

Guidance for simulation-based education in anaesthesia training



For trainers, and module and programme leads: use the guidance to inform the ongoing development of simulation-based education. Map existing simulation training to the recommended modules and work with colleagues to share, improve and expand the use of simulation-based education.

For anaesthetists in training: this guidance will help you to identify how episodes of simulation-based education can be used to help you achieve the key capabilities set out in the curriculum and to document and reflect on your learning.

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Guidance

General principles

The current breadth of simulation-based education (SBE) covers a growing range of modalities, from skills practice with part-task trainers or organic models to interaction with simulated participants, immersive simulation or extended realities. The intended learning outcomes must guide the choice of modality and its combination with complementary educational approaches. Detailed recommendations for design, delivery and evaluation of simulation are provided in the ASPiH (Association for Simulated Practice in Healthcare) standards 2023. Key priorities include the following:

- The format of SBE should be appropriate to the intended learning outcomes.
- Low-complexity methods can often achieve the intended learning outcomes using fewer resources and in a more sustainable manner.
- Simulation learning may take place ad hoc in clinical environments.
- The provision of specific training days with a focus in simulation learning ensures protected teaching time for participants and faculty.
- Those delivering SBE should have appropriate training for the format being used and engage in continuing professional development, with a particular emphasis on psychological safety and debriefing.
- Anaesthetists in training should have the opportunity to develop as clinical educators, including in the use of simulation, by attending relevant courses and participating as faculty.
- Whenever harm could be a consequence of the simulation experience, a risk assessment should be made. Examples include when using sharps or a live defibrillator or employing hybrid or in situ simulation.

The Royal College of Anaesthetists (RCoA) encourages collaboration, within and between schools of anaesthesia, to foster equitable and sustainable access to educational opportunities. This would include sharing organisational perspectives, educational materials, such as course outlines and scenarios, and faculty development opportunities.

Simulation arrangements should aim to provide all anaesthetists in training equal opportunities to participate in this form of learning at times appropriate to their needs. This should be enabled by adequate funding streams, supporting trained faculty and providing resources to ensure stability, sustainability and growth of the simulation goals and outcomes.

Recommended simulation training

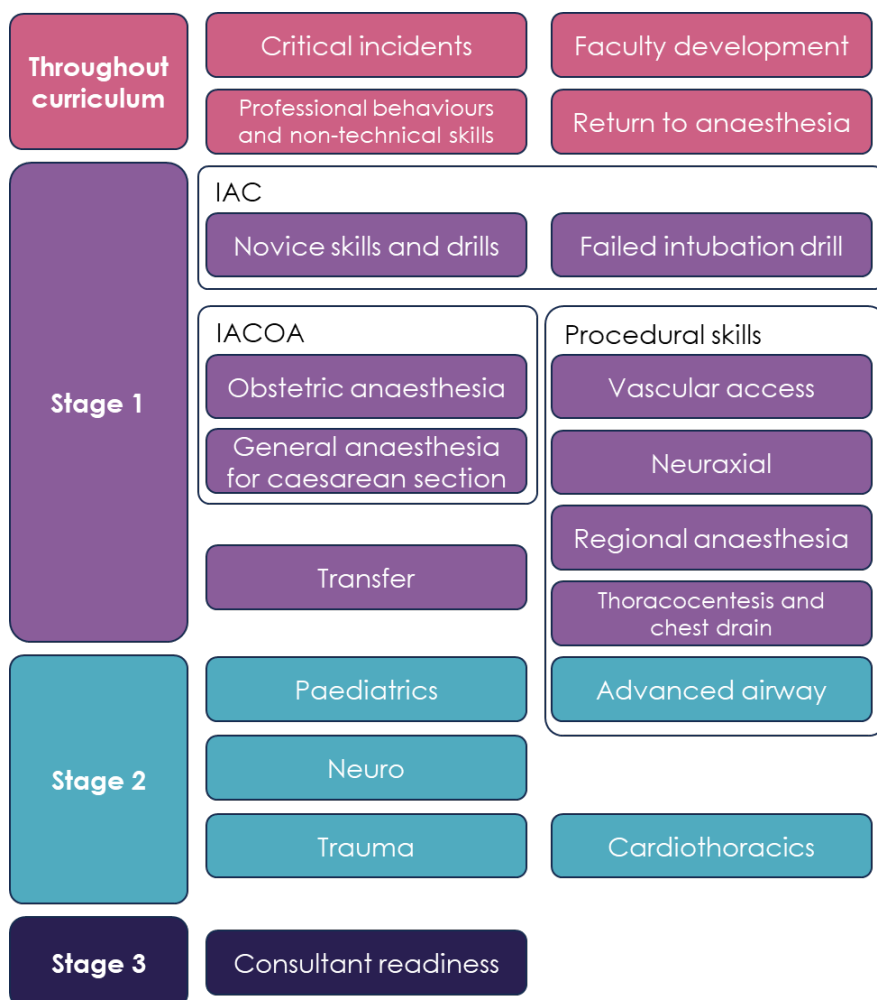
We developed the following recommendations in line with the CCT (certificate of completion of training) Curriculum 2021 and informed by simulation described in its guidance for the IAC (Initial Assessment of Competence) and IACOA (Initial Assessment of Competence in Obstetric Anaesthesia) Entrustable Professional Activities (EPAs) 1–4. We mapped and analysed the experiential learning needs of anaesthetists in training with regard to their suitability for simulation. This process resulted in the description of recommended modules, organised into four time periods across each of the three stages of training and throughout the curriculum. The modules have been described in detailed tables to help the design of local programmes.

