La-Net

ANE 603

CLINICAL SKILLS SIMULATION, ICU AND THEATRE TEACHING

Download on the App Store

GET IT ON Google Play

Course video is available on our app

lanetonline.com

Course code: ANE 603

Course title: Clinical Skills Simulation, ICU and Theatre Teaching

Course credit load: 3 Units

Series 1: Perioperative Management: Principles and Preoperative Simulation

- **Part 1.1: Principles of Simulation-Based Learning in Anaesthesia**
  - Sub Part 1.1.1: Rationale and value of simulation in anaesthetic training
  - Sub Part 1.1.2: Structure of a simulation session: briefing, scenario, debriefing
  - Sub Part 1.1.3: Applying ANE 601 principles within simulated scenarios
- **Part 1.2: Simulated Preanaesthetic Evaluation**
  - Sub Part 1.2.1: Conducting a simulated preanaesthetic assessment
  - Sub Part 1.2.2: Simulated recognition of the high-risk patient
  - Sub Part 1.2.3: Simulated premedication decision-making
- **Part 1.3: Simulated Airway Assessment and Management**
  - Sub Part 1.3.1: Simulated airway assessment
  - Sub Part 1.3.2: Simulated management of airway obstruction
  - Sub Part 1.3.3: Practical skill station: airway devices
- **Part 1.4: Simulated Induction of Anaesthesia**
  - Sub Part 1.4.1: Simulated intravenous induction
  - Sub Part 1.4.2: Simulated rapid sequence induction
  - Sub Part 1.4.3: Practical skill station: anaesthetic machine check
- **Part 1.5: Applying Perioperative Principles in Simulation**
  - Sub Part 1.5.1: Simulated intraoperative monitoring and vigilance
  - Sub Part 1.5.2: Simulated management of an intraoperative critical event
  - Sub Part 1.5.3: Debriefing and feedback in perioperative simulation

Introduction

Knowing the principles of anaesthesia and being able to apply them confidently at the bedside are genuinely different achievements, and **ANE 603: Clinical Skills Simulation, ICU and Theatre Teaching** exists specifically to bridge that gap, taking the theoretical foundation established in ANE 601 and translating it into practised, rehearsed, hands-on clinical competence. This opening Series establishes the principles of simulation-based learning itself, before applying those principles directly to simulated **preanaesthetic evaluation**, **airway assessment and management**, and **induction of anaesthesia**, and concludes by working through how the same core perioperative principles are practised and reinforced within a structured simulation environment.

The aim of this Series is to equip you with a thorough, practical understanding of applying the principles of anaesthesia in the perioperative management of patients, specifically preanaesthetic evaluation, airway management, and induction of anaesthesia, through structured clinical simulation.

This Series begins with **principles of simulation-based learning in anaesthesia**, before turning to **simulated preanaesthetic evaluation**, **simulated airway assessment and management**, and **simulated induction of anaesthesia**. It concludes with **applying perioperative principles in simulation**.

Series Learning Outcomes

At the end of this Series, you should be able to:

- **SLO 1.1:** describe the rationale, value, and structure of simulation-based learning in anaesthesia
- **SLO 1.2:** describe how ANE 601 principles are applied within simulated clinical scenarios
- **SLO 1.3:** conduct a simulated preanaesthetic assessment and recognise the high-risk patient
- **SLO 1.4:** apply simulated premedication decision-making
- **SLO 1.5:** conduct a simulated airway assessment and manage simulated airway obstruction
- **SLO 1.6:** demonstrate practical skill with airway devices in a simulation setting
- **SLO 1.7:** perform simulated intravenous and rapid sequence induction
- **SLO 1.8:** demonstrate a practical anaesthetic machine check
- **SLO 1.9:** apply simulated intraoperative monitoring, vigilance, and critical event management, and
- **SLO 1.10:** describe the role of debriefing and feedback in perioperative simulation.

