ISCP INTERCOLLEGIATE SURGICAL CURRICULUM PROGRAMME

Congenital Cardiac Surgery Curriculum

(Sub-specialty of Cardiothoracic Surgery)

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THE INTERCOLLEGIATE
SURGICAL CURRICULUM PROGRAMME

Educating the surgeons of the future

Acknowledgements

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You can also find the curriculum on the ISCP website at **www.iscp.ac.uk**

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1 Introduction

The Congenital Cardiac Surgery sub-specialty curriculum provides the approved United Kingdom (UK) framework for the training of doctors to the level of independent consultant practice in an advanced specialist area of Cardiothoracic Surgery, addressing the requirements of patients, the population and the strategic health services.

The curriculum will also be followed for training in the Republic of Ireland. General Medical Council (GMC) approval of the curriculum pertains to UK training programmes while those in the Republic of Ireland are governed by the Royal College of Surgeons in Ireland (RCSI) and the Medical Council of Ireland.

2 Purpose

2.1 Purpose of the curriculum and scope of practice

The purpose of the curriculum for Congenital Cardiac Surgery is to produce, at certification, competent doctors, able to deliver excellent outcomes for patients as consultant congenital cardiac surgeons in the UK and Republic of Ireland. The curriculum will provide consultant surgeons with the generic professional and specialty-specific knowledge needed to manage patients presenting with the full range of acute and elective congenital cardiac surgical conditions.

Congenital Cardiac Surgery is a specialised area of Cardiothoracic Surgery separate to surgery for acquired cardiac or thoracic pathologies. Following the Bristol enquiry[1] and the Kennedy Report[2] there was a clear recommendation for specialisation of children's heart surgery. The subsequent Paediatric Congenital Cardiac Service Review (PCCS review)[3] produced specific recommendations for the provision of Congenital Cardiac Surgery which can only be met through specific training and regulation of the surgeons involved. It was stated that congenital cardiac surgeons need to be 'trained in paediatric (cardiac) surgery'. In 2013 in recognition of the need to train and produce dedicated congenital cardiac surgeons the GMC approved sub-speciality recognition of Congenital Cardiac Surgery.

Currently there are approximately 3000 open heart procedures on children per year in UK. These are undertaken in eleven designated specialised congenital cardiac surgical centres. Due to advances made in paediatric cardiac surgical and medical care, over 80% of patients born with congenital heart disease (CHD) now survive to adulthood. It is predicted that by 2020 the majority of patients with CHD will be over eighteen years of age. There is evidence that surgical outcomes for adults with CHD are better when they are operated on by paediatric trained heart surgeons than by non-specialised heart surgeons. The SCTS-SAC Cardiothoracic Workforce Report 2025 (a report by the Society for Cardiothoracic Surgery in Great Britain and Ireland and the Specialty Advisory Committee) provides information on the current workforce within congenital cardiac surgery.[4]

With the increase in the number of adults with CHD it is likely that patients with CHD will present with cardiovascular pathology separate to their congenital pathology such as ischaemic heart disease or thoracic pathology. There will also be times when patients with CHD present as an unplanned or emergency admission to a non-CHD cardiothoracic centre requiring immediate

[1] Public inquiry into children's heart surgery
[2] The Report of the Independent Review of Children's Cardiac Services in Bristol
[3] PCCS review
[4] https://scts.org/_userfiles/pages/files/workforce_report_18032025_44.pdf

intervention before transfer. A core knowledge of CHD is, therefore, fundamental for the cardiac or thoracic consultant dealing with acquired intrathoracic pathologies.

The curriculum will cover the principles and exposure to the operative management of all congenital cardiac pathologies. Practical experience in the operative management of basic and intermediate conditions is included in the curriculum. It is recognised that for the complex congenital operations first surgeon experience will be gained as a consultant whilst being appropriately mentored. Senior trainees will be entrusted to undertake the role of the Congenital Cardiac Surgery Specialty Registrar (StR) during training and will be qualified at certification to apply for consultant posts in Congenital Cardiac Surgery in the UK or Republic of Ireland.

The curriculum in Congenital Cardiac Surgery includes all aspects of neonatal, infant and paediatric cardiac surgery as well as surgery for adult congenital heart disease. The syllabus covers all emergency and elective conditions as well as transplantation, mechanical circulatory support and hybrid technology. In addition, the syllabus covers an understanding of specific medical, physiological, technical and legal aspects of working with children.

Patient safety and competent practice are both essential and the curriculum has been designed so that the learning experience itself should not affect patient safety. Patient safety is the first priority of training demonstrated through safety-critical content, expected levels of performance, critical progression points, required breadth of experience and levels of trainer supervision needed for safe and professional practice. Upon satisfactory completion of training programmes, we expect trainees to be able to work safely and competently in the defined area of practice and to be able to manage or mitigate relevant risks effectively. A feature of the curriculum is that it promotes and encourages excellence through the setting of high-level outcomes, supervision levels for excellence, and tailored assessment and feedback, allowing trainees to progress at their own rate.

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.

2.2 Rationale and development of a new curriculum

The *Shape of Training* (SoT) review[5] and *Excellence by design: standards for postgraduate curricula*[6] provided opportunities to reform postgraduate training. The Congenital Cardiac Surgery sub-specialty will produce a workforce fit for the needs of patients, producing doctors who are more patient-focused, more general and who have more flexibility in their career structure. The GMC's introduction of updated standards for curricula and assessment processes laid out in *Excellence by Design* requires all medical curricula to be based on high-level outcomes. The high-level outcomes in this curriculum are called Capabilities in Practice (CiPs) and integrate parts of the syllabus to describe the professional tasks within the scope of specialty practice. At the centre of each of these groups of tasks are Generic Professional Capabilities[7] (GPCs), interdependent essential capabilities that underpin professional medical practice and are common to all who practise medicine. GPCs are in keeping with Good Medical Practice (GMP)[8]. Equipping all trainees with these transferable capabilities should result in a more flexible, adaptable workforce.

[5] Shape of training: Securing the future of excellent patient care
[6] Excellence by design: standards for postgraduate curricula
[7] Generic professional capabilities framework
[8] Good Medical Practice

The shared CiPs support flexibility for trainees to move between the specialties in line with the recommendations set out in the GMC's report to the four UK governments[3]. The GPCs are common to all medical specialties, facilitating transferability of learning outcomes across other related specialties and disciplines. This flexible approach with acquisition of transferable capabilities will allow training in specialty to adapt to current and future patient and workforce needs as well as to changes in surgery with the advent of new treatments and technologies.

The curriculum has been developed in consultation with stakeholders, including trainees, trainers, employers, lay representatives and other groups, ensuring the development of a curriculum that is fair, flexible, non-discriminatory, fit for purpose today with the capacity to evolve in future iterations in response to changing needs of patients.

2.3. Progression through training

Congenital Cardiac Surgery is a sub-specialty of Cardiothoracic Surgery occurring in phase 3 of the Cardiothoracic Surgery parent curriculum as outlined below. Trainees pursuing the Congenital Cardiac Surgery sub-specialty will be selected through a national selection process following success in the Intercollegiate Specialty Board ISB) examination in Cardiothoracic Surgery (with a declared interest of cardiac surgery).

Although sub-specialty training will be outcome-based rather than time-based, applicants to sub-specialty training will undertake an indicative two years of training with a critical progression point at the end of sub-specialty training, satisfaction of which would lead to an ARCP outcome 6 and the ability to apply to be entered onto the specialist register as a Cardiothoracic Surgeon with a sub-specialty of Congenital Cardiac Surgery.

There will be options for those trainees who demonstrate exceptionally rapid development and acquisition of capabilities to complete training more rapidly. There may also be a small number of trainees who develop more slowly and will require an extension of training in line with the Gold Guide[9]: *A Reference Guide for Postgraduate Foundation and Specialty Training in the UK*. Trainees who choose less than full-time training (LTFT) will have the indicative training time extended pro rata in accordance with the Gold Guide. LTFT trainees will perform both elective and out-of-hours duties pro rata throughout the time of LTFT.

The two-year posts will be in centres approved for training in CHD by the Cardiothoracic Surgery Specialty Advisory Committee (SAC) and will usually comprise one year in each of two collaborative training units.

Trainees who have successfully completed the two-year national training programme in the sub-specialty will be eligible for recommendation to enter the specialist register with sub-speciality accreditation in Congenital Cardiac Surgery. Trainees who do not meet the requirements of phase 3 may require an extension of training time in accordance with the Gold Guide.

The training pathway into Congenital Cardiac Surgery from the parent curriculum of Cardiothoracic Surgery is shown in Figure 1.

[9] Gold Guide 10th edition

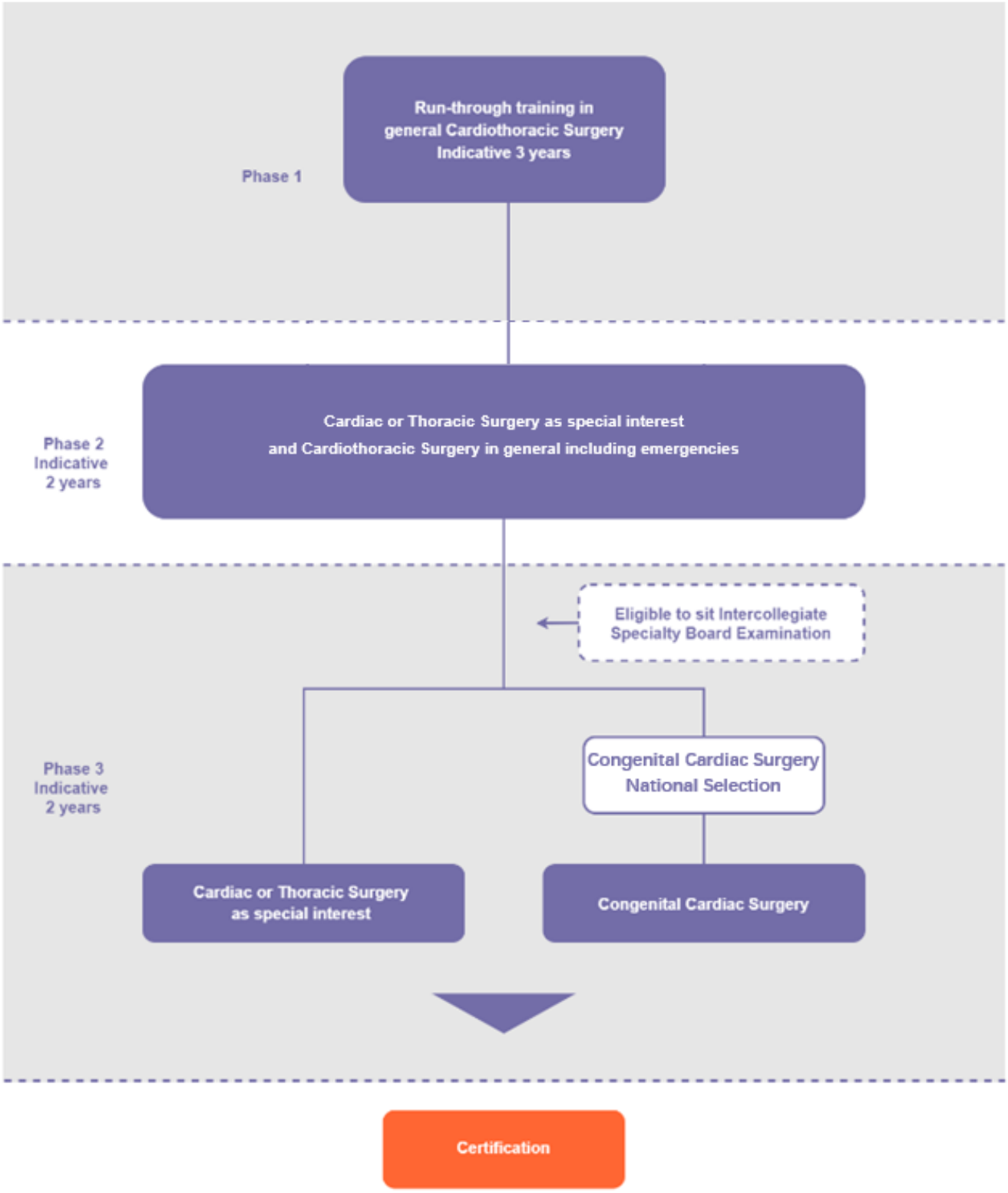

Figure 1: Training pathway for Cardiothoracic Surgery and the sub-specialty of Congenital Cardiac Surgery

3 Programme of Learning

This section covers the expected learning outcomes, learning methods, breadth of experience and levels of performance at critical progression points in the training programme and the levels of performance expected of those completing training.

3.1 What has to be learnt to complete the Congenital Cardiac Surgery curriculum

The practice of Congenital Cardiac Surgery requires the generic and specialty knowledge, clinical and technical skills and behaviours to manage patients presenting with the full range of acute and elective congenital cardiac surgical conditions. It involves development of competence in diagnostic reasoning, managing uncertainty, dealing with co-morbidities, and recognising when another specialty opinion or care is required (as well as developing technical skills in the areas and to the level described in the syllabus as shown in appendix 2). The main areas for learning are described by the CiPs which are the high-level learning outcomes for training in Congenital Cardiac Surgery described below and shown in full in appendix 1.

3.2 Capabilities in Practice (the high-level outcomes of training)

Training is designed to produce a person capable of safely and effectively performing the role of a first day consultant surgeon. The role of a consultant surgeon can be thought of as a sum of all the various tasks which need to be performed through a working week. These tasks are the high-level outcomes of the curriculum and grouping these together describe the role of a consultant surgeon. To perform a high level clinical task as a consultant surgeon requires trainees to be able to integrate areas of learning from all parts of the syllabus, including knowledge, clinical skills, professional skills and technical skills. In addition, a surgeon will need to have acquired the generic skills, behaviours and values shared by all doctors in order to perform this task safely and well. A capability is a set of skills that can be developed through training from novice to expert and, therefore these high-level clinical outcomes are known as Capabilities in Practice. They are common across all surgical specialties and are delivered within the context of the GPCs and the specialty syllabus.

There are five CiPs which are shared between all surgical specialties:

1) Manages an outpatient clinic
2) Manages the unselected emergency take
3) Manages ward rounds and the on-going care of in-patients
4) Manages an operating list
5) Manages multi-disciplinary working

In addition to these, the specialty-specific Cardiothoracic Surgery (parent specialty) CiPs are:

6) Manages patients within the critical care area
7) Assesses surgical outcomes both at a personal and unit level

The generic knowledge, skills, behaviours and values shared by all doctors are described in the GPC framework. The GPCs are essential components and have equal weight to the CiPs in the training and assessment of clinical capabilities and responsibilities in the training programme.

The GPC framework has nine domains:

Domain 1: Professional values and behaviours

Domain 2: Professional skills

Practical skills
Communication and interpersonal skills
Dealing with complexity and uncertainty
Clinical skills

Domain 3: Professional knowledge

Professional requirements

National legislative requirements
The health service and healthcare system in the four countries

Domain 4: Capabilities in health promotion and illness prevention

Domain 5: Capabilities in leadership and team working

Domain 6: Capabilities in patient safety and quality improvement

Patient safety
Quality improvement

Domain 7: Capabilities in safeguarding vulnerable groups

Domain 8: Capabilities in education and training

Domain 9: Capabilities in research and scholarship

Simply put, the CiPs and GPCs are the constituent parts of the role of a consultant congenital cardiac surgeon. Each part is as important as the next and doctors are required to be capable in all parts of the role in order to be able to practice independently. In order to complete training and be recommended to the GMC for certification and entry to the specialist register, the doctor must demonstrate that they are capable of unsupervised practice in all the CiPs and GPCs. For example, managing the unselected emergency take (CiP 2) requires the integration of knowledge, clinical and diagnostic skills, and technical skills described in the syllabus as well as communication and interpersonal skills, time management skills and many other generic skills described in the GPCs in order to be delivered safely, professionally and effectively. This will be assessed using the Multiple Consultant Report (MCR) as described below. The full content of the seven CiPs can be found in appendix 1.

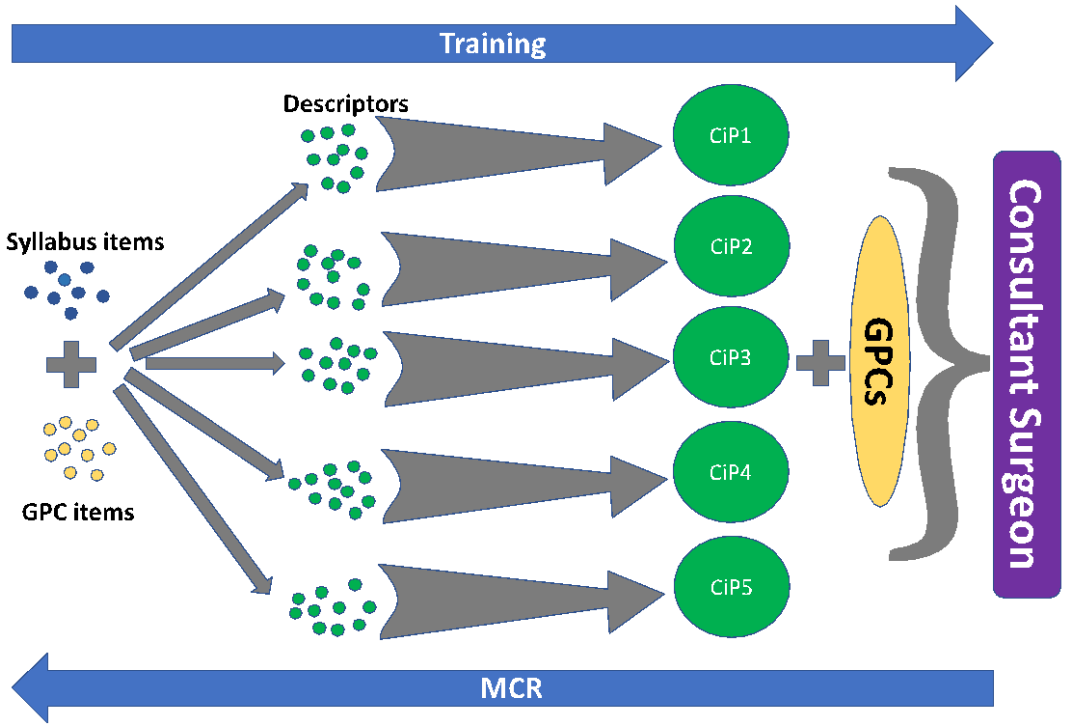

Figure 2 - The interrelationship of the GPCs, the syllabus, the CiPs and their descriptors to the role of a consultant surgeon. Items from the syllabus are combined with items taken from the GPC framework to form the small tasks which are the CiP descriptors. When the small tasks of the descriptors are integrated they comprise the constituent parts of the role of a consultant surgeon (the CiPs). When the CiPs are taken together, along with the GPCs, the role of a consultant surgeon (the overall outcome of the curriculum), is described. Each of these CiPs will be developed through

training until the level required of a day-one consultant is reached. Assessment in an outcomes-based curriculum through the MCR examines the trainee from the perspective of the outcome (a consultant surgeon), and compares performance in each CiP and in the GPCs to that level. If the outcome level is not reached, then targeted feedback and development plans can be made with reference to the CiP descriptors and beyond to the syllabus items and GPC items that combine to form the descriptors.