Recommendations for Stage 1 focus on initial training in procedures, preparation and evaluation of the IAC/IACO and transfer training. At Stage 2, simulation should support learning for specialist anaesthesia modules and advanced practical skills. Training during Stage 3 should enable anaesthetists in training to transition to consultant-level practice. Throughout the curriculum, regular simulation opportunities should be provided to rehearse the management of critical incidents and develop stage-appropriate, non-technical skills and professional behaviours. Simulation should be offered to trainees returning to anaesthesia after a period of absence to enhance patient safety. Those with an interest in simulation-based education should have the opportunity to undertake formal faculty training.

The timing of simulation activities should be organised to maximise patient safety and learning opportunities for anaesthetists in training. In particular, they should ideally receive training in all procedural skills in a simulated setting before performing these procedures clinically. Procedural competency training, using simulation aimed at achieving technical competence for certain anaesthetic procedures, should be provided as early as possible in CT1. Scenario-based immersive simulation training is expected to be undertaken in Stage 1 in all relevant specialty-specific learning outcomes, with human factors incorporated into the scenarios where appropriate.

Training on professional behaviours, sociocognitive skills (also known as non-technical skills) and management of critical incidents should occur at each stage of training.

Recommended training modules (summary diagram)



Recommended training modules

Throughout the curriculum

Critical incidents training

Name of training	Critical incidents training
Simulation learning outcomes	Discuss and rehearse the critical incidents described in the AAGBI (Association of Anaesthetists of Great Britain and Ireland) Quick Reference Handbook (QRH), with an emphasis on improving non-technical skills and behaviours
Timing	Initially early in CT1/ACCS (Acute Care Common Stem) CT2 Further training throughout the curriculum
Delivery methods: minimum requirements	According to the incident being rehearsed As realistic as possible Drills should be rehearsed as part of a team Could be multi-professional
Equipment: minimum requirements	A manikin, monitor and ancillary equipment to allow recognition and management of critical incidents listed in the QRH
Faculty: minimum requirements	Clinically credible faculty members appropriately trained to provide and debrief safe simulation scenario training
Location of training	In situ (which enables teams working together to train together) or simulation suite
Key capabilities suitable for simulation-based learning – 2021 Curriculum	<p>Aligned to current stage of training: Professional Behaviours and Communication; Team Working; Safety and Quality Improvement; Education and Training</p> <p>Stage 1 Perioperative Medicine and Health Promotion (A–F, J, O); General Anaesthesia (A–S); Regional Anaesthesia (G); Resuscitation and Transfer (A–D); Procedural Sedation (G); Intensive Care (C)</p> <p>Stage 2 Perioperative Medicine and Health Promotion (A–H, O–T); General Anaesthesia (A, C–L, X); Resuscitation and Transfer (A–G); Intensive Care (C)</p> <p>Stage 3 Perioperative Medicine and Health Promotion (A–G); General Anaesthesia (A–D, F–O); Resuscitation and Transfer (A–H); Intensive Care (D, J, K)</p> <p>Annex F (procedures as appropriate)</p>

