired Discuss the implications of blood-borne viruses (BBVs) for HCWs Describe the management of 'inoculation incident' and follow-up for healthcare workers (HCWs), including ethics, screening and counselling Describe local, national and international guidelines and standards in relation to occupational exposure to infection	Management of 'inoculation incident' Organise the laboratory testing associated with 'inoculation incident' and liaise with Occupational Health	Recognise the need for confidentiality at all times Empathy towards co-workers Recognise limits of knowledge and need to seek specialist advice

3.10 Clinical microbiology – paediatric infection

Objective: Understand the specific infection problems related to infection in children, including neonates, and preventive, diagnostic and therapeutic strategies.

Subject	Knowledge	Skills	Behaviours
Paediatric infection	Describe the pathophysiology, clinical signs and symptoms of infectious diseases in children, Especially those illnesses that are particularly important in or specific to childhood, e.g. neonatal meningitis, group B sepsis, intraventricular shunt infections Describe relevant diagnostic techniques Outline the pharmacokinetics of prescribing for children Describe the antimicrobials best avoided in children	Consider different diagnostic possibilities and treatments in children compared to adults	Empathy with parents and children Cooperative working within a multidisciplinary team

3.11 Clinical microbiology – Infection in pregnancy

Objective: Understand the specific infection problems related to pregnancy including preventive, diagnostic and therapeutic strategies.

Subject	Knowledge	Skills	Behaviours
Pregnancy and the immune system	Describe the effects of pregnancy on the immune system	Recognise clinical manifestations of physiological immunodeficiency associated with pregnancy	Empathy with patient and family
Pregnancy-specific infections	Describe the aetiology, risk factors, clinical presentation and diagnosis of infections specific to pregnancy, e.g. septic abortion, chorioamnionitis and endometritis	Take relevant clinical history, select, interpret and perform relevant laboratory tests	Cooperative working within a multidisciplinary team
Infections important in pregnancy	Describe the aetiology, risk factors, clinical presentation and diagnosis of infections considered important in pregnancy, including urinary tract infections, sexually transmitted infections, fungal infection including candidosis, parasitic diseases, e.g. toxoplasmosis and malaria in pregnancy		
Treatment of infections in pregnant women	Describe the use of antimicrobials in treating infections in pregnancy Describe potential teratogenicity when prescribing in pregnancy and the need to avoid certain antimicrobials	Consider different therapeutic strategies in pregnant women compared to other patients	

4 SPECIALIST AREAS OF MICROBIOLOGY

Objectives: the trainees will acquire a working knowledge of:

4.1 Virology
4.2 Health protection and epidemiology
4.3 Mycology
4.4 Parasitology

4.1 Virology

Microbiology trainees should normally undertake 6–12 months' training in virology, at least one month of which should take place before the FRCPath Part 1 examination. The delivery of the virology training is a local matter.

Subject	Knowledge	Skills	Behaviours
Pregnancy and viral infection	Describe the investigation, intervention and advice for women with, or in contact with, rash/illness in pregnancy. Describe the natural history of cytomegalovirus rubella, parvovirus B19, measles, enterovirus, hepatitis B, HIV, hepatitis C in relation to pregnancy Describe rates of abnormality and fetal loss in cases complicated by, in comparison to those not complicated by, viral infection Describe risk, and absence of evident risk, of viral immunisations	Select, interpret and perform (kit-based) relevant virological tests Use past results and archived serology samples to achieve diagnosis	Empathic with women concerned regarding rash illness or exposure thereto in pregnancy Empathic with hospital and community midwives in managing reported exposure or illness Able to maintain productive relationship with reference laboratory staff and consultants