3.3 Descriptors for CiPs

The seven CiPs taken together describe the role of a consultant congenital cardiac surgeon but more detail is needed to help trainees develop that capability through training via detailed feedback and focused development goals.

We can break the CiPs down into smaller tasks. Each of these smaller tasks is a CiP descriptor. For example, managing the unselected emergency take (CiP 2), includes the need to promptly assess acutely unwell and deteriorating patients and deliver resuscitative treatment and initial management and ensure sepsis is recognised and treated in compliance with protocol (see appendix 1). If a trainee has not yet reached the level required of a new consultant in a CiP then the descriptors can be used to describe in standard language what needs to be improved through learning and training to allow the trainee to get closer towards the outcome of training. By describing the component parts of a CiP, descriptors also aid decisions on assessment of the level of supervision required by a trainee at the time of that assessment, providing prompts for feedback of performance by allowing identification of areas of excellence or specific detail on areas for development, including in behavioural and professional domains. Descriptors can, therefore, help trainees identify where to focus their efforts to become competent and safe independent practitioners. More detail about assessment and feedback is given in section 5, Programme of Assessment.

Each CiP is judged against a scale that describes the level of supervision required to perform the CiP to the standard of certification. The level of supervision changes in line with the trainee's progression, consistent with safe and effective care for the patient. Typically, there should be a gradual reduction in the level of supervision required and an increase in the complexity of cases managed until the level of competence for independent practice is acquired. In the early years, therefore, it would be normal for trainees to achieve a lower supervision level and progress as experience is gained.

The supervision levels are:

Level I: Able to observe only
Level II: Able and trusted to act with direct supervision:
  a) Supervisor present throughout
  b) Supervisor present for part
Level III: Able and trusted to act with indirect supervision
Level IV: Able and trusted to act at the level expected of a day-one consultant
Level V: Able and trusted to act at a level beyond that expected of a day-one consultant

3.4 Critical progression points

A trainee becomes eligible for certification when supervision level IV has been achieved in both the shared and specialty-specific CiPs in the sub-specialty as well as acquiring all of the skills described in the GPC framework (and the other certification requirements shown in section 5.4) as confirmed by an ARCP panel.

Excellence will be recognised by:

a) Achievement of Level V in any of the CiPs
b) Exceeding the supervision level expected for the end of phase 3
c) Achievement of a supervision level at an earlier stage than would normally be expected
d) Recognition of particularly good performance in any of the descriptors within a CiP.

Capability in practice (shared)	**Supervision Level (end of phase 3 and certification)**
1. Manages an out-patient clinic	Level IV
2. Manages the unselected emergency take	Level IV
3. Manages ward rounds and the on-going care of in-patients	Level IV
4. Manages an operating list	Level IV
5. Manages multi-disciplinary working	Level IV

Capability in practice (specialty-specific)	**Supervision level (end of phase 3 and certification)**
6. Manages patients within the critical care area	Level IV
7. Assesses surgical outcomes both at a personal and unit level	Level IV

Table 1: Supervision levels to be achieved by the end of training

3.5 Breadth of experience required during training in Congenital Cardiac Surgery

The curriculum requires trainees to accrue a rich experience that promotes deep learning of knowledge, clinical skills, technical skills, professional behaviour, leadership and all other generic professional skills that are considered necessary to ensure patient safety throughout the training process and specifically at the end of training. The scope of practice of a day-one consultant is described in the syllabus.

3.5.1 The syllabus

The syllabus, shown in appendix 2, provides a detailed description of the specialty-specific knowledge, clinical and technical skills required for the sub-specialty phase of training and for certification in Cardiothoracic Surgery and the sub-specialty of Congenital Cardiac Surgery. The syllabus is organised by topics which are the presenting conditions of patients in relation to the sub-specialty. Trainees are expected to have exposure to all topics in phase 3 of training.

As surgical practice continues to evolve, it is essential for trainees to develop competencies in areas that are shaping the future of healthcare. The following three areas of practice are becoming

increasingly relevant to the delivery of surgery and patient care. While these areas are not written into the syllabus in detail, they are recognised as critical aspects of practice that trainees should be aware of and integrate where appropriate. Given that surgical specialties and healthcare systems adopt these advancements at different rates, trainees are expected to stay informed and adapt their practice accordingly.

Whilst these areas are of growing importance and relevance, they are not expected to be fully evidenced by all trainees at this stage due to current disparities in training opportunities. Where feasible, trainee engagement in these emerging areas is encouraged, with continued focus on demonstrating the essential skills and behaviours in the GPC framework.

Genomics

Knowledge of genomics is increasingly important for surgical trainees, aiding them in patient screening, enhancing diagnostics and treatments leading to better targeted care. Genomic technologies allow for the identification of genetic mutations and variations that contribute to disease, enabling treatment plans tailored to individual genetic profiles. Additionally, it is important for understanding hereditary and familial conditions, allowing surgeons to provide better-informed consent and management options for patients and their families. Although some specialties are likely to adopt genomic medicine into their clinical practice sooner than others, trainees will be expected to stay current with these developments and integrate genetic insights into their own clinical practice where appropriate. Trainees can demonstrate their application of genomics to patient care using workplace-based assessment methods such as the CEX, CBD, AoA and through presentations and quality improvement projects [10] [11] [12].

Clinical Informatics

The use of Clinical informatics is a critical area of knowledge for surgical trainees as it encompasses the use of information technology to improve patient care. Proficiency in clinical informatics enables surgeons to efficiently manage electronic health records, use clinical decision support systems, and analyse health data to enhance surgical outcomes. Furthermore, clinical informatics supports evidence-based practice by providing access to the latest research and guidelines, facilitating continuous learning and improvement. Trainees will be expected to demonstrate the use of digital applications and the ability to access critical information for administrative efficiency, making informed surgical decisions and improving patient care. Trainees can demonstrate their knowledge, understanding and application of clinical informatics to patient care using workplace-based assessment methods such as the CEX, CBD, AoA, OoT and through presentations, research, quality improvement projects and health service management related activity [13] [14] [15].

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[10] https://www.aomrc.org.uk/wp-content/uploads/2021/11/Genomics_syllabus_1121.pdf

[11] https://www.england.nhs.uk/long-read/accelerating-genomic-medicine-in-the-nhs/

[12] https://www.nationalhealthexecutive.com/articles/nhs-scotland-first-genomic-medicine-strategy-launches

[13] https://www.england.nhs.uk/long-read/digital-skills-health-informatics-competency-standards-frameworks-and-tools-for-healthcare-professionals/

[14] https://digital-transformation.hee.nhs.uk/

[15] https://www.aomrc.org.uk/wp-content/uploads/2020/09/Doctors_Download_exploring_doctors_digital_priorities-_for-_action_0320.pdf

Sustainability

The use of sustainable practices is an increasingly important consideration in surgery, given the environmental impact of healthcare activities. By adopting sustainable practices, surgeons can contribute to the broader effort of making healthcare more environmentally friendly while still providing high-quality patient care. Trainees will be expected to keep up to date with knowledge of sustainable practices, including an understanding of the environmental implications of surgical procedures, the use of sustainable materials, and the implementation of energy-efficient practices within the operating room. Trainees should demonstrate that they can incorporate sustainability into their own practice and encourage a culture of environmental responsibility and stewardship. Trainees can demonstrate their commitment to sustainability using workplace-based assessment methods such as DOPS, PBA, CEX, CBD, OoT, AoA and through quality improvement projects, and reflective practice [16].

4 Teaching and Learning

4.1 How the Congenital Cardiac Surgery curriculum is delivered

The curriculum is used to help design training programmes locally that ensure all trainees can develop the necessary skills and knowledge in a variety of settings and situations. The curriculum is designed to ensure it can be applied in a flexible manner, meeting service needs as well as supporting each trainee's own tailored learning and development plan. The requirements for curriculum delivery have not changed as a result of this new curriculum. All training must comply with the GMC requirements presented in *Promoting excellence: standards for medical education and training*[17] (2017). This stipulates that all training must comply with the following ten standards:

Theme 1: learning environment and culture

S1.1 The learning environment is safe for patients and supportive for learners and educators. The culture is caring, compassionate and provides a good standard of care and experience for patients, carers and families.

S1.2 The learning environment and organisational culture value and support education and training, so that learners are able to demonstrate what is expected in Good Medical Practice and to achieve the learning outcomes required by their curriculum.

Theme 2: educational governance and leadership

S2.1 The educational governance system continuously improves the quality and outcomes of education and training by measuring performance against the standards, demonstrating accountability and responding when standards are not being met.

S2.2 The educational and clinical governance systems are integrated, allowing organisations to address concerns about patient safety, the standard of care, and the standard of education and training.

S2.3 The educational governance system makes sure that education and training is fair and is based on the principles of equality and diversity.

[16] https://www.aomrc.org.uk/publication/sustainability-resources/

[17] Promoting excellence: standards for medical education and training

Theme 3: supporting learners

S3.1 Learners receive educational and pastoral support to be able to demonstrate what is expected in Good Medical Practice, and to achieve the learning outcomes required by their curriculum.

Theme 4: supporting educators

S4.1 Educators are selected, inducted, trained, and appraised to reflect their education and training responsibilities.

S4.2 Educators receive the support, resources and time to meet their education and training responsibilities.

Theme 5: developing and implementing curricula and assessments

S5.1 Medical school curricula and assessments are developed and implemented so that medical students are able to achieve the learning outcomes required for graduates.

S5.2 Postgraduate curricula and assessments are implemented so that doctors in training are able to demonstrate what is expected in Good Medical Practice, and to achieve the learning outcomes required by their curriculum.

It is the responsibility of NHS England, NHS Education for Scotland (NES), Health Education and Improvement Wales (HEIW), the Northern Ireland Medical and Dental Training Agency (NIMDTA) and the Health Service Executive (HSE) in the Republic of Ireland to ensure compliance with these standards for Cardiothoracic training. Training delivery must also comply with the latest edition of the Gold Guide. Appendix 7 outlines the quality management arrangements for the curriculum.

4.2 Learning opportunities

A variety of educational approaches are used by education providers in order to help trainees develop the knowledge, clinical and technical skills, professional judgement, values and behaviours required by the curriculum. Taken together, these educational approaches ensure that the CiPs and GPCs are taught appropriately in order that the purpose of the curriculum is met. These educational approaches divide into three areas:

- Self-directed learning
- Learning from practice
- Learning from formal situations

4.2.1 Self-directed learning

The curriculum is trainee-led and self-directed learning is encouraged. Trainees are expected to take a proactive approach to learning and development and towards working as a member of a multi-professional team. Trainees are encouraged to establish study groups, journal clubs and conduct peer reviews. They should take the opportunity of learning with peers at a local level through postgraduate teaching and discussion sessions, and nationally with examination preparation courses. Trainees are expected to undertake personal study in addition to attending formal and informal teaching. This includes using study materials and publications and reflective practice. Trainees are expected to use the developmental feedback they get from their trainers in learning agreement meetings and from assessments to focus further research and practice.

Reflective practice is an important part of self-directed learning and of continuing professional development. It is an educational exercise that enables trainees to explore, with rigour, the complexities and underpinning elements of their actions in order to refine and improve them. Reflection in the oral form is very much an activity that surgeons engage in and find useful and

developmental. Writing reflectively adds more to the oral process by deepening the understanding of practice. Written reflection offers different benefits to oral reflection which include: a record for later review, a reference point to demonstrate development and a starting point for shared discussion. Whatever the modality of reflection, it is important that it takes place and that there is a record of it having taken place, whether or not the specific subject or content of the reflection is recorded[18]. Self-directed learning permits development in all seven CiPs and the GPCs, especially when there is effective reflection on all aspects of learning at the centre of self-directed learning.

4.2.2 Learning from clinical practice

Surgical learning is largely experiential in nature with any interaction in the workplace having the potential to become a learning episode. The workplace provides learning opportunities on a daily basis for surgical trainees, based on what they see and what they do. Trainees are placed in clinical placements, determined locally by Training Programme Directors (TPDs), which provide teaching and learning opportunities. The placements must be in units that are able to provide sufficient clinical resource and have sufficient trainer capacity.

While in the workplace, trainees are involved in supervised clinical practice, primarily in a hospital environment in wards, clinics or theatre. There are strong links to practitioners working in primary care and training environments may include private settings and, where available for training, a variety of community settings where the necessary facilities and governance arrangements are in place. The trainee role in these contexts determines the nature of the learning experience.

Learning begins with observation of a trainer (not necessarily a doctor) and progresses to assisting a trainer; the trainer assisting/supervising the trainee and then the trainee managing a case independently but with access to their supervisor. The level of supervision changes in line with the trainee's progression through the phase of the curriculum. As training progresses, trainees should have the opportunity for increased autonomy, consistent with safe and effective care for the patient. Typically, there should be a gradual reduction in the level of supervision required and an increase in the complexity of cases managed until the level of competence for independent practice is acquired.

The CiPs are best taught by a specifically selected trainer directly watching and supervising while the trainee carries out the activity. This type of training is known as Professionalised Training and requires more time (and so, consequently, a reduced clinical workload) than conventional methods. It permits more thorough teaching, more rapid achievement of skill and earlier recognition of difficulties. Continuous systematic feedback and reflection are integral to learning from clinical practice. CiP and GPC descriptors through the MCR assessment provide detailed feedback and identify specific, timely and relevant goals for development through training. Education providers should make every attempt to ensure that each trainee has exposure to Professionalised Training appropriate to their phase of progression through the curriculum. Trainees are required to keep a surgical logbook to support their reflection and the assessment of their operative skills.

4.2.3 Learning from formal situations

Learning from clinical practice is supplemented by an educational programme of courses and teaching sessions arranged at local, regional and national levels. These should be mapped to the CiPs and the Congenital Cardiac Surgery syllabus and may include a mixture of formal talks including attendance at national conferences relevant to the sub-specialty, small group discussion, case review and morbidity and mortality meetings, literature review and skills teaching.

[18] Improving feedback and reflection to improve learning. A practical guide for trainees and trainers

4.2.4 Simulation

Teaching in formal situations often involves the use of simulation. In this context simulation can be any reproduction or approximation of a real event, process, or set of conditions or problems e.g. taking a history in clinic, performing a procedure or managing post-operative care. Trainees have the opportunity of learning in the same way as they would in the real situation but in a patient-free environment. Simulation can be used for the development of both individuals and teams. The realism of the simulation may reflect the environment in which simulation takes place, the instruments used or the emotional and behavioural features of the real situation. Simulation training does not necessarily depend on the use of expensive equipment or complex environments e.g. it may only require a suturing aid or a role play with scenarios.

Simulation training has several purposes:

- supporting learning and keeping up to date
- addressing specific learning needs
- situational awareness of human factors which can influence people and their behaviour
- enabling the refining or exploration of practice in a patient-safe environment
- promoting the development of excellence
- improving patient care.

The use of simulation in surgical training is part of a blended approach to managing teaching and learning concurrent with supervised clinical practice. The use of simulation on its own cannot replace supervised clinical practice and experience or authorise a doctor to practice unsupervised. Provision of feedback and performance debriefing are integral and essential parts of simulation-based training. Simulation training broadly follows the same pattern of learning opportunities offering insight into the development of technical skills, team-working, leadership, judgement and professionalism. Education providers should use all teaching methods available, including simulation teaching, to ensure that the full breadth of the syllabus is covered. Where there is a need for specific intensive courses to meet specific learning outcomes, there may be a number of equivalent providers.

4.3 Supervision

Supervision is fundamental in the delivery of safe and effective training. It takes advantage of the experience, knowledge and skills of expert clinicians and ensures interaction between an experienced clinician and a trainee. The ultimate responsibility for the quality of patient care and the quality of training lies with the supervisor. Supervision is designed to ensure the safety of the patient by encouraging safe and effective practice and professional conduct. A number of people from a range of professional groups are involved in teaching and training with subject areas of the curriculum being taught by staff with relevant specialist expertise and knowledge. Those involved in the supervision of trainees must have the relevant qualifications, experience and training to undertake the role. Specialist skills and knowledge are usually taught by consultants and senior trainees whereas the more generic aspects of practice can also be taught by the wider multi-disciplinary team (MDT).

The key roles involved in teaching and learning are the Training Programme Director, Assigned Educational Supervisor, Clinical Supervisor, Assessor and Trainee. Their responsibilities are described in appendix 3 and further information is given in the Gold Guide.

In the UK, the GMC's process for the recognition and approval of trainers[19] enables Deaneries to formally recognise Assigned Educational Supervisors (AESs) and Clinical Supervisors (CSs) and ensure they meet the specified criteria. Trainees must be placed in approved placements that meet the required training and educational standards of the curriculum. In each placement, trainees have a named AES and one or more CS, responsible for overseeing their education. Depending on local arrangements, these roles may be combined into a single role of AES.

All elements of work in training posts must be supervised. The level of supervision varies according to the experience of the trainee, the clinical exposure and the case mix undertaken. As training progresses trainees should have the opportunity for increased autonomy, consistent with safe and effective care for the patient. Achievement of supervision level IV in any of the seven CiPs indicates that a trainee is able to work at an independent level, with advice from their trainer at this level being equivalent to a consultant receiving advice from senior colleagues within an MDT. However, within the context of a training system trainees are always under the educational and clinical governance structures of the Health Service.

4.4 Supporting feedback and reflection

Effective feedback is known to enhance learning and combining self-reflection[7] with feedback promotes deeper learning. Trainees are encouraged to seek feedback on all they do, either informally, through verbal feedback at the end of a learning event, or formally through workplace based assessments (WBAs). The MCR and use of the CiP and GPC descriptors provide regular opportunities for detailed and specific feedback. Trainee self-assessment of CiPs provides a regular opportunity for focused and structured reflection and development of self-directed goals for learning as well as developing these goals through dialogue with trainers. All the assessments in the curriculum are designed to include a feedback element as well as to identify concerns in multiple ways:

- *Learning agreement:* appraisal meetings with the AES at the beginning, middle and end of each placement
- *WBA:* immediate verbal dialogue after a learning episode
- *CBD:* meeting with a consultant trainer to discuss the management of a patient case
- *MSF:* meeting with the AES to discuss the trainee's self-assessment and team views
- *MCR (mid-point formative):* meeting with the AES or CS to discuss the trainee's self-assessment and CSs' views on CiPs
- *MCR (final formative, contributing to the AES's summative Report):* meeting with the AES or CS to discuss the trainee's self-assessment and CSs' views on CiPs
- *ARCP:* a feedback meeting with the TPD or their representative following an ARCP.

Constructive feedback is expected to include three elements i) a reflection on performance ii) identification of the trainee's achievements, challenges and aspirations and iii) an action plan.

4.5 Academic training

All trainees are required to satisfy the learning outcomes in domain 9 of the GPC framework: *Capabilities in research and scholarship*. Trainees are encouraged to participate in clinical research and collaborative trials to achieve these outcomes, as well as in journal clubs, literature review and systematic review and to make a major contribution to the publication of novel findings in peer reviewed journals. An understanding of the principles of research, its interpretation and safe

[19] GMC recognition and approval of trainers

implementation of evidenced-based new methods, processes and techniques is essential for the modern, progressive practice of surgery and in the interests of patients and the service.