Professional behaviours and non-technical skills

Name of training	Professional behaviours and non-technical skills
Simulation learning outcomes	Discuss and demonstrate professional behaviours and sociocognitive skills necessary for interacting with patients and relatives and working in teams
Timing	Throughout curriculum, with initial training in Stage 1
Delivery methods: minimum requirements	Case-based discussions, role-play, simulated participants Could be multi-professional
Equipment: minimum requirements	A range of environments will be required for non-technical skills training; experiential learning on professional behaviours can be attained with minimal equipment but may require simulated participants
Faculty: minimum requirements	Faculty trained in professional behaviours and non-technical skills teaching
Location and organisation of training	In situ, classroom or simulation suite Local, regional or national
Key capabilities suitable for simulation-based learning – 2021 Curriculum	Aligned to current stage of training: Professional Behaviours and Communication; Team working; Safety and Quality Improvement; Education and Training

Return to anaesthesia

Name of training	Return to anaesthesia
Simulation learning outcomes	Support those returning to anaesthesia after a period of work in other specialties, in academia or on extended leave Review and rehearse the management of critical incidents with reflection on non-technical skills and behaviours
Timing	As required
Delivery methods: minimum requirements	Part-task trainer or manikin, with sufficient realism that enables contextual rehearsal and demonstration of technical and non-technical skills Could be multi-professional
Equipment: minimum requirements	Simulation models, monitor and equipment to allow practice of procedures, and recognition and management of routine and emergency situations
Faculty: minimum requirements	Clinically credible faculty members appropriately trained to provide and debrief safe simulation training
Location and organisation of training	In situ or simulation suite Local or regional
Key capabilities suitable for simulation-based learning – 2021 Curriculum	Aligned to current stage of training: Professional Behaviours and Communication; Team working; Safety and Quality Improvement Stage 1 Perioperative Medicine and Health Promotion (A–F, J, O); General Anaesthesia (A–S), Regional Anaesthesia (G); Resuscitation and Transfer (A–D); Procedural Sedation (G); Intensive Care (C) Stage 2 Perioperative Medicine and Health Promotion (A–H, O–T); General Anaesthesia (A, C–L, X); Resuscitation and Transfer (A–G); Intensive Care (C) Stage 3 Perioperative Medicine and Health Promotion (A–G); General Anaesthesia (A–D, F–O); Resuscitation and Transfer (A–H); Intensive Care (D, J, K) Annex F (procedures as appropriate)

Simulation faculty development

Name of training	Simulation faculty development
Simulation learning outcomes	To demonstrate skills required to lead simulation sessions, facilitate safe debriefing and contribute to simulation design
Timing	As required
Delivery methods: minimum requirements	Blended learning approaches including hands-on practice on simulation facilitation and debriefing Could be multi-professional
Equipment: minimum requirements	A manikin, monitor and equipment to allow rehearsal of simulation delivery
Faculty: minimum requirements	Faculty members appropriately trained to support simulation faculty development
Location and organisation of training	In situ or simulation suite Local, regional or national (eg RCoA Anaesthetists as Educators: Simulation Unplugged Course)
Key capabilities suitable for simulation-based learning – 2021 Curriculum	Stage 1 Education and Training (A--I) Stage 2 Education and Training (A–H) Stage 3 Education and Training (A–I)

Stage 1

Novice anaesthesia skills and drills

Name of training	Novice anaesthesia skills and drills
Simulation learning outcomes	Discuss and rehearse the AAGBI Quick Reference Handbook (QRH) unknowns Demonstrate appropriate management of failed intubation on a manikin
Timing	CT1 0–3 months ACCS CT2 0–3 months
Delivery methods: minimum requirements	Low-fidelity settings might be sufficient at this stage Could be multi-professional
Equipment: minimum requirements	Intubatable manikin Airway equipment sufficient to practise plans A, B, C and D – reflecting difficult airway equipment available in your department
Faculty: minimum requirements	Faculty members able to supervise learning events for novice anaesthetic training
Location and organisation of training	In situ or simulation suite Local or regional
Key capabilities suitable for simulation-based learning – 2021 Curriculum	EPA 1 and 2 Stage 1 Professional Behaviours and Communication (A–F, H); Team Working (A–F); Safety and Quality Improvement (E–M); Perioperative Medicine and Health Promotion (A–G, J, O, Q); General Anaesthesia (A–K) Annex F (Insertion of supraglottic airway; Intubation using standard laryngoscope; Intubation using video laryngoscope; Emergency front-of-neck access)

