

JRCPTB

Joint Royal Colleges of Physicians Training Board



Curriculum for Aviation and Space Medicine Training Implementation August 2022



ROYAL COLLEGE
of PHYSICIANS
of EDINBURGH



ROYAL COLLEGE OF
PHYSICIANS AND
SURGEONS OF GLASGOW



Royal College
of Physicians

Contents

1.	Introduction	3
2.	Purpose	3
2.1	Purpose of the curriculum	3
2.2	High level learning outcomes – capabilities in practice (CiPs)	4
2.3	Training pathway	6
2.4	Duration of training	6
2.5	Flexibility and accreditation of transferrable capabilities	7
2.6	Less than full time training	7
2.7	Generic Professional Capabilities and Good Medical Practice	8
3.	Content of Learning	9
3.1	Capabilities in practice	9
3.2	Generic capabilities in practice	10
3.3	Specialty capabilities in practice	14
3.4	Presentations and conditions	27
3.5	Practical procedures	33
4	Learning and Teaching	35
4.1	The training programme	35
4.2	Teaching and learning methods	37
4.3	Academic training	39
4.4	Taking time out of programme	39
4.5	Research	39
5	Programme of Assessment	40
5.1	Purpose of assessment	40
5.2	Programme of Assessment	41
5.3	Assessment of CiPs	41
5.4	Critical progression points	43
5.5	Evidence of progress	45
5.6	Decisions on progress (ARCP)	47
5.7	Assessment blueprint	48
6	Supervision and feedback	50
6.1	Supervision	50
6.2	Appraisal	52
7	Quality Management	53
8	Intended use of curriculum by trainers and trainees	54
9	Equality and diversity	55

1. Introduction

The purpose of this curriculum is to define the process of training and the competencies needed for the award of a certificate of completion of training (CCT) in Aviation and Space Medicine (ASM) and to be registered on the specialist register.

2. Purpose

2.1 Purpose of the curriculum

The purpose is to train doctors who have and maintain detailed knowledge and understanding of the ASM environment, the factors affecting the human body in flight, in health as well as sickness, and how those flying may be protected against the potentially harmful effects of their abnormal environment. This purpose statement has been endorsed by the GMC's Curriculum Oversight Group and confirmed as meeting the needs of the health services of the countries of the UK. The curriculum provides a framework for training, articulating the standard required to work at the consultant level, and at key progression points during their training, as well as encouraging the pursuit of excellence in all aspects of clinical and wider ASM practise.

Most ASM physicians practice as general ASM physicians but may work exclusively in the military or civilian environment. Some consultant ASM physicians practise as specialists and limit their clinical practice to a greater or lesser degree to their own clinical subspecialties. The curriculum enables trainees who wish to develop a special interest to do so and post CCT credentialing will permit the development of further specialist skills.

The specialty of ASM encompasses the health, well-being, and safety of all those who fly, both crew and passengers and how they may be protected from the potentially harmful effects of their environment. It also encompasses the large numbers of other aviation workers such as air traffic controllers. The spectrum is substantial, ranging from the civilian airline industry to the highly sophisticated and hugely complex military aviation arena and including the large number of private pilots. Further aspects of this complex specialty include those medical practitioners involved in the design and manufacture of air and space vehicles as well as doctors engaged in aeromedical retrieval of critically ill patients, safety regulation and medical certification.

An ASM capability has been of crucial importance to the development of safe and reliable world-wide air travel. To be able to make such contributions it is essential that practitioners in ASM be trained in several interrelated disciplines. These doctors must be able to understand, and indeed conduct, human clinical and/or physiological research, train junior doctors in the speciality and be able to respond to clinical referrals and requests for opinions in the context of the aviation environment. It is vital, therefore, that the aviation physician be able to liaise closely and authoritatively with both their clinical and physiological research co-workers and be able to act as an expert on the medical aspects of aviation.

The curriculum is structured so that trainees will be equipped with the knowledge and skill sets demanded by working in both the civilian and military aviation environments. There is no equivalent NHS practice for ASM physicians. It is expected that certain competencies will be of more significant use to those working in either the civilian or military sub-groups. Hence, individual trainees whose career choice have dictated they are likely to be working in one or other of these sub-groups may tailor the scope of the competencies to their individual professional requirements. Nevertheless, the overall training will provide the necessary skills to work in either environment.

Specialty training in ASM consists of core and higher specialty training. Core training provides physicians with the ability to investigate, treat and diagnose patients with acute and chronic medical symptoms; and with high quality review skills for managing patients in hospitals and in the community. Higher specialist training then builds on these core skills to develop the specific ASM competencies required to practice independently as an ASM specialist.

ASM is a Group 2 Specialty, and the core training curriculum will consist of 2 years of Internal Medicine Training (IMT) Stage 1 following on from the Foundation Curriculum. Completion of core training will be evidenced by satisfactory:

- Foundation competences
- Completion of IMT Stage 1 (IM1 and IM2)

Assessments to ensure completion of IMT will include success in the full MRCP(UK). Doctors who have undertaken alternative career pathways, including general practice and other training programmes e.g., anaesthetics, occupational medicine, will also be eligible to apply for higher specialty training. Eligible doctors who have not completed IMT must be able to demonstrate broad clinical experiences and may demonstrate the following criteria:

- Satisfactory completion of early years of training in Anaesthetics, or another clinical specialty, and success in for example FRCA, MRCS or
- Satisfactory completion of General Practice training including the MRCGP (this may include Broad Based Training)

Doctors entering from alternative routes may have a training needs analysis following appointment to determine whether they need tailored training to ensure their competencies in managing patients are at a level equivalent to the experience gained in IMT.

Doctors undergo selection into ASM specialty training using a nationally agreed person specification.

2.2 High level learning outcomes – capabilities in practice (CiPs)

The ASM capabilities in practice (CiPs) describe the professional tasks or work within the scope of ASM. Ten core specialty ASM medicine CiPs describe the essential tasks which must be entrusted to all ASM physicians.

Each CiP has a set of descriptors associated with that activity or task. Descriptors are intended to help trainees and trainers recognise the minimum level of knowledge, skills and behaviours which should be demonstrated for an entrustment decision to be made. By the completion of training and award of a CCT, the doctor must demonstrate that they are capable of unsupervised practice in all 10 specialty CiPs. The ASM CiPs describe the tasks or activities which are essential to the practice of the specialty. They have been mapped to the GPC domains and subsections to reflect the professional generic capabilities required to undertake the clinical tasks. Satisfactory sign off requires demonstration that, for each of the CiPs, the trainee’s performance meets or exceeds the minimum expected level for completion of training, as defined in the curriculum.

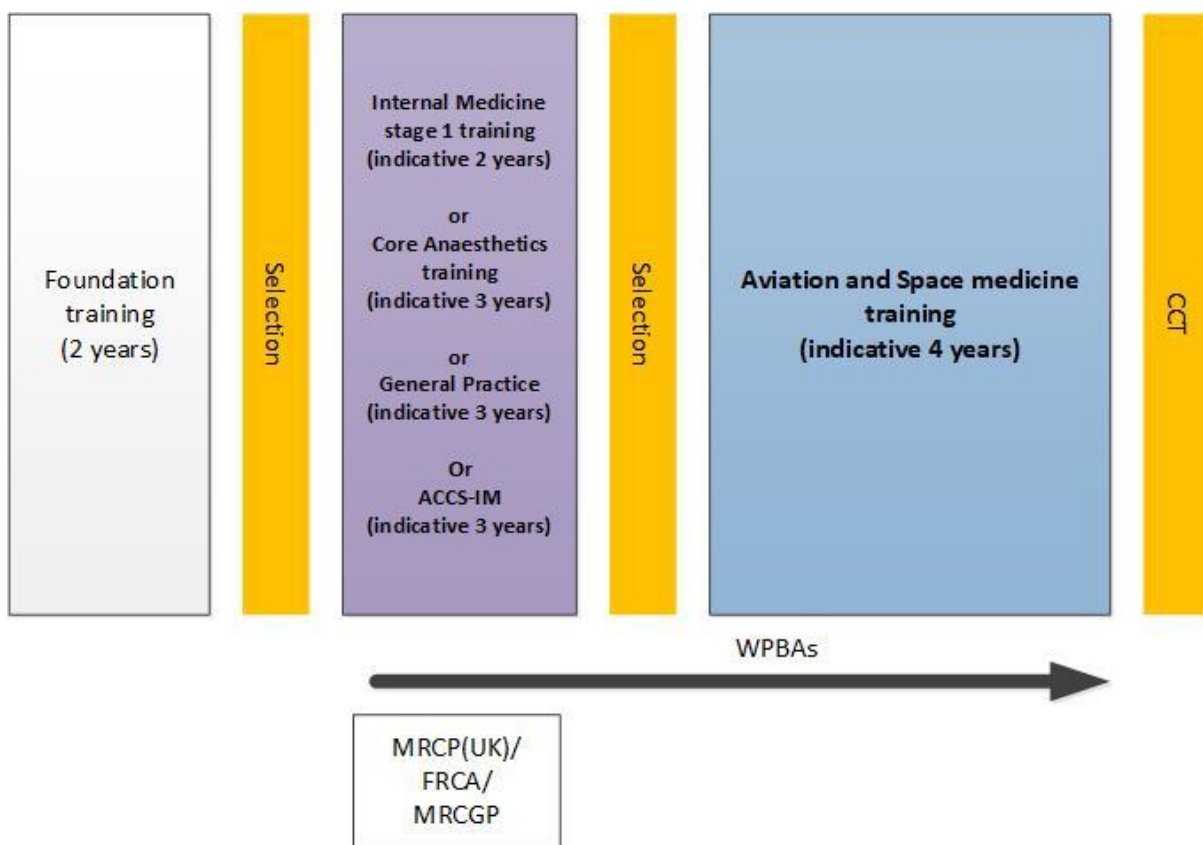
These are in addition to the six generic CiPs described within the IM curriculum.

Learning outcomes – capabilities in practice (CiPs)
Generic CiPs
<ol style="list-style-type: none"> 1. Able to successfully function within NHS organisational and management systems 2. Able to deal with ethical and legal issues related to clinical practice 3. Communicates effectively and can share decision making, while maintaining appropriate situational awareness, professional behaviour and professional judgement 4. Is focussed on patient safety and delivers effective quality improvement in patient care 5. Carrying out research and managing data appropriately 6. Acting as a clinical teacher and clinical supervisor
Specialty CiPs
<ol style="list-style-type: none"> 1. Ability to perform medicals on aircrew and other aviation workers and define and understand the clinical standards of licensing requirements 2. Ability to understand and assess hazards to health in the aviation environment and workplace, and the illnesses, which they cause 3. Ability to carry out flight environment medical assessments and investigations and how these may contribute to aero-medical decision making 4. Ability to assess research studies to provide risk and hazard analyses based on research findings 5. Ability to show how personal protective equipment and life-support systems work and how the physiological effect of the aviation environment can alter aircrew performance 6. Ability to conduct the medical investigation of an aircraft accident or incident 7. Ability to describe the factors influencing human performance and human error 8. Ability to conduct and understand the requirements for an aeromedical transfer of a patient 9. Ability to assess pathophysiological challenges of the space environment

10. Ability to demonstrate the principles of management and the structure of international, military and civilian regulatory bodies

2.3 Training pathway

Aviation and Space Medicine is a group 2 specialty and typically is entered at ST3 on completion of two years of Internal Medicine (IM) stage 1 or Acute Care Common Stem – Acute/Internal Medicine (ACCS-AM/IM) with full MRCP(UK) diploma, three years of Core Anaesthetics with FRCA or three years of General Practice with MRCGP. Trainees will undertake an indicative four-year higher specialist training programme.



2.4 Duration of training

Training in Aviation and Space Medicine will usually be completed in four years of full-time training. There will be options for those trainees who demonstrate exceptionally rapid development and acquisition of capabilities to complete training more rapidly than the current indicative time although it is recognised that clinical experience is a fundamental aspect of development as a good physician (guidance on completing training early will be available on the [JRCPTB website](#)). There may also be a small number of trainees who

develop more slowly and will require an extension of training in line the Reference Guide for Postgraduate Specialty Training in the UK (The Gold Guide).