Subject	Knowledge	Skills	Behaviours
Blood-borne virus infected healthcare worker	Describe the investigation, intervention and advice following ascertainment of a healthcare worker with a blood-borne viral infection Describe the reporting mechanisms of such incidents Explain the relevance of past employment Describe role and use of prophylactic measures Outline the role of public notification exercises, helplines and lookback investigation testing	Recognise potential situations requiring intervention, whether as a result of an enquiry or upon reviewing results, and constructively support the infection prevention and control doctor/Director of Infection Prevention Control/CCDC leading the incident, and inform the range of colleagues involved in information acquisition, strategy formation, patient classification investigation and follow-up, healthcare worker diagnosis and management, specimen and specimen collection logistics Select, perform and interpret relevant virological tests Able to act as resource for protocol drafting for helpline staff Capable of managing time in fluid situations	Empathic with concerns of public, healthcare workers, managers and laboratory staff Able to maintain productive relationship with all involved in such episodes Practised in media interview behaviour
Eye infections	Describe the aetiology, risk factors, and clinical presentation of eye infections with adenovirus, herpes simplex virus, Chlamydia	Competent to select, perform and interpret relevant virological tests	Empathic with patients, clinical, laboratory and ancillary staff Able to create and maintain productive relationships with all involved

Subject	Knowledge	Skills	Behaviours
Pharyngitis	Describe the aetiology, risk factors, and clinical presentation of viral causes of pharyngitis and infectious mononucleosis	Competent to select, perform and interpret relevant virological tests.	Empathic with patients, clinical, laboratory and ancillary staff. Able to create and maintain productive relationships with all involved.
Viral hepatitis	Describe the epidemiology and risk factors Describe the management of acute cases, including appropriate information for the management of contacts, ascertainment of risk factors and notification Describe the investigation of individual cases, methods for and significance of virus quantitation	Select, perform and interpret relevant virological tests Perform statutory notification	Empathic with patients, clinical, laboratory and ancillary staff Able to create and maintain productive relationships with all involved
Rotavirus Norovirus	Describe the epidemiology and risk factors of infections Describe the management of acute cases, including infection prevention and control	Select, perform and interpret relevant virological tests Working with infection prevention and control team in management of outbreak of infection with suspected norovirus	Assertiveness Recognition of skills and priorities of other specialties
Respiratory infections with RSV and influenza	Describe the epidemiology and risk factors in hospitals and the community of RSV and influenza. Describe the use of antivirals in prophylaxis and treatment of risk groups. Describe the use of immunisation in prevention. Describe infection prevention and control precautions to prevent spread	Select, perform and interpret relevant virological tests Use antivirals to treat and prevent infection	Cooperative working within a multidisciplinary team Prompt and relevant decision-making with clear communication

Subject	Knowledge	Skills	Behaviours
Smallpox	Describe the identification and investigation of suspected cases Describe the need for liaison reference facilities and public health teams (notification) and infection prevention and control team in investigation and management		Recognise limits of knowledge and need to seek specialist advice
Rabies	Describe the investigation and management of potential contact in returned travellers, of bat-associated bites and of suspected clinical cases		
Viral haemorrhagic fevers and dengue	Describe the epidemiology and risk factors Describe the identification, including differential diagnosis, and investigation of suspected cases. Describe the need for liaison reference facilities and infection prevention and control team in investigation and management	Select appropriate tests and to interact with reference laboratories in arranging specimen transport and testing; interpret relevant virological tests Advise infection prevention and control team where appropriate	Recognise limits of knowledge and need to seek specialist advice Co-operative working within a multidisciplinary team Prompt and relevant decision-making with clear communication
Rickettsial diseases	Describe the epidemiology and risk factors Describe the identification, including differential diagnosis, and investigation of suspected cases. Describe the need for liaison reference facilities	Select appropriate tests and to interact with reference laboratories in arranging specimen transport and testing; interpret relevant virological tests	Recognise limits of knowledge and need to seek specialist advice

Subject	Knowledge	Skills	Behaviours
Encephalitis and meningitis	Describe the clinical presentation, management and investigation of CNS infections due to Herpes simplex virus (including recurrent infection) and enteroviruses	Select appropriate tests and be able to interact with reference laboratories in arranging specimen transport and testing when needed; interpret relevant virological tests Advise clinical teams on treatment Advise infection prevention and control team where appropriate	Recognise limits of knowledge and need to seek specialist advice Prompt and relevant decision-making with clear communication
Psittacosis and *Chlamydophila (Chlamydia) pneumoniae* **Q fever**	Describe the clinical presentation, management, investigation and notification		
Varicella-zoster	Chickenpox: describe the management of the acute case in children, management of the acute case in adults, management of the case in pregnant women including obstetric risk factors and counselling, investigation and prevention of secondary cases and infection prevention and control in relation to the immunosuppressed, and neonates and the pregnant Zoster: describe risk factors and the management of infection in 'normal' people, pregnancy and the immunocompromised		
Creutzfeldt-Jakob disease (CJD) **Variant CJD**	Describe the clinical presentation, management, investigation and reporting	Competent to liaise with reference facilities in investigation, and to advise infection prevention and control teams	