1.1 Principles of Simulation-Based Learning in Anaesthesia

1.1.1 rationale and value of simulation in anaesthetic training

Practising genuine risk in a genuinely risk-free environment

Simulation-based learning, discussed throughout this Series, allows trainees to practise genuinely rare, high-stakes clinical scenarios, including life-threatening airway emergencies and critical events, repeatedly and without any risk of harm to a real patient, providing a genuinely essential complement to the clinical exposure available through actual theatre and ICU practice alone.

This approach, discussed earlier in this sub-Part, allows deliberate, structured practice of both **technical skills**, such as airway instrumentation, and **non-technical skills**, including communication, teamwork, and situational awareness, together supporting the genuinely integrated competence required for safe, confident anaesthetic and critical care practice.

Fill in the blank: Simulation-based learning allows trainees to practise genuinely rare, high-stakes clinical scenarios repeatedly and without any risk of harm to a real _____.

1.1.2 structure of a simulation session: briefing, scenario, debriefing

A deliberate three-phase structure supporting genuine learning

A well structured simulation session, discussed throughout this Part, generally follows three distinct phases, the **briefing**, orienting participants to the simulation environment and establishing a genuinely psychologically safe learning space, the **scenario** itself, and the **debriefing**, discussed further later in this Series, where genuine learning is generally consolidated.

This structure, discussed earlier in this sub-Part, reflects the recognised principle that meaningful learning from simulation depends considerably more on careful, reflective debriefing following the scenario than on the scenario performance itself, meaning genuinely effective simulation-based education requires genuine investment in all three phases rather than the scenario alone.

Fill in the blank: Meaningful learning from simulation depends considerably more on careful, reflective debriefing following the scenario than on the scenario performance _____.

1.1.3 applying ane 601 principles within simulated scenarios

Translating theoretical knowledge into rehearsed, confident practice

Every simulated scenario throughout this course, discussed throughout this Series, deliberately applies the specific anaesthetic principles established in **ANE 601**, preanaesthetic evaluation, airway management, general and regional anaesthetic technique, and perioperative and critical care, providing the genuine, practical bridge between that theoretical foundation and confident bedside competence.

This deliberate integration, discussed earlier in this sub-Part, means genuine familiarity with the specific principles established in that earlier course represents an essential prerequisite for meaningful engagement with the practical simulation work throughout this course, since simulation is genuinely most valuable when it applies and reinforces existing theoretical understanding rather than introducing entirely new content.

Fill in the blank: Every simulated scenario throughout this course deliberately applies the specific anaesthetic principles established in ANE 601, providing the genuine, practical bridge between theoretical foundation and confident bedside _____.

Table 1.1: The three-phase structure of a simulation session.

Phase	Purpose	Key focus
Briefing	Orientation and establishing psychological safety	Preparing participants to engage genuinely
Scenario	Active clinical performance in a simulated environment	Technical and non-technical skill application
Debriefing	Structured reflection following the scenario	Consolidating genuine, lasting learning

Pilot questions 1.1

1. Explain the rationale for simulation-based learning in anaesthesia. (Linked to SLO 1.1)
2. Distinguish technical from non-technical skills practised in simulation. (Linked to SLO 1.1)
3. Describe the three-phase structure of a simulation session. (Linked to SLO 1.1)
4. Explain why debriefing is considered particularly important to genuine learning. (Linked to SLO 1.1)
5. Explain how ANE 601 principles are applied within simulated scenarios in this course. (Linked to SLO 1.2)

1.2 Simulated Preanaesthetic Evaluation

1.2.1 conducting a simulated preanaesthetic assessment

Applying history, examination, and investigation review in scenario

Simulated preanaesthetic evaluation, applying the specific principles established in ANE 601, requires the trainee to conduct a systematic history, examination, and review of relevant investigations, generally using a simulated patient or structured case scenario, practising the same essential clinical reasoning that genuine preoperative assessment demands.

This practised repetition, discussed earlier in this sub-Part, allows the trainee to develop genuine, confident fluency in preanaesthetic assessment technique before encountering equivalent real clinical scenarios, meaning simulated practice represents a genuinely valuable rehearsal opportunity rather than a mere academic exercise.

Fill in the blank: Simulated preanaesthetic evaluation requires the trainee to conduct a systematic history, examination, and review of relevant _____.