Assessment of failed intubation drill for IAC

Name of training	Assessment of failed intubation drill for IAC
Simulation learning outcomes	Demonstrate the appropriate management of failed intubation on a manikin as per DAS (Difficult Airway Society) guidelines
Timing	CT1, ACCS CT2 before completion of IAC
Delivery methods: minimum requirements	Low-fidelity settings might be sufficient at this stage Each individual must demonstrate competency for dealing with failed intubation on a manikin
Equipment: minimum requirements	Intubatable manikin or part-task trainer Airway equipment – including difficult airway equipment available in your department
Faculty: minimum requirements	Faculty members able to assess for IAC according to curriculum requirements
Location and organisation of training	In situ or simulation suite Local or regional
Key capabilities suitable for simulation-based learning – 2021 Curriculum	EPA 2 Stage 1 Professional Behaviours and Communication (A–F, H, I); Team Working (A–F); Safety and Quality Improvement (E–L); Perioperative Medicine and Health Promotion (O); General Anaesthesia (A–H, K) Annex F (Insertion of supraglottic airway; Intubation using standard laryngoscope; Intubation using video laryngoscope; Emergency front-of-neck access)

Obstetric anaesthesia

Name of training	Obstetric anaesthesia
Simulation learning outcomes	<p>Develop skills required to successfully complete the initial assessment of competence in obstetric anaesthesia</p> <p>Demonstrate ability to provide analgesia and anaesthesia for women in the delivery suite</p> <p>Discuss and rehearse the management of common obstetric emergencies and demonstrate skills required to provide immediate resuscitation and care for acute obstetric emergencies, eg eclampsia, pre-eclampsia, haemorrhage, under distant supervision with an emphasis on recognising when additional help is required</p> <p>Demonstrate skills required to provide general anaesthesia for caesarean section</p> <p>Demonstrate appropriate application of the DAS guidelines for failed intubation in an obstetric patient</p>
Timing	Stage 1, near start of obstetric anaesthesia module
Delivery methods: minimum requirements	<p>Simulation setting providing sufficient realism to allow contextual rehearsal and demonstration of technical and non-technical skills</p> <p>Scenarios should be rehearsed as part of a team (team training), which could be multi-professional</p> <p>Blended approaches, for instance including case-based discussions</p>
Equipment: minimum requirements	Simulation models, monitor and equipment to allow practice of procedures, and recognition and management of routine and emergency obstetric situations
Faculty: minimum requirements	Clinically credible faculty members appropriately trained to provide and debrief safe simulation training in obstetric anaesthesia
Location and organisation of training	<p>In situ or simulation suite</p> <p>Local or regional</p>
Key capabilities suitable for simulation-based learning – 2021 Curriculum	<p>EPA 3 and 4</p> <p>Stage 1 Perioperative Medicine and Health Promotion (A--E, G, J, L, N, O, Q); General Anaesthesia (K, Q, R); Regional Anaesthesia (A--D, G--I, K); Pain (F)</p> <p>Annex F (Lumbar epidural; Spinal anaesthesia; Combined spinal/epidural)</p>

Assessment of general anaesthesia for caesarean section

Name of training	Assessment of general anaesthesia for caesarean section
Simulation learning outcomes	Demonstrate skills and safe behaviours required to provide general anaesthesia for caesarean section Demonstrate appropriate management of failed intubation drill in an obstetric patient according to DAS guidelines
Timing	To support the completion of IACOA
Delivery methods: minimum requirements	Simulation setting of sufficient realism to allow contextual demonstration of technical and non-technical skills Each individual must demonstrate competency for dealing with failed intubation on a manikin representing a pregnant patient
Equipment: minimum requirements	Simulation models, monitor and equipment to allow practice of procedures, and recognition and management of routine and emergency obstetric situations
Faculty: minimum requirements	Faculty members able to assess for IACOA according to curriculum requirements
Location and organisation of training	In situ or simulation suite Local or regional
Key capabilities suitable for simulation-based learning – 2021 Curriculum	EPA 4 Stage 1 Perioperative Medicine and Health Promotion (N); General Anaesthesia (A–K, Q, R) Annex F (Intubation using standard laryngoscope; Intubation using video laryngoscope; Emergency front-of-neck access)

Transfer

Name of training	Transfer
Simulation learning outcomes	Discuss the risks of patient transfers and how to mitigate them Demonstrate the safe management of intra-/inter-hospital transfer of the critically ill but stable adult patient Demonstrate appropriate management of common complications associated with transfers
Timing	Stage 1 and repeated at appropriate intervals
Delivery methods: minimum requirements	Simulation setting of sufficient realism to allow contextual practice and demonstration of technical and non-technical skills required for the safe transfer of critically ill but stable adult patients Could be multi-professional
Equipment: minimum requirements	Simulation models, monitor and equipment to allow practice of procedures, and recognition and management of complications that may occur during transfers
Faculty: minimum requirements	Clinically credible faculty members appropriately trained to provide and debrief safe simulation in the context of transferring patients
Location and organisation of training	In situ or simulation suite Local or regional
Key capabilities suitable for simulation-based learning – 2021 Curriculum	Stage 1 Team Working (A–F); General Anaesthesia (E–G, M); Resuscitation and Transfer (E–G); Intensive Care (G)