Subject	Knowledge	Skills	Behaviours
Viral infection of immunocompromised patients	Describe the risk factors for, clinical presentation, management and investigation of infection due to: BK, CMV, EBV, HHV-6, adenovirus Outline the treatment of infections Outline the infection prevention and control precautions for these infections	Competent to select, perform and interpret relevant virological tests.	Recognise limits of knowledge and need to seek specialist advice Cooperative working within a multidisciplinary team Prompt and relevant decision-making with clear communication
Occupational health and viruses	Describe the risk factors for clinical presentation, management and investigation of infection from: Hepatitis B virus, Hepatitis C virus, HIV, Influenza virus, Varicella-Zoster virus and Herpes simplex virus Describe precautions required by healthcare workers if infected with these viruses	Competent to select, perform and interpret relevant virological tests. Liaise with Occupational Health	Recognise limits of knowledge and need to seek specialist advice Cooperative working within a multidisciplinary team Prompt and relevant decision-making with clear communication

4.2 Health protection and epidemiology

Objective: Understand the importance of control of communicable diseases and be able to evaluate effectiveness of services to prevent, diagnose and treat infection.

Subject	Knowledge	Skills	Behaviours
Surveillance	Demonstrates the principles and practices of surveillance of infectious disease, including the use of routine and enhanced surveillance systems	Correctly utilise laboratory reporting and monitoring trends (e.g. in antimicrobial resistance). Demonstrate competence in data handling and interpretation. Recognition of value and limitations of surveillance systems (e.g. for surgical site infection, other HAI, Legionnaires' disease, meningococcal disease, TB)	Adopt an enthusiastic approach Methodical but intuitive.
Individuals responsible for Health Protection	Describe the role of others in the prevention and control of infection	Liaise and communicate with CCDCs, Consultants in Health Protection, EHOs, REs, etc	Collaborative, establishes rapport and understanding with colleagues.
Immunisation	Describe the general principles involved in immunisation programmes Describe methods of vaccine delivery, surveillance of immunisation programmes and evaluation of vaccine efficacy		Risk-based approach.
Occupational health and travel health procedures		Able to give basic health and travel advice and refer to other sources of information and support	Know limits of knowledge

Subject	Knowledge	Skills	Behaviours
Agents of bio-terrorism	Describe the epidemiology, risk factors, clinical presentation of current perceived potential microbiological agents for bio-terrorism Outline the potential for abuse of laboratory organisms for bioterrorism and the current relevant legislative framework, including the Prevention of Terrorism Act 2004	Recognise abnormal patterns of infection Deal with the unexpected 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	Multidisciplinary team working Recognition of skills and priorities of other Willingness to seek advice and help Seek expert help when necessary Attitudes towards laboratory security should be in accord with the principles of *Good Medical Practice*
Reference laboratories	**Describe the role and function of reference laboratories**	Awareness of the need for timely referral of material to reference laboratories Use the expertise of reference laboratories to inform local practice	Know how to obtain expert advice and support

4.3 Mycology

Objective: Understand superficial and deep infection caused by yeasts and moulds including diagnostic, therapeutic and preventative strategies.