2.5 Flexibility and accreditation of transferrable capabilities

The curriculum supports flexibility and transferability of outcomes across related specialties and disciplines, reflecting key interdependencies between this curriculum and other training programmes, outlined below.

The curriculum incorporates and emphasises the importance of the generic professional capabilities (GPCs). GPCs will promote flexibility in postgraduate training as these common capabilities can be transferred from specialty to specialty.

ASM specialty training is expected to take 4 years however, as the specialty training curriculum is competency and outcome based there is the flexibility and scope for this duration to be reduced if the trainee is demonstrating the timely attainment of relevant knowledge and skills. In contrast, as there is a significant research-based element to the curriculum there is scope for the training period to be lengthened, through out-of-programme placements, to accommodate the trainees' interests for the completion of a research thesis. The competency and outcome-based curriculum, coupled with the fact that the specialty has little out of hours or on-call rota commitments, is such that the training readily lends itself to less than full time (LTFT) working practices.

There is potential scope to transfer some shared learning outcomes and content with other specialties into ASM. Similarities of the skills and knowledge of the Occupational Medicine curriculum could be considered as transferable (the competencies identified in Specialty CiP 2). Likewise, the Emergency Medicine Curriculum has areas of commonality specifically relating to the human factors of safety decision making and in the areas of education and research. The ASM specific competencies tend to be unique to the specialty however, the generic professional capabilities framework, Domains 1 to 9, are transferable and trainees transferring from other specialties into ASM should have training a needs analysis carried out following appointment. This should determine which gained common competencies are applicable to ASM and following this assessment the training period and educational framework can be adjusted accordingly. Similarly, for trainees transferring out of ASM into another clinical specialty the generic professional capabilities would be transferrable, but it would be expected that there would be limited scope for the ASM specific competencies to be relevant to NHS based specialty training programmes.

2.6 Less than full time training

Trainees are entitled to opt for less than full time training programmes. Less than full time trainees should undertake a pro rata share of any out-of-hours duties (including on-call and other out-of-hours commitments), required of their full-time colleagues in the same programme and at the equivalent stage.

Less than full time trainees should assume that their ASM training will be of a duration pro-rata with the time indicated/recommended, but this should be reviewed in accordance with the Gold Guide.

2.7 Generic Professional Capabilities and Good Medical Practice

The GMC has developed the Generic professional capabilities (GPC) framework¹ with the Academy of Medical Royal Colleges (AoMRC) to describe the fundamental, career-long, generic capabilities required of every doctor. The framework describes the requirement to develop and maintain key professional values and behaviours, knowledge, and skills, using a common language. GPCs also represent a system-wide, regulatory response to the most common contemporary concerns about patient safety and fitness to practise within the medical profession. The framework will be relevant at all stages of medical education, training, and practice.

The nine domains of the GMC's Generic Professional Capabilities



Good medical practice (GMP)² is embedded at the heart of the GPC framework. In describing the principles, duties, and responsibilities of doctors the GPC framework articulates GMP as a series of achievable educational outcomes to enable curriculum design and assessment.

¹ [Generic professional capabilities framework](#)

² [Good Medical Practice](#)

The GPC framework describes nine domains with associated descriptor outlining the 'minimum common regulatory requirement' of performance and professional behaviour for those completing a CCT or its equivalent. These attributes are common, minimum, and generic standards expected of all medical practitioners achieving a CCT or its equivalent.

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

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

3. Content of Learning

The curriculum is recursive, and topics and themes will be revisited to expand understanding and expertise. The level of entrustment for capabilities in practice will increase as an individual progresses from needing direct supervision to able to be entrusted to act unsupervised.

3.1 Capabilities in practice

CiPs describe the professional tasks or work within the scope of the specialty. CiPs are based on the concept of entrustable professional activities³ which use the professional judgement of appropriately trained, expert assessors as a defensible way of forming global judgements of professional performance.

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

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

Additionally, the CiPs repeatedly refer to the need to demonstrate professional behaviour about patients, carers, colleagues and others. Good doctors work in partnership with patients and respect their rights to privacy and dignity. They treat each patient as an

³ [Nuts and bolts of entrustable professional activities](#)

individual. They do their best to make sure all patients receive good care and treatment that will support them to live as well as possible, whatever their illness or disability. Appropriate professional behaviour should reflect the principles of GMP and the GPC framework.

To complete training and be recommended to the GMC for the award of CCT and entry to the specialist register, the doctor must demonstrate that they are capable of unsupervised practice in all generic and specialty CiPs. Once a trainee has achieved level 4 sign off for a CiP it will not be necessary to repeat assessment of that CiP if capability is maintained (in line with standard professional conduct).

This section of the curriculum details the six generic CiPs and 10 specialty CiPs for Aviation and Space Medicine. The expected levels of performance, mapping to relevant GPCs and the evidence that may be used to make an entrustment decision are given for each CiP. The list of evidence for each CiP is not prescriptive and other types of evidence may be equally valid for that CiP.

3.2 Generic capabilities in practice

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

To ensure consistency and transferability, the generic CiPs have been grouped under the GMP-aligned categories used in the Foundation Programme curriculum plus an additional category for wider professional practice:

- Professional behaviour and trust
- Communication, team-working and leadership
- Safety and quality
- Wider professional practice

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

KEY

CbD	Case-based discussion	DOPS	Direct observation of procedural skills
GCP	Good Clinical Practice	MCR	Multiple consultant report
Mini-CEX	Mini-clinical evaluation exercise	PS	Patient survey
MSF	Multi source feedback	TO	Teaching observation
QIPAT	Quality improvement project assessment tool		

Generic capabilities in practice (CiPs)	
Category 1: Professional behaviour and trust	
1. Able to function successfully within NHS organisational and management systems	
Descriptors	<ul style="list-style-type: none"> • Aware of and adheres to the GMC professional requirements • Aware of public health issues including population health, social detriments of health and global health perspectives • Demonstrates effective clinical leadership • Demonstrates promotion of an open and transparent culture • Keeps practice up to date through learning and teaching • Demonstrates engagement in career planning • Demonstrates capabilities in dealing with complexity and uncertainty • Aware of the role of and processes for commissioning • Aware of the need to use resources wisely
GPCs	Domain 1: Professional values and behaviours Domain 3: Professional knowledge <ul style="list-style-type: none"> • professional requirements • national legislative requirements • the health service and healthcare systems in the four countries Domain 9: Capabilities in research and scholarship
Evidence to inform decision	MCR MSF Active role in governance structures Management course End of placement reports
2. Able to deal with ethical and legal issues related to clinical practice	
Descriptors	<ul style="list-style-type: none"> • Aware of national legislation and legal responsibilities, including safeguarding vulnerable groups • Behaves in accordance with ethical and legal requirements • Demonstrates ability to offer apology or explanation when appropriate • Demonstrates ability to lead the clinical team in ensuring that medical legal factors are considered openly and consistently
GPCs	Domain 3: Professional knowledge <ul style="list-style-type: none"> • professional requirements • national legislative requirements • the health service and healthcare systems in the four countries Domain 4: Capabilities in health promotion and illness prevention Domain 7: Capabilities in safeguarding vulnerable groups Domain 8: Capabilities in education and training Domain 9: Capabilities in research and scholarship

Evidence to inform decision	MCR MSF CbD DOPS Mini-CEX End of placement reports
Category 2: Communication, teamworking and leadership	
3. Communicates effectively and can share decision making, while maintaining appropriate situational awareness, professional behaviour and professional judgement	
Descriptors	<ul style="list-style-type: none"> • Communicates clearly with patients and carers in a variety of settings • Communicates effectively with clinical and other professional colleagues • Identifies and manages barriers to communication (eg cognitive impairment, speech and hearing problems, capacity issues) • Demonstrates effective consultation skills including effective verbal and nonverbal interpersonal skills • Shares decision making by informing the patient, prioritising the patient's wishes, and respecting the patient's beliefs, concerns and expectations • Shares decision making with children and young people • Applies management and team working skills appropriately, including influencing, negotiating, re-assessing priorities and effectively managing complex, dynamic situations
GPCs	<p>Domain 2: Professional skills</p> <ul style="list-style-type: none"> • practical skills • communication and interpersonal skills • dealing with complexity and uncertainty • clinical skills (<i>history taking, diagnosis and medical management; consent; humane interventions; prescribing medicines safely; using medical devices safely; infection control and communicable disease</i>) <p>Domain 5: Capabilities in leadership and teamworking</p>
Evidence to inform decision	MCR MSF PS End of placement reports ES report
Category 3: Safety and quality	
4. Is focussed on patient safety and delivers effective quality improvement in patient care	
Descriptors	<ul style="list-style-type: none"> • Makes patient safety a priority in clinical practice • Raises and escalates concerns where there is an issue with patient safety or quality of care • Demonstrates commitment to learning from patient safety investigations and complaints

	<ul style="list-style-type: none"> • Shares good practice appropriately • Contributes to and delivers quality improvement • Understands basic Human Factors principles and practice at individual, team, organisational and system levels • Understands the importance of non-technical skills and crisis resource management • Recognises and works within limit of personal competence • Avoids organising unnecessary investigations or prescribing poorly evidenced treatments
GPCs	<p>Domain 1: Professional values and behaviours</p> <p>Domain 2: Professional skills</p> <ul style="list-style-type: none"> • practical skills • communication and interpersonal skills • dealing with complexity and uncertainty • clinical skills (<i>history taking, diagnosis and medical management; consent; humane interventions; prescribing medicines safely; using medical devices safely; infection control and communicable disease</i>) <p>Domain 3: Professional knowledge</p> <ul style="list-style-type: none"> • professional requirements • national legislative requirements • the health service and healthcare systems in the four countries <p>Domain 4: Capabilities in health promotion and illness prevention</p> <p>Domain 5: Capabilities in leadership and teamworking</p> <p>Domain 6: Capabilities in patient safety and quality improvement</p> <ul style="list-style-type: none"> • patient safety • quality improvement
Evidence to inform decision	<p>MCR</p> <p>MSF</p> <p>QIPAT</p> <p>End of placement reports</p>
Category 4: Wider professional practice	
5. Carrying out research and managing data appropriately	
Descriptors	<ul style="list-style-type: none"> • Manages clinical information/data appropriately • Understands principles of research and academic writing • Demonstrates ability to carry out critical appraisal of the literature • Understands the role of evidence in clinical practice and demonstrates shared decision making with patients • Demonstrates appropriate knowledge of research methods, including qualitative and quantitative approaches in scientific enquiry • Demonstrates appropriate knowledge of research principles and concepts and the translation of research into practice • Follows guidelines on ethical conduct in research and consent for research • Understands public health epidemiology and global health patterns

	<ul style="list-style-type: none"> Recognises potential of applied informatics, genomics, stratified risk and personalised medicine and seeks advice for patient benefit when appropriate
GPCs	Domain 3: Professional knowledge <ul style="list-style-type: none"> professional requirements national legislative requirements the health service and healthcare systems in the four countries Domain 7: Capabilities in safeguarding vulnerable groups Domain 9: Capabilities in research and scholarship
Evidence to inform decision	MCR MSF GCP certificate (if involved in clinical research) Evidence of literature search and critical appraisal of research Use of clinical guidelines Quality improvement and audit Evidence of research activity End of placement reports
6. Acting as a clinical teacher and clinical supervisor	
Descriptors	<ul style="list-style-type: none"> Delivers effective teaching and training to medical students, junior doctors, and other health care professionals Delivers effective feedback with action plan Able to supervise less experienced trainees in their clinical assessment and management of patients Able to supervise less experienced trainees in carrying out appropriate practical procedures Able to act as clinical supervisor to doctors in earlier stages of training
GPCs	Domain 1: Professional values and behaviours Domain 8: Capabilities in education and training
Evidence to inform decision	MCR MSF TO Relevant training course End of placement reports

3.3 Specialty capabilities in practice

The specialty CiPs describe the tasks or activities which are essential to the practice of Aviation and Space Medicine. The CiPs have been mapped to the nine GPC domains to reflect the professional generic capabilities required to undertake the tasks.

Satisfactory sign off will require educational supervisors to make entrustment decisions on the level of supervision required for each CiP and if this is satisfactory for the stage of training, the trainee can progress. More detail is provided in the programme of assessment section of the curriculum.