Procedural skills – vascular access

Name of training	Procedural skills – vascular access
Simulation learning outcomes	Demonstrate the skills required to perform safe: <ul style="list-style-type: none"> ■ central venous line insertion ■ insertion of venous access line for renal replacement therapy ■ arterial line insertion ■ ultrasound-guided peripheral venous cannulation
Timing	CT1/ACCS CT2 Before clinical performance of these skills
Delivery methods: minimum requirements	Appropriate simulation modalities include part-task trainers, organic models, live humans (for identification of anatomy only), extended reality or hybrid simulation Educational approaches include mastery-based learning
Equipment: minimum requirements	Part-task trainers Ultrasound and invasive equipment in alignment with local availability
Faculty: minimum requirements	Faculty experienced in vascular access under ultrasound guidance
Location and organisation of training	Local
Key capabilities suitable for simulation-based learning – 2021 Curriculum	Stage 1 Intensive Care (B) Annex F (Central venous line insertion; Venous access line for renal replacement therapy; Arterial line; Ultrasound-guided peripheral venous cannulation)

Procedural skills – regional anaesthesia and analgesia

Name of training	Procedural skills – regional anaesthesia and analgesia
Simulation learning outcomes	Demonstrate the skills required to safely perform ultrasound-guided blocks
Timing	Stage 1, before clinical performance of these skills
Delivery methods: minimum requirements	Appropriate simulation modalities include part-task trainers, organic models, live humans (for identification of anatomy only), extended reality or hybrid simulation Educational approaches include mastery-based learning
Equipment: minimum requirements	As appropriate for the chosen modality Ultrasound identification of structures can be performed on live individuals Part-task trainers, simulated tissues or extended reality may be used in combination with simulated participants to provide a realistic experience Regional anaesthesia equipment equivalent to that available locally (ideally NRFit).
Faculty: minimum requirements	Faculty experienced in regional anaesthesia
Location and organisation of training	Local, regional or national
Key capabilities suitable for simulation-based learning – 2021 Curriculum	Stage 1 Regional Anaesthesia (A–C, E–G, J, K) Annex F (Simple peripheral nerve block; Ultrasound-guided chest wall plane block; Ultrasound-guided abdominal wall plane block; Ultrasound-guided lower limb block, including femoral nerve block and fascia iliaca block; Ultrasound guided upper limb block, including brachial plexus block)

Procedural skills – neuraxial anaesthesia and analgesia

Name of training	Procedural skills – neuraxial anaesthesia and analgesia
Simulation learning outcomes	Demonstrate the skills required to safely perform spinal and epidural procedures
Timing	Stage 1, before clinical performance of these skills Before IACOA
Delivery methods: minimum requirements	Simulated practice with part-task trainers, live humans (for identification of anatomy only) or hybrid simulation Educational approaches include mastery-based learning
Equipment: minimum requirements	Part-task trainers Neuraxial equipment equivalent to that available locally (ideally NRFit)
Faculty: minimum requirements	Faculty experienced in neuraxial anaesthesia and analgesia
Location and organisation of training	Classroom or in situ Local
Key capabilities suitable for simulation-based learning – 2021 Curriculum	EPA 3 Stage 1 Regional Anaesthesia (A–D,G–I, K) Annex F (Lumbar epidural; Low thoracic epidural; Spinal anaesthesia; Combined spinal/epidural)

Procedural skills – thoracocentesis and chest drain

Name of training	Procedural skills – thoracocentesis and chest drain insertion
Simulation learning outcomes	Demonstrate the skills required to perform safe needle thoracocentesis and chest drain insertion
Timing	Stage 1, before clinical opportunities to develop skills
Delivery methods: minimum requirements	Appropriate simulation modalities include part-task trainers, organic models, live humans (for identification of anatomy only) or hybrid simulation Educational approaches include mastery-based learning
Equipment: minimum requirements	Part-task trainers or organic models Ultrasound and invasive equipment in alignment with local availability
Faculty: minimum requirements	Faculty experienced in thoracocentesis and chest drain insertion
Location of training	Local
Key capabilities suitable for simulation-based learning – 2021 Curriculum	Annex F (Needle thoracocentesis; Chest drain insertion)