5 Programme of Assessment

5.1 Purpose of assessment

Assessment of learning is an essential component of any curriculum. This section describes the assessment system and the purpose of its individual components which are blueprinted to the curriculum as shown in appendix 9. The focus is on good practice, based on fair and robust assessment principles and processes in order to ensure a positive educational impact on learners and to support assessors in making valid and reliable judgements. The programme of assessment comprises an integrated framework of assessments in the workplace and judgements made about a learner during their approved programme of training. Its purpose 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 assessment programme is shown in figure 3 below.

Assessments can be described as *helping* learning or *testing* learning - referred to as formative and summative respectively. There is a link between the two; some assessments are purely formative (shown in green in figure 4), others are explicitly summative with a feedback element (shown in blue) while others provide formative feedback while contributing to summative assessment (shown in orange).

The purposes of formative assessment are to:

- assess trainees' actual performance in the workplace.
- enhance learning by 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.
- enable supervisors to reflect on trainee needs in order to tailor their approach accordingly.

The purposes of summative assessment are to:

- provide robust, summative evidence that trainees are meeting the curriculum requirements during the training programme.
- ensure that trainees possess the essential underlying knowledge required for their specialty, including the GPCs to meet the requirements of GMP.
- 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.
- provide information for the quality assurance of the curriculum.

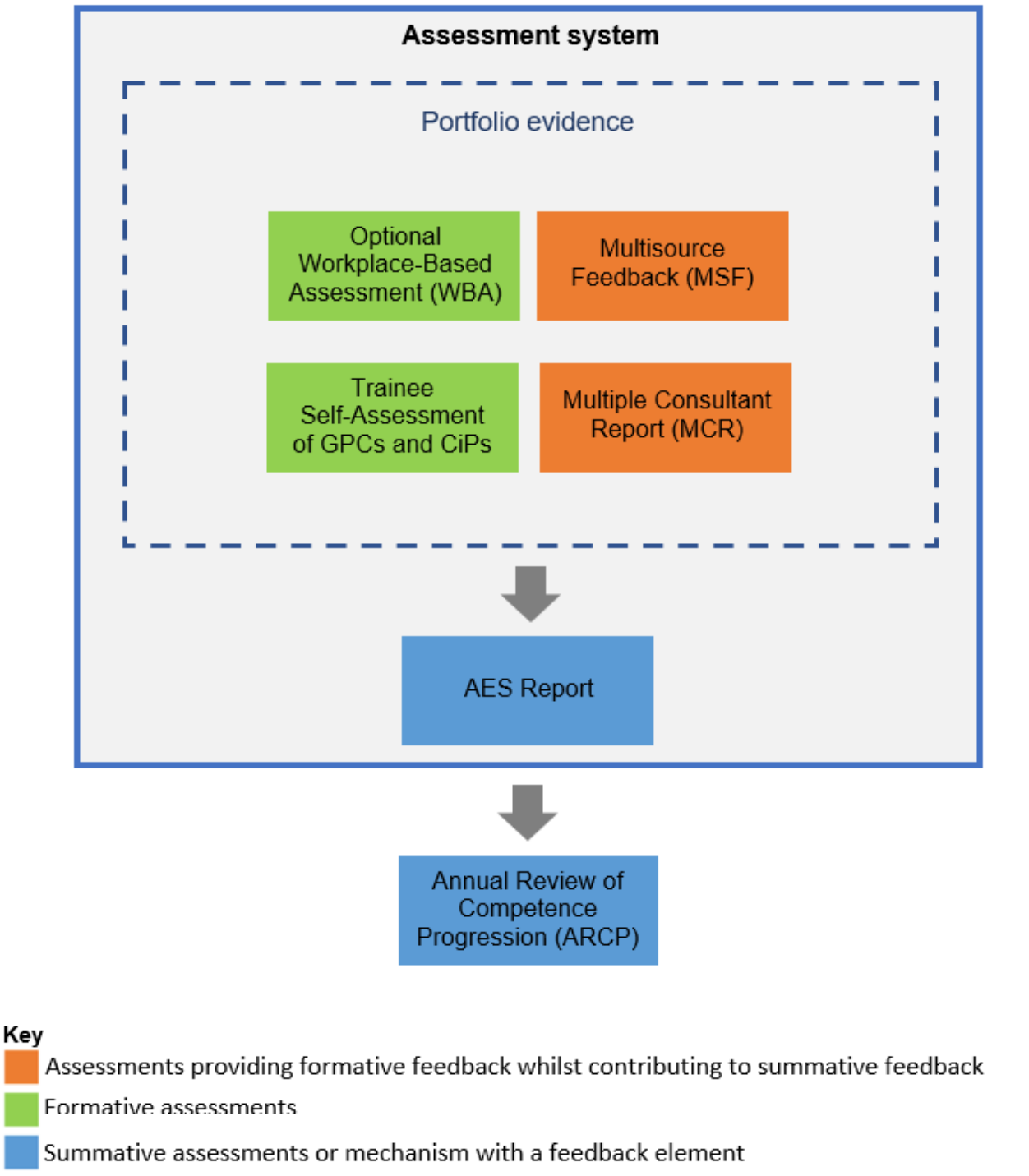

Figure 3: Assessment framework

5.2 Delivery of the programme of assessment

The programme of assessment is comprised of several different types of assessment needed to meet the requirements of the curriculum. These together generate the evidence required for global judgements to be made about satisfactory trainee performance, progression in, and completion of, training. These include WBAs. The primary assessment in the workplace is the MCR, which, together with other portfolio evidence, contributes to the AES report for the ARCP. Central to the assessment framework is professional judgement. Assessors are responsible and accountable for these judgements and these judgements are supported by structured feedback to trainees. Assessment takes place throughout the training programme to allow trainees to continually gather evidence of learning and to provide formative feedback to the trainee to aid progression.

Reflection and feedback are also integral components of all WBAs. In order for trainees to maximise the benefit of WBA, reflection and feedback should take place as soon as possible after the event. Feedback should be of high quality that should include a verbal dialogue between trainee and assessor in reflection on the learning episode, attention to the trainee's specific questions, learning needs and achievements as well as an action plan for the trainee's future development. Both trainees and trainers should recognise and respect cultural differences when giving and receiving feedback[20]. The assessment framework is also designed to identify where trainees may be running into difficulties. Where possible, these are resolved through targeted training, practise and assessment with specific trainers and, if necessary, with the involvement of the AES and TPD to provide specific remedial placements, additional time and additional resources.

5.3 Assessment framework components

Each of the components of the assessment framework are described below.

5.3.1 The sequence of assessment

Training and assessment take places within placements of twelve months' duration throughout phase 3 (figure 4). Assessments are carried out by relevant qualified members of the trainee's multi-professional team whose roles and responsibilities are described in appendix 6. Trainee progress is monitored primarily by the trainee's AES through learning agreement meetings with the trainee. Throughout the placement trainees must undertake WBAs. The trainee's CSs must assess the trainee on the seven CiPs and nine GPC domains using the MCR. This must be undertaken towards the mid-point of each placement in a formative way and at the end of the placement when the formative assessment will contribute to the AES's summative assessment at the final review meeting of the learning agreement. The placement culminates with the AES report of the trainee's progress for the ARCP. The ARCP makes the final decision about whether a trainee can progress to the next level or completion of training. It bases its decision on the evidence that has been gathered in the trainee's learning portfolio during the period between ARCP reviews, particularly the AES report in each training placement.

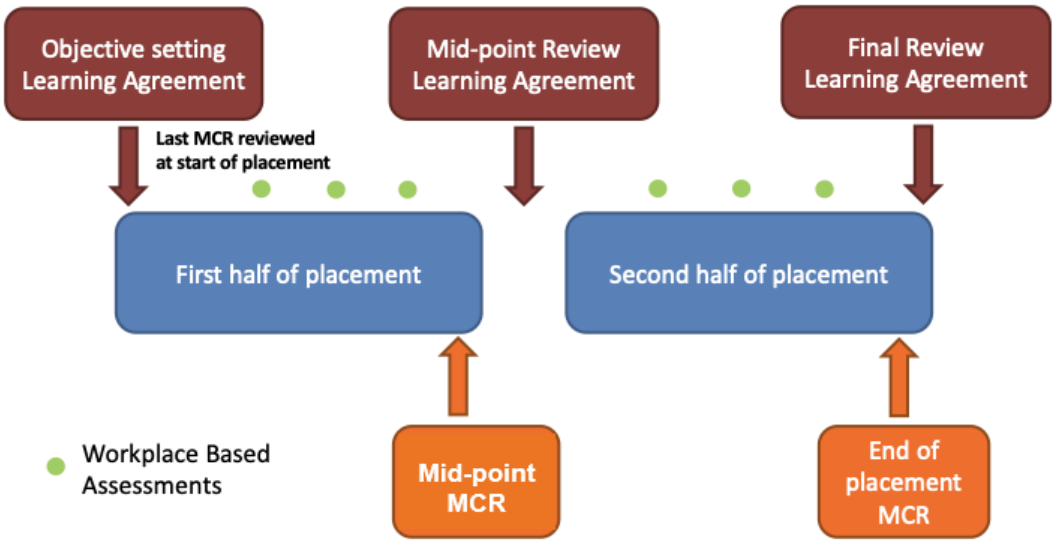

Figure 4: The sequence of assessment through a placement.

[20] https://www.iscp.ac.uk/courses/culturalawarenesscourse.aspx

5.3.2 The learning agreement

The learning agreement is a formal process of goal setting and review meetings that underpin training and is formulated through discussion. The process ensures adequate supervision during training, provides continuity between different placements and supervisors and is one of the main ways of providing feedback to trainees. There are three learning agreement meetings in each placement and these are recorded in the trainee's learning portfolio. Any significant concerns arising from the meetings should be fed back to the TPD at each point in the learning agreement.

Objective-setting meeting

At the start of each placement the AES and trainee must meet to review the trainee's progress so far, agree learning objectives for the placement ahead and identify the learning opportunities presented by the placement. The learning agreement is constructively aligned towards achievement of the high-level outcomes (the CiPs and GPCs) and, therefore, the CiPs and GPCs are the primary reference point for planning how trainees will be assessed and whether they have attained the learning required. The learning agreement is also tailored to the trainee's progress, phase of training and learning needs. The MCR from the previous placement will be reviewed alongside the most recent trainee self-assessment and the action plan for training. Any specific targeted training objectives from the previous ARCP should also be considered and addressed though this meeting and form part of the learning agreement.

Mid-point review meeting

A meeting between the AES and the trainee must take place at each 3 months within the twelve-month placement. The learning agreement must be reviewed, along with other portfolio evidence of training such as WBAs, the logbook and the formative mid-point MCR, including the trainee's self-assessment of CiPs. This meeting ensures training opportunities appropriate to the trainee's own needs are being presented in the placement, and are adjusted if necessary in response to the areas for development identified through the MCR. Particular attention must be paid to progress against targeted training objectives and a specific plan for the remaining part of the placement made if these are not yet achieved. There should be a dialogue between the AES and CSs if adequate opportunities have not been presented to the trainee, and the TPD informed if there has been no resolution. Discussion should also take place if the scope and nature of opportunities should change in the remaining portion of the placement in response to areas for development identified through the MCR.

Final review meeting

Shortly before the end of each placement trainees should meet with their AES to review portfolio evidence including the final MCR. The dialogue between the trainee and AES should cover the overall progress made in the placement and the AES's view of the placement outcome.

AES report

The AES must write an end of placement report which informs the ARCP. The report includes details of any significant concerns and provides the AES's view about whether the trainee is on track in the phase of training for completion within the indicative time. If necessary, the AES must also explain any gaps and resolve any differences in supervision levels which came to light through the MCR.

5.3.3 The Multiple Consultant Report

The assessment of the CiPs and GPCs (high-level outcomes of the curriculum) involves a global professional judgement of a range of different skills and behaviours to make decisions about a learner's suitability to take on particular responsibilities or tasks that are essential to consultant

practice at the standard of certification. The MCR assessment must be carried out by the consultant CSs involved with a trainee, with the AES contributing as necessary to some domains (e.g. *Quality Improvement*, *Research and Scholarship*). The number of CSs taking part reflects the size of the specialty unit and is expected to be no fewer than two. The exercise reflects what many consultant trainers do regularly as part of a faculty group.

The MCR includes a global rating in order to indicate how the trainee is progressing in each of the seven CiPs. This global rating is expressed as a supervision level recommendation described in table 2 below. Supervision levels are behaviourally anchored ordinal scales based on progression to competence and reflect a judgment that has clinical meaning for assessors. Using the scale, CSs must make an overall, holistic judgement of a trainee's performance on each CiP. Levels IV and V, shaded in grey, equate to the level required for certification and the level of practice expected of a day-one consultant in the Health Service (level IV) or beyond (level V). Figures 5 and 6 show how the MCR examines performance from the perspective of the outcome of the curriculum, the day-one consultant surgeon, in the GPCs and CiPs. If not at the level required for certification the MCR can identify areas for improvement by using the CiP or GPC descriptors or, if further detail is required, through free text. The assessment of the GPCs can be performed by CSs, whilst GPC domains 6-9 might be more relevant to assessment by the AES in some placements.

CSs will be able to best recommend supervision levels because they observe the performance of the trainee in person on a day-to-day basis. The CS group, led by a Lead CS, should meet at the mid-point and towards the end of a placement to conduct a formative MCR. Through the MCR, they agree which supervision level best describes the performance of a trainee at that time in each of the seven CiPs and also identify any areas of the nine GPC domains that require development. It is possible for those who cannot attend the group meeting, or who disagree with the report of the group as a whole, to add their own section (anonymously) to the MCR for consideration by the AES. The AES will provide an overview at the end of the process, adding comments and signing off the MCR.

The MCR uses the principle of highlight reporting, where CSs do not need to comment on every descriptor within each CiP but use them to highlight areas that are above or below the expected level of performance. The MCR can describe areas where the trainee might need to focus development or areas of particular excellence. Feedback must be given for any CiP that is not rated as level IV and in any GPC domain where development is required. Feedback must be given to the trainee in person after each MCR and, therefore, includes a specific feedback meeting with the trainee using the highlighted descriptors within the MCR and/or free text comments.

The mid-point MCR feeds into the mid-point learning agreement meeting. At the mid-point it allows goals to be agreed for the remaining part of the placement, with an opportunity to specifically address areas where development is required. Towards the end of the placement the MCR feeds into the final review learning agreement meeting, helping to inform the AES report (figure 4). It also feeds into the objective-setting meeting of the next placement (if relevant) to facilitate discussion between the trainee and the next AES.

The MCR, therefore, gives valuable insight into how well the trainee is performing, highlighting areas of excellence, areas of support required and concerns. It forms an important part of detailed, structured feedback to the trainee at the mid-point and before the end of the placement, and can trigger any appropriate modifications for the focus of training as required. The final formative MCR, together with other portfolio evidence, feeds into the AES report which in turn feeds into the ARCP. The ARCP uses all presented evidence to make the definitive decision on progression.

MCR Rating Scale (CiPs)	Anchor statements	Trainer input at each supervision level			
		Does the trainee perform part or all of the task?	Is guidance required?	Is it necessary for a trainer to be present for the task?	Is the trainee performing at a level beyond that expected of a day one consultant? [c]
Supervision Level I:	Able to observe only: no execution.	no	n/a	n/a	n/a
Supervision Level IIa:	Able and trusted to act with direct supervision: The supervisor needs to be physically present throughout the activity to provide direct supervision.	yes	all aspects	throughout	n/a
Supervision Level IIb:	Able and trusted to act with direct supervision: The supervisor will need to be physically present for part of the activity. The supervisor needs to guide all aspects of the activity. This guidance may partly be given from another setting.	yes	all aspects	will be necessary for part	n/a
Supervision Level III:	Able and trusted to act with indirect supervision: The supervisor may be required to be physically present on occasion. The supervisor does not need to guide all aspects of the activity. For those aspects which do need guidance, this may be given from another setting.	yes	some aspects	may be necessary for part	n/a
Supervision Level IV:	Able and trusted to act at the level of a day-one consultant.	yes	None [a,b]	None [a, b]	n/a

Supervision Level V:	Able and trusted to act at a level beyond that expected of a day-one consultant.	yes	None[a]	None [a]	yes

Table 2: MCR anchor statements and guide to recommendation of appropriate supervision level in each CiP.

a. This equates to the level of practice expected of a day-one consultant in the Health Service. It is recognised that advice from senior colleagues within a MDT is an important part of consultant practice. Achievement of supervision level IV indicates that a trainee is able to work at this level, with advice from their trainer at this level being equivalent to a consultant receiving advice from senior colleagues within a multidisciplinary team. It is recognised that within the context of a training system that trainees are always under the educational and clinical governance structures of the Health Service.
b. Where the PBA level required by the syllabus is less than level 4 for an operative procedure, it would be expected that mentorship is sought for such procedures and this would fall within the scope of being able to carry out this activity without supervision (level IV), i.e. be a level commensurate with that of a day-one consultant.
c. Achievement of this level across the entirety of an activity would be rare, although free text could describe aspects of an activity where this level has been reached.

In making a supervision level recommendation, CSs should take into account their experience of working with the trainee and the degree of autonomy they were prepared to give the trainee during the placement. They should also take into account all the descriptors of the activities, knowledge, skills listed in the detailed descriptions of the CiPs. If, after taking all this into account, the CSs feel the trainee is able to carry out the activity without supervision (level IV) then no further detail of this assessment is required, unless any points of excellence are noted. If the trainee requires a degree of supervision to carry out the activity then the CSs should indicate which of the descriptors of the activities, knowledge and skills require further development (to a limit of five items per CiP, so as to allow targets set at feedback to be timely, relevant and achievable). Similarly, if a trainee excels in one or more areas, the relevant descriptors should be indicated. Examples of how the online MCR will look are shown in figures 5 and 6. Figure 7 describes the MCR as an iterative process involving the trainee, CSs and the AES and the development of specific, relevant, timely and achievable action plans.