Subject	Knowledge	Skills	Behaviours
Superficial fungal infection	Describe the aetiology, risk factors and clinical presentation and treatment of fungal infections of skin, hair, nails and mucous membranes	Recognise clinical features of superficial infection caused by dermatophytes and yeasts Examine skin, hair, nails etc for presence of fungal elements Identify yeast, dermatophyte fungi and other common moulds from clinical material Recommend appropriate treatment	Establishes close rapport and understanding with laboratory staff
Systemic fungal infection and endemic fungal infection	Describe the aetiology, risk factors and clinical presentation of systemic and endemic mycoses including candidosis, aspergillosis, cryptococcosis, histoplasmosis, coccidioidomycosis and blastomycosis Describe use of appropriate antifugal agents Describe methods available for susceptibility testing and their limitations Describe the use of chemoprophylaxis and environmental measures to prevent infection in the immunocompromised	Patient risk assessment for systemic infection or infection acquired from endemic area Request appropriate specimens for diagnosis reference laboratory tests including appropriate serological and molecular test as available Identify yeasts and filamentous fungi commonly encountered Ability to recognise when susceptibility testing is required for an individual patient	Prompt and relevant decision making with clear communication Multidisciplinary team working Risk-based approach

4.4 Parasitology

Objective: Understand parasitic disease likely to present in the UK.

Subject	Knowledge	Skills	Behaviours
Epidemiology of parasitic disease	Describe the epidemiology of: • imported parasitic infections with an emphasis on the infections common in European practice: e.g. malaria, intestinal protozoa, intestinal helminths, leishmaniasis, trypanosomiasis, filariasis and schistosomiasis • endemic parasitic infections including for example toxoplasmosis, toxocariasis, giardiasis, hydatid disease • parasitic infections associated with severely immunocompromised patients, e.g. microsporidiosis, cryptosporidiosis Describe the conditions under which infections are acquired so that the risk of infection to patients can be assessed	Plan an appropriate investigation scheme for individuals at risk of tropical infection	Prompt and relevant decision making with clear communication Multidisciplinary-team working Risk-based approach

Subject	Knowledge	Skills	Behaviours
Epidemiology of parasitic disease	Describe the epidemiology of: • imported parasitic infections with an emphasis on the infections common in European practice: e.g. malaria, intestinal protozoa, intestinal helminths, leishmaniasis, trypanosomiasis, filariasis and schistosomiasis • endemic parasitic infections including, for example, toxoplasmosis, toxocariasis, giardiasis, hydatid disease • parasitic infections associated with severely immunocompromised patients, e.g. microsporidiosis, cryptosporidiosis • describe the conditions under which infections are acquired so that the risk of infection to patients can be assessed	Plan an appropriate investigation scheme for individuals at risk of tropical infection	Prompt and relevant decision making with clear communication Multidisciplinary-team working Risk-based approach
Clinical features and laboratory diagnosis of parasitic disease	Describe the clinical features and laboratory diagnosis of: • imported parasitic infections (above) • endemic parasitic (above) • parasitic infections associated with severe immunocompromise (above)	Examine blood, stool and other tissues for the presence of protozoa and helminths Identify major parasitic species Measure parasite size under the microscope Estimate malaria parasite numbers Select appropriate serological and molecular diagnostics for parasitic infections Use reference facilities appropriately Recommend appropriate treatment	Establishes close rapport and understanding with laboratory staff Willingness to use reference services appropriately

Subject	Knowledge	Skills	Behaviours
Treatment of parasitic disease	Describe the use of antiparasitic drugs, including antimalarial agents, imidazoles, ivermectin, praziquantel Describe in detail the diagnosis and management of toxoplasmosis in the context of pregnancy		Prompt and relevant decision making with clear communication Multidisciplinary-team working Risk-based approach Willingness to use reference services appropriately

5 COMMUNICATION AND MANAGEMENT ISSUES IN MICROBIOLOGY

Objectives: To develop necessary management, communication and leadership skills to run a laboratory and deliver a high-quality clinical service.

Subject	Knowledge	Skills	Behaviours
Laboratory management and practice	Define good laboratory management Explain the concepts of good laboratory practice Summarise the process of management and being managed	Demonstrate awareness of organisation and structure of a microbiology/virology laboratory including: • staffing and financial issues • planning • implementation of policies and rotas	Establish a close rapport and understanding with laboratory staff Respond constructively to change Demonstrate appropriate behaviours in multidisciplinary team working Display leadership qualities
Laboratory accreditation	Describe the criteria for laboratory accreditation	Implement these criteria	
Appraisal	Describe how the appraisal process works	Use constructive listening, mentoring, and appraisal skills Use personal appraisal constructively	
Clinical audit	Describe the process of clinical audit	Audit and evaluate: • personal and departmental activities • existing and new tests, techniques or clinical services	Show prompt and relevant decision making with clear communication Recognise need for change, and principles involved Be open minded