Stage 2

Procedural skills – advanced airway

Name of training	Procedural skills – advanced airway
Simulation learning outcomes	Demonstrate the skills required to perform safe fiberoptic intubation and one-lung ventilation
Timing	Stage 2, before clinical performance of these skills
Delivery methods: minimum requirements	Appropriate simulation modalities include part-task trainers, organic models, hybrid simulation or live humans for identification of anatomy, nasendoscopy or potentially awake intubation of volunteers (provided that risk assessments have been completed) Educational approaches include mastery-based learning
Equipment: minimum requirements	Intubatable manikin with two isolatable main bronchi and lungs Part-task trainers such as bronchoscopy simulators Double-lumen endotracheal tubes, bronchial blockers, fiberoptic scopes as well as routine airway management equipment
Faculty: minimum requirements	Faculty experienced in advanced airway management
Location of training	Local, regional or national
Key capabilities suitable for simulation-based learning – 2021 Curriculum	Annex F (Fiberoptic Intubation; Intubation in the awake patient; Insertion of double-lumen tube) Stage 2 General Anaesthesia (G–J, O, P, R)

Paediatric anaesthesia

Name of training	Paediatric anaesthesia
Simulation learning outcomes	Demonstrate safe provision of paediatric anaesthesia Demonstrate the appropriate management of emergencies and critical incidents specific to paediatric anaesthesia Demonstrate technical skills specific to paediatric anaesthesia, eg caudal block, use of straight laryngoscope
Timing	Stage 2 Paediatric anaesthesia
Delivery methods: minimum requirements	Simulation equipment of sufficient realism to allow contextual practice and demonstration of technical and non-technical skills required for paediatric anaesthesia Blended approaches, for instance including case-based discussions Could be multi-professional
Equipment: minimum requirements	Simulation models, monitors and equipment to allow practice of procedures, and recognition and management of routine and emergency paediatric situations
Faculty: minimum requirements	Two clinically credible faculty members appropriately trained to provide and debrief safe paediatric anaesthesia simulation
Location and organisation of training	In situ or simulation suite Local or regional (eg managing emergencies in paediatric anaesthesia)
Key capabilities suitable for simulation-based learning – 2021 Curriculum	Stage 2 Perioperative Medicine and Health Promotion (A–H, L, O–R); General Anaesthesia (A, H, U–W); Intensive Care (D)

Neuroanaesthesia

Name of training	Neuroanaesthesia
Simulation learning outcomes	Demonstrate safe provision of anaesthesia in neurosurgical cases Demonstrate the appropriate management of emergencies and critical incidents specific to neuroanaesthesia and neurosurgery
Timing	Stage 2 Neuroanaesthesia
Delivery methods: minimum requirements	Simulation equipment of sufficient realism to allow contextual practice and demonstration of technical and non-technical skills required for neuroanaesthesia Could be multi-professional Blended approaches, for instance including case-based discussions
Equipment: minimum requirements	Simulation models, monitors and equipment to allow practice of procedures, and recognition and management of routine and emergency situations
Faculty: minimum requirements	Two clinically credible faculty members appropriately trained to provide and debrief safe neuroanaesthesia simulation
Location and organisation of training	In situ or simulation suite Local or regional
Key capabilities suitable for simulation-based learning – 2021 Curriculum	Stage 2 Perioperative Medicine (A–H, M, Q); General Anaesthesia (F, G, H, M, N, X); Resuscitation and Transfer (G)

Major trauma

Name of training	Major trauma
Simulation learning outcomes	Demonstrate safe provision of stabilisation, resuscitation and anaesthesia for trauma patients Demonstrate the appropriate management of emergencies and critical incidents specific to trauma patients, including head injury, major haemorrhage, burns, poisoning, electrical injuries and drowning
Timing	Stage 2
Delivery methods: minimum requirements	Simulation equipment of sufficient realism to allow contextual practice and demonstration of technical and non-technical skills required to care for trauma patients Could be multi-professional Blended approaches, for instance including case-based discussions
Equipment: minimum requirements	Simulation models, monitors and equipment to allow practice of procedures, and recognition and management of trauma situations
Faculty: minimum requirements	Two clinically credible faculty members appropriately trained to provide and debrief safe trauma simulation
Location and organisation of training	In situ or simulation suite Local, regional or national (eg trauma provider course)
Key capabilities suitable for simulation-based learning – 2021 Curriculum	Stage 2 Perioperative Medicine and Health Promotion (A–H); General Anaesthesia (C, D, E, F, G, H); Resuscitation and Transfer (A, B, E)