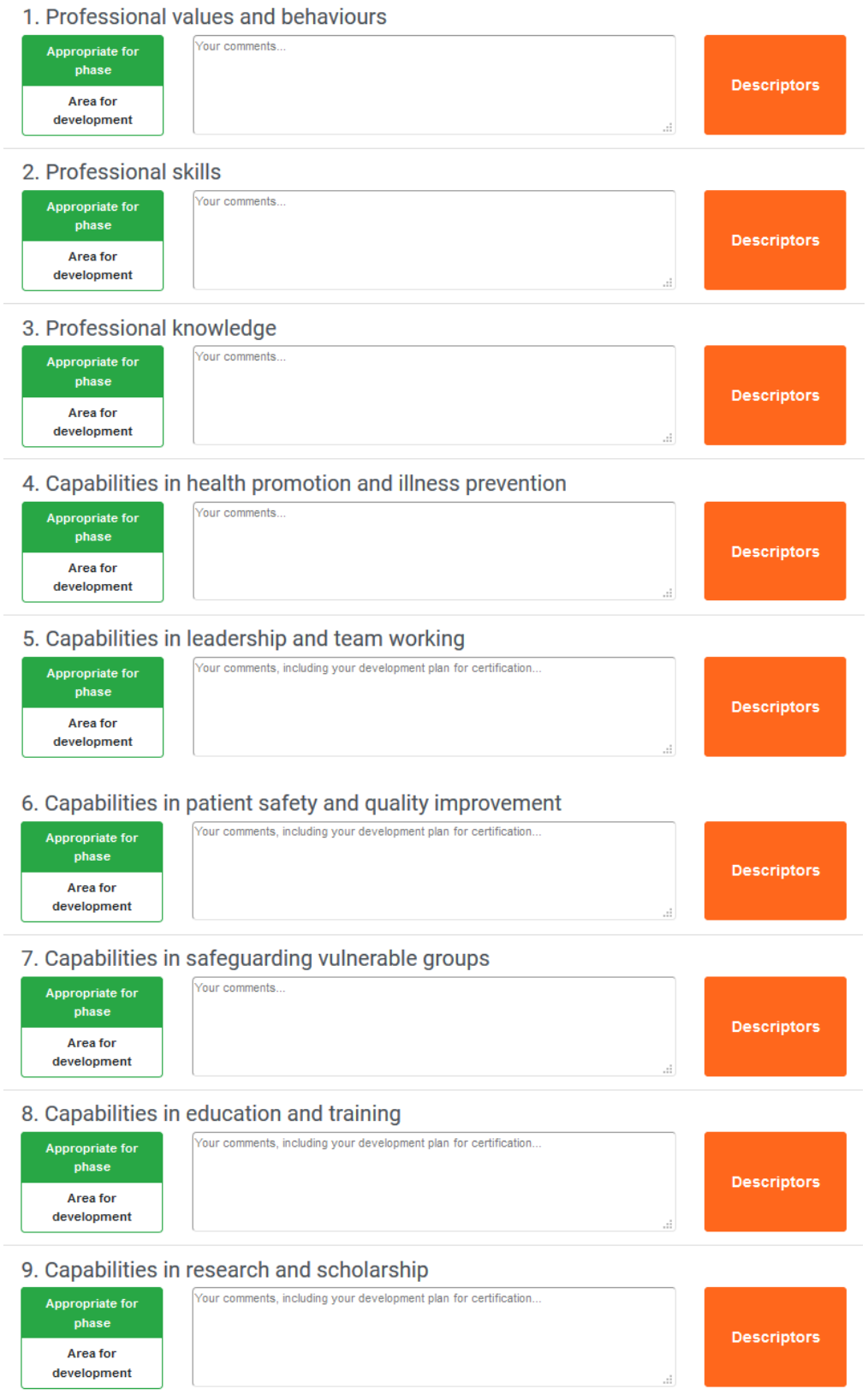

Figure 5: An example of how the GPCs are assessed through the MCR. CSs would consider whether there are areas for development in any of the nine GPD domains. If not, then nothing further need be recorded. If there are areas for development identified, then CSs are obliged to provide feedback through the MCR. This feedback can be recorded as free text in the comments box indicated. The Descriptors box expands to reveal descriptors taken from the GPC framework. These can be used as prompts for free text feedback or verbatim as standardised language used to describe professional capabilities.

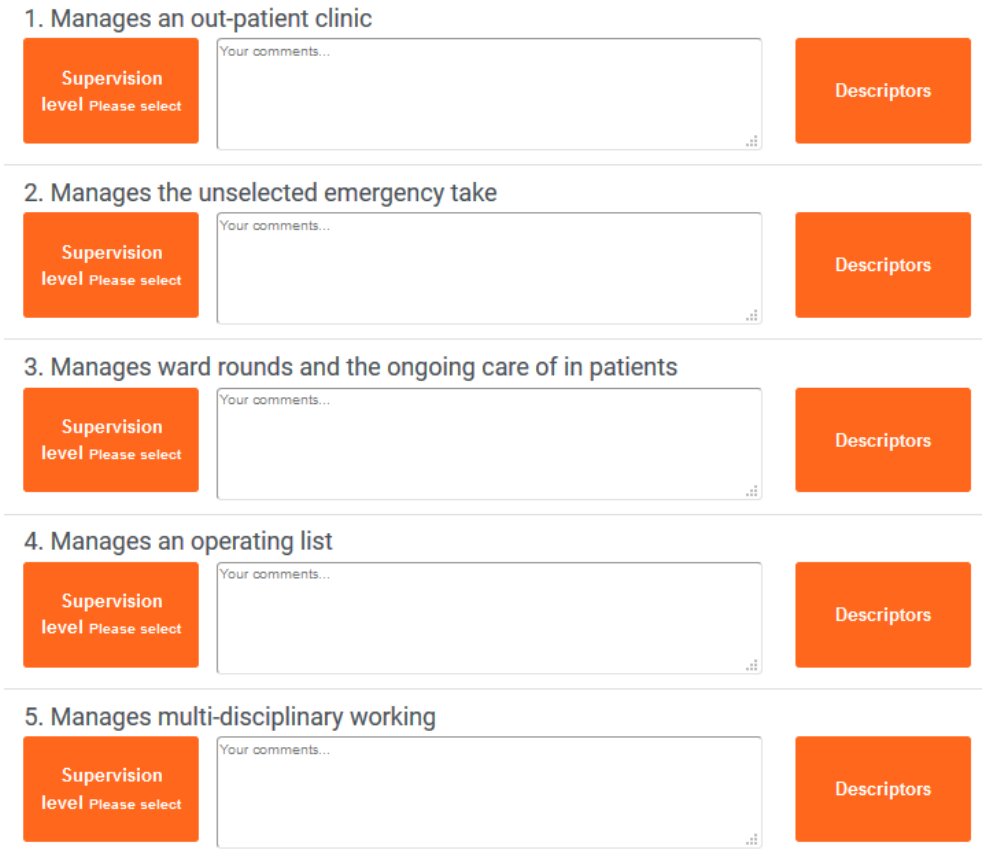

Figure 6: An example of how the CiPs are assessed through the MCR. The CSs would decide what supervision level to recommend for each of the CiPs and record this for each through the Supervision Level box. If the level recommended is IV or V then no further comment need be recorded, unless the CSs wished to capture areas of particular excellence for feedback. If levels I to III are recommended, then the CSs are obliged to provide feedback through the MCR. This feedback can be recorded as free text in the comments box indicated. The Descriptors box expands to reveal CiP descriptors. These can be used as prompts for free text feedback or verbatim as standardised language to describe the clinical capabilities.

5.3.4 Trainee self-assessment

Trainees should complete the self-assessment in the same way as CSs complete the MCR, using the same form and describing self-identified areas for development with free text or using CiP or GPC descriptors. Reflection for insight on performance is an important development tool and self-recognition of the level of supervision needed at any point in training enhances patient safety. Self-assessments are part of the evidence reviewed when meeting the AES at the mid-point and end of a placement. Wide discrepancy between the self-assessment and the recommendation by CSs in the MCR allows identification of over or under confidence and for support to given accordingly.

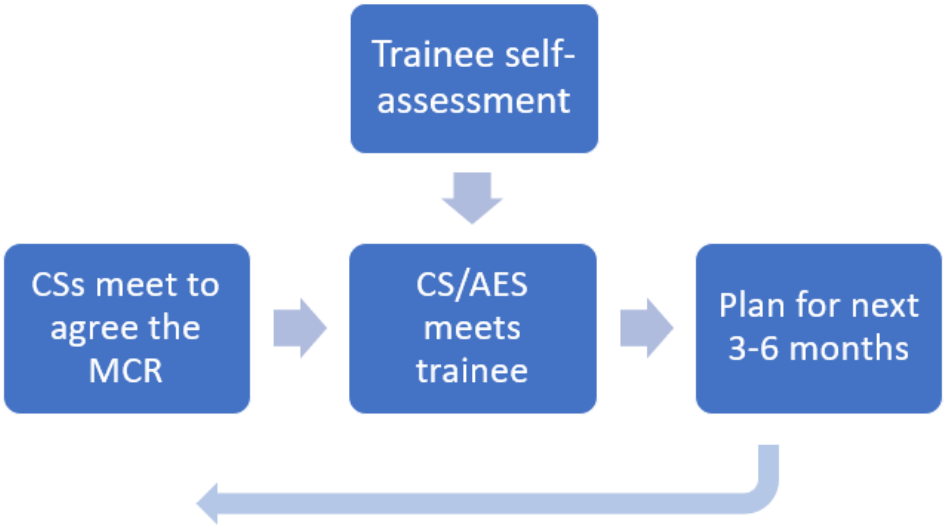

Figure 7: The iterative process of the MCR, showing the involvement of CSs, self-assessment by trainees, face to face meetings between trainees and supervisors and the development of an action plan focused on identified learning needs over the next three to six months of training. Progress against these action plans is reviewed by the AES and at the subsequent MCRs.

5.3.5 Workplace Based Assessment (WBA)

Each individual WBA is designed to assess a range of important aspects of performance in different training situations. Taken together the WBAs can assess the breadth of knowledge, skills and performance described in the curriculum. They also constructively align with the clinical CiPs and GPCs (as shown in appendix 6) and will be used to underpin assessment of the syllabus as well as being available for other conditions and operations as determined by the trainee and supervisors and especially where needed in the assessment of a remediation package to evidence progress in areas of training targeted by a non-standard ARCP outcome. The WBAs described in this curriculum have been in use for over ten years and are now an established component of training.

The WBA methodology is designed to meet the following criteria:

- *Validity* – the assessment actually does test what is intended; that methods are relevant to actual clinical practice; that performance in increasingly complex tasks is reflected in the assessment outcome
- *Reliability* - multiple measures of performance using different assessors in different training situations produce a consistent picture of performance over time
- *Feasibility* – methods are designed to be practical by fitting into the training and working environment
- *Cost-effectiveness* – the only significant additional costs should be in the training of trainers and the time investment needed for feedback and regular appraisal, this should be factored into trainer job plans
- *Opportunities for feedback* – structured feedback is a fundamental component
- *Impact on learning* – the educational feedback from trainers should lead to trainees' reflections on practice in order to address learning needs.

WBAs use different trainers' direct observations of trainees to assess the actual performance of trainees as they manage different clinical situations in different clinical settings and provide more granular formative assessment in the crucial areas of the curriculum than does the more global assessment of CiPs in the MCR. WBAs are primarily aimed at providing constructive feedback to trainees in important areas of the syllabus throughout each placement in all phases of training. Trainees undertake each task according to their training phase and ability level and the assessor

must intervene if patient safety is at risk. It would be normal for trainees to have some assessments which identify areas for development because their performance is not yet at the standard for the completion of that training.

Each WBA is recorded on a structured form to help assessors distinguish between levels of performance and prompt areas for their verbal developmental feedback to trainees immediately after the observation. Each WBA includes the trainee's and assessor's individual comments, ratings of individual competencies (e.g. *Satisfactory*, *Needs Development* or *Outstanding*) and global rating (using anchor statements mapped to phases of training). Rating scales support the drive towards excellence in practice, enabling learners to be recognised for achievements above the level expected for a level or phase of training. They may also be used to target areas of under-performance.

WBAs are formative and optional and may be used to assess and provide feedback on all clinical activity. Trainees can use any of the assessments described below to gather feedback or provide evidence of their progression in a particular area. They may also be useful to evidence progress in targeted training where this is required e.g. for any areas of concern. All trainees are required to use WBAs to evidence that they have achieved the learning by certification.

The assessment blueprint (appendix 6) indicates how the assessment programme provides coverage of the CiPs, the GPC framework and the syllabus. It is not expected that the assessment methods will be used for each competency and additional evidence may be used to help make a supervision level recommendation. The principle of assessment is holistic; individual GPC and CiP descriptors and syllabus items should not be assessed, other than if an area of concern is identified when the programme of assessment provides a variety of tools to feedback to and assess the trainee.

Case Based Discussion (CBD)

The CBD assesses the performance of a trainee in their management of a patient case to provide an indication of competence in areas such as clinical judgement, decision-making and application of medical knowledge in relation to patient care. The CBD process is a structured, in-depth discussion between the trainee and a consultant supervisor. The method is particularly designed to test higher order thinking and synthesis as it allows the assessor to explore deeper understanding of how trainees compile, prioritise and apply knowledge. By using clinical cases that offer a challenge to trainees, rather than routine cases, trainees are able to explain the complexities involved and the reasoning behind choices they made. It also enables the discussion of the ethical and legal framework of practice. It uses patient records as the basis for dialogue, for systematic assessment and structured feedback. As the actual record is the focus for the discussion, the assessor can also evaluate the quality of record keeping and the presentation of cases. Trainees are assessed against the standard for the completion of their phase of training.

Clinical Evaluation Exercise (CEX) / CEX for Consent (CEX(C))

The CEX or CEX(C) assesses a clinical encounter with a patient to provide an indication of competence in skills essential for good clinical care such as communication, history taking, examination and clinical reasoning. These can be used at any time and in any setting when there is a trainee and patient interaction and an assessor is available. Trainees are assessed against the standard for the completion of their phase of training.

Direct Observation of Procedural Skills (DOPS)

The DOPS assesses the trainee's technical, operative and professional skills in a range of basic diagnostic and interventional procedures during routine surgical practice in wards, out-patient

clinics and operating theatres. The procedures reflect the common and important procedures. Trainees are assessed against the standard for the completion of core surgical training.

Multi-source Feedback (MSF)

The MSF assesses professional competence within a team working environment. It comprises a self-assessment and the assessments of the trainee's performance from a range colleagues covering different grades and environments (e.g. ward, theatre, out-patients) including the AES. The competencies map to the standards of GMP and enable serious concerns, such as those about a trainee's probity and health, to be highlighted in confidence to the AES, enabling appropriate action to be taken. Feedback is in the form of a peer assessment chart, enabling comparison of the self-assessment with the collated views received from the team and includes their anonymised but verbatim written comments. The AES should meet with the trainee to discuss the feedback on performance in the MSF. Trainees are assessed against the standard for the completion of their training level.

Procedure Based Assessment (PBA)

The PBA assesses advanced technical, operative and professional skills in a range of specialty procedures or parts of procedures during routine surgical practice in which trainees are usually scrubbed in theatre. The standard is at the level of certification. The assessment covers pre-operative planning and preparation; exposure and closure; intra-operative elements specific to each procedure and post-operative management. The procedures reflect the routine or index procedures relevant to the specialty. Trainees are assessed against the standard for certification.

Surgical Logbook

The logbook is tailored to each specialty and allows the trainee's competence as assessed by the DOPS and PBA to be placed in context. It is not a formal assessment in its own right, but trainees are required to keep a log of all operative procedures they have undertaken including the level of supervision required on each occasion using the key below. The logbook demonstrates breadth of experience which can be compared with procedural competence using the DOPS and the PBA.

Observed (O)
Assisted (A)
Supervised - trainer scrubbed (S-TS)
Supervised - trainer unscrubbed (S-TU)
Performed (P)
Training more junior trainee (T)

The following WBAs may also be used to further collect evidence of achievement, particularly in the GPC domains of *Quality improvement*, *Education and training* and *Leadership and team working*:

Assessment of Audit (AoA)

The AoA reviews a trainee's competence in completing an audit or quality improvement project. It can be based on documentation or a presentation of a project. Trainees are assessed against the standard for the completion of their phase of training.

Observation of Teaching (OoT)

The OoT assesses the trainee's ability to provide formal teaching. It can be based on any instance of formalised teaching by the trainee which has been observed by the assessor. Trainees are assessed against the standard for the completion of their phase of training.

The forms and guidance for each WBA method can be found on the ISCP website (see section 7).

5.3.5 Annual Review of Competence Progression (ARCP)

The ARCP is a formal Deanery Local Office process overseen and led by the TPD. It scrutinises the trainee's suitability to progress through the training programme. It bases its decisions on the evidence that has been gathered in the trainee's learning portfolio during the period between ARCP reviews, particularly the AES report in each training placement. The ARCP would normally be undertaken on an annual basis for all trainees in surgical training. A panel may be convened more frequently for an interim review or to deal with progression issues (either accelerated or delayed) outside the normal schedule. The ARCP panel makes the final summative decision that determines whether trainees are making appropriate progress through the phase of training or to complete training.

5.4 Completion of training in Congenital Cardiac Surgery

There is a critical progression point at the end of sub-specialty training, satisfaction of which would lead to an ARCP 6 and the ability to apply to be entered onto the specialist register as a Cardiothoracic Surgeon with a sub-specialty of Congenital Cardiac Surgery.

The following requirements are applied to all trainees completing the curriculum and applying for certification and entry to the specialist register.

All seeking certification in Cardiothoracic Surgery with the Congenital Cardiac Surgery sub-specialty must:

a) be fully registered with the GMC and have a licence to practise (UK trainees) or be registered with the Medical Council in Ireland (Republic of Ireland trainees)
b) have successfully passed the ISB examination
c) have achieved level IV or V in all the CiPs
d) have achieved the competencies described in the nine domains of the GPC framework
e) have been awarded an outcome 6 at a final ARCP (if applying for specialist registration through certification).

In order to be awarded an outcome 6 at final ARCP trainees must be able to satisfy the following specialty-specific guidelines:

a) Generic requirements shared between surgical specialities

Research - Trainees must provide evidence of having met the relevant requirements for research and scholarship. For UK trainees, this can be found in the GMC's GPC framework. Broadly, this includes capabilities in 4 areas:

1. The demonstration of evidence-based practice
2. Understanding how to critically appraise literature and conduct literature searches and reviews
3. Understanding and applying basic research principles
4. Understanding the basic principles of research governance and how to apply relevant ethical guidelines to research activities.

Quality Improvement - evidence of an understanding of, and participation in, audit or service improvement as defined in the curriculum	Trainees must complete or supervise an indicative number of three audit or quality improvement projects during specialty training. In one or more of these, the cycle should be completed.
Medical Education and training - evidence of an understanding of, and participation in, medical education and training as defined in the curriculum	Trainees must provide evidence of being trained in the training of others and present written structured feedback on their teaching uploaded to the ISCP portfolio.
Management and leadership - evidence of an understanding of management structures and challenges of the health service across relevant health services and the variations between nations	Trainees must provide evidence of training in health service management and leadership and having taken part in a management related activity e.g. rota administration, trainee representative, membership of working party etc. or of having shadowed a management role within the hospital.

b) Requirements specific to Congenital Cardiac Surgery

Additional courses / qualifications - evidence of having attended specific courses/gained specific qualifications as defined in the curriculum	The Advanced Trauma Life Support® (ATLS®), European Trauma Course, Definitive Surgical Trauma Skills course or equivalent locally provided course(s) meeting the outcomes described.
Specialist conferences - evidence of having attended conferences and meetings as defined in the curriculum appropriate to the specialty	It is recommended that trainees attend national or international meetings during training (e.g. annual meetings of specialty associations or major international equivalents).
Clinical experience - evidence of the breadth of clinical experience defined in the specialty syllabus, and experience in one specialty interests.	Trainees must be able to provide evidence of managing patients presenting with the full range of acute cardiothoracic conditions up to the point of operation and to manage the full range of acute and elective conditions in the Congenital Cardiac Surgery, including the operation. Trainees must be able to provide evidence of clinical experience required for completion of phase 2 of the cardiothoracic surgery curriculum as a cardiac themed trainee.
Operative experience - consolidated logbook evidence of the breadth of operative experience defined in the specialty syllabus	An indicative number of 100 major cases in Cardiac Surgery with the majority in Congenital Cardiac Surgery.

Table 3: Requirements for completion of training in Congenital Cardiac Surgery:
a) generic requirements shared between all surgical specialties and
b) requirements specific to Cardiothoracic Surgery and Congenital Cardiac Surgery.
Attainment of these requirements contribute to evidence that outcomes of training have been met.

Once these requirements have been met, the ARCP panel may consider the award of outcome 6 having reviewed the portfolio and AES report. Award of outcome 6 allows the trainee to seek recommendation for certification and entry onto the specialist register.