- Domain 1: Professional values and behaviours
- Domain 2: Professional skills
- Domain 3: Professional knowledge
- Domain 4: Capabilities in health promotion and illness prevention
- Domain 5: Capabilities in leadership and teamworking
- Domain 6: Capabilities in patient safety and quality improvement
- Domain 7: Capabilities in safeguarding vulnerable groups
- Domain 8: Capabilities in education and training
- Domain 9: Capabilities in research and scholarship

KEY

CbD	Case-based discussion	DOPS	Direct observation of procedural skills
GCP	Good Clinical Practice	MCR	Multiple consultant report
Mini-CEX	Mini-clinical evaluation exercise	PS	Patient survey
MSF	Multi source feedback	TO	Teaching observation
QIPAT	Quality improvement project assessment tool	DAvMed	Diploma in Aviation Medicine
PbD	Project Based Discussion		

Specialty CiPs	
1. Ability to perform medicals on aircrew and other aviation workers and define and understand the clinical standards of licensing requirements.	
Descriptors	<ul style="list-style-type: none"> • Performs medicals on aircrew and other aviation workers including air traffic controllers to ensure individuals are medically fit and reach the required medical standards. • Defines the patterns of symptoms found in patients presenting with disease, and how these are related to aviation environment. • Defines the pathophysiological basis of investigations, including those relevant to aviation, and functional prognosis. • Interprets the results of investigations, especially to those relating to occupational attribution, functional prognosis and to licensing gain/retention. • Understands the clinical conditions requiring secondary review procedures. • Understands the clinical conditions which define the licensing requirements. • Understands the clinical conditions and their effect in the flight environment. • Understands the requirements of aviation regulatory bodies and the implications of clinical conditions on the setting of regulatory policies. • Understands the importance of evidence-based literature reviews to inform licensing and regulatory decision making. • Understands how to effect policy changes at national and international level.

	<ul style="list-style-type: none"> • Demonstrates knowledge of the limitations of statutory regulation on some clinical conditions. • Demonstrates knowledge of the effects on health of travelling by air. • Demonstrates knowledge of research and other relevant information on aviation health and to set priorities for areas which require further attention. • Acquires practical knowledge and experience of the conditions in which flight deck crew and other operators, including air traffic control workers, carry out their duties. • Provides certification of individuals within the medical standards necessary to achieve and maintain a high level of aviation safety. • Issues or revokes aircrew and air traffic controller's certificates to ensure medical standards are maintained. • Be responsible for identifying the clinical condition and licensing implications and take responsibility for these.
GPCs	<p>Domain 1: Professional values and behaviours</p> <p>Domain 2: Professional skills</p> <ul style="list-style-type: none"> • practical skills • communication and interpersonal skills • dealing with complexity and uncertainty • clinical skills (<i>history taking, diagnosis and medical management; consent; humane interventions; prescribing medicines safely; using medical devices safely; infection control and communicable disease</i>) <p>Domain 3: Professional knowledge</p> <ul style="list-style-type: none"> • professional requirements • national legislative requirements <p>Domain 5: Capabilities in leadership and teamworking</p> <p>Domain 6: Capabilities in patient safety and quality improvement</p> <p>Domain 9: Capabilities in research and scholarship</p>
Evidence to inform decision	<p>DAvMed</p> <p>mini-CEX</p> <p>PS</p> <p>MCR</p> <p>CbD</p> <p>MSF</p>
2. Ability to understand and assess hazards to health in the aviation environment and workplace, and the illnesses, which they cause.	
Descriptors	<ul style="list-style-type: none"> • Understands the physical (e.g., acceleration, pressure change, low ambient pressures, temperature, impact), chemical, biological, ergonomic, psychosocial, and other hazards to health in the aviation workplace, and the illnesses, which they cause. • Understands the military and civilian flight environment and the broader aviation working environments with the aim to have practical flight deck (or Simulator) experience.

	<ul style="list-style-type: none"> • Understands the principles of toxicology, physical (including thermal, noise, vibration, and radiation) hazards, occupational hygiene and ergonomics. • Knows about the clinical features and investigation of occupational diseases relevant to aviation. • Undertakes assessments of the aviation working environment, recognise hazards, and provide preliminary advice. • Undertakes quantitative measurements and advises on control measures for hazards in flight. • Recognises situations where specialist assessment of the aviation environment is needed and be able to seek and evaluate advice. • Diagnoses work related ill health and provide advice on prognosis, prevention, and management. • Customises assessments to subgroups (such as pregnant women) and to individuals. • Understands the sources of information on and methods of evaluating and controlling risk. • Understands the principles of health risk management in the aviation environment. • Evaluates the implementation of health risk management in the aviation workplace. • Carries out and evaluates health surveillance including biological monitoring for workers exposed to hazards on the ground or in the air. • Understands aviation health standards, biological monitoring, and the principles of health surveillance. • Understands the importance of risk assessment to ensure those with medical conditions are fit to fly on commercial aircraft. • Understands the health issues for passenger flying in commercial airlines and the hazards of microbiological and communicable diseases for commercial air travel. • Understand the implications for military and commercial flying from global pandemics and biosecurity threats. • Understands the management of inflight medical emergencies for commercial aircraft passengers and how to deal with on-board sick passengers.
<p>GPCs</p>	<p>Domain 1: Professional values and behaviours</p> <p>Domain 2: Professional skills</p> <ul style="list-style-type: none"> • practical skills • communication and interpersonal skills • dealing with complexity and uncertainty • clinical skills (<i>history taking, diagnosis and medical management; consent; humane interventions; prescribing medicines safely; using medical devices safely; infection control and communicable disease</i>) <p>Domain 3: Professional knowledge professional requirements</p> <ul style="list-style-type: none"> • professional requirements

	<ul style="list-style-type: none"> national legislative requirements <p>Domain 4: Capabilities in health promotion and illness prevention Domain 6: Capabilities in patient safety and quality improvement</p>
Evidence to inform decision	<p>DAvMed mini-CEX PS MCR CbD MSF</p>
3. Ability to carry out flight environment medical assessments and investigations and how these may contribute to aero-medical decision making.	
Descriptors	<ul style="list-style-type: none"> Understands the limitations of ground based clinical assessments, equipment investigation and research. Understands how flight environment (including in-flight or synthetic simulator) investigations may contribute to aero-medical decision making, formal equipment clearances and clinical fitness to fly judgements. Is familiar with the use of flight environment clinical rehabilitation assessment and its use in returning to fitness-for-flight. Determines areas of investigation that require flight environment assessment, or conditions where in-flight rehabilitation is justified and cost effective. Recognises the valuable contribution that flight environment assessment and rehabilitation offer, and the potential for error without consideration of in-flight factors. Has a thorough understanding of the flight environment, and the limitations involved with conducting such work on board aircraft. Is aware of all appropriate regulations. Writes flight protocols, in conjunction with experienced aircrew, for flight environment assessment, research or rehabilitation using skills and knowledge acquired from all aspects of Aviation and Space Medicine practice. Understands the various modalities of clinical and physiological monitoring that may be used in flight, and their principal limitations. Understands how monitoring can be integrated with aircraft systems to ensure there is no impact on flight safety or escape systems. Demonstrates an understanding of the physiological principles underlying monitoring techniques used. Describes the most appropriate parameters to be monitored and be familiar with the limitations. Identifies typical sources of error, and the problems associated with in-flight instrumentation. Has knowledge of aircrew and passenger equipment procurement organisations and responsible bodies. Understands appropriate format and channels for reporting.

	<ul style="list-style-type: none"> • Writes a report based on the findings of the assessment, with recommendations. • Produces reports to a high standard of clarity and accuracy, comparable with those in peer reviewed scientific literature.
GPCs	<p>Domain 1: Professional values and behaviours</p> <p>Domain 2: Professional skills</p> <ul style="list-style-type: none"> • professional requirements • national legislative requirements <p>Domain 3: Professional knowledge</p> <ul style="list-style-type: none"> • professional requirements • national legislative requirements • the health service and healthcare systems in the four countries <p>Domain 5: Capabilities in leadership and teamworking</p> <p>Domain 6: Capabilities in patient safety and quality improvement</p> <p>Domain 9: Capabilities in research and scholarship</p>
Evidence to inform decision	<p>DAvMed</p> <p>mini-CEX</p> <p>PS</p> <p>MCR</p> <p>CbD</p> <p>MSF</p> <p>DOPS</p> <p>PbD</p>
4. Ability to assess research studies to provide risk and hazard analyses based on research findings.	
Descriptors	<ul style="list-style-type: none"> • Publishes and communicates internally and externally the results of research undertaken, to respond to and raise awareness of issues or directives. • Delivers accurate and scientifically sound research • Demonstrates curiosity and a critical spirit of enquiry • Demonstrates the persistence needed to follow a project from inception to completion. • Ensures that research is undertaken using relevant ethical guidelines. • Applies for appropriate ethical research approval. • Converts a problem into a researchable question. • Can set up a hypothesis and test it. • Knows how to design a research study. • Carries out a literature search. • Plans data collection for simple survey (sample selection and recording and storing data). • Knows how to use appropriate statistical methods and utilise the knowledge of a statistician or epidemiological expert. • Interpret scientific data in journals and from own research. • Develops critical appraisal skills and apply these when reading literature.

	<ul style="list-style-type: none"> • Demonstrates the ability to write a scientific paper. • Demonstrates good verbal and written presentations skills.
GPCs	<p>Domain 1: Professional values and behaviours</p> <p>Domain 2: Professional skills</p> <ul style="list-style-type: none"> • practical skills • communication and interpersonal skills • dealing with complexity and uncertainty • clinical skills (<i>history taking, diagnosis and medical management; consent; humane interventions; prescribing medicines safely; using medical devices safely; infection control and communicable disease</i>) <p>Domain 3: Professional knowledge</p> <ul style="list-style-type: none"> • professional requirements • national legislative requirements <p>Domain 5: Capabilities in leadership and teamworking</p> <p>Domain 6: Capabilities in patient safety and quality improvement</p> <p>Domain 7: Capabilities in safeguarding vulnerable groups</p> <p>Domain 8: Capabilities in education and training</p> <p>Domain 9: Capabilities in research and scholarship</p>
Evidence to inform decision	<p>DAvMed</p> <p>MCR</p> <p>CbD</p> <p>MSF</p> <p>DOPS</p> <p>QIPAT</p> <p>TO</p> <p>PbD</p>
5. Ability to show how personal protective equipment and life-support systems work and how the physiological effects of the aviation environment can alter aircrew performance.	
Descriptors	<ul style="list-style-type: none"> • Assesses how personal protective equipment works and how the physiological effects of hypoxia can alter aircrew performance. • Conducts assessments of the fit and function of individual items of aircrew personal protective equipment under hypobaric conditions. • Performs physiological monitoring necessary to assess the performance and limitations of protective equipment. • Understands altitude chamber procedures, including medical fitness and contraindications. • Demonstrates how personal protective equipment mitigates the effects of long duration acceleration of the human. • Assesses the fit and function of individual items of aircrew personal protective equipment under increased acceleration. • Demonstrates how the physiological effects of acceleration exposure can alter aircrew performance and how aircrew life support systems mitigate these effects. • Operates a human centrifuge in a safe manner.