Subject	Knowledge	Skills	Behaviours
Standards of professional practice and clinical governance	Describe the importance of clinical governance and delivery of high-quality standards in microbiology and virology Describe the concept of clinical risk management and procedures designed to minimise risks Outline the importance of patient consent to use data or specimens for ethically approved research or teaching		
External organisations	Maintain an up to date knowledge of the organisation of NHS and allied organisations Outline the role of HPA, Food Standards Agency (FSA), CQC and NICE Outline the healthcare structures (including primary care teams)		Demonstrate appropriate behaviours in multidisciplinary team working Network appropriately
Teaching	Explain how to utilise the teaching methods, assistance and resources available	Demonstrate good presentation skills, good public speaking and organisation of teaching	Teach and communicate competently Describe the methods available for susceptibility testing and outline their limitations

Subject	Knowledge	Skills	Behaviours
Information technology	Demonstrate: • a working knowledge of laboratory data entry and retrieval and surveillance systems • an understanding of the Data Protection Act	Search electronic databases and use the Internet as a learning and communication resource Demonstrate competent use of database, word processing and statistics programmes Define how to undertake searches Apply the principles of confidentiality and their implementation in terms of clinical practice	Adopt proactive and enquiring attitude to new technology

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 microbiology 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 Discussions (CbDs) and/or Evaluation of Clinical/Management Events (ECEs).

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

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	24
Maintaining good medical practice	31
Teaching and training, appraising and assessing	41
Relationships with patients	43
Working with colleagues	48
Health	54
Probity	55

APPENDIX 2   ACRONYMS

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
CJD	Creutzfeldt-Jakob disease
CMT	Core medical training
CMV	Cytomegalovirus
COSHH	Control of Substance Hazardous to Health Regulations
CPA	Clinical Pathology Accreditation
CPD	Continuing professional development
CPHM	Consultant in Public Health Medicine
CSSD	Central Sterile Services Department
DIC	Disseminated intravascular coagulation
DNA	Deoxyribonucleic acid
DOPS	Directly observed practical skills
EBV	Epstein Barr virus
ECE	Evaluation of clinical/management events
EIA or ELISA	Enzyme-linked immunoassays or Enzyme-linked immunosorbent assay
ESBL	Extended-spectrum beta-lactamase-producing organism

FRCPath	Fellowship of The Royal College of Pathologists
FSA	Food Standards Agency
GIT	Gastro-intestinal
GMC	General Medical Council
GP	General Practitioner
GRE	Glycopeptide-resistant enterococci
GUM	Genito-urinary medicine
HAI	Hospital-acquired infection
HOPS	Head of Pathology School
HIV	Human immunodeficiency virus
HPA	Health Protection Agency
ICD	Infection control doctor
ICU	Intensive care unit
IT	Information technology
JCPT	Joint Committee on Pathology Training
JRCPTB	Joint Royal Colleges of Physicians Training Board
LAC	Lay Advisory Committee
LCR	Ligase chain reaction
Mini-CEX	Mini-clinical evaluation exercise
MMC	Modernising Medical Careers
MRCP	Membership of The Royal College of Physicians
MRCP(I)	Membership of The Royal College of Physicians, Ireland
MRSA	Meticillin-resistant *Staphylococcus aureus*
MSF	Multi-source feedback
NASBA	Nucleic Acid Sequence Based Amplification
NEQAS	National External Quality Assurance Service

NHS	National Health Service
NICE	National Institute for Health and Clinical Excellence
NICU	Neonatal intensive care unit
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
QCQ	Quality Care Commission
RE	Regional epidemiologist
RIDDOR	Reporting of Injuries, Diseases and Dangerous Occurrences Regulations
RNA	Ribonucleic acid
RSV	Respiratory syncytial virus
RT-PCR	Real time-polymerase chain reaction
SAC	Specialist Advisory Committee
SCBU	Special care baby unit
SDA	Strand Displacement Assay
SOP	Standard operating procedures
ST	Specialty training
STC	Specialty Training Committee
STI	Sexually transmitted infection
TAC	Trainees Advisory Committee
TB	Tuberculosis
VHF	Viral haemorraghic fever
VRE	Vancomycin-resistant enterococcus