Cardiothoracic anaesthesia

Name of training	Cardiothoracics
Simulation learning outcomes	Demonstrate safe provision of cardiothoracic anaesthesia Demonstrate the appropriate management of emergencies and critical incidents specific to cardiothoracic anaesthesia, including one-lung ventilation and management of its complications
Timing	Stage 2 Cardiothoracic anaesthesia module
Delivery methods: minimum requirements	Simulation equipment of sufficient realism to allow contextual practice and demonstration of technical and non-technical skills required to care for patients undergoing cardiothoracic surgery Could be multi-professional Blended approaches, for instance including case-based discussions
Equipment: minimum requirements	Simulation models, monitors and equipment to allow practice of procedures, and recognition and management of routine and emergency situations
Faculty: minimum requirements	Two clinically credible faculty members appropriately trained to deliver cardiothoracic scenarios using a manikin and lead de-briefs
Location and organisation of training	In situ or simulation suite Local, regional or national
Key capabilities suitable for simulation-based learning – 2021 Curriculum	Stage 2 Perioperative Medicine (A–H, M, O, Q); General Anaesthesia (G, H, L, O–R); Resuscitation and Transfer (A, B)

Stage 3

Consultant readiness

Name of training	Consultant readiness
Simulation learning outcomes	Demonstrate the non-technical skills and behaviours required at consultant-level practice
Timing	Stage 3
Delivery methods: minimum requirements	Case-based discussions, role-play, simulated participants or immersive simulation Could be multi-professional
Equipment: minimum requirements	A range of environments will be required for non-technical skills training; experiential learning on professional behaviours can be attained with minimal equipment but may require simulated participants
Faculty: minimum requirements	Faculty trained in professional behaviours and non-technical skills teaching
Location and organisation of training	Regional or national
Key capabilities suitable for simulation-based learning – 2021 Curriculum	Stage 3 Professional Behaviours and Communication (A, B, D, E); Managerial and Professional Regulatory Requirements (F); Team Working (A–L); Perioperative Medicine and Health Promotion (A, E–G); General Anaesthesia (A–D); Resuscitation and Transfer (E, H)

Background

The Royal College of Anaesthetists (RCoA) is responsible for setting training standards in the specialty of anaesthesia. Simulation is a proven and powerful tool for learning in healthcare, beneficial to individuals and teams. As an educational intervention, it can support and enhance the development of basic and advanced capabilities, including technical and sociocognitive skills, as well as professional behaviours at all levels of experience. It aligns with the objectives described in the College's charter since its inception, because it enables anaesthetic teams to reach the highest possible standards of professional competence in the practice of anaesthesia for the protection and benefit of the public. It is also a valuable tool for research, the promotion of the specialty and engagement with the general public.

There is a clear societal expectation that procedures should never be carried out for the first time on a living person. The need for simulation-based education is further highlighted in crucial reports advising on harm reduction in healthcare. The Seventh National Audit Project¹ states 'All clinical staff who deliver anaesthesia autonomously should be trained, skilled and practised in the management of emergencies', such as haemorrhage, anaphylaxis, airway difficulty and cardiac arrest. The Ockenden report² recommends that all 'staff who work together must train together' and that 'there must be regular multidisciplinary skills drills and on-site training'.

This guidance aligns with the RCoA's strategic aims and values³, particularly with regard to being innovative and progressive in pursuing excellence and promoting healthier outcomes. By supporting high-quality and collaborative initiatives for simulation-based anaesthetic training, we aim to encourage fairer access to this method of learning across the UK. It aims to facilitate access to excellent and equitable simulation-based education in anaesthesia across the four UK nations by:

- promoting quality assurance in this teaching modality
- encouraging and enabling collaboration on the development of materials, courses and simulation faculty throughout the UK
- recommending key targets for simulation training in alignment with the curriculum.

The RCoA's ongoing support for delivering excellence in training is closely linked with its commitment to promoting quality-assured simulation practice. This aligns with the Standards provided by the Association for Simulated Practice in Healthcare (ASPiH)⁴, a 'learned body that focuses on the development and application of simulation-based practice in health and care contexts'. Their updated standards for simulation-based practice have been developed through consultation with the four UK nations and endorsed by organisations and societies worldwide.