	<ul style="list-style-type: none"> • Medically monitors human centrifuge exposures. • Manages safely centrifuge emergency procedures. • Conducts accurate and appropriate non-human subject tests of life support equipment. • Assesses the performance of aircrew life support systems and health related medical investigations. • Assesses medical fitness to undergo high-G exposure and to detect medical conditions contra-indicating exposure.
GPCs	<p>Domain 1: Professional values and behaviours</p> <p>Domain 2: Professional skills</p> <ul style="list-style-type: none"> • practical skills • communication and interpersonal skills • dealing with complexity and uncertainty <p>Domain 3: Professional knowledge</p> <ul style="list-style-type: none"> • professional requirements • national legislative requirements <p>Domain 4: Capabilities in health promotion and illness prevention</p> <p>Domain 5: Capabilities in leadership and teamworking</p> <p>Domain 6: Capabilities in patient safety and quality improvement</p> <p>Domain 9: Capabilities in research and scholarship</p>
Evidence to inform decision	<p>DAvMed</p> <p>MCR</p> <p>CbD</p> <p>MSF</p> <p>DOPS</p> <p>TO</p> <p>PbD</p>
6. Ability to conduct the medical investigation of an aircraft accident or incident.	
Descriptors	<ul style="list-style-type: none"> • Documents and records evidence during an investigation. • Demonstrates cockpit/cabin crashworthiness structural assessments and identify hazards. • Demonstrates assessments on the performance of restraint systems. • Demonstrates assessments on the crashworthiness and energy attenuation capabilities of seat systems. • Assesses post-crash survivability. • Assesses the performance and functioning of aircraft assisted escape systems and understands the associated injury mechanisms. • Demonstrates how design and test failings can influence the causation of injury. • Identifies morphological abnormalities and interprets autopsy and clinical findings in relation to the injury mechanisms. • Can identify issues to be addressed by the clinical/autopsy examination. • Is conversant with current legislation and regulations relating to medico-legal aspects of accident investigations. • Makes recommendations to improve flight safety and injury outcome.

GPCs	Domain 1: Professional values and behaviours Domain 2: Professional skills <ul style="list-style-type: none"> • practical skills • communication and interpersonal skills • dealing with complexity and uncertainty Domain 3: Professional knowledge <ul style="list-style-type: none"> • professional requirements • national legislative requirements Domain 4: Capabilities in health promotion and illness prevention Domain 6: Capabilities in patient safety and quality improvement Domain 9: Capabilities in research and scholarship
Evidence to inform decision	DAvMed MCR Cbd MSF DOPS TO PbD
7. Ability to describe the factors influencing human performance and human error.	
Descriptors	<ul style="list-style-type: none"> • Describes the factors influencing human performance and the use of human error classification systems. • Describes the personal and organisation factors that affect safety. • Assesses the human factors issues associated with the design of flight decks. • Delivers and enhances crew and management awareness of human factors. • Understands the concept of risk as the product of event frequency and the application of as low as reasonably practical criteria (or likelihood and severity) to safety decision making. • Demonstrates knowledge of safety and risk analysis, nature and location of aircraft accidents, benefits of aircraft warning systems, and reporting systems. • Demonstrates knowledge of the factors influencing human performance and error, including the effects of fatigue, stress, individual differences, and medical conditions. • Uses and interprets fatigue risk management systems and measures to mitigate the effects of fatigue.
GPCs	Domain 1: Professional values and behaviours Domain 2: Professional skills <ul style="list-style-type: none"> • practical skills • communication and interpersonal skills • dealing with complexity and uncertainty Domain 3: Professional knowledge <ul style="list-style-type: none"> • professional requirements • national legislative requirements Domain 6: Capabilities in patient safety and quality improvement

Evidence to inform decision	DAVMed MCR CbD MSF DOPS TO PbD
8. Ability to conduct and understand the requirements for an aeromedical transfer of a patient.	
Descriptors	<ul style="list-style-type: none"> • Understands how to aero-medically evacuate patients safely. <ul style="list-style-type: none"> ○ Factors influencing the decision to transfer patients and the classification categories of patients for aeromedical evacuation. ○ Composition of the transfer team and the requirements of civilian and military patient transfers. • Can identify the essential data and requirements for safe and effective aeromedical transfers. <ul style="list-style-type: none"> ○ Requirements of the pre-flight preparation of the patient. ○ Requirements of the pre-existing clinical conditions, the relative contraindications to transfer and the presentation of difficulties which may be encountered during transfers. ○ Factors which influence the choice of aircraft for aeromedical evacuation • Demonstrates an understanding of in-flight medical equipment and understands the rationale behind the aviation standards relevant to aeromedical equipment. <ul style="list-style-type: none"> ○ Principles of monitoring and maintenance of the equipment during flight. • Demonstrates how the environment can influence the physiology and pathology of disease processes. <ul style="list-style-type: none"> ○ Aeromedical considerations for the patient regarding altitude, temperature, noise, air sickness, vibration and movement, visibility for medical staff and communication. • Is aware of the availability of in-flight resources and the influence on patient transfer and care. • Understands the importance of the administration of medication during transit though different times zones. • Understands the principles of transfer of patients with infectious diseases and those suffering from biological and chemical agents. • Understands the principles for the aeromedical transfer of the critically ill patient. • Understands the principles for the aeromedical transfer of the chronically ill patient.
GPCs	Domain 1: Professional values and behaviours Domain 2: Professional skills <ul style="list-style-type: none"> • practical skills • communication and interpersonal skills • dealing with complexity and uncertainty

	<ul style="list-style-type: none"> • clinical skills (<i>history taking, diagnosis and medical management; consent; humane interventions; prescribing medicines safely; using medical devices safely; infection control and communicable disease</i>) <p>Domain 3: Professional knowledge</p> <ul style="list-style-type: none"> • professional requirements • national legislative requirements • the health service and healthcare systems in the four countries <p>Domain 4: Capabilities in health promotion and illness prevention</p> <p>Domain 5: Capabilities in leadership and teamworking</p> <p>Domain 6: Capabilities in patient safety and quality improvement</p> <p>Domain 7: Capabilities in safeguarding vulnerable groups</p>
Evidence to inform decision	<p>DAvMed MCR CbD MSF DOPS PbD Mini-CEX</p>
9. Ability to assess pathophysiological challenges of the space environment.	

Descriptors	<ul style="list-style-type: none"> • Assesses the pathophysiological challenges of the space environment (including sub orbital and long duration space missions). <ul style="list-style-type: none"> ○ Problems associated with decreased pressure with the consequent risk of hypoxia, decompression sickness, ebullism, barotrauma and thermal injury and in comparison, with these factors in the non-space flying environment. ○ Problems associated with the accelerations of launch, atmospheric re-entry and landing. ○ Principles relating to nutrition, fluid balance, waste management and personal hygiene. • Assesses how microgravity influences space adaption <ul style="list-style-type: none"> ○ Problems associated with decreased accelerations (microgravity) with specific reference to the effects on the cardiovascular, neurovestibular and musculoskeletal systems. ○ Mechanisms and countermeasures available to minimise the effects of long duration space flights. ○ Knowledge of the limitations of medical intervention in a microgravity environment. • Demonstrates an understanding of the protection requirements for space flight. <ul style="list-style-type: none"> ○ Requirements for space craft and space suit pressurisation schedules. ○ Protection requirements for portable life support systems for extra-vehicular activities (space walks). • Understands the hazards of radiation and micrometeoroids • Understands the rationale and methods for rehabilitation from the long-term physiological effects of human spaceflight. • Understands of the constraints and challenges of delivering space medicine within a multinational operational environment such as the International Space Station. • Understands of the role of the space medicine specialist within a wider team centred around crew medical support. • Understands the behavioural consequences of prolonged space flight. <ul style="list-style-type: none"> ○ Importance of pre-selection psychological evaluation of prospective astronauts (and potentially space tourists). ○ Interrelationships between humans, their environment and spacecraft including the psycho-physiological factors associated with spacecraft habitability.
GPCs	<p>Domain 1: Professional values and behaviours</p> <p>Domain 2: Professional skills</p> <ul style="list-style-type: none"> • practical skills • communication and interpersonal skills • dealing with complexity and uncertainty • clinical skills (<i>history taking, diagnosis and medical management; consent; humane interventions; prescribing medicines safely; using</i>

	<p><i>medical devices safely; infection control and communicable disease)</i></p> <p>Domain 3: Professional knowledge</p> <ul style="list-style-type: none"> • professional requirements • national legislative requirements • the health service and healthcare systems in the four countries <p>Domain 5: Capabilities in leadership and teamworking</p>
Evidence to inform decision	<p>DAvMed</p> <p>MCR</p> <p>CbD</p> <p>MSF</p> <p>DOPS</p> <p>Mini-CEX</p> <p>PbD</p>
10. Ability to demonstrate the principles of management and the structure of international, military and civilian regulatory bodies.	
Descriptors	<ul style="list-style-type: none"> • Is able describe the structure and function of the healthcare system and medical regulation as it applies to Aviation and Space Medicine • Understands the military and civilian aviation regulatory bodies and promote a culture where safety is paramount. <ul style="list-style-type: none"> ○ Structure and authority of UK, European and other international regulatory bodies including CAA, FAA, EASA, and ICAO. ○ How and why regulatory bodies interact with each other. ○ Military and civilian flying regulations and how military civilian counterparts interact. • Demonstrates knowledge of the need for safety standards in aircraft operations. • Develops appropriate relationships that facilitates solutions to aviation workers health/licensing problems. • Understands and interacts with the aerospace industry and demonstrates how it functions to enhance flight safety and aviation worker and passenger health.
GPCs	<p>Domain 1: Professional values and behaviours</p> <p>Domain 2: Professional skills</p> <ul style="list-style-type: none"> • practical skills • communication and interpersonal skills • dealing with complexity and uncertainty <p>Domain 3: Professional knowledge</p> <ul style="list-style-type: none"> • professional requirements • national legislative requirements • the health service and healthcare systems in the four countries <p>Domain 5: Capabilities in leadership and teamworking</p> <p>Domain 6: Capabilities in patient safety and quality improvement</p>
Evidence to inform decision	<p>DAvMed</p> <p>MCR</p> <p>CbD</p> <p>MSF</p>

3.4 Presentations and conditions

The tables below detail the key presentations and conditions of Aviation and Space Medicine together with the main role specific competencies. Each of these presentations should be regarded as a clinical context in which trainees should be able to demonstrate CiPs and GPCs. In this spiral curriculum, trainees will expand and develop the knowledge, skills, and attitudes around managing patients with these conditions and presentations.

Trainees must demonstrate core patient-centred skills, including information gathering through history and physical examination and information sharing with patients, families, and colleagues.

Treatment care and strategy covers how a doctor selects drug treatments or interventions for a patient and includes discussions and decisions as to whether care is focused mainly on curative intent or whether the focus is on symptomatic relief. Importantly, for ASM, how the condition and treatment rationales effect and are influenced by the flight environment is paramount. Consideration needs to be given to how effective treatments may influence the performance and wellbeing in the aviation and space environment.

Presentations, conditions, and issues are listed either because they are common or serious (having high morbidity, mortality and/or serious implications for the aviation environment).

For each condition/presentation, trainees will need to be familiar with such aspects as aetiology, epidemiology, clinical features, investigation, management, and prognosis and how the conditions relate to the aviation, or space, environment. Trainees will need to understand the clinical presentation, signs, symptoms, pathology, prognosis, and treatment regimens for the following systems/ specialties. Trainees will need to assess a patient to formulate and implement an aeromedical management plan and will need to understand how these clinical presentations can influence licensing decisions, future/continued employment and passenger travel. The approach is to provide general guidance and not exhaustive detail, which would inevitably become out of date.

Presentations, and conditions for aeromedical disposition for Aviation and Space Medicine by system/specialty.