6 Recording progress in the ISCP learning portfolio

This curriculum is available through the JCST's Intercollegiate Surgical Curriculum Programme (ISCP) training management system at www.iscp.ac.uk. Trainees and all involved with training must register with the ISCP and use the curriculum as the basis of their discussion and to record assessments and appraisals. 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 must maintain their learning portfolio by developing learning objectives, undergoing assessments, recording training experiences and reflecting on their learning and feedback.

The ISCP learning portfolio can be used to build a training record of trainee conduct and practice as follows:

- Trainees can initiate the learning agreement and WBAs directly with supervisors. They can record logbook procedures and other evidence using a variety of forms. They can also link WBAs with critical conditions and index procedures.
- TPDs can validate trainees in their placements, monitor training and manage the ARCP.
- Deanery Local Office administrators can support the TPD, JCST trainee enrolment and ARCP process.
- AESs can complete trainee appraisal through the learning agreement, monitor trainee portfolios and provide end of placement AES reports.
- CSs can complete the MCR at the mid-point and end of each placement.
- Assessors can record feedback and validate WBAs.
- Other people involved in training can access trainee portfolios according to their role and function.

Appendix 1: Capabilities in Practice

In each of the CiPs the word 'manage' is defined as clinical assessment, diagnosis, investigation and treatment (both operative and non-operative) and recognising when referral to more specialised or experienced surgeons is required for definitive treatment. Trainees are expected to apply syllabus defined knowledge and skills in straightforward and unusual cases across the breadth of the specialty across all CiPs.

Shared Capability in Practice 1:

Manages an out-patient clinic

Good Medical Practice Domains 1,2,3,4

Description

Manages all the administrative and clinical tasks required of a consultant surgeon in order that all patients presenting as out-patients in the specialty are cared for safely and appropriately.

Example descriptors:

- Assesses and prioritises GP and inter-departmental referrals and deals correctly with inappropriate referrals
- Assesses new and review patients using a structured history and a focused clinical examination to perform a full clinical assessment, and determines the appropriate plan of action, explains it to the patient and carries out the plan
- Carries out syllabus defined practical investigations or procedures within the out-patient setting
- Adapts approach to accommodate all channels of communication (e.g. interpreter, sign language), communicates using language understandable to the patient, and demonstrates communication skills with particular regard to breaking bad news. Appropriately involves relatives and friends
- Takes co-morbidities into account
- Requests appropriate investigations, does not investigate when not necessary, and interprets results of investigations in context
- Selects patients with urgent conditions who should be admitted from clinic
- Manages potentially difficult or challenging interpersonal situations, including breaking bad news and complaints
- Completes all required documentation
- Makes good use of time
- Uses consultation to emphasise health promotion

Specialty specific requirements: None

Supervision levels:

Level I: Able to observe only

Level II: Able and trusted to act with direct supervision:

a) Supervisor present throughout
b) Supervisor present for part

Level III: Able and trusted to act with indirect supervision

Level IV: Able and trusted to act at the level expected of a day-one consultant

Level V: Able and trusted to act at a level beyond that expected of a day-one consultant

Shared Capability in Practice 2:

Manages the unselected emergency take

Good Medical Practice Domains 1,2,3,4

Description

Manages all patients with an emergency condition requiring management within the specialty. Able to perform all the administrative and clinical tasks required of a consultant surgeon in order that all patients presenting as emergencies in the specialty are cared for safely and appropriately.

Example descriptors:

- Promptly assesses acutely unwell and deteriorating patients, delivers resuscitative treatment and initial management, and ensures sepsis is recognised and treated in compliance with protocol
- Makes a full assessment of patients by taking a structured history and by performing a focused clinical examination, and requests, interprets and discusses appropriate investigations to synthesise findings into an appropriate overall impression, management plan and diagnosis
- Identifies, accounts for and manages co-morbidity in the context of the surgical presentation, referring for specialist advice when necessary
- Selects patients for conservative and operative treatment plans as appropriate, explaining these to the patient, and carrying them out
- Demonstrates effective communication with colleagues, patients and relatives
- Makes appropriate peri- and post-operative management plans in conjunction with anaesthetic colleagues
- Delivers ongoing post-operative surgical care in ward and critical care settings, recognising and appropriately managing medical and surgical complications, and referring for specialist care when necessary
- Makes appropriate discharge and follow up arrangements
- Carries out all operative procedures as described in the syllabus
- Manages potentially difficult or challenging interpersonal situations
- Gives and receives appropriate handover

Specialty specific requirements: None

Supervision levels:

Level I: Able to observe only

Level II: Able and trusted to act with direct supervision:

a) Supervisor present throughout
b) Supervisor present for part

Level III: Able and trusted to act with indirect supervision

Level IV: Able and trusted to act at the level expected of a day-one consultant

Level V: Able and trusted to act at a level beyond that expected of a day-one consultant

Shared Capability in Practice 3:

Manages ward rounds and the on-going care of in-patients

Good Medical Practice Domains 1,2,3,4

Description

Manages all hospital in-patients with conditions requiring management within the specialty. Able to perform all the administrative and clinical tasks required of a consultant surgeon in order that all in-patients requiring care within the specialty are cared for safely and appropriately.

Example descriptors:

- Identifies at the start of a ward round if there are acutely unwell patients who require immediate attention
- Ensures that all necessary members of the multi-disciplinary team are present, knows what is expected of them and what each other's roles and contributions will be, and contributes effectively to cross specialty working
- Ensures that all documentation (including results of investigations) will be available when required and interprets them appropriately
- Makes a full assessment of patients by taking a structured history and by performing a focused clinical examination, and requests, interprets and discusses appropriate investigations to synthesise findings into an appropriate overall impression, management plan and diagnosis
- Identifies when the clinical course is progressing as expected and when medical or surgical complications are developing, and recognises when operative intervention or re-intervention is required and ensures this is carried out
- Identifies and initially manages co-morbidity and medical complications, referring on to other specialties as appropriate
- Contributes effectively to level 2 and level 3 care
- Makes good use of time, ensuring all necessary assessments are made and discussions held, while continuing to make progress with the overall workload of the ward round
- Identifies when further therapeutic manoeuvres are not in the patient's best interests, initiates palliative care, refers for specialist advice as required, and discusses plans with the patient and their family
- Summarises important points at the end of the ward rounds and ensures all members of the multi-disciplinary team understand the management plans and their roles within them
- Gives appropriate advice for discharge documentation and follow-up

Specialty specific requirements: None

Supervision levels:

Level I: Able to observe only

Level II: Able and trusted to act with direct supervision:

a) Supervisor present throughout
b) Supervisor present for part

Level III: Able and trusted to act with indirect supervision

Level IV: Able and trusted to act at the level expected of a day-one consultant

Level V: Able and trusted to act at a level beyond that expected of a day-one consultant

Shared Capability in Practice 4:

Manages an operating list

Good Medical Practice Domains 1,2,3,4

Description

Manages all patients with conditions requiring operative treatment within the specialty. Able to perform all the administrative and clinical tasks required of a consultant surgeon in order that all patients requiring operative treatment receive it safely and appropriately.

Example descriptors:

- Selects patients appropriately for surgery, taking the surgical condition, co-morbidities, medication and investigations into account, and adds the patient to the waiting list with appropriate priority
- Negotiates reasonable treatment options and shares decision-making with patients
- Takes informed consent in line with national legislation or applies national legislation for patients who are not competent to give consent
- Arranges anaesthetic assessment as required
- Undertakes the appropriate process to list the patient for surgery
- Prepares the operating list, accounting for case mix, skill mix, operating time, clinical priorities, and patient co-morbidity
- Leads the brief and debrief and ensures all relevant points are covered for all patients on the operating list
- Ensures the WHO checklist (or equivalent) is completed for each patient at both the beginning and end of each procedure
- Understands when prophylactic antibiotics should be prescribed and follows local protocol
- Synthesises the patient's surgical condition, the technical details of the operation, co-morbidities and medication into an appropriate operative plan for the patient
- Carries out the operative procedures to the required level for the phase of training as described in the specialty syllabus
- Uses good judgement to adapt operative strategy to take account of pathological findings and any changes in clinical condition
- Undertakes the operation in a technically safe manner, using time efficiently
- Demonstrates good application of knowledge and non-technical skills in the operating theatre, including situation awareness, decision-making, communication, leadership, and teamwork
- Writes a full operation note for each patient, ensuring inclusion of all post-operative instructions
- Reviews all patients post-operatively
- Manages complications safely, requesting help from colleagues where required

Specialty specific requirements:

Trainees should have an indicative number of 100 major cases in Cardiac Surgery with the majority in Congenital Cardiac Surgery.

Supervision levels:

Level I: Able to observe only

Level II: Able and trusted to act with direct supervision:

a) Supervisor present throughout

	b) Supervisor present for part
Level III:	Able and trusted to act with indirect supervision
Level IV:	Able and trusted to act at the level expected of a day-one consultant
Level V:	Able and trusted to act at a level beyond that expected of a day-one consultant

Shared Capability in Practice 5:

Manages multi-disciplinary working

Good Medical Practice Domains 1,2,3,4

Description

Manages all patients with conditions requiring inter-disciplinary management (or multi-consultant input as in trauma or fracture meetings in Trauma and Orthopaedic Surgery) including care within the specialty. Able to perform all the administrative and clinical tasks required of a consultant surgeon in order that safe and appropriate multi-disciplinary decisions are made on all patients with such conditions requiring care within the specialty.

Example Descriptors:

Appropriately selects patients who require discussion at the multi-disciplinary team

Follows the appropriate administrative process

Deals correctly with inappropriate referrals for discussion (e.g. postpones discussion if information is incomplete or out-of-date)

Presents relevant case history, recognising important clinical features, co-morbidities and investigations

Identifies patients with unusual, serious or urgent conditions

Engages constructively with all members of the multi-disciplinary team in reaching an agreed management decision, taking co-morbidities into account, recognising when uncertainty exists, and being able to manage this

Effectively manages potentially challenging situations such as conflicting opinions

Develops a clear management plan and communicates discussion outcomes and subsequent plans by appropriate means to the patient, GP and administrative staff as appropriate

Manages time to ensure the case list is discussed in the time available

Arranges follow up investigations when appropriate and knows indications for follow up

Specialty specific requirements: None

Supervision levels:

Level I: Able to observe only

Level II: Able and trusted to act with direct supervision:

a) Supervisor present throughout
b) Supervisor present for part

Level III: Able and trusted to act with indirect supervision

Level IV: Able and trusted to act at the level expected of a day-one consultant

Level V: Able and trusted to act at a level beyond that expected of a day-one consultant

Specialty-specific Capability in Practice 6:

Manages patients within the critical care area

Good Medical Practice Domains 1,2,3,4

Description

Able to perform all administrative and clinical tasks required of a consultant surgeon for all patients within the intensive care and high dependency settings in both cardiac and thoracic surgery to ensure they receive safe and appropriate care.

Example Descriptors:

- Assesses referrals to ICU or HDU, and regularly reviews patients
- Arranges urgent investigations as necessary and reviews in a timely fashion
- Works with appropriate specialties in the management of critically ill patients, referring on to other specialties as appropriate
- Leads on surgical decisions for post-operative patients
- Supports nursing and anaesthetic staff in managing patients
- Plans discharges in a timely fashion to maintain patient flow
- Communicates appropriately with family and next of kin
- Communicates appropriately with consultant, nursing and anaesthetic colleagues
- Delegates and trains other staff members on appropriate cases
- Applies syllabus defined knowledge and clinical skills in all cases
- Carries out syllabus defined practical investigations or procedures within HDU and ICU
- Exercises good judgement in deciding on management plans and executes these within appropriate timescales
- Effectively manages potentially challenging situations in patients

Supervision levels:

Level I: Able to observe only

Level II: Able and trusted to act with direct supervision:

a) Supervisor present throughout
b) Supervisor present for part

Level III: Able and trusted to act with indirect supervision

Level IV: Able and trusted to act at the level expected of a day-one consultant

Level V: Able and trusted to act at a level beyond that expected of a day-one consultant

Specialty-specific Capability in Practice 7:

Assesses surgical outcomes both at a personal and unit level

Good Medical Practice Domains 1,2,3,4

Description

Able to assess surgical outcomes in the specialty at a personal and unit level, and to respond to or adapt practice, where appropriate, without compromising patient care.

Example Descriptors:

- Assesses pre-operative investigations to collect risk factors
- Collects data at the time of surgery about patient demographics, procedure performed and risk factors
- Enters data into local and national datasets as appropriate
- Collects post-operative data of outcomes following surgery
- Analyses and presents surgical outcome data at local audit meetings
- Describes both personal and unit outcomes during a prescribed audit period
- Describes risk adjusted outcomes at personal and unit level
- Demonstrates ability to recognise acceptable variations in practice as well as excellent and poor performance in self and others
- Promotes excellence in meeting standards to improve the quality and outcomes of surgical practice
- Demonstrates ability to analyse reasons for poor performance and suggest means for adapting practice to improve patient care
- Demonstrates knowledge of risk factors, current risk models (such as EuroSCORE, Thoracoscore etc.), and risk adjustment
- Demonstrates knowledge of national and local audits (SCTS, NICOR, cancer registries etc.)
- Demonstrates skills in using IT and databases

Supervision levels:

Level I: Able to observe only

Level II: Able and trusted to act with direct supervision:

a) Supervisor present throughout
b) Supervisor present for part

Level III: Able and trusted to act with indirect supervision

Level IV: Able and trusted to act at the level expected of a day-one consultant

Level V: Able and trusted to act at a level beyond that expected of a day-one consultant

Appendix 2: Congenital Cardiac Surgery Syllabus

The syllabus is organised by topics which are the presenting conditions of patients in relation to the sub-specialty. Trainees are expected to have exposure to all topics in phase 3 of training.

WBA

Formative WBAs may be used to assess and provide feedback on any areas of clinical activity. However, other than for the critical conditions, index procedures or where they have been identified to address a concern, WBAs are optional and trainees, therefore, do not need to use WBAs to evidence their learning against each syllabus topic.

Standards for depth of knowledge during surgical training

The following methodology is used to define the relevant depth of knowledge required of the surgical trainee. Each topic has a competence level ascribed to it for knowledge ranging from 1 to 4 which indicates the depth of knowledge required:

1 - knows of
2 - knows basic concepts
3 - knows generally
4 - knows specifically and broadly

Standards for clinical and technical skills

The practical application of knowledge is evidenced through clinical and technical skills. Each topic within a phase has a competence level ascribed to it in the areas of clinical and technical skills ranging from 1 to 4:

1. Has observed

Exit descriptor; at this level the trainee:

- Has adequate knowledge of the steps through direct observation.
- Demonstrates that he/she can handle instruments relevant to the procedure appropriately and safely.
- Can perform some parts of the procedure with reasonable fluency.

2. Can do with assistance

Exit descriptor; at this level the trainee:

- Knows all the steps - and the reasons that lie behind the methodology.
- Can carry out a straightforward procedure fluently from start to finish under direct supervision.
- Knows and demonstrates when to call for assistance/advice from the supervisor (knows personal limitations).

3. Can do whole but may need assistance

Exit descriptor; at this level the trainee:

- Can adapt to well- known variations in the procedure encountered, without direct input from the trainer.
- Recognises and makes a correct assessment of common problems that are encountered.
- Is able to deal with most of the common problems.
- Knows and demonstrates when he/she needs help.

- Requires advice rather than help that requires the trainer to scrub.

4. Competent to do without assistance, including complications

Exit descriptor, at this level the trainee:

- With regard to the common clinical situations in the specialty, can deal with straightforward and difficult cases to a satisfactory level and without the requirement for external input.
- Is at the level at which one would expect a day-one UK consultant surgeon to function.
- Is capable of supervising trainees.

The technical skill competency level which trainees need to achieve differs significantly in the 2 special interest areas of Cardiac and Thoracic surgery

Syllabus

FETAL CIRCULATION & CHANGES AFTER BIRTH

OBJECTIVE

Understand physiology of fetal circulation, normal values and the clinical relevance to neonatal surgery and preoperative management.

KNOWLEDGE	**ST7**	**ST8**
Physiology of fetal circulation and changes at birth	3	4
Normal values in neonatal life	3	4
Manipulation of neonatal circulation in congenital heart disease	3	4
Diagnosis and Management of Persistent Fetal Circulation	3	4
CLINICAL SKILLS		
Stabilisation of the newborn with congenital heart disease	3	4
Interpretation of echo findings	3	4
Manipulation of the newborn circulation on the PICU	3	4
Management of Persistent Fetal Circulation	3	4

NEONATAL AND INFANT PHYSIOLOGY

OBJECTIVE

Understand fundamental neonatal physiology and the differences from older children and adults

KNOWLEDGE	**ST7**	**ST8**
Biochemical, Haematological and immunological Characteristics	3	4
Normal circulatory physiology (values, volumes etc)	4	4
Nutritional and thermoregulatory requirements	3	4
Neurodevelopment and brain protection	3	4
Changes in all the above during infancy	3	4
Pharmacology in neonates and infants	3	4

CLINICAL SKILLS

Interpretation of clinical signs and lab tests	3	4
Stabilisation of the newborn circulation	3	4
Safe prescribing, drug dosing and infusion rates	3	4

PAEDIATRIC INTENSIVE CARE

OBJECTIVE

To have a broad understanding of the differences between paediatric and adult intensive care. Understand the principles of PICU management in congenital heart disease.

KNOWLEDGE	**ST7**	**ST8**
Differences between paediatric and adult intensive care	4	4
Stabilisation of the sick child	3	4
Ventilation of neonates and children	3	4
Invasive and non-invasive monitoring	3	4
Management of fluid balance and nutrition including TPN	3	4
Pharmacology	3	4
Resuscitation of neonates and children	3	4

CLINICAL SKILLS

Indications and referral to PICU	3	4
Stabilisation of the sick child	3	4
Interpretation of invasive monitoring	3	4
Basic Life Support – neonates and children	3	4
Fluid management, nutrition and prescribing	3	4
Management of parents and families in the PICU	3	4

TECHNICAL SKILLS

Arterial and central venous access	3	4
Intercostal drainage	4	4
Peritoneal dialysis	3	4
Emergency chest opening post-op	4	4

MORPHOLOGY AND SEQUENTIAL SEGMENTAL ANALYSIS

OBJECTIVE

Comprehensive understanding of the morphology of congenital heart disease and the principle of sequential segmental analysis

KNOWLEDGE	**ST7**	**ST8**
Detailed anatomy of the normal heart	3	4
Morphology of congenital heart disease	3	4
Principal of Sequential Segmental Analysis	3	4
Concepts of isomerism, situs and topology	3	4

CLINICAL SKILLS

Application of morphology and classification in the interpretation of echo, angiography and CT/MRI	3	4

RISK STRATIFICATION AND DATA COLLECTION

OBJECTIVE

Understand risk stratification systems in congenital heart disease, national requirements for data collection, validation and quality assurance.

KNOWLEDGE	**ST7**	**ST8**
Minimum data sets.	3	4
Nationally collected and reported data	3	4
Common risk assessment systems – RACHS and ARISTOTLE	3	4
Problems of risk stratification in congenital heart disease	3	4
Standard setting, quality assurance systems and mechanisms of managing poor performance	3	4

CLINICAL SKILLS		
Familiarity with data collection systems	3	4
Interpretation of risk	4	4
Interpretation of CUSUM analysis	4	4

ATRIAL SEPTAL DEFECTS

OBJECTIVE

To diagnose, treat and manage atrial septal defects in children, including all aspects of operative repair.