Simulation-based education (SBE) has an important role in improving efficiency and quality of training and in maintaining safety, supporting the delivery of the anaesthetics curriculum, and should be aligned with the RCoA simulation strategy. Although it can be a resource-heavy method of training, simulation is referenced throughout the curriculum as a means of achieving learning outcomes. This document provides practical guidance on how to prioritise curriculum-related simulation activity, emphasises the need for trained faculty and embodies the overall vision and strategy for this method of learning for anaesthetists in training.

The development and consultation process for this guidance

Currently, most simulation programmes for anaesthetists in training are planned and delivered on a local or regional basis. A survey of College tutors, training programme directors, heads of school and regional advisors demonstrated inconsistencies and inequities across the UK.

To develop a coordinated approach to the provision of simulation experiences in the UK, we undertook a broad exploration of national and regional initiatives, including focus group discussions with trainees, training programme directors, simulation faculty, lay representatives and RCoA representatives. The conceptual model provided by Scotland became a key precedent for structuring a common framework.

We reviewed international approaches, such as the recent guidance produced by the European Society for Anaesthesia and Intensive Care⁵, as well as the methods for standardisation of simulation training and assessment in Canada⁶ and Australia/New Zealand.^{7,8} We discussed a summary and explored transferability in collaboration with the RCoA Simulation Leads.

At the same time, we analysed the CCT curriculum 2021,⁹ identifying areas suitable for simulation enhancement. A particular focus of interest was the value of simulation to achieve and evaluate skills and behaviours highlighted in the workbooks for Initial Assessment of Competency (IAC)¹⁰ and Initial Assessment of Competency for Obstetric Anaesthesia (IACO),¹¹ which has informed the format of the recommended training tables.

Domains and specific areas described in the 2021 Curriculum for a CCT in Anaesthetics that refer to simulation as potential evidence:

		Stage 1	Stage 2	Stage 3
Generic professional domains	Professional behaviours and communication	✓	✓	
	Management and professional regulatory requirements			
	Team working	✓	✓	✓
	Safety and quality improvement	✓		
	Safeguarding			
	Education and training	✓	✓	✓
	Research and managing data			
	Perioperative medicine and health promotion			
Specialty-specific domains	General anaesthesia	A–E, K, L, N	D–F, I, J, T, U–W	
	Regional anaesthesia		A–C	
	Resuscitation and transfer	A–H	A–C, E–G	
	Sedation			
	Pain			
	Intensive care medicine	C, D, J	C, D, J	A–K
Special interest areas	Intensive care medicine, neuroanaesthesia, anaesthesia for ophthalmic surgery, anaesthesia for plastic surgery and burns management, military anaesthesia, paediatric anaesthesia, trauma and stabilisation			

Definition of terms

Debriefing: a semi-structured process in which the learner is encouraged to reflect on the events of the simulation with the aim of improving future performance.

Drills: exercises that allow learning and perfecting the use of a skill or algorithm through repetitive practice.

Extended reality: umbrella term for any technology that alters reality by adding digital elements to the physical or real-world environment to any extent and includes, but is not limited to, augmented reality (AR), mixed reality (MR) and virtual reality (VR).

Hybrid simulation: 'the union of two or more modalities of simulation with the aim of providing a more realistic experience.'¹²

Immersive simulation: 'A real-life situation that deeply involves the participants' senses, emotions, thinking, and behaviour; creating an immersive simulation depends on the alignment with learning objectives, the fidelity of the simulation (physical, conceptual, and emotional), and participant's perception of realism.'¹²

Mastery learning: a process where learners are required to achieve a minimum level of performance before moving to the next stage. The aim is to have all learners achieve an equivalent high level of performance.

Modality: the type(s) of simulation being used as part of the simulation activity, eg part-task trainers, simulated participants, hybrid or virtual reality.

Non-technical skills (also referred to as sociocognitive skills): the social (teamwork, leadership, communication), cognitive (situation awareness, decision-making, cognitive readiness, task management) and personal (stress and fatigue management) management skills necessary for safe and effective performance.

Psychological safety: the shared belief held by simulation participants and faculty that it is OK to take risks, to express ideas and concerns, to speak up, to ask questions and to admit mistakes, all without fear of negative consequences.

Simulation: 'a technique that creates a situation or environment to allow persons to experience a representation of a real event for the purpose of practice, learning, evaluation, testing, or to gain understanding of systems or human actions.'¹²

Simulation-based education: the use of any simulation in the formative or summative education and training of healthcare professionals.

Simulated participant: a live person playing the role of a patient, staff or family member in a health and care simulation.

Skills training: the use of part-task trainers, organic models or manikins to facilitate learning and practice of skills required to perform clinical procedures.

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