System	Presentations and Conditions
Cardiovascular disease	<ul style="list-style-type: none"> Coronary artery disease Rate and rhythm disturbances Conduction disturbances Valvular disease Pericarditis Myocarditis Endocarditis Cardiomyopathy

System	Presentations and Conditions
	Congenital heart disease Ion channelopathies Peripheral vascular disease Great vessel disease Hypertension.
Respiratory disease	Asthma Sarcoidosis Pneumothorax Bullous lung disease and cysts Obstructive sleep apnoea Chronic obstructive lung disease Bronchiectasis Pulmonary tuberculosis and mycobacterial disease Interstitial lung disease Pulmonary thromboembolic disease Pulmonary malignancies Bacterial and viral infections.
Gastrointestinal disease	Gastro-oesophageal reflux disease Peptic ulcer disease Inflammatory bowel disease Irritable bowel syndrome Coeliac disease Travellers' gastrointestinal infections Liver disease Gallstones, and pancreatitis.
Metabolic and endocrine diseases	Diabetes Disorders of the pituitary Thyroid Adrenal glands Calcium metabolism Disturbances of lipid metabolism
Renal disease	Haematuria Proteinuria Renal stone disease Chronic renal failure Benign prostatic hypertrophy Renal and bladder tumours.
Haematology	Anaemia Bleeding disorders Venous thrombosis and anticoagulation Blood transfusion Air travel and DVT Splenectomy Haematological malignancies.
Malignant disease	Colorectal carcinoma Lymphoid malignancies Melanoma Testicular tumours Renal carcinoma Prostatic tumours Breast carcinoma Lung carcinomas
Neurological disease	Cerebrovascular disease,

System	Presentations and Conditions
	Subarachnoid haemorrhage, Neurodegenerative diseases Tumours Inflammatory diseases Infections Myasthenia gravis Injuries to the nervous system Paroxysmal disorders (especially migraine and epilepsy) non-specific neurological symptoms.
Ophthalmologic disease	Refractive error in aviation Ocular adnexa disease Ocular anterior segment disease Retinal disease Neurophthalmology.
Psychiatric disease	Adjustment disorders Mood disorders Attempted suicide and para-suicide Acute stress disorder Post-traumatic stress disorder Phobias and fear of flying Personality disorders Schizophrenia and other delusional disorders Substance misuse
Otorhinolaryngology	Barotraumas Hearing loss Vertigo Acoustic neuromas and other tumours Paranasal sinus disease and infections Obstructive sleep apnoea Facial palsies Trauma and post-surgical complications/assessments.
Orthopaedic and musculo-skeletal diseases	Rheumatoid arthritis Seronegative arthritides Osteoarthritis and degenerative diseases Spinal disorders and deformities Bone and soft tissue tumours Metabolic bone diseases Trauma including gunshot wounds and battle injuries Genetic disorders.
Obstetrics and Gynaecology	Physiological changes associated with pregnancy Impact of the aviation environment on the mother and foetus.
Pharmacology / Medications	Understands the implication of the action of the medications and their side effects on flying tasks and the risk of incapacitation. Demonstrates the practical application of knowledge of the potential impact on flight safety of prescription and non-prescription medications, and the appropriate use of these agents in aviation workers.

Role specific knowledge and skills for Aviation and Space Medicine

In addition to the clinical presentations outlined above ASM has several knowledge and skills requirements in which the trainee will have to demonstrate proficiency. The trainees understanding of these knowledge areas can be used as a means of gauging and evaluating

the gaining of the Specialty CiPs. The table below is intended as an aid memoire and to provide further details for trainees to understand the scope of practice and knowledge basis which underpins the Specialty CiPs and practical procedures.

Topic	Knowledge and Skills	Issues
Altitude (Hypobaric) Chamber Procedures	Ground based pressure breathing	Demonstrate and teach ground-based pressure breathing training.
	Medical requirements for altitude chamber exposure	Perform medical examinations and assess medical fitness for personnel undergoing altitude chamber exposure.
	Altitude chamber emergencies	Assess and manage the types of potential emergencies arising in a hypobaric chamber exposure including DCS, VGE.
	Rapid decompression chamber procedures	Conduct rapid decompression chamber procedures.
	Hypoxia demonstrations	Conduct safely hypobaric hypoxia demonstrations
	Working practices	Work in the chamber in a safe way.
Hypobaric Assessment of Aircrew Personal Protective Equipment	Personal protective equipment assessment in mitigating effects of high-altitude exposure	Show how personal protective equipment works and how the physiological effects of hypoxia can alter aircrew performance.
	Protective equipment integration for protection for high altitude	Conduct an assessment of the fit and function of individual items of aircrew personal protective equipment under altitude chamber conditions
	Physiological monitoring during personal equipment assessment under high altitude exposure	Perform physiological monitoring necessary to assess the performance and limitations of protective equipment.
	Reporting of findings	Write a report based on the findings of the assessment, and to a standard comparable with those in peer reviewed journals
Clinical Assessment of Aircrew in the Hypobaric Chamber	Return to flying medical assessments	Determine fitness for return to flying by carrying out altitude chamber medical assessments
	Medical conditions disqualifying from flying	Detect and have thorough knowledge of the conditions resulting in medical disqualification from flying.
Long Duration Acceleration – Human Centrifuge Procedures	Medical requirements for long duration acceleration exposure	Assess medical fitness to undergo high-G exposure and to detect medical conditions contra-indicating exposure
	Medical monitoring during acceleration exposure	Medically monitor human centrifuge exposures
	Centrifuge emergencies	Manage safely centrifuge emergency procedures
	Operating procedures and working practices	Operate human centrifuges in a safe manner
Long Duration Acceleration – Clinical Assessment of Aircrew on the Centrifuge	Effect of acceleration exposure on human physiology	Assess the effects of long duration acceleration on healthy individuals and in disease.
	Return to flying medical assessments	Determine fitness for flight in the high-G environment.

Topic	Knowledge and Skills	Issues
	Medical monitoring during clinical centrifuge assessment	Carry out measurements appropriate in the assessment of medical fitness in the high-G environment.
	Aeromedical disposition report	Deliver an appropriate report providing military and civilian aeromedical disposition and licensing requirements.
Long Duration Acceleration – Assessment of Aircrew Personal Protective Equipment	Role of personal protective equipment in mitigating effects of acceleration exposure	Demonstrate how personal protective equipment mitigates the effects of long duration acceleration of the human
	Personal protective equipment integration under acceleration	Assess the fit and function of individual items of aircrew personal protective equipment under increased acceleration
	Physiological monitoring during personal equipment assessment under increased acceleration	Carry out physiological monitoring to assess the performance and limitations of protective equipment
	Reporting of findings	Write a report based on the findings of the assessment, with recommendations.
Long Duration Acceleration – Assessment of Aircrew Health Issues and Life Support Systems	Role of life support systems in mitigating effects of acceleration exposure	Describe how the physiological effects of acceleration exposure can alter aircrew performance and how aircrew life support systems mitigate these effects.
	Non-human testing (not animal testing)	Conduct accurate and appropriate non-human tests of life support equipment.
	Issues affecting aircrew health under increased G	Devise research protocols and conduct studies to examine the effects of acceleration.
	Physiological monitoring for aircrew health and life support system assessments under increased acceleration	Assess the performance of aircrew life support systems and health related medical investigations.
	Reporting of findings	Produce reports to a high standard of clarity and accuracy, comparable with those in peer reviewed scientific literature
Long Duration Acceleration – Training of Aircrew	Physiological principles of protection against acceleration	Describe the techniques available to aircrew to augment acceleration protection.
	Conduct centrifuge experience for aircrew and teach acceleration countermeasures	Competence in the teaching of acceleration countermeasures to aircrew.
Assisted Aircrew Escape System Testing	Ejection sequence	Analyse the techniques used for testing ejection systems.
	Ejection sequence modelling	Interrogate and interpret results to determine the likely functioning of the systems.
	Anthropomorphic test dummies (ATD)	Analyse ATD test data.
	Aircrew equipment assemblies and aircrew protective equipment	Demonstrate how design and test failings can influence the causation of injury.
Assessment of Aircrew Protective Helmets	Head protection and impact damage analysis	Analyse head protection systems
	Head injury analysis	Correlate clinical findings with the performance of head protection systems

Topic	Knowledge and Skills	Issues
	Helmet impact testing	Able to perform helmet impact tests
	Head protection procurement	Competence in the legislative and duty of care issues involved in the procurement of safety systems
Post-Accident Workspace (Cockpit) Assessments	Cockpit and cabin environment assessment	Evaluate the aircraft environment and formulate a management plan.
	Cockpit and cabin functional assessment	Carry out an accurate history and cockpit assessment.
	Consequences of injury assessment	Assess and make recommendations on the fitness for task of post-accident aircrew
Aircraft Crashworthiness and Survivability Assessments	Aircraft structural container and injury causation	Carry out cockpit structural assessments and identify hazards.
	Restraint systems and injury	Carry out assessments on the performance of restraint systems.
	Impact energy attenuation	Carry out assessments on the energy attenuation capabilities of seat systems
	Post-crash survivability	Assess post-crash survivability
Aircrew Equipment Integration	Life support equipment (LSE) integration	Assess and integrate aircrew life support systems
	Aircrew anthropometry	Assess aircraft occupant anthropometry and cockpit space limitations.
	LSE sizing	Assess sizing and functional fit of items of LSE
	LSE integration data capture	Measure and record data from LSE integration assessments.
	Emergency aircraft evacuation	Evaluate emergency aircraft evacuations and procedures
Aviation Psychology and the Investigation of Human Factor Incidents	Human error	Describe the factors influencing human performance and the use of human error classification systems
	Safety and risk	Describe the personal and organisation factors that affect safety
	Cockpit workspace ergonomics	Assess the human factors issues associated with the design of flight decks.
	Crew Resource Management (CRM)	Deliver and enhance crew and management awareness of human factors.
	Fatigue risk, management, and countermeasures	Describe the fatigue factors influencing human performance and error and understand the countermeasures and drug interventions used to mitigate fatigue, together with shift cycle management.
Thermal Evaluation of Aircrew and Aircrew Equipment Assembly Performance	Thermal environment and heat balance	Assess thermal balance and heat in the aviation environment.
	Body temperature and thermoregulatory response and thermal injury	Assess heat regulation in the body
	Heat stress indices	Ability to apply hot and cold heat stress indices to the assessment of aircrew performance

Topic	Knowledge and Skills	Issues
	Climatic chambers	Ability to conduct thermal evaluation trials
	Effect of hot and cold stress on aircrew performance and operations	Assess how thermal issues relate to crew performance
	Brun injury	Assess burn injury protection afforded by flame retardant ensembles.
Assessment of Hearing Protection and In-Flight Noise	Hearing protection and in-flight noise monitoring	Carry out and interpret a noise risk assessment in the aircraft environment.
	Role of hearing protection in mitigating the effects of aircraft noise exposure	Assess hearing protection
	In-flight and audio booth monitoring of noise during hearing protection and speech intelligibility assessments	Conduct functional assessments of human performance during noise exposure.
Assessment of Aircraft Vibration and its Effect on the Human	Vibration protection and in-flight vibration monitoring	Carry out and interpret a vibration risk assessment.
	Role of vibration protection in mitigating the effects of aircraft vibration exposure	Assess the effects of vibration exposure on the body
	In-flight monitoring of vibration and vibration rig assessments of aircrew at risk from whole body vibration exposure	Assess the fit and function of vibration protection and communications intelligibility.
	Motion sickness	Assess motion sickness and conduct a desensitisation programme.
Situational Awareness and Spatial Disorientation	Spatial awareness	Assess situational awareness and its loss
	Disorientation in flight	Understand and assess disorientation in flight
	Prevention of disorientation	Understand disorientation countermeasures.
	Investigation of disorientation incidents	Identify and address the issues raised by disorientation incidents.
Vision and Optical Systems	Vision	Describe how vision can affect the performance of aircrew.
	Visual acuity and fields	Ability to assess vision
	Vision and licensing	Interpret the results of vision investigations and examinations and assess functional prognosis for licensing gain/retention.
	Optical devices	Show how vision protection works and the limitations of protection equipment and enhancement

3.5 Practical procedures

There are procedural skills in which a trainee must become proficient, these however are typically not invasive and are unlikely to require aseptic technique, or safe use of analgesia and local anaesthetics.

Trainees must be able to outline the indications for the practical procedures and recognise the importance of valid consent, minimisation of patient/aircrew discomfort, and requesting help when appropriate. For all practical procedures the trainee must be able to recognise complications and respond appropriately if they arise, including calling for help from colleagues when necessary.

Assessment of procedural skills will be made using the direct observation of procedural skills (DOPS) tool. The table below sets out the minimum competency level expected for each of the practical procedures.

When a trainee has been signed off as being able to perform a procedure independently, they are not required to have any further assessment (DOPS) of that procedure, unless they or their educational supervisor think that this is required (in line with standard professional conduct).

Procedure	ST3	ST4	ST5	ST6
Altitude (hypobaric) chamber procedures	2	2	3	4
Long duration acceleration – human centrifuge procedures	2	2	3	4
Aircrew equipment integration procedures	2	2	3	4
Motion sickness desensitisation procedures	2	3	3	4
Aircraft accident investigation procedures	2	2	3	4
Noise and vibration assessment procedures	2	2	3	4
Thermal evaluation of aircrew equipment assembly performance procedures	2	2	3	4
Assessment of vision and visual (enhancement) systems	2	2	3	4
Assessment of aircrew helmet protection procedures	2	3	3	4

Key - see section 5.3

4 Learning and Teaching

4.1 The training programme

The organisation and delivery of postgraduate training is the responsibility of the Health Education England (HEE), NHS Education for Scotland (NES), Health Education and Improvement Wales (HEIW) and the Northern Ireland Medical and Dental Training Agency (NIMDTA) – referred to from this point as ‘deaneries’. A training programme director (TPD) will be responsible for coordinating the specialty training programme.