KNOWLEDGE	**ST7**	**ST8**
Anatomy of the atrial septum	4	4
Classification of septal defects and associated lesions	4	4
Physiological implications of septal defects	4	4
Natural history and complications	4	4
Indications for surgical and interventional defect repair	4	4
Current methods for surgical repair including techniques for sinus venous defects, management of bilateral SVC, unroofed SVC and coronary sinus defects. Minimally invasive techniques and alternative surgical incisions and approaches.	3	4

CLINICAL SKILLS		
Diagnose and assess a patient with atrial septal defect	4	4
Interpret echocardiographic and CT/MRI assessment of the anatomy	3	4
Manage postoperative course, recognise and manage common complications	3	4

TECHNICAL SKILLS		
Repair of Secundum ASD	3	4
Repair of Sinus Venosus ASD & correction of Partial Anomalous Pulmonary Venous Drainage	3	3
Repair of Coronary Sinus ASD	3	4

Management of Unroofed Coronary Sinus	2	3
Retrieval of dislodged ASD device	3	4

Note: Management of Primum ASD is covered under 'Atrio-ventricular septal defect'

PATENT DUCTUS ARTERIOSUS

OBJECTIVE

Understand fetal circulation and the physiological consequences of persistent PDA and associated lesions. Understand neonatal and infant management including medical treatment and indications for surgery. Surgical techniques and approaches.

KNOWLEDGE	**ST7**	**ST8**
Anatomy and physiology of PDA	4	4
Medical management including management of the premature newborn	4	4
Indications and timing of surgical closure	4	4
CLINICAL SKILLS		
Diagnose and assess patents with PDA	3	4
Assessment of the premature newborn and definition of failed medical management	3	4
Interpret echo and angiographic findings	3	4
Manage post-operative course and common complications	3	4
TECHNICAL SKILLS		
Ligation of PDA via thoracotomy in premature infants	3	4
Ligation/division of PDA via thoracotomy in older infants	4	4
Ligation of PDA via sternotomy	3	4

COARCTATION AND INTERRUPTED AORTIC ARCH

OBJECTIVE

Understand morphology of coarctation, hypoplastic aortic arch, interrupted arch and associated conditions. Physiology of the condition, age at presentation and pre-operative assessment and stabilisation. Management, including role of interventional cardiology and surgical repair techniques.

KNOWLEDGE	**ST7**	**ST8**
Anatomy and physiology of CoA, Hypoplastic aortic arch and Interruption	3	4
Spectrum of presentation and preoperative management and stabilisation	3	4
Associated conditions	3	4
Indications for catheter and surgical intervention	3	4
Surgical techniques	3	4
Management of post-operative course and common complications	3	4
CLINICAL SKILLS		
Diagnose and assess patients with CoA, Hypoplastic arch and Interruption	3	4
Interpret echo, angiographic and CT/MRI findings	3	4

Manage post-operative course and common complications	3	4
TECHNICAL SKILLS		
CoA repair via thoracotomy	3	4
Extended end to end anastomosis	3	4
Subclavian flap repair	2	3
Repair of hypoplastic arch via sternotomy	2	3
Repair of Aortic Interruption	2	3
Repair of CoA in children and adults (interposition graft and patch techniques)	2	3
Late complications of CoA repair (false aneurysm and aorto-bronchial/enteric fistulae)	2	3

AORTIC VALVE DISEASE

OBJECTIVE

Understand morphology and physiology of aortic valve disease in neonates, infants and children. Role of cardiological intervention and surgical repair. Treatment of aortic valve disease including surgical repair and replacement techniques

KNOWLEDGE	**ST7**	**ST8**
Morphology and classification of aortic valve disease	4	4
Spectrum of presentation and clinical assessment	4	4
Associated conditions	3	4
Indications for trans-catheter and surgical intervention	3	4
Range of surgical repair and replacement techniques	3	4
Management of operative course and common complications	3	4
CLINICAL SKILLS		
Diagnose and assess patients with aortic valve disease	3	4
Interpret echo and angiographic findings	3	4
Assess operative and interventional options and timing of intervention	3	4
Application of surgical techniques	3	4
Management of operative course and common complications	3	4
TECHNICAL SKILLS		
Aortic valvotomy	3	4
Prosthetic aortic valve replacement	3	4
Ross Procedure (pulmonary autograft)	2	3
Aortic valve repair	2	3
Valve Sparing Root Procedure	2	3
Aortic Root Replacement	2	3

SUB-AORTIC STENOSIS

OBJECTIVE

Understand morphological spectrum of Sub-Aortic Stenosis and associated conditions. Indications for intervention and the timing and application of surgical repair.

KNOWLEDGE	ST7	ST8
Morphology and classification of Sub-Aortic Stenosis	3	4
Spectrum of presentation and indication for intervention	3	4
Application of surgical techniques	3	4
Management of operative course and common complications	3	4
CLINICAL SKILLS		
Diagnose and assess patients with Sub-Aortic Stenosis	3	4
Interpret echo and angiographic findings	3	4
Application of surgical techniques	3	4
Management of operative course and common complications	3	4
TECHNICAL SKILLS		
Sub-Aortic resection	3	4
Morrow Procedure	3	4
Konno and Ross-Konno techniques	2	3

SUPRA-AORTIC STENOSIS

OBJECTIVE

Understand morphology and spectrum of Supra-Aortic stenosis. Indications and surgical techniques of repair.

KNOWLEDGE	ST7	ST8
Morphology and physiology of Supra-Aortic Stenosis	3	4
Indications for intervention and surgical techniques	3	4
Management of operative course and common complications	3	4
CLINICAL SKILLS		
Diagnose and assess patients with Supra-Aortic Stenosis	3	4
Interpret echo and angiographic findings	3	4
Application of surgical techniques	3	4
Management of operative course and common complications	3	4
TECHNICAL SKILLS		
Y-Shaped Patch Repair of Supra-Aortic Stenosis	2	3
Brom Repair (three patch technique)	2	3

CONGENITAL MITRAL VALVE DISEASE

OBJECTIVE

Diagnose and manage the complete range of congenital MV anomalies and dysplasia. Understand assessment and associated lesions. Role and indications for intervention.

KNOWLEDGE	ST7	ST8
Range of anatomical variants and associated conditions	3	4
Modes and age of presentation	3	4
Assessment and indications for intervention	3	4

Choice of valve repairs and replacements	3	4
Post-operative management and follow-up	3	4

CLINICAL SKILLS

Diagnose and assess patients with Mitral disease	3	4
Interpret echo and angiographic findings	3	4
Management of associated conditions	3	4
Application of surgical repair techniques	3	4
Management of operative course and common complications	3	4

TECHNICAL SKILLS

Mitral valvotomy	3	4
Supra-mitral membrane resection	2	3
Mitral valve repair techniques	2	3
Mitral valve replacement	3	4

TOTAL ANOMALOUS PULMONARY VENOUS DRAINAGE

OBJECTIVE

Diagnose, manage and treat all forms of TAPVD. Understand principles of assessment and preoperative stabilisation. Indications and Operative techniques of repair.

KNOWLEDGE	**ST7**	**ST8**
Morphological classification and pathophysiology	3	4
Assessment and diagnosis. Associated conditions.	3	4
Pre-operative stabilisation.	3	4
Indications and timing of surgery	3	4
Post-operative management	3	4
Follow-up and late complications	3	4

CLINICAL SKILLS

Interpretation of echo and CT/MRI findings	3	4
Pre-operative stabilisation and management	3	4
Choices and timing of surgical repair	3	4
Management of operative course and common complications	3	4

TECHNICAL SKILLS

Repair of Supra-cardiac TAPVD	2	3
Repair of Cardiac TAPVD	2	3
Repair of Infra-cardiac TAPVD	2	3
Sutureless techniques	2	3
Redo-TAPVD repair	2	3

VENTRICULAR SEPTAL DEFECTS

OBJECTIVE

To diagnose, treat and manage ventricular septal defects in children, including all aspects of operative repair

KNOWLEDGE	ST7	ST8
Anatomy of the ventricular septum	4	4
Classification of VSDs and associated lesions	4	4
Physiological implications of VSDs	4	4
Natural History and Complications	4	4
Indications for surgical and interventional repair	4	4
Current methods for repair, materials and surgical approaches, including techniques for multiple VSDs	3	4
CLINICAL SKILLS		
Diagnose and assess patients of different ages with VSD	3	4
Interpret echo and angiographic assessment	3	4
Manage postoperative course, recognise and mange common complications	3	4
TECHNICAL SKILLS		
Repair of Perimembranous VSDs	3	4
Repair of muscular VSDs	3	4
Repair of Doubly-Committed VSDs	3	4
Repair of Multiple VSDs	2	3

ATRIO-VENTRICULAR SEPTAL DEFECTS

OBJECTIVE

To diagnose, treat and manage all variants of Atrioventricular Septal defect (AVSD) including operative techniques.

KNOWLEDGE	ST7	ST8
Morphological classification and common variants	3	4
Natural history and timing of intervention	3	4
Physiology and associated conditions	3	4
Indications for surgical repair	3	4
Methods of repair, choice of technique and repair materials	3	4
Follow-up and late complications	3	4
CLINICAL SKILLS		
Diagnose and assess patients with all varieties of AVSD	3	4
Interpret echo and angiographic findings	3	4
Manage post-operative course, recognise and manage common complication	3	4
TECHNICAL SKILLS		
Repair of partial AVSD	3	4
Repair of intermediate AVSD	3	3
Repair of Complete AVSD (two-patch technique)	2	3
Repair of Complete AVSD (one-patch technique)	2	3
AV valve repair techniques	2	3

FALLOT'S TETRALOGY

OBJECTIVE

To diagnose, treat and manage all variants of Fallot's Tetralogy including operative techniques and staged approach.

KNOWLEDGE	**ST7**	**ST8**
Morphology and anatomy including common variants	4	4
Natural history and timing of intervention	3	4
Neonatal management of cyanosis	3	4
Physiology and morphological correlates	3	4
Indications for interventional and surgical treatment	3	4
Peri-operative management including restrictive physiology	3	4
Follow-up and late complications	3	4
CLINICAL SKILLS		
Diagnose and assess patients with all varieties of Fallot's tetralogy	3	4
Interpret echo and angiographic findings	3	4
Plan appropriate intervention	3	4
Manage post-operative course, recognise and manage common complications	3	4
TECHNICAL SKILLS		
Blalock-Taussig Shunt and Central shunts	3	4
Repair of Tetralogy of Fallot	2	3
Management of anomalous LAD	2	3
Creation of monocusp valve	3	3

PULMONARY ATRESIA WITH VSD

OBJECTIVE

Understand the morphology and physiology of pulmonary atresia VSD including complex variants with major aorto-pulmonary collaterals (MAPCAs). Management of all aspects of the condition including indications for surgery and operative techniques

KNOWLEDGE	**ST7**	**ST8**
Morphology and associated conditions	3	4
Physiology and pre-operative assessment	3	4
Timing of intervention and early palliation	3	4
Surgical techniques	3	4
Management of post-operative care, recognise and manage complications	3	4
Staged repair and follow-up surveillance	3	4
CLINICAL SKILLS		
Diagnose and assess patients with PA/VSD	3	4
Assess pre-operative investigations including assessment of MAPCAs	2	3
Surgical techniques and perioperative strategies	3	4
Management of post-operative care and common complications	3	4

TECHNICAL SKILLS		
Palliative shunts	3	4
Direct PA- Aortic shunts (Mee Procedure)	2	3
Surgical repair of PA/VSD	3	3
Unifocalisation of MAPCAs	2	2
Complete repair of PA/VSD/MAPCAs	2	2

PULMONARY ATRESIA WITH INTACT VENTRICULAR SEPTUM

OBJECTIVE

Understand morphology and spectrum of the condition with emphasis on the assessment for biventricular, 1
½ and Fontan-type repair. Indications and timing of intervention and the techniques of surgical repair and palliation.

KNOWLEGDE	**ST7**	**ST8**
Morphology and spectrum of the condition and the physiological correlates	3	4
Timing of intervention and management strategies	3	4
Management of the newborn and palliative strategies	3	4
Relevance of RV-dependent coronary circulation	3	4
Post-operative management and common complications	3	4

CLINICAL SKILLS		
Diagnose and assess patients with all variants of PA/IVS	3	4
Interpret echo and angiographic findings	3	4
Surgical techniques and operative strategies	3	4
Management of post-operative care and common complications	3	4

TECHNICAL SKILLS		
Shunt procedures	3	4
RV-Overhaul procedure	2	3
1 ½ -type Repair	2	3
Biventricular Repair	2	3

TRANSPOSITION OF THE GREAT ARTERIES

OBJECTIVE

Understand morphology and physiology of common (d-) transposition of the great arteries (TGA) and associated lesions. Management of all aspects of the condition including preoperative stabilisation and techniques for surgical repair.

KNOWLEDGE	**ST7**	**ST8**
Morphology and associated conditions	3	4
Physiology and pre-operative stabilisation	3	4
Timing of intervention and management of late presentation	3	4
Investigation and diagnosis	3	4
Surgical techniques	3	4
Management of post-operative course, recognise and mange	3	4

complications		
Follow-up and late complications	3	4
CLINICAL SKILLS		
Diagnose and assess patients with all variants of d-TGA	3	4
Interpret echo and angiographic findings	3	4
Surgical techniques and operative strategies	3	4
Management of post-operative care and common complications	3	4
TECHNICAL SKILLS		
Balloon atrial septostomy	2	3
Arterial switch procedure	3	3
Arterial switch and VSD closure	3	3
Arterial switch, VSD and arch repair	2	2
Management of intramural coronaries	2	2

TRANSPOSITION OF THE GREAT ARTERIES WITH VSD AND PULMONARY STENOSIS/ATRESIA

OBJECTIVE

Understand morphology and physiology of TGA/VSD/PS or PA and associated lesions. Management of all aspects of the condition including preoperative stabilisation and techniques for surgical repair.

KNOWLEDGE	**ST7**	**ST8**
Morphology and timing of intervention	3	4
Physiology and pre-operative stabilisation	3	4
Timing of intervention	3	4
Investigation and diagnosis	3	4
Surgical techniques for repair	3	4
Management of post-operative course, recognise and manage complications	3	4
CLINICAL SKILLS		
Diagnose and assess patients with TGA/VSD/PS or PA	3	4
Interpret echo, angiographic and CT/MRI investigations	3	4
Plan operative strategies	3	4
Applications of Surgical techniques	3	4
Manage post-operative course and common complications	3	4
TECHNICAL SKILLS		
Arterial shunts and RV-PA conduits	3	4
Rastelli procedure	2	3
REV procedure	2	3
Nikaidoh Procedure	2	2
Reoperations for conduit replacement	2	3

DOUBLE-OUTLET RIGHT VENTRICLE (DORV)

OBJECTIVE

Understand morphology and physiology of DORV and associated conditions including relationship with spectrum of Fallot's tetralogy. Interpret intra-cardiac anatomy and strategies of surgical repair.

KNOWLEGE	**ST7**	**ST8**
Morphology and spectrum of anatomical sub-types	3	4
Physiology and indication for repair/palliation	3	4
Recognition of morphology inappropriate for biventricular repair	3	4
Timing of intervention	3	4
Surgical techniques for repair	3	4
Management of post-operative course, recognise and manage complications	3	4
CLINICAL SKILLS		
Diagnose and assess patients with DORV	3	4
Interpret echo, angiographic and CT/MRI investigations	3	4
Applications of Surgical techniques	3	4
Manage post-operative course and common complications	3	4
TECHNICAL SKILLS		
Repair of DORV and DORV/Fallot spectrum	3	3
Trans-ventricular repair with or without conduit	3	3
Kawashima repair	2	3
REV repair	2	3

VASCULAR RINGS

OBJECTIVE

To diagnose, treat and manage all types of vascular ring and recognise associated oesophageal and airway problems.

KNOWLEDGE	**ST7**	**ST8**
Anatomy of vascular rings	4	4
Classification and associated lesions	4	4
Modes of presentation & diagnosis	3	4
Indications & methods for surgical repair	3	4
Management of associated airway problems	3	4
CLINICAL SKILLS		
Diagnosis and assessment	3	4
Interpretation of CT/MRI, Ba swallow, bronchoscopy and angiography	3	4
Manage postoperative course, recognise and manage complications	3	4
TECHNICAL SKILLS		
Division of Double Aortic Arch	3	4

Correction of Pulmonary artery sling	3	3
Aortopexy and tracheopexy procedures	3	4

ARTERIAL SHUNTS

OBJECTIVE
Understand indications and management of all types of systemic-pulmonary artery shunts, including surgical approaches and techniques.

KNOWLEDGE	**ST7**	**ST8**
Types of shunt and surgical approaches	3	4
Choice of size, position and open vs closed	3	4
Understand alternative strategies and the staged nature of managing the underlying condition	3	4
Management of post-operative physiology	3	4
CLINICAL SKILLS		
Indications and decision making	3	4
Interpretation of echo and angiographic findings	3	4
Management of post-operative physiology	3	4
TECHNICAL SKILLS		
Modified Blalock-Taussig Shunt via sternotomy	3	4
Modified Blalock-Taussig Shunt via thoracotomy	3	4
Central shunt	3	4
Taking down shunts at reoperation	3	4

CAVO-PULMONARY SHUNT

OBJECTIVE
Understand indications and management of cavo-pulmonary (Glenn) shunts including surgical approaches and techniques.

KNOWLEDGE	**ST7**	**ST8**
Physiology of the cavo-pulmonary circulation	4	4
Indications and morphological correlates	3	4
Different techniques and surgical strategies	3	4
Management of post-operative physiology	3	4
CLINICAL SKILLS		
Indications and decision making	3	4
Interpretation of echo and angiographic data	3	4
Management of post-operative physiology	3	4
TECHNICAL SKILLS		
Bidirectional Glenn (cavo-pulmonary shunt)	2	3
Bilateral shunts	2	3
Hemi-Fontan	2	3

FONTAN CIRCULATION

OBJECTIVE

Understand physiology of the Fontan circulation, anatomical and haemodynamic indications. Familiarity with surgical variants, bypass techniques, post-operative management and late problems of the Fontan physiology.

KNOWLEDGE	**ST7**	**ST8**
Physiology of the Fontan circulation	4	4
Indications and morphological correlates	3	4
Different techniques and surgical strategies	3	4
Pre-operative assessment	3	4
Post-operative management and common complications	3	4
Physiology of the Fontan state and natural history	3	4
CLINICAL SKILLS		
Indications and decision making	3	4
Interpretation of echo and angiographic data	3	4
Management of post-operative physiology	3	4
Management of early and late complications	3	4
TECHNICAL SKILLS		
Bypass strategies and cannulation	3	4
Extracardiac Total Cavo-Pulmonary Connection (TCPC)	2	3
Lateral tunnel TCPC	2	3
Conversion Fontan-TCPC	2	2

HYPOPLASTIC LEFT HEART SYNDROME

OBJECTIVE

Diagnose, treat and manage HLHS and its anatomical variants. Understand stabilisation, pre- and post- operative management of the Norwood procedure. Surgical techniques and options.