APPENDIX 3a   ILLUSTRATIVE EXAMPLE OF MEDICAL MICROBIOLOGY TRAINING
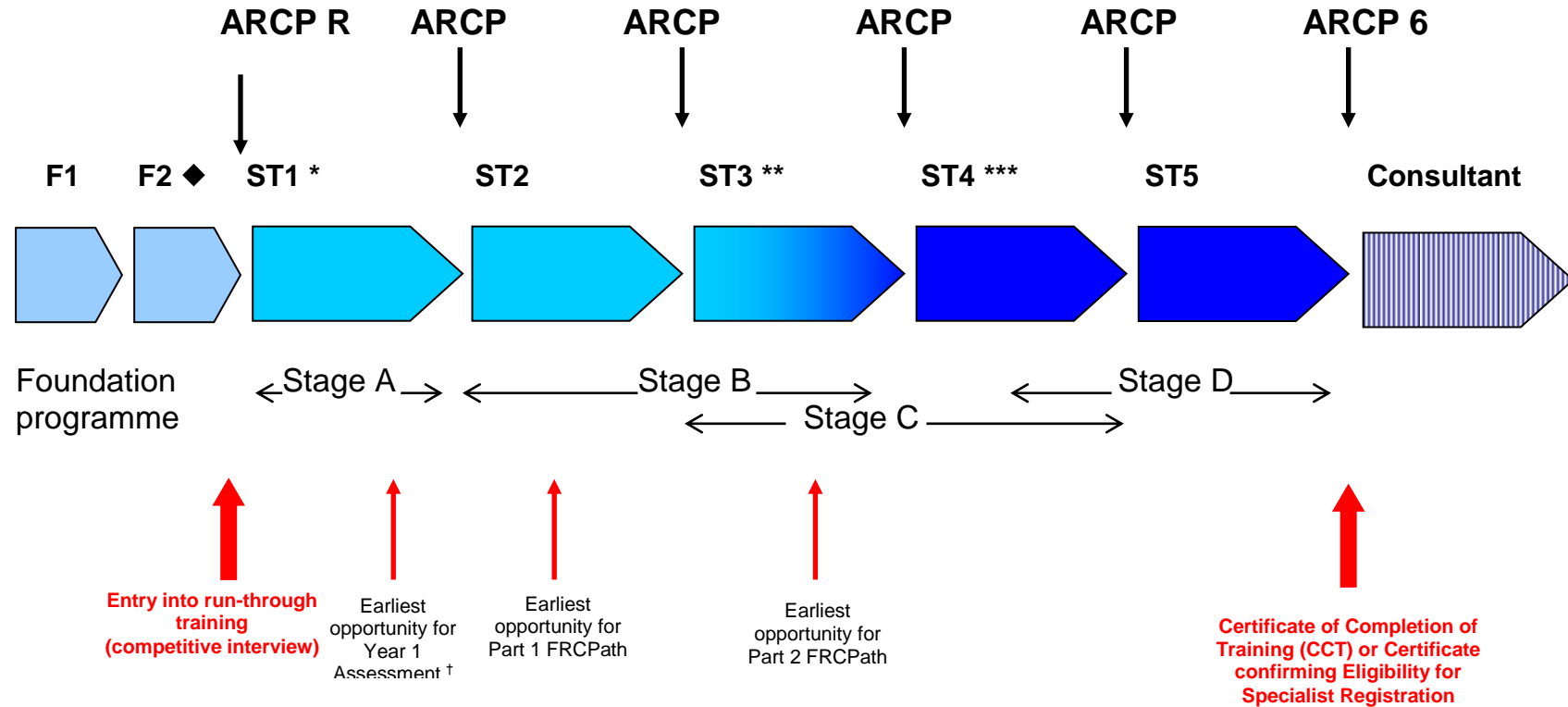
◆   Entry is also possible from clinical training.

*   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 MEDICAL MICROBIOLOGYTRAINING

	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