Progression through the programme will be determined by the Annual Review of Competency Progression (ARCP) process and the training requirements for each indicative year of training are summarised in the ARCP decision aid (available on the [JRCPTB website](#)).

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

Trainees will have an appropriate clinical supervisor and a named educational supervisor. The clinical supervisor and educational supervisor may be the same person. Training posts in Aviation and Space Medicine will be in various settings, which are invariably outside the NHS. It is likely that no one employing organisation will be able to provide training in all ASM competencies and it is expected that trainees will spend training-time within other approved training establishments and organisations. A lead or ‘host’ deanery will be responsible for the organisation and delivery of specialty training in Aviation and Space Medicine. All training in Aviation and Space Medicine should be conducted in institutions with appropriate standards of clinical governance and which meet the relevant Health and Safety standards for clinical and work areas. Training placements must also comply with the European Working Time Directive for trainee doctors. Training posts must provide the necessary clinical exposure but also evidence that the required supervision and assessments can be achieved.

The following provides a guide on how the training programmes should be focussed on each training year for trainees to gain the experience and develop the capabilities to the level required.

4.1.2 Higher Specialty Training Programme Structure

ST3. ST3 of the HST will concentrate on the acquisition of skills in basic science and Aviation and Space Medicine, with an emphasis on human physiology and clinical aviation medicine. Assessment of this knowledge base will be by successful submission to the examinations for the Diploma in Aviation Medicine of the Faculty of Occupational Medicine (DAvMed). The higher specialty training programme is flexible and so the Diploma in Aviation Medicine may be studied for, and its exam taken in ST4 or 5 depending on the individual’s tailored training

programme and requirements of their employing organisation. The examination is a summative assessment which must be passed by end of ST5 to be eligible for the award of a CCT. The diploma is blueprinted to the syllabus (please see section 3.3). Furthermore, trainees may wish to consider attending a course of study which provides preparation for the DAvMed exam. Attendance at a course of study which provides preparation for the DAvMed can provide the opportunity to gain important ASM competences which may be challenging to achieve through other less structured routes. The ASM knowledge base may be acquired more expeditiously and more efficiently using such courses.

Training will continue in the practice of Aviation and Space Medicine and will encourage the development of the essential research skills necessary to devise, conduct and report original research. The trainee should start to be able to demonstrate adequate knowledge of scientific methodology and statistical or epidemiological research techniques. These skills may be gained through the trainees' work in their employing organisation, or they could undertake an MSc in Aviation and Space Medicine, Aeromedical Research or Human and Applied Physiology to gain these competencies. In addition, the ability to evaluate adequately the research efforts of others will be gained. The training will also address the acquisition of other skills, such as the teaching and management abilities essential to a practising Consultant.

ST4-6. These years will have several principal elements to the training; clinical aviation and space medicine, role specific competencies, research, teaching and training, and managerial skills.

Clinical Aviation and Space Medicine is to include the medical care of aircrew, (including other aviation workers) and of air passengers. To achieve the appropriate delivery of medical care to both passengers and aircrew the trainee is required to acquire detailed knowledge of the medical and physiological consequences of flight and to understand the specific requirements of each group. Maintenance of clinical skills must be demonstrated by clinical contact with aircrew or passengers under assessment for fitness for flight. The trainee will be expected to maintain a portfolio of cases managed, and clinical assessments conducted involving aircrew (including cabin crew), other aviation workers and passengers. The portfolio of cases should contain a full report of the clinical presentation, its investigation and management, as well as supporting evidence drawn from the medical literature. A review of the portfolio will form an element of their ARCP.

The imparting of knowledge of Aviation and Space Medicine to groups of doctors, aircrew and passengers is a crucial element of the role of Aviation and Space Medicine specialists. Therefore, all specialists are required to develop expertise in this area. A formal course of training in teaching techniques may be undertaken and satisfactory performance in this role demonstrated. The trainee will be required to maintain a record of teaching and training duties undertaken and their performance in this activity will be assessed by Teaching Observations in the organisation in which they work.

Managerial skills will be developed through wider professional training. This may include the supervision and assessment of junior medical and non-medical staff, the demonstration of financial awareness and accountability when working within a constrained budget and the

ability to communicate by written and oral means to the contribution of aeromedical considerations to aviation project management. A period of formal staff/management training would be advantageous to the trainee.

The sequence of training should ensure appropriate progression in experience and responsibility. The training to be provided at each training site is defined to ensure that, during the programme, the entire curriculum is covered and that unnecessary duplication and educationally unrewarding experiences are avoided.

4.2 Teaching and learning methods

The curriculum will be delivered through a variety of learning experiences and will achieve the capabilities described in the syllabus through a variety of learning methods. There will be a balance of different modes of learning from formal teaching programmes to experiential learning 'on the job'. The proportion of time allocated to different learning methods may vary depending on the nature of the attachment within a training location.

This section identifies the types of situations in which a trainee will learn.

Opportunities for concentrated practice in skills and procedures - There are a number of skills specific to the practice of Aviation and Space Medicine, for example altitude chamber assessments, human centrifuge assessments, aircrew equipment integration, motion sickness desensitisation, accident investigation, noise and vibration assessments, interpretation of ECGs and EEGs for the aviation environment, and optometric assessments in which it will be appropriate for trainees to receive training. It is important that these skills are acquired at the pace appropriate to the individual trainee. Acquisition of these skills will require some initial theoretical training, followed by supervised practice with increasing independence. The training programme should afford the trainee the opportunity to maintain and further enhance these skills once acquired

Learning with peers - There are opportunities for trainees to learn with their peers. Local postgraduate teaching opportunities allow trainees of varied levels of experience to come together for small group sessions. Examination preparation encourages the formation of self-help groups and learning sets.

Work-based experiential learning - The content of work-based experiential learning is decided by the local faculty for education but includes active participation in:

- Medical clinics including specialty clinics. After initial induction, trainees will review patients in clinics, under direct supervision. The degree of responsibility taken by the trainee will increase as competency increases. As experience and clinical competence increase trainees will assess 'new' and 'review' patients and present their findings to their clinical supervisor.
- Patient centred learning. Every patient seen provides a learning opportunity, which will be enhanced by following the patient through the course of their medical condition management and aeromedical disposition. Patients seen should provide the basis for critical reading and reflection of clinical problems.

- Multi-disciplinary team meetings and grand rounds. There are many situations where clinical problems are discussed with clinicians in other disciplines. These provide excellent opportunities for observation of clinical reasoning.

Trainees have supervised responsibility for the review of the patient's or aviation worker's clinical conditions, note keeping, and the initial aeromedical management with referral to and liaison with other clinical colleagues as necessary. The degree of responsibility taken by the trainee will increase as competency increases. There should be appropriate levels of supervision throughout training with increasing independence and responsibility as learning outcomes are achieved.

Formal postgraduate teaching - The content of these sessions is determined by the local educational supervisors and will be based on the curriculum. There are many opportunities throughout the year for formal teaching. Many of these are organised by internationally recognised organisations.

Suggested activities include:

- One to one teaching with the Aviation and Space Medicine physicians.
- Case presentations.
- Research and audit projects.
- Journal clubs and local aeromedical meetings.
- Lectures and small group teaching.
- Aviation and Space Medicine skills demonstrations and teaching.
- Critical appraisal and evidence-based medicine.
- Other specialty meetings such as CAA Medical Advisory Panel Meeting.
- Attendance at regional, national, and international meetings such as the Aerospace Medical Association Annual Scientific Meeting, International Congress in Aviation and Space Medicine, and Royal Aeronautical Society Aerospace Medicine Group Seminars.

Attendance at the educational activity must be properly documented and a record of satisfactory attendance is regarded as an essential prerequisite for progression through training. The trainee should understand that reflecting on practice is a crucial part of learning and both the trainee and the supervisor should explore the thinking that underlies good practice. Acquiring and demonstrating abilities in self-directed learning is an essential part of training to be a professional and the trainee should develop these skills to include reading textbooks, journals and review articles, web-based learning, and research in the process of writing presentations for teaching. The trainees must develop and gain excellent computer skills. The participation in journal clubs fosters critical thinking and an approach to the evaluation of the medical literature, which is essential to professional practice. Aviation and Space Medicine specialists need themselves to be excellent teachers and will develop their teaching skills by presenting to colleagues and to other personnel on Aviation and Space Medicine courses. Hence, all trainees should attend formal training in presentational and teaching skills.

Independent self-directed learning -Trainees will use this time in a variety of ways depending upon their stage of learning. Suggested activities include:

- Reading, including web-based material
- Maintenance of personal portfolio (self-assessment, reflective learning, personal development plan)
- Audit and research projects
- Reading journals
- Achieving personal learning goals beyond the essential, core curriculum

Formal study courses - Time to be made available for formal courses is encouraged, subject to local conditions of service. Examples include management courses and communication courses which are particularly relevant to patient and aviation worker safety and experience.

4.3 Academic training

Some trainees may opt to do research leading to a higher degree without being appointed to a formal academic programme. This curriculum should not impact in any way on the facility to take time out of programme for research (OOPR). Such time requires discussion between the trainee, the TPD and the Deanery as to what is appropriate together with guidance from the appropriate SAC that the proposed period and scope of study is sensible.

4.4 Taking time out of programme

There are a number of circumstances when a trainee may seek to spend some time out of specialty training, such as undertaking a period of research or taking up a fellowship post. All such requests must be agreed by the postgraduate dean in advance and trainees are advised to discuss their proposals as early as possible. Full guidance on taking time out of programme can be found in the Gold Guide.

4.5 Research

A significant proportion of specialists in Aviation and Space Medicine will conduct original aeromedical research and/or undertake an informed assessment of research conducted by others. Trainees will improve their critical thinking around such research questions, which may require extensive literature reviews and liaison with national and international teams of experts. Trainees must have achieved a high standard in their own research activities and trainees may undertake research to further refine these skills. The trainee's research projects should be assessed by the Educational Supervisor, at ARCP with the evidence to inform the decision outlined in Specialty CiP4. The evidence may include, among other evidence, peer reviewed publications in the open literature, production of research reports for their respective training organisations or with the award of a higher research degree. In the case of work carried out in a field restricted from publication by security considerations, reports given a restricted circulation will be available to the Educational Supervisor and the ARCP for inspection.

Research is integral to the Aviation and Space Medicine Curriculum, but trainees may elect to conduct out of programme research (OOPR) or take part in an out of programme

experience (OOPE). This should be done in accordance with guidance provided in the Gold Guide and the JRCPTB website.

Upon completion of the research period the learning outcomes achieved will be agreed by the OOP Supervisor, Educational Supervisor and communicated to the SAC, accessing the facilities available on the JRCPTB e-Portfolio. The learning outcomes achieved will determine the trainee's position on return to programme; for example, if an ST3 trainee obtains all ST4 learning outcomes then 12 months will be recognised towards the minimum training time and the trainee will return to the programme at ST5. This would be corroborated by the subsequent ARCP.

4.6 Overseas Training

Trainees may be able eligible to spend a period working in Aviation and Space Medicine outside the UK. This may be in support of UK air operations overseas or with aviation medical authorities or agencies of another nation. Local supervision may be delegated to a suitable expert in the region in which the trainee is working, although the overall supervision of the trainee's work and progress would remain the responsibility of the designated UK Educational Supervisor. Trainees may apply for up to six months out of programme training (OOPT) overseas. To be eligible to have this period of training recognised towards the award of the CCT, trainees must have their OOPT overseas training approved prospectively by GMC before beginning their overseas training. Requests will be considered on an individual basis to ensure the training opportunities and level of supervision required are clear and trainees should refer to the guidance on the JRCPTB website (www.jrcptb.org.uk).