KNOWLEDGE	**ST7**	**ST8**
Anatomy of HLHS and anatomical variants including borderline left ventricle	3	4
Physiology of post-natal stabilisation	3	4
Pre-operative management	3	4
Role and indications for hybrid procedures	3	4
Post-operative management of the Norwood physiology	3	4
Timing and plan of staged repair and inter-stage monitoring	3	4
CLINICAL SKILLS		
Assessment of the newborn with HLHS	3	4
Echo interpretation and assessment of borderline LV	3	4
Pre-operative intervention and stabilisation	3	4
Post-operative management, manipulation of the Norwood circulation on PICU and management of common complications	3	4

TECHNICAL SKILLS		
Atrial septectomy	3	4
Classical Norwood Procedure	2	2
Norwood procedure with RV-PA conduit	2	2
Hybrid Norwood Procedure	2	2
Comprehensive stage II Hybrid procedure	2	2

AORTO-PULMONARY WINDOW

OBJECTIVE

Understand morphological classification and underlying physiology. Recognise associated lesions. Clinical management including pre-operative stabilisation and operative techniques of repair.

KNOWLEDGE	**ST7**	**ST8**
Morphological classification and associated conditions	3	4
Physiology and indications for intervention	3	4
Stabilisation of the neonate	3	4
Operative strategy and repair technique	3	4
Management of operative course and common complications	3	4

CLINICAL SKILLS		
Indications and decision making	3	4
Interpretation of echo and angiographic data	3	4
Management of post-operative physiology	3	4
Management of operative course and common complications	3	4

TECHNICAL SKILLS		
Repair of Aorto-Pulmonary Window	2	3
Management of Associated Lesions	2	3

TRUNCUS ARTERIOSUS

OBJECTIVE

To diagnose, treat and manage the condition, recognise the common morphological variants and associated lesions. Understand concepts and techniques of surgical repair.

KNOWLEDGE	**ST7**	**ST8**
Anatomy of the lesion, Van Praagh and Collis/Edwards classifications	3	4
Pathophysiology and preoperative stabilisation	3	4
Strategies and techniques of surgical repair including choice or use of conduit	3	4
Management of post-operative physiology	3	4
Late management of conduit replacement and the truncal valve.	3	4

CLINICAL SKILLS		
Interpret echo findings	3	4

Preoperative assessment and stabilisation	3	4
Operative techniques and bypass strategies	3	4

TECHNICAL SKILLS		
Bypass Strategy	3	4
Repair of Truncus Arteriosus	2	3
Repair of Truncus/Interruption	2	2
Repair of Truncus/Non-confluent PAs	2	2
Repair of Truncal Valve	2	3

ANOMALOUS LEFT CORONARY ARTERY FROM PULMONARY ARTERY (ALCAPA)

OBJECTIVE

To diagnose, treat and manage the condition. Understand physiology and age at presentation. Techniques and timing of surgical repair.

KNOWLEDGE	**ST7**	**ST8**
Anatomy and common variants	3	4
Physiology and influence on age and mode of presentation	3	4
Pathophysiology and preoperative stabilisation	3	4
Management of post-operative course and common complications	3	4
Late management and follow-up	3	4

CLINICAL SKILLS		
Interpret echo findings and conformation of diagnosis	3	4
Preoperative assessment and stabilisation	3	4
Use and indications of ECLS	3	4
Application of Operative techniques and cardioplegia strategy	3	4

TECHNICAL SKILLS		
Myocardial protection	3	4
ALCAPA repair by coronary transfer	3	3
Tacheuchi procedure	2	3
Coronary grafting in children	2	3

EXTRA CORPOREAL MEMBRANE OXYGENATION (ECMO) / EXTRA CORPOREAL LIFE SUPPORT (ECLS)

OBJECTIVE

Understand principles of ECMO, indications and management in neonates and children

KNOWLEDGE	**ST7**	**ST8**
Indications and physiology	3	4
Alternatives to ECMO and conventional PICU management	3	4
Principles of ECMO circuit, components and design	3	4
Options and choice of cannulation	3	4
Differences and Indications of VA and VV ECMO	3	4
Management of the circuit and trouble-shooting	3	4
Management of complications	3	4

Indications and management of weaning	3	4
CLINICAL SKILLS		
Clinical assessment and decision making for VV and VA ECMO	3	4
Choice of cannulation and circuit design	3	4
Management of the neonate and child on ECMO	3	4
Circuit trouble-shooting and daily management	3	4
Indications and Supervision of weaning	3	4
Transport on ECMO	2	3
TECHNICAL SKILLS		
Cannulation for VV and VA in neonate and child	3	4
Conversion of VV to VA and vice versa	3	4
Open chest cannulation	3	4
Change of Oxygenator	3	4
Decannulation	3	4

MECHANICAL CIRCULATORY ASSIST (LVAD/RVAD/BIVAD)

OBJECTIVE

Understand indications for mechanical circulatory assist as a salvage procedure, pre-operative stabilisation and as a bridge to transplantation. Understand principles of commonly used devices and indications for each. Routine management of patients supported by these devices and common complications.

KNOWLEDGE	**ST7**	**ST8**
Basic and applied physiology of ventricular assist	3	4
Varieties and options available for LVAD or BiVAD	3	4
Indications for use of VAD	3	4
Management of patient on VAD and common complications	3	4
Role of bridge to transplant and recovery	3	4
Awareness of new devices and devices under trial	3	3
CLINICAL SKILLS		
Application of criteria and indications for VAD	3	4
Choice of device and circuit design	3	4
Management of the patient on VAD	3	4
Conversion of LVAD to BiVAD or ECLS	3	4
Device trouble-shooting and management of complications	3	4
Bridging to transplantation and recovery	3	4
TECHNICAL SKILLS		
Implantation of VAD	2	2
Implantation of BiVAD	2	2
Explanation of VAD	2	2

TRANSPLANTATION - Optional Module

By the end of sub-specialty training the trainee will be able to:

- *Apply the principles of heart and lung transplantation in children including indications, assessment, operative procedures and post-operative management including immunosuppression*
- *Describe the specific issues of transplantation in Adults with Congenital Heart Disease (ACHD)*

KNOWLEDGE

	ST7	ST8
Describe		
Indications for heart, lung and heart-lung transplantation	3	4
Assess		
Retrieval and donor assessment	3	4
Manage		
Management and stabilisation of severe heart failure in children	3	4
Selection and listing for transplantation. Pre transplant work-up.	3	4
Operative planning and procedures	3	4
Post-operative management and immunosuppression	3	4
Late complications, chronic rejection and re-transplantation	3	4
Psychological issues in children and adolescents	3	4
Mechanical circulatory assist (LVAD/RVAD/BIVAD)		
Role of bridge to transplant and recovery	3	4

Learning opportunities

- Postgraduate teaching and discussion sessions
- Multi-disciplinary meetings
- External conferences and seminars

Sources of evidence

CBD
PBA
Audit / Research / Project

CLINICAL SKILLS

	ST7	ST8
Manage:		
Management and stabilisation of acute and chronic heart failure	3	4
Assessment for listing	3	4
Application of bridging devices	3	4
Immunosuppression protocols and regimens	3	4
Coordination of retrieval and list management	3	4
Post-operative management and common complications	3	4
Mechanical circulatory assist (LVAD/RVAD/BIVAD)		

Bridging to transplantation and recovery	3	4

Learning opportunities

- Supervised clinical practice, primarily in a hospital, wards, clinics or theatre.
- Management of specific clinical cases
- Assessment of new patients and review/follow up existing patients

Sources of evidence

PBA
MSF

TECHNICAL SKILLS	**ST7**	**ST8**
Assess		
Retrieval and donor organ assessment	3	4
Manage		
Orthotopic heart transplantation	3	3
Single lung and double-lung transplantation	2	3
Heart-lung transplantation	2	3

Learning opportunities

- Supervised theatre training lists on selected patients covering consent, pre-operative planning and preparation, operative sills and post operative management, adhering to protocols and patient-safety.
- Intensive Care

Sources of evidence

PBA
MSF

* Transplantation is covered in the general syllabus and examination and trainees should already have a strong basic level of knowledge. Further experience in such a super-specialised area is optional rather than mandatory.

TRACHEAL SURGERY

OBJECTIVE

Understand the spectrum of congenital tracheal anomalies and associated conditions. Diagnose and manage each condition. Indications and techniques of repair.

KNOWLEDGE	**ST7**	**ST8**
Morphological classification and associated conditions	3	4
Diagnosis and investigation	3	4
Indications for intervention and surgery	3	4
Pre-operative stabilisation	3	4
Role of bronchoscopy and bronchography	3	4
Choice of operative techniques	3	4
Role of stem-cell technology	3	3
CLINICAL SKILLS		
Interpretation of investigations	3	4

Indication and planning of interventions	3	4
Role of functional assessment and stenting	3	4
Repair of associated lesions	3	4
Post-operative management and common complications	3	4
Long-term follow-up and assessment	3	4
TECHNICAL SKILLS		
Local Resection and anastomosis	2	3
Slide Tracheal Repair	2	2
Patch Repair Techniques and tracheoplasty	2	2
Bronchoplasty	2	2
Reoperations	2	2

PRINCIPLES OF ADULT CONGENITAL HEART DISEASE

OBJECTIVE

Understand the spectrum of conditions in Adult Congenital Heart Disease Surgery and the physiological implications of the residua and sequelae of previous surgery. Understand the issues of multiple redo surgery, implications of surgery in young adults and natural history of underlying conditions.

KNOWLEDGE	**ST7**	**ST8**
Physiology of Congenital Heart Disease presenting in adulthood	3	4
Residua and Sequelae of surgery in childhood	3	4
Investigation of adults with congenital heart disease	3	4
Choice of procedures and conduits/prostheses in young adults	3	4
Role of interventional cardiology	3	4
Indications for surgery	3	4
CLINICAL SKILLS		
Assessment of the young adult	3	4
Interpretation of echo, CT and MRI in congenital heart disease	3	4
Post-operative management in adult intensive care	3	4

PULMONARY VALVE REPLACEMENT

OBJECTIVE

Understand the aetiology of pulmonary regurgitation in adult congenital heart disease. Assessment of the right ventricle, indications for surgery and the timing and choice of valve replacement.

KNOWLEDGE	**ST7**	**ST8**
Physiology of pulmonary regurgitation and sequelae of Fallot repair and pulmonary valvotomy in childhood	3	4
Assessment of the right ventricle and indications for intervention	3	4
Role and indications of percutaneous valve replacement	3	4
Timing of valve replacement and choice of prosthesis	3	4
Management of associated lesions including arrhythmias	3	4
CLINICAL SKILLS		

Assessment of pulmonary regurgitation	3	4
Interpretation of echo and MRI findings	3	4
Use and Interpretation of exercise testing	3	4
Management of post-operative course and common complications	3	4

TECHNICAL SKILLS

Redo sternotomy with a dilated Right Ventricle	3	4
Pulmonary Valve Replacement	3	4
RVOT patching and placation of the dilated RVOT	2	3
Concomitant Tricuspid Valve Repair	2	3

RIGHT VENTRICLE-PULMONARY ARTERY CONDUIT REPLACEMENT IN THE ADULT

OBJECTIVE

Understand the underlying morphology and indications for original conduit. Assessment of conduit degeneration and indications for replacement. Techniques for replacement and choice of conduit.

KNOWLEDGE	**ST7**	**ST8**
Underlying morphology and conduit type used in childhood	3	4
Assessment of conduit deterioration	3	4
Indications for re-intervention and surgery	3	4
Choice of conduit and procedure	3	4
Management of associated lesions	3	4
Post-operative management and common complications	3	4

CLINICAL SKILLS

Interpretation of echo, angio and MRI/CT	3	4
Apply indications for surgery and role of catheter intervention	3	4
Assessment of associated conditions	3	4
Choice of conduit	3	4
Management of post-operative course and common complications	3	4

TECHNICAL SKILLLS

Redo sternotomy and femoral cannulation	3	4
Conduit replacement	2	3
Repair of associated conditions (branch pulmonary artery stenosis)	2	3

ASD CLOSURE IN THE ADULT

OBJECTIVE

Understand assessment of the adult with atrial septal defect, morphological subtypes and indications for surgical and interventional closure. Focus on concomitant arrhythmia management and assessment of the right ventricle and tricuspid valve.

KNOWLEDGE	**ST7**	**ST8**
Morphological classification	3	4
Clinical and physiological assessment	3	4

Indications for surgical and interventional closure	3	4
Associated right heart failure, tricuspid regurgitation and arrhythmias	3	4
Post-operative management and common complications	3	4

CLINICAL SKILLS

Interpretation of echo, angio and MRI	3	4
Pre-operative assessment	3	4
Operative techniques and choice of patch material	3	4
Management of post-operative course and common complications	3	4

TECHNICAL SKILLS

Repair of secundum ASD in the adult	4	4
Repair of Sinus Venosus ASD	3	3
Management of Partial Anomalous Pulmonary Venous Drainage	3	4
Repair of Coronary Sinus ASD +/- Unroofed Coronary Sinus	3	3
Repair of Partial AVSD	3	4

FONTAN CONVERSION SURGERY

OBJECTIVE

Understand the history of the Fontan procedure and the late complications of the atrio-pulmonary connection. Patient assessment and indications for conversion to TCPC. Operative technique and importance of arrhythmia management.

KNOWLEDGE	**ST7**	**ST8**
Iterations of the Fontan circulation	4	4
Complications of the APC and indications for conversion	3	4
Operative techniques and arrhythmia management	3	4
Post-operative course and common complications	3	4

CLINICAL SKILLS

Interpretation of echo, angio and MRI	3	4
Planning operative strategy	3	4
Management of post-operative course	3	4

TECHNICAL SKILLS

Redo Sternotomy in the Fontan	2	3
Fontan Conversion	2	3
Maze technique and epicardial pacing	2	3

TRANSPLANTATION IN ADULTS WITH CONGENITAL HEART DISEASE

OPTIONAL MODULE

OBJECTIVE

Understand specific issues of transplantation in ACHD.

KNOWLEDGE	**ST7**	**ST8**

Underlying conditions and physiologies associated with heart failure in ACHD	3	4
Issues of reoperation and antigen load	3	4
Outcomes compared to non-ACHD	3	4
Management of pulmonary hypertension pre and post-transplant	3	4
Anatomical considerations in complex conditions	3	4
Psychological issues in transplant in young adults	3	4
CLINICAL SKILLS		
Assessment of heart failure	3	4
Criteria and indication for listing	3	4
Pre-operative planning	3	4
Management of immunosuppression and pulmonary hypertension	3	4
Post-operative management and common complications	3	4
TECHNICAL SKILLS		
Donor management and retrieval	3	4
Orthotopic Heart transplantation	2	3
Anatomical techniques for abnormal venous anatomy	2	3

Appendix 3: Roles and responsibilities for supervision

The role of the Training Programme Director (TPD)

TPDs are responsible for managing the specialty training programmes, ensuring they deliver the specialty curriculum.

TPDs are responsible for:

- Organising, managing and directing the training programmes, ensuring that the programmes meet curriculum requirements
- Identifying, appointing and supporting local faculty i.e. Assigned Educational Supervisors (AESs) and Clinical Supervisors (CSs), providing training as necessary, including training in equality and diversity and providing feedback to AESs and CSs on the quality of their performance
- Ensuring a policy for career management and advice covering the needs of trainees in their placements and programmes
- Overseeing progress of individual trainees through the levels of the curriculum, ensuring learning objectives are set, appropriate assessments are being undertaken and that appropriate levels of supervision and support are in place
- Helping the Postgraduate Dean and AES manage trainees who are running into difficulties by identifying remedial placements and resources where required
- Working with delegated Specialty Advisory Committee (SAC) representatives (SAC Liaison Members) and College representatives (e.g. college tutors) to ensure that programmes deliver the specialty curriculum
- Ensuring that Deanery administrative support are knowledgeable about curriculum delivery and are able to work with NHS and Irish healthcare system employers, SACs, trainees and trainers
- Providing induction for trainees entering specialty programmes
- Administering and chairing the Annual Review of Competence Progression (ARCP) meetings
- Monitoring the quality of the training programme and producing quality reports (including the quality of trainer assessments and feedback) for the Postgraduate Dean
- Ensuring access to trainee data is kept confidential.

The role of the Assigned Educational Supervisor (AES)

AESs are consultant surgeons responsible for the management and educational progress of one or more specified trainee(s) in a training placement or series of placements. AESs must be appropriately trained for the role, familiar with the curriculum and have demonstrated an interest and ability in teaching, training, assessing and appraising. They should have gained skills equivalent to courses such as Training the Trainer offered by an appropriate educational institution and must keep up-to-date with developments in training. They must have appropriate access to teaching resources and time for training allocated to their job plan (approx. 0.25 PA per trainee). They must have access to the support and advice of their senior colleagues regarding any issues related to teaching and training and to keep up-to-date with their own professional development.

AESs are responsible for:

- Providing induction to the unit (where appropriate)
- Ensuring that trainees are familiar with the curriculum and assessment system relevant to the level/phase of training and undertake it according to requirements
- Ensuring that trainees have appropriate day-to-day supervision appropriate to their phase of training

- Helping trainees with both professional and personal development
- Completing a learning agreement with trainees and undertaking appraisal meetings (typically one at the beginning, middle and end of a placement)
- Ensuring the MCR is completed by CSs, ensuring all the CiPs are addressed, any differences in supervision level are explained and final sign off of the MCR
- Ensuring a record is kept in the portfolio of any serious incidents or concerns and how they have been resolved
- Regularly inspecting trainee learning portfolios and ensuring trainees are making the necessary clinical and educational progress
- Informing trainees of their progress and encouraging trainees to discuss any deficiencies in the training programme, ensuring that records of such discussions are kept
- Ensuring access to trainee data is kept confidential
- Ensuring patient safety in relation to trainee performance by the early recognition and management of those doctors in distress or difficulty
- Keeping the TPD informed of any significant problems that may affect training
- Discussing trainees' progress with each trainer with whom trainees spend a period of training and involving them in the formal reporting process
- Providing an end of placement AES report for the ARCP.

The role of the Clinical Supervisor (CS)

CSs are consultant surgeons responsible for delivering teaching and training under the delegated authority of the AES. The training of CSs should be similar to that of the AES.

CSs are responsible for:

- Ensuring patient safety in relation to trainee performance
- Carrying out WBAs on trainees and providing verbal and written feedback
- Liaising closely with other colleagues, with whom the trainee is working, regarding the progress and performance of trainees
- Keeping the AES informed of any significant problems that may affect training
- Ensuring access to trainee data is kept confidential
- Contributing to the MCR as part of the faculty of CSs and providing constructive feedback to the trainee.

The roles of AES and CS come under the umbrella of the Professionalised Trainer outlined in section 3.2.2. The JSCT is supportive of the GMC's moves towards greater recognition and accreditation for clinicians undertaking the roles of AES and CS, and other responsibilities supporting education and training.

The role of the Assessor

Assessors carry out a range of WBAs and provide verbal and written feedback trainees. Assessments during training are usually be carried out by CSs, who will be responsible for the MCR, recommending the supervision level and providing detailed formative feedback to trainees with reference to the CiPs. Other members of the surgical team including senior trainees, senior nurses and doctors from other medical disciplines may assess trainees in areas where they have particular expertise (e.g. with the use of the DOPS). Those who are not medically qualified may also act as assessors for the trainee's Multi-source Feedback (MSF). Assessors must be appropriately qualified in the relevant professional discipline and trained in the methodology of WBA. This does not apply to MSF raters.

Assessors are responsible for:

- Carrying out WBAs, including the MCR, according to their area of expertise and training
- Providing constructive verbal feedback to trainees, including an action plan, immediately after the event
- Ensuring access to trainee data is kept confidential
- Providing written feedback and/or validating WBAs in a timely manner.

The role of the Trainee

Trainees are the learners who have been selected into a specialty training programme. Other surgeons who have registered to use the curriculum and learning portfolio as learners have the same responsibilities. All trainees/learners have a responsibility to recognise and work within the limits of their professional competence and to consult with colleagues as appropriate. Throughout the curriculum, great emphasis is laid on the development of good judgement and this includes the ability to judge when to seek assistance and advice. Trainees/learners must place the well-being and safety of patients above all other considerations. They are required to take responsibility for their own learning and to be proactive in initiating appointments to plan, undertake and receive feedback on learning opportunities.

Trainees/learners are responsible for:

- Engaging with opportunities for learning
- Creating a learning agreement and initiating meetings with the AES
- Raising concerns with the AES and/or TPD about any problems that might affect training
- Initiating regular WBAs with assessors in advance of observations
- Undertaking self and peer assessment
- Undertaking regular reflective practice
- Maintaining an up to date learning portfolio
- Working as part of the surgical and wider multi-professional team.

Appendix 4: Quality Management of the Curriculum

The Joint Committee on Surgical Training (JCST) works as an advisory body to the four surgical Royal Colleges of the UK and Ireland for all matters related to surgical training. It is the parent body of the Specialty Advisory Committees (SACs) and the Training Interface Groups (TIGs) and works closely with the Surgical Specialty Associations in Great Britain and Ireland. The JCST sets out a curriculum quality framework directed at evaluating and monitoring curriculum delivery against curriculum standards whereby a range of qualitative and quantitative measures inform continuous improvement. The JCST is also the umbrella organisation for the Intercollegiate Surgical Curriculum Programme (ISCP), the curriculum training management system. Through the variety of mechanisms outlined below, the JCST complies, and ensures compliance, with the requirements of equality and diversity legislation set out in the Equality Act 2010.

The quality system includes the following components:

- Quality assurance (QA): the development and maintenance of the curriculum links with the GMC's role in providing standards for training and for curricula.
- Quality management (QM): the implementation of training and curriculum standards by Deaneries through training programmes and post locations approved by the GMC. The system includes processes for recruitment and selection and mechanisms to address concerns. SAC Liaison Members provide externality and support for local quality management.
- Quality control (QC): the implementation of training standards by local education providers (LEPs). The local delivery of curriculum is through the trainers recognised by the GMC.

Internal Quality Review

The following mechanisms provide sources of information that, together, provide complementary information which informs quality management and quality improvement.

Specialty Advisory Committees (SACs)

There is one SAC for each GMC recognised surgical specialty and a Core Surgical Training Advisory Committee (CSTAC) which oversees core surgical training. Each SAC will comprise appointed Liaison Members to cover all training regions in the UK and Republic of Ireland, the Lead Dean for the specialty, a trainee representative, the Chair of the Intercollegiate Specialty Board (ex officio), the President of the Specialty Association or deputy, a representative of Royal College of Surgeons in Ireland and additional members may be co-opted for a time-limited period to provide specific expertise as necessary. The skill set and experience of SAC members will reflect the breadth of the specialty. The Liaison Members act on behalf of the SAC by overseeing training in a particular region(s) other than their own. Duties include contributing to the local quality management systems, the ARCP and to the regular reporting through first-hand independent knowledge of training programmes.

Curriculum development

The SACs, working with their Specialty Associations, are responsible for curriculum development and maintenance. They monitor innovations in clinical practice and, when these become established components of service delivery, they can be incorporated into an approximately three yearly review of the specialty curriculum. Similarly, the JCST, ISCP Management Committee, JCST Quality Assurance Group and the SACs monitor developments in training delivery and incorporate these into formal curriculum reviews. Curriculum updates are made in consultation with all stakeholders, including trainees, trainers, speciality organisations, deans, employers, patient and lay representatives and the GMC including specific trials and pilots when required.

Equality and diversity implications are considered throughout the development of curricula in association with trainees and trainers through specific development events, which feed into impact assessments, noting any potential adverse effects on learners with protected characteristics as defined by the Equality Act 2010. Curricula are also developed through regular meetings with the GMC, helping to refine the curriculum approach and ensuring that the standards for curricula are met and identify future developments.

GMC Survey

The GMC undertakes a national training survey of trainee views on their training. The findings of the survey are available by country, postgraduate body, LEP, training level and graduating medical school. The GMC also conducts a survey of educational and clinical supervisors in the UK, which aims to collect evidence on whether trainers are able to undertake their duties as trainers effectively; have support for training including trainer development and the formal recognition of their duties in job plans; are implementing curricula and assessments appropriately.

The JCST analyses the GMC's published reports on these surveys, drawing out the key messages for surgery to feed into each SAC and QA Group meeting. SAC Liaison Members are responsible for consulting on the outcomes of these discussions with those responsible for curriculum delivery in their regions including TPDs and Specialty Training Committees (STCs). They also report key learning points through their Liaison Member Reports. The JCST uses the initial analysis and feedback from these processes to help address *ad hoc* queries and inform projects, pilots, monitoring and evaluation work. The outcomes of these processes are to report the specialty and national view of postgraduate surgical training through a continuous model of reporting to the GMC at regional and national level.

The GMC also provides a progression data portal, which colleges and faculties can use to consider data on the progression of trainees by specialties and regions. The JCST uses these data to help identify system or policy changes that might need review in order to ensure equality, diversity and fairness. See also below – External Quality Review (the GMC and postgraduate bodies use the GMC survey findings in external quality review).

Quality Indicators

The JCST Quality Indicators are the JCST and SACs' guidance on the attributes of good quality training posts. They are not an assessment for measuring the achievements of individual trainee. They are a tool to monitor the quality of training posts and drive quality improvement.

JCST Survey

The JCST trainee survey measures training post compliance with the JCST Quality Indicators across all UK training programmes. The anonymised survey responses are pivotal to the JCST's quality processes. Trainees complete one survey for each training placement prior to their ARCP. As part of its five-year strategy, the JCST shares this information in the form of annual reports. The JCST also conducts a biennial survey of surgical Assigned Educational Supervisors to gather information on issues particularly relevant to surgical trainers, such as use of the web-based ISCP, time and support available to undertake training and other related activities. Analysis of the findings from these surveys are key to the work of the SACs and QA Group. This informs their meetings and the consultations SAC Liaison Members have with those responsible for curriculum delivery within their regions including TPDs and STCs. The learning points drawn from the analysis and feedback inform all JCST work including projects, pilots and evaluation and help report the specialty and national view of postgraduate surgical training.

JCST and ISCP data

Training data collected through the JCST and ISCP are used to review quality. These include curriculum delivery, adherence to quality indicators and equality and diversity issues. The ISCP is used to monitor curriculum delivery, trainee progression and WBA performance. The ISCP Management Committee undertakes and supports qualitative and quantitative research and recruits external Research Fellows to conduct specific studies to support curriculum and assessment change.

Trainee views

Representatives of trainee associations are members of the JCST committees and have specific sections of meetings to report on training issues and raise concerns. Trainee representatives are involved in working groups, curriculum review and the development of the ISCP training management system, including, where necessary, cascading training, testing and piloting.

External Quality Review

Postgraduate Deans

The responsibility for the quality management of specialty training programmes rests with the Deans. They ensure posts and programmes are approved by the GMC, oversee the appointment of trainees and of TPDs. They ensure that training in the regions is implemented in accordance with GMC-approved curricula. Deans work through STCs and Boards, seeking advice from the JCST, the surgical Royal Colleges and SACs on curriculum delivery, the local content of programmes, assessment of trainees, remedial training and the recognition and training of trainers. The Deans contract LEPs through Service Level Agreements to deliver training to agreed standards. Working alongside Postgraduate Deans, education providers must take responsibility for ensuring that clinical governance and health and safety standards are met. This includes the provision of a system of training including in equality and diversity, a process of revalidation and annual appraisals of trainers by employers set against the professional standards for Good Medical Practice.

Schools of Surgery

The co-ordination of surgical training is through Schools and their devolved nation equivalents, which are accountable to the Deaneries. They bring together networks of lead providers of postgraduate medical education in a particular specialty or group of specialties to decide how educational initiatives are best delivered and ensure consistency of approach. Each School is led by the Head of School who acts as a workforce adviser to the education commissioners, leads on quality management of surgery, supports and develops lead providers, provides regional representation in national fora and an interface with other disciplines. The Head of School or their devolved nation equivalent also oversees the quality of training posts provided locally. The national Heads of School and their devolved nation equivalents meet through their Confederation of Postgraduate Schools of Surgery (CoPSS), which is also attended by the Chair of the JCST and ISCP Surgical Director.

Training Programme Directors

Training programmes are led by TPDs or their designated equivalent. TPDs have responsibility for managing individual specialty training programmes. Their responsibilities include allocating trainees to training placements and rotations, providing systems for career management, flexible training, academic training and remedial training as well as organising the recognition and training of trainers and co-ordinating the ARCP. TPDs, working alongside Heads of School, are also

introducing a standardised form for the evaluation of AES reports in order to offer feedback to AESs about the quality of their feedback to trainees, along with mechanisms for development.

Statutory Education Bodies

Co-ordination and alignment of policy on medical education is devolved from health ministers to bodies governing the health services in the four nations of the UK (NHS England, NHS Education for Scotland (NES), the Northern Ireland Medical and Dental Training Agency (NIMDTA) and Health Education and Improvement Wales (HEIW)) and Ireland (the Health Service Executive (HSE)). These organisations are responsible for healthcare, education, training and workforce development. They take advice from the JCST and the surgical Royal Colleges in order to ensure consistent regional delivery. These organisations can undertake visits to LEPs and visits can be triggered by specific concerns. They highlight any areas for improvement, agree the timetable for any appropriate action and identify areas of notable practice. SAC Liaison Members may be involved in the visits to provide both specialty-specific input and externality.

UK Medical Education Reference Group (UKMERG)

The UKMERG is a forum for discussion, co-ordination and alignment of matters relating to medical education across the UK. It includes representation from the four UK health departments and the four statutory postgraduate medical education bodies.

General Medical Council

The GMC is responsible for setting the standards for curricula and approving curricula as well as approval of training programmes and training post locations. The Deanery submits an application for programme and post location approval. Support for an application is available from the relevant surgical SAC. There is regular reporting to the GMC as part of their quality framework. The GMC activities may include document requests, meetings, shadowing, observations, visits and document reviews. The GMC uses the GMC survey results in quality assurance by monitoring that training meets the required standards. It will escalate issues through other QA activity such as an enhanced monitoring process. Triggered visits investigate possible serious educational failures or risks to patient safety as part of the GMC's enhanced monitoring process. The GMC’s QA process includes the ability to impose a sanction in response to a failure to meet its standards including imposing conditions which limit the time or scope of approval, refusing approval, and withdrawing recognition for training.

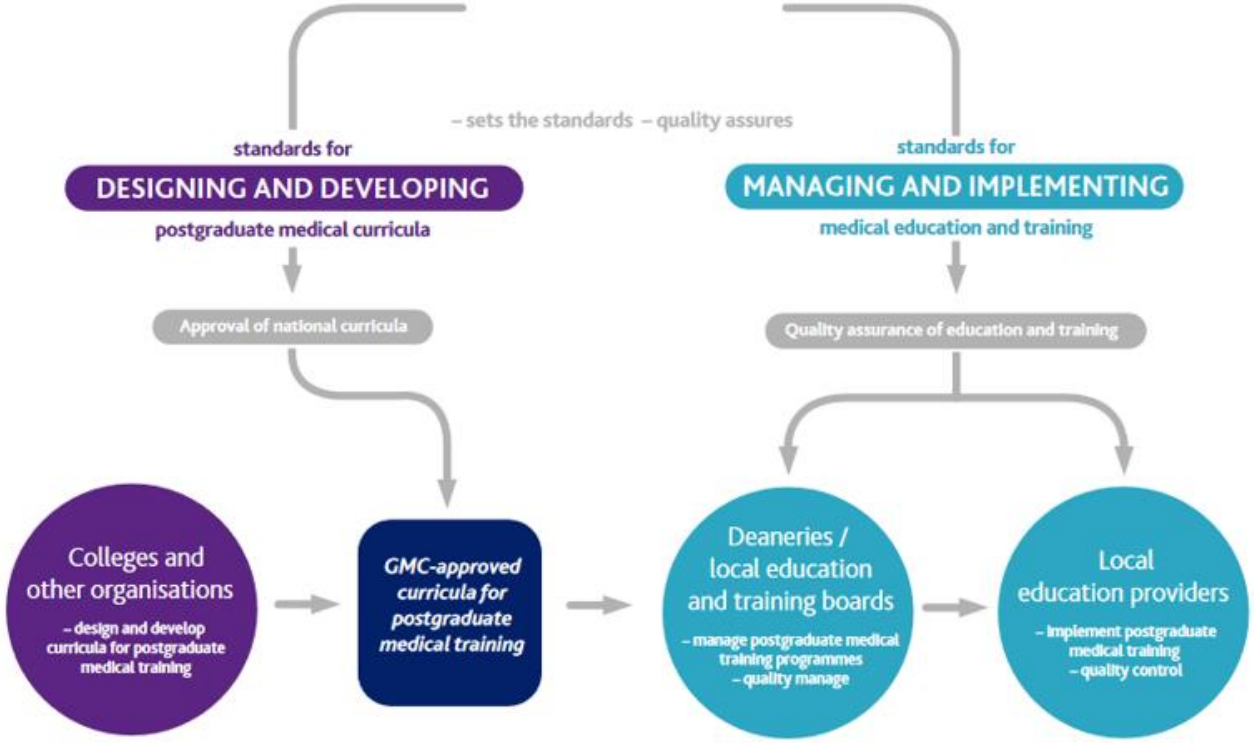

Figure 8: The QA structure of the curriculum (adapted from Excellence by Design, GMC, 2017)

Appendix 5: Glossary

Term	Definition
AES Report	An end of placement report by the trainee's Assigned Educational Supervisor, providing key evidence for the trainee's ARCP.
ARCP / ARCP 6	The Annual Review of Competence Progression (ARCP) panel will recommend one of 8 outcomes to trainees. Outcome 6 sets out that a trainee has gained all required competencies and will be recommended as having completed the training programme. (For further information, please see the Gold Guide).
Capability	The ability to be able to perform an activity in a competent way.
Capabilities in Practice (CiP)	The high-level learning outcomes of the curriculum. Learning outcomes operationalise groups of competencies by describing them in terms of holistic professional activities. In surgery they are aligned to what a day-one consultant will need to be able to know and do. Rather than learning 'inputs' ('what is learned', they set out what the learner must be able to do as a result of the learning at the end of the training programme – a practical skill) and clarify the extent to which trainees should successfully perform to reach certification.
Critical Condition	Any condition where a misdiagnosis can be associated with devastating consequences for life or limb.
Critical Progression Points	Key points during the curriculum where trainees will transition to a higher level of responsibility or enter a new area of practice. These points are frequently associated with increased risk, and so robust assessment is required. These points are at the end of phase 2 (transition to phase 3), and the end of phase 3 to achieve certification.
Generic	Applicable to *all* trainees regardless of specialty, discipline and level of training, e.g. Generic Professional Capabilities.
Generic Professional Capabilities (GPCs)	A framework of educational outcomes that underpin medical professional practice for all doctors in the United Kingdom.
Good Medical Practice (GMP)	The core ethical guidance that the General Medical Council (GMC) provides for doctors.
High-Level Outcome	See Capability in Practice.
Index Procedure	Operative procedures that refer to some of the more commonly performed clinical interventions and operations in the specialty. They represent evidence of technical competence across the whole range of specialty procedures in supervised settings, ensuring that the required elements of specialty practice are acquired and adequately assessed. Direct Observations of Procedural Skills (DOPS) and

	Procedure-based Assessments (PBAs) assess trainees carrying out index procedures (whole procedures or specific sections) to evidence learning.
Manage	Throughout the curriculum the term 'manage' indicates competence in clinical assessment, diagnosis, investigation and treatment (both operative and non-operative), recognising when referral to more specialised or experienced surgeons is required for definitive treatment.
Multiple Consultant Report (MCR)	An assessment by Clinical Supervisors that assesses trainees on the high-level outcomes of the curriculum. The MCR provides a supervision level for each of the five Capabilities in Practice (CiPs) as well as giving outcomes for the nine domains of the Generic Professional Capabilities. The assessment will be at the mid-point and end of a placement. The MCR is a formative assessment, providing trainees with formative feedback. However, the final MCR also contributes to the summative AES report.
Phase	An indicative period of training encompassing a number of indicative training levels. Phases are divided by critical progression points to ensure safe transitioning where patient or training risk may increase. Phases have replaced 'stages' of training in previous versions of the curriculum.
Placement	A surgical unit in which trainees work in order to gain experiential training and assessment under named supervisors.
Specialty Advisory Committee (SAC)	The committee which oversees training in a particular specialty, reporting to the JCST. SAC responsibilities include trainee enrolment and support, certification, out of programme and LTFT training, curriculum development, logbook development, simulation training, quality assurance (including processes for externality via the provision of regional liaison members), national recruitment also credentialing (if appropriate).
Shared	Applicable to all specialties i.e. the five shared CiPs are identical to all ten surgical specialties. In some specialties some additional CiPs may be specialty-specific.
Special Interest	Advanced areas of training in the specialty.
Supervision level	The level of supervision required by a trainee to undertake an activity, task or group of tasks, ranging from the ability to observe only through direct and indirect supervision to the ability to perform unsupervised.
Trainees	Doctors in training programmes.
Training programme	A rotation of placements in which training is provided under a Training Programme Director and named supervisors.

Appendix 6: Assessment Blueprint

All aspects of the curriculum are assessed using one or more of the described components of the assessment system. Some curriculum content can be assessed in more than one component but the emphasis will differ between assessments so that testing is not excessive in any one area. The key assessment is the MCR through which trainees are assessed on the high-level outcomes of the curriculum; the CiPs and GPCs.

High-level outcomes	**Assessment Framework**									
		CiP/GPC self-assessment	MCR	MSF	CEX	CBD	PBA	DOPS	AoA	OoT
	Capabilities in Practice									
	1. Manages an out-patient clinic	*	*	*	*	*				
	2. Manages the unselected emergency take	*	*	*	*	*	*	*		
	3. Manages ward rounds and the on-going care of in-patients	*	*	*	*	*				
	4. Managing an operating list	*	*	*			*	*		
	5. Managing multi-disciplinary working	*	*	*		*				
	6. Manages patients within the critical care area	*	*	*	*	*	*	*		
	7. Assesses surgical outcomes both at a personal and unit level	*	*			*				

High-level outcomes	Generic Professional Capabilities									
		CiP/GPC self-assessment	MCR	MSF	CEX	CBD	PBA	DOPS	AoA	OoT
	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 team working	*	*	*		*	*	*	*	*
	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	*	*							

Syllabus		CiP/GPC self-assessment	MCR	MSF	CEX	CBD	PBA	DOPS	AoA	OoT
	Knowledge	*	*	*	*	*	*	*	*	*
	Clinical skills	*	*	*	*	*				
	Technical skills	*	*				*	*		