5 Programme of Assessment

5.1 Purpose of assessment

The purpose of the programme of assessment is to:

- assess trainees' actual performance in the workplace
- enhance learning by providing formative assessment, enabling trainees to receive immediate feedback, understand their own performance and identify areas for development
- drive learning and enhance the training process by making it clear what is required of trainees and motivating them to ensure they receive suitable training and experience
- demonstrate trainees have acquired the GPCs and meet the requirements of GMP
- ensure that trainees possess the essential underlying knowledge required for their specialty
- provide robust, summative evidence that trainees are meeting the curriculum standards during the training programme.
- inform the ARCP, identifying any requirements for targeted or additional training where necessary and facilitating decisions regarding progression through the training programme.
- identify trainees who should be advised to consider changes of career direction.

5.2 Programme of Assessment

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

The programme of assessment is comprised of several different individual types of assessment. A range of assessments is needed to generate the necessary evidence required for global judgements to be made about satisfactory performance, progression in, and completion of, training. All assessments, including those conducted in the workplace, are linked to the relevant curricular learning outcomes (e.g., through the blueprinting of assessment system to the stated curricular outcomes).

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

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

Assessment will take place throughout the training programme to allow trainees continually to gather evidence of learning and to provide formative feedback. Those assessment tools which are not identified individually as summative will contribute to summative judgements about a trainee's progress as part of the programme of assessment. The number and range of these will ensure a reliable assessment of the training relevant to their stage of training and achieve coverage of the curriculum.

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

5.3 Assessment of CiPs

Assessment of CiPs involves looking across a range of different skills and behaviours to make global decisions about a learner's suitability to take on responsibilities or tasks.

Clinical supervisors and others contributing to assessment will provide formative feedback to the trainee on their performance throughout the training year. This feedback will include a global rating to indicate to the trainee and their educational supervisor how they are progressing at that stage of training. To support this, workplace-based assessments and multiple consultant reports will include global assessment anchor statements.

Global assessment anchor statements

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

Towards the end of the training year, trainees will make a self-assessment of their progression for each CiP and record this in the e-portfolio with signposting to the evidence to support their rating.

The educational supervisor (ES) will review the evidence in the e-portfolio including workplace-based assessments, feedback received from clinical supervisors (via the Multiple Consultant Report) and the trainee’s self-assessment and record their judgement on the trainee’s performance in the ES report, with commentary.

For **generic CiPs**, the ES will indicate whether the trainee is meeting expectations or not using the global anchor statements above. Trainees will need to be meeting expectations for the stage of training as a minimum to be judged satisfactory to progress to the next training year.

For **specialty CiPs**, the ES will make an entrustment decision for each CiP and record the indicative level of supervision required with detailed comments to justify their entrustment decision. Some ASM specialty CiPs may not involve specific areas of clinical care, nevertheless, the same Level descriptors will be used. The ES will also indicate the most appropriate global anchor statement (see above) for overall performance.

Level descriptors for specialty CiPs

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

Level 4	Entrusted to act unsupervised
---------	--------------------------------------

The ARCP will be informed by the ES report and the evidence presented in the e-portfolio. The ARCP panel will make the final summative judgement on whether the trainee has achieved the generic outcomes and the appropriate level of supervision for each CiP. The ARCP panel will determine whether the trainee can progress to the next year/level of training in accordance with the Gold Guide. ARCPs will be held for each training year. The final ARCP will ensure trainees have achieved level 4 in all CiPs for the critical progression point at completion of training.

5.4 Critical progression points

There will be key progression points on entry and on completion of specialty training. Trainees will be required to be entrusted at level 4 in all CiPs by the end of training to achieve an ARCP outcome 6 and be recommended for a CCT.

The educational supervisor report will make a recommendation to the ARCP panel as to whether the trainee has met the defined levels for the CiPs and acquired the procedural competence required for each year of training. The ARCP panel will make the final decision on whether the trainee can be signed off and progress to the next year/level of training [see section 5.6].

The outline grid below sets out the expected level of supervision and entrustment for the specialty CiPs and includes the critical progression points across the whole training programme.

Table 1: Outline grid of levels expected for Aviation and Space Medicine specialty CiPs

Levels to be achieved by the end of each training year for specialty CiPs

Level descriptors

Level 1: Entrusted to observe only – no clinical care

Level 2: Entrusted to act with direct supervision

Level 3: Entrusted to act with indirect supervision

Level 4: Entrusted to act unsupervised

Specialty CiP	ST3	ST4	ST5	ST6	CRITICAL PROGRESSION POINT
1. Ability to perform medicals on aircrew and other aviation workers and define and understand the clinical standards of licensing requirements.	2	3	3	4	
2. Ability to understand and assess hazards to health in the aviation environment and workplace, and the illnesses, which they cause.	2	3	3	4	
3. Ability to carry out flight environment medical assessments and investigations and how these may contribute to aero-medical decision making.	2	2	3	4	
4. Ability to assess research studies to provide risk and hazard analyses based on research findings.	2	3	3	4	
5. Ability to show how personal protective equipment and life-support systems works and how the physiological effects of the aviation environment can alter aircrew performance.	2	2	3	4	
6. Ability to conduct the medical investigation of an aircraft accident or incident.	2	2	3	4	
7. Ability to describe the factors influencing human performance and human error.	2	3	3	4	
8. Ability to conduct and understand the requirements for an aeromedical transfer of a patient.	2	2	3	4	
9. Ability to assess pathophysiological challenges of the space environment.	2	2	3	4	
10. Ability to demonstrate the principles of management and the structure of international, military and civilian regulatory bodies.	2	3	3	4	

5.5 Evidence of progress

The following methods of assessment will provide evidence of progress in the integrated programme of assessment. The requirements for each training year/level are stipulated in the ARCP decision aid (www.jrcptb.org.uk).

Summative assessment

Examinations and certificates

- Diploma In Aviation Medicine

Workplace-based assessment (WPBA)

- Direct Observation of Procedural Skills (DOPS) – summative

Formative assessment

Supervised Learning Events (SLEs)

- Case-Based Discussions (CbD)
- Project- based Discussions (PbD)
- mini-Clinical Evaluation Exercise (mini-CEX)

WPBA

- Direct Observation of Procedural Skills (DOPS) – formative
- Multi-Source Feedback (MSF)
- Patient Survey (PS)
- Quality Improvement Project Assessment Tool (QIPAT)
- Teaching Observation (TO)

Supervisor reports

- Multiple Consultant Report (MCR)
- Educational Supervisor Report (ESR)

These methods are described briefly below. More information and guidance for trainees and assessors are available in the e-portfolio and on the JRCPTB website (www.jrcptb.org.uk).

Assessment should be recorded in the trainee's e-portfolio. These methods include feedback opportunities as an integral part of the programme of assessment.

Case-based Discussion (CbD)

The CbD assesses the performance of a trainee in their management of a patient to provide an indication of competence in areas such as clinical reasoning, decision-making and application of medical knowledge in relation to patient care. It also serves as a method to document conversations about, and presentations of, cases by trainees. The CbD should

focus on a written record (such as written case notes, out-patient letter, and discharge summary). A typical encounter might be when presenting newly referred patients in the out-patient department.

Project based Discussion (PbD)

A PbD assesses the performance of a trainee in the management of a project to provide an indication of competence in areas such as reasoning, decision-making and application of ASM knowledge in relation to project goals and outcomes. It also serves as a method to document conversations about and presentations of projects by trainees.

Diploma in Aviation Medicine

The Diploma in Aviation Medicine is designed for medical practitioners who wish to specialise in the practice of aviation medicine. It is established to demonstrate that the holder has achieved a level of competence appropriate to the specialist working in aviation medicine.

Mini-Clinical Evaluation Exercise (mini-CEX)

This tool evaluates a clinical encounter with a patient to provide an indication of competence in skills essential for good clinical care such as history taking, examination and clinical reasoning. The trainee receives immediate feedback to aid learning. The mini-CEX can be used at any time and in any setting when there is a trainee and patient interaction, and an assessor is available.

Direct Observation of Procedural Skills (DOPS)

A DOPS is an assessment tool designed to evaluate the performance of a trainee in undertaking a practical procedure, against a structured checklist. The trainee receives immediate feedback to identify strengths and areas for development. DOPS can be undertaken as many times as the trainee and their supervisor feel is necessary (formative). A trainee can be regarded as competent to perform a procedure independently after they are signed off as such by an appropriate assessor (summative).

Multi-source feedback (MSF)

This tool is a method of assessing generic skills such as communication, leadership, team working, reliability etc, across the domains of Good Medical Practice. This provides systematic collection and feedback of performance data on a trainee, derived from several colleagues. 'Raters' are individuals with whom the trainee works, and includes doctors, administrative staff, and other allied professionals. Raters should be agreed with the educational supervisor at the start of the training year. The trainee will not see the individual responses by raters. Feedback is given to the trainee by the Educational Supervisor.

Patient Survey (PS)

The PS addresses issues, including the behaviour of the doctor and effectiveness of the consultation, which are important to patients. It is intended to assess the trainee's performance in areas such as interpersonal skills, communication skills and professionalism by concentrating solely on their performance during one consultation.

Quality Improvement Project Assessment Tool (QIPAT)

The QIPAT is designed to assess a trainee's competence in completing a quality improvement project. The QIPAT can be based on review of quality improvement project documentation or on a presentation of the quality improvement project at a meeting. If possible, the trainee should be assessed on the same quality improvement project by more than one assessor.

Teaching Observation (TO)

The TO form is designed to provide structured, formative feedback to trainees on their competence at teaching. The TO can be based on any instance of formalised teaching by the trainee which has been observed by the assessor. The process should be trainee-led (identifying appropriate teaching sessions and assessors).

Supervisor reports

Multiple Consultant Report (MCR)

The MCR captures the views of consultant supervisors based on observation on a trainee's performance in practice. The MCR feedback and comments received give valuable insight into how well the trainee is performing, highlighting areas of excellence and areas of support required. MCR feedback will be available to the trainee and contribute to the educational supervisor's report.

Educational supervisors report (ESR)

The ES will periodically (at least annually) record a longitudinal, global report of a trainee's progress based on a range of assessment, potentially including observations in practice or reflection on behaviour by those who have appropriate expertise and experience. The ESR can incorporate commentary or reports from longitudinal observations, such as from supervisors or formative assessments demonstrating progress over time.

5.6 Decisions on progress (ARCP)

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

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

Assessment of CiPs involves looking across a range of different skills and behaviours to make global decisions about a learner’s suitability to take on responsibilities or tasks, as do decisions about the satisfactory completion of presentations/conditions and procedural skills set out in this curriculum. The outline grid in section 5.4 sets out the level of supervision expected for each of the clinical and specialty CiPs. The requirements for each year of training are set out in the ARCP decision aid (www.jrcptb.org.uk).

The ARCP process is described in the Gold Guide. Deaneries are responsible for organising and conducting ARCPs. The evidence to be reviewed by ARCP panels should be collected in the trainee’s e-portfolio.

As a precursor to ARCPs, JRCPTB strongly recommend that trainees have an informal e-portfolio review with their educational supervisor. These provide opportunities for early detection of trainees who are failing to gather the required evidence for ARCP.

There should be review of the trainee’s progress to identify any outstanding targets that the trainee will need to complete to meet all the learning outcomes for completion training approximately 12-18 months before CCT. This should include an external assessor from outside the training programme.

To guide trainees, supervisors and the ARCP panel, JRCPTB has produced an ARCP decision aid which sets out the requirements for a satisfactory ARCP outcome at the end of each training year and critical progression point. The ARCP decision aid is available on the JRCPTB website www.jrcptb.org.uk.

Poor performance should be managed in line with the Gold Guide.

5.7 Assessment blueprint

The table below show the possible methods of assessment for each CiP. It is not expected that every method will be used for each competency and additional evidence may be used to help make a judgement on capability.

KEY

DOPS	Direct observation of procedural skills	CbD	Case-based discussion
MCR	Multiple consultant report	Mini-CEX	Mini-clinical evaluation exercise
PS	Patient survey	MSF	Multi source feedback
TO	Teaching observation	QIPAT	Quality improvement project assessment tool
DAvMed	Diploma in Aviation Medicine		

Blueprint for WPBAs mapped to CiPs

Learning outcomes	DAVMed	CbD	DOPS	MCR	Mini-CEX	MSF	PS	QIPAT	TO	PbD
Generic CiPs										
Able to function successfully within NHS organisational and management systems				√		√				
Able to deal with ethical and legal issues related to clinical practice		√	√	√	√	√				
Communicates effectively and can share decision making, while maintaining appropriate situational awareness, professional behaviour and professional judgement				√		√	√			
Is focussed on patient safety and delivers effective quality improvement in patient care				√		√		√		
Carrying out research and managing data appropriately	√			√		√				
Acting as a clinical teacher and clinical supervisor				√		√			√	
Specialty CiPs										
Ability to perform medicals on aircrew and other aviation workers and define and understand the clinical standards of licensing requirements.	√	√		√	√	√	√			
Ability to understand and assess hazards to health in the aviation environment and workplace, and the illnesses, which they cause.	√	√	√	√	√	√	√			
Ability to carry out in-flight medical assessments and investigations and how these may contribute to aero-medical decision making.	√	√	√	√	√	√	√			√
Ability to assess research studies to provide risk and hazard analyses based on research findings.	√	√	√	√		√		√	√	√
Ability to show how personal protective equipment and life-support systems works and how the physiological effects of the aviation environment can alter aircrew performance.	√	√	√	√		√			√	√
Ability to conduct the medical investigation of an aircraft accident or incident.	√	√	√	√		√			√	√
Ability to describe the factors influencing human performance and human error.	√	√	√	√		√			√	√
Ability to conduct and understand the requirements for an aeromedical transfer of a patient.	√	√	√	√	√	√				√
Ability to assess pathophysiological challenges of the space environment.	√	√	√	√	√	√				√

Learning outcomes	DAVMed	CbD	DOPS	MCR	Mini-CEX	MSF	PS	QIPAT	TO	PbD
Ability to demonstrate the principles of management and the structure of international, military, and civilian regulatory bodies.	√	√		√		√				√

6 Supervision and feedback

This section of the curriculum describes how trainees will be supervised, and how they will receive feedback on performance. For further information please refer to the AoMRC guidance on Improving feedback and reflection to improve learning⁴.

Access to high quality, supportive and constructive feedback is essential for the professional development of the trainee. Trainee reflection is an important part of the feedback process and exploration of that reflection with the trainer should ideally be a two-way dialogue. Effective feedback is known to enhance learning and combining self-reflection to feedback promotes deeper learning.

Trainers should be supported to deliver valuable and high-quality feedback. This can be by providing face to face training to trainers. Trainees would also benefit from such training as they frequently act as assessors to junior doctors, and all involved could also be shown how best to carry out and record reflection.

6.1 Supervision

All elements of work in training posts must be supervised with the level of supervision varying depending on the experience of the trainee and the clinical exposure and case mix undertaken. Outpatient and referral supervision must routinely include the opportunity to discuss all cases with a supervisor if appropriate. As training progresses the trainee should have the opportunity for increasing autonomy, consistent with safe and effective care for the patient.

Organisations must make sure that each doctor in training has access to a named clinical supervisor and a named educational supervisor. Depending on local arrangements these roles may be combined into a single role of educational supervisor. However, it is preferred that a trainee has a single named educational supervisor for (at least) a full training year, in which case the clinical supervisor is likely to be a different consultant during some placements.

⁴ [Improving feedback and reflection to improve learning. A practical guide for trainees and trainers](#)

The role and responsibilities of supervisors have been defined by the GMC in their standards for medical education and training⁵.

Educational supervisor

The educational supervisor is responsible for the overall supervision and management of a doctor's educational progress during a placement or a series of placements. The educational supervisor regularly meets with the doctor in training to help plan their training, review progress and achieve agreed learning outcomes. The educational supervisor is responsible for the educational agreement, and for bringing together all relevant evidence to form a summative judgement about progression at the end of the placement or a series of placements.

Clinical supervisor

Consultants responsible for patients that a trainee looks after (or aeromedically assesses) providing clinical supervision for that trainee and thereby contribute to their training; they may also contribute to assessment of their performance by completing a 'Multiple Consultant Report (MCR)' and other WPBAs. A trainee may also be allocated (for instance, if they are not working with their educational supervisor in a particular placement) a named clinical supervisor, who is responsible for reviewing the trainee's training and progress during a particular placement. It is expected that a named clinical supervisor will provide a MCR for the trainee to inform the Educational Supervisor's report.

The educational and (if relevant) clinical supervisors, when meeting with the trainee, should discuss issues of clinical governance, risk management and any report of any untoward clinical incidents involving the trainee. If the service lead (clinical director) has any concerns about the performance of the trainee, or there are issues of doctor or patient safety, these would be discussed with the clinical and educational supervisors (as well as the trainee). These processes, which are integral to trainee development, must not detract from the statutory duty of the trust to deliver effective clinical governance through its management systems.

Educational and clinical supervisors need to be formally recognised by the GMC to carry out their roles⁶. It is essential that training in assessment is provided for trainers and trainees to ensure that there is complete understanding of the assessment system, assessment methods, their purposes and use. Training will ensure a shared understanding and a consistency in the use of the WPBAs and the application of standards.

Opportunities for feedback to trainees about their performance will arise using the workplace-based assessments, regular appraisal meetings with supervisors, other meetings and discussions with supervisors and colleagues, and feedback from ARCP.

Trainees

Trainees should make the safety of patients their priority and they should not be practising in clinical scenarios which are beyond their experiences and competencies without supervision. Trainees should actively devise individual learning goals in discussion with their

⁵ [Promoting excellence: standards for medical education and training](#)

⁶ [Recognition and approval of trainers](#)

trainers and should subsequently identify the appropriate opportunities to achieve said learning goals. Trainees would need to plan their WPBAs accordingly to enable their WPBAs to collectively provide a picture of their development during a training period. Trainees should actively seek guidance from their trainers to identify the appropriate learning opportunities and plan the appropriate frequencies and types of WPBAs according to their individual learning needs. It is the responsibility of trainees to seek feedback following learning opportunities and WPBAs. Trainees should self-reflect and self-evaluate regularly with the aid of feedback. Furthermore, trainees should formulate action plans with further learning goals in discussion with their trainers.

6.2 Appraisal

A formal process of appraisals and reviews underpins training. This process ensures adequate supervision during training, provides continuity between posts and different supervisors and is one of the main ways of providing feedback to trainees. All appraisals should be recorded in the e-portfolio

Induction Appraisal

The trainee and educational supervisor should have an appraisal meeting at the beginning of each post to review the trainee's progress so far, agree learning objectives for the post ahead and identify the learning opportunities presented by the post. Reviewing progress through the curriculum will help trainees to compile an effective Personal Development Plan (PDP) of objectives for the upcoming post. This PDP should be agreed during the Induction Appraisal. The trainee and supervisor should also both sign the educational agreement in the e-portfolio at this time, recording their commitment to the training process.

Mid-point Review

This meeting between trainee and educational supervisor is not mandatory (particularly when an attachment is shorter than 6 months) but is encouraged particularly if either the trainee or educational or clinical supervisor has training concerns, or the trainee has been set specific targeted training objectives at their ARCP). At this meeting trainees should review their PDP with their supervisor using evidence from the e-portfolio. Workplace-based assessments and progress through the curriculum can be reviewed to ensure trainees are progressing satisfactorily, and attendance at educational events should also be reviewed. The PDP can be amended at this review.

End of Attachment Appraisal

Trainees should review the PDP and curriculum progress with their educational supervisor using evidence from the e-portfolio. Specific concerns may be highlighted from this appraisal. The end of attachment appraisal form should record the areas where further work is required to overcome any shortcomings. Further evidence of competence in certain areas may be needed, such as planned workplace-based assessments, and this should be recorded. If there are significant concerns following the end of attachment appraisal, then the programme director should be informed. Supervisors should also identify areas where a trainee has performed about the level expected and highlight successes.

7 Quality Management

The organisation of training programs is the responsibility of the deaneries. The deaneries will oversee programmes for postgraduate medical training in their regions. The Schools of Medicine in England, Wales and Northern Ireland and the Medical Specialty Training Board in Scotland will undertake the following roles:

- oversee recruitment and induction of trainees into the specialty
- allocate trainees into rotations appropriate to their training needs
- oversee the quality of training posts provided locally
- ensure adequate provision of appropriate educational events
- ensure curricula implementation across training programmes
- oversee the workplace-based assessment process within programmes
- coordinate the ARCP process for trainees
- provide adequate and appropriate career advice
- provide systems to identify and assist doctors with training difficulties
- provide flexible training.

Educational programmes to train educational supervisors and assessors in workplace-based assessment may be delivered by deaneries or by the colleges or both.

Development, implementation, monitoring and review of the curriculum are the responsibility of the JRCPTB and the SAC. The committee will be formally constituted with representatives from each health region in England, from the devolved nations and with trainee and lay representation. It will be the responsibility of the JRCPTB to ensure that curriculum developments are communicated to heads of school, regional specialty training committees and TPDs.

The JRCPTB has a role in quality management by monitoring and driving improvement in the standard of all medical specialties on behalf of the three Royal Colleges of Physicians in Edinburgh, Glasgow, and London. The SACs are actively involved in assisting and supporting deaneries to manage and improve the quality of education within each of their approved training locations. They are tasked with activities central to assuring the quality of medical education such as writing the curriculum and assessment systems, reviewing applications for new posts and programmes, provision of external advisors to deaneries and recommending trainees eligible for CCT or Certificate of Eligibility for Specialist Registration (CESR).

JRCPTB uses data from six quality datasets across its specialties and subspecialties to provide meaningful quality management. The datasets include the GMC national Training Survey (NTS) data, ARCP outcomes, examination outcomes, new consultant survey, external advisor reports and the monitoring visit reports.

Quality criteria have been developed to drive up the quality of training environments and ultimately improve patient safety and experience. These are monitored and reviewed by JRCPTB to improve the provision of training and ensure enhanced educational experiences.

8 Intended use of curriculum by trainers and trainees

This curriculum and ARCP decision aid are available from the Joint Royal Colleges of Physicians Training Board (JRCPTB) via the website www.jrcptb.org.uk.

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

Each trainee will engage with the curriculum by maintaining an e-portfolio. The trainee will use the curriculum to develop learning objectives and reflect on learning experiences.

Recording progress in the e-portfolio

On enrolling with JRCPTB trainees will be given access to the e-portfolio. The e-portfolio allows evidence to be built up to inform decisions on a trainee's progress and provides tools to support trainees' education and development.

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

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

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

JRCPTB will use summarised, anonymous e-portfolio data to support its work in quality assurance.

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

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

- to provide the means for reflection and evaluation of current practice
- to inform discussions with supervisors to help both gain insight and assists in developing personal development plans.

- to identify shortcomings between experience, competency and areas defined in the curriculum to guide future clinical exposure and learning.

Supervisors can sign-off and comment on curriculum capabilities to build up a picture of progression and to inform ARCP panels.

9 Equality and diversity

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

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

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

Compliance with anti-discriminatory practice will be assured through:

- monitoring of recruitment processes
- ensuring all College representatives and Programme Directors have attended appropriate training sessions prior to appointment or within 12 months of taking up post
- Deaneries ensuring that educational supervisors have had equality and diversity training (for example, an e-learning module) every three years
- Deaneries ensuring that any specialist participating in trainee interview/appointments committees or processes has had equality and diversity training (at least as an e-module) every three years
- ensuring trainees have an appropriate, confidential, and supportive route to report examples of inappropriate behaviour of a discriminatory nature. Deaneries and Programme Directors must ensure that on appointment trainees are made aware of the route in which inappropriate or discriminatory behaviour can be reported and supplied with contact names and numbers. Deaneries must also ensure contingency mechanisms are in place if trainees feel unhappy with the response or uncomfortable with the contact individual
- providing resources to trainees needing support (for example, through the provision of a professional support unit or equivalent)
- monitoring of College Examinations
- ensuring all assessments discriminate on objective and appropriate criteria and do not unfairly advantage or disadvantage a trainee with any of the Equality Act 2010 protected characteristics. All efforts shall be made to ensure the participation of people with a disability in training through reasonable adjustments.

JRCPTB

Joint Royal Colleges of Physicians Training Board