1.2.2 simulated recognition of the high-risk patient

Practising the clinical judgement risk recognition demands

Simulated scenarios, discussed throughout this Part, deliberately incorporate patients with significant coexisting disease, extremes of age, or emergency presentation, providing structured opportunity to practise recognising the high-risk patient, discussed in relation to preanaesthetic evaluation in an earlier related course, and to formulate an appropriately modified anaesthetic plan in response.

This deliberate practice, discussed earlier in this sub-Part, allows the trainee to develop genuine confidence in risk stratification and proactive planning before facing equivalent decisions under the genuine time pressure and consequence of actual clinical practice, meaning simulation genuinely supports the development of sound clinical judgement rather than technical skill alone.

Fill in the blank: Simulated scenarios deliberately incorporate high-risk patients, providing structured opportunity to formulate an appropriately modified anaesthetic _____.

1.2.3 simulated premedication decision-making

Applying premedication principles to a specific simulated patient

Simulated premedication decision-making, discussed throughout this Part, requires the trainee to select an appropriate premedicant regimen, anxiolytic, analgesic, or anticholinergic, discussed in

relation to premedication principles in an earlier related course, genuinely tailored to the specific simulated patient and procedure, rather than applying a fixed, generic approach.

This exercise, discussed earlier in this sub-Part, reinforces the genuinely individualised nature of sound premedication practice, since simulated patients deliberately presenting with differing ages, comorbidities, and levels of preoperative anxiety require the trainee to genuinely apply, rather than simply recall, the underlying premedication principles established previously.

Fill in the blank: Simulated premedication decision-making requires the trainee to select an appropriate premedicant regimen genuinely tailored to the specific simulated patient and _____.

Figure 1.1: A diagram illustrating a simulated preanaesthetic assessment scenario, showing a trainee conducting a structured history and examination.

Pilot questions 1.2

1. Describe the components practised during simulated preanaesthetic assessment. (Linked to SLO 1.3)
2. Explain the value of repeated simulated practice for preanaesthetic assessment fluency. (Linked to SLO 1.3)

3. Describe how simulated scenarios support practice in recognising the high-risk patient. (Linked to SLO 1.3)
4. Explain why simulated premedication decision-making should be individualised. (Linked to SLO 1.4)
5. Describe the value of simulated practice for developing sound clinical judgement. (Linked to SLO 1.4)

1.3 Simulated Airway Assessment and Management

1.3.1 simulated airway assessment

Practising bedside prediction of intubation difficulty

Simulated airway assessment, applying the specific bedside tests established in ANE 601, including Mallampati classification, thyromental distance, and neck mobility assessment, allows the trainee to practise these specific techniques on simulated or standardised patients, building genuine confidence and consistency in predicting airway difficulty before every simulated or real induction.

This repeated practice, discussed earlier in this sub-Part, allows the trainee to develop a genuinely systematic, reliable personal approach to airway assessment, meaning simulated repetition helps establish the specific habitual, consistent clinical routine that safe, everyday anaesthetic practice genuinely requires.

Fill in the blank: Simulated airway assessment allows the trainee to practise specific bedside techniques, building genuine confidence and consistency in predicting airway _____.

1.3.2 simulated management of airway obstruction

Rehearsing rapid recognition and structured response

Simulated scenarios of acute airway obstruction, applying the recognition principles and non-invasive manoeuvres established in ANE 601, allow the trainee to practise prompt recognition of obstruction and immediate application of head tilt, jaw thrust, or chin lift, discussed in relation to airway management in an earlier related course, under genuinely realistic simulated time pressure.

This deliberate rehearsal, discussed earlier in this sub-Part, genuinely helps convert theoretical knowledge of the appropriate emergency response sequence into an automatic, reliable clinical reflex, meaning repeated simulated exposure to airway obstruction scenarios directly supports safer, more confident response when a genuine obstruction is encountered in real clinical practice.

Fill in the blank: Repeated simulated exposure to airway obstruction scenarios directly supports safer, more confident response when a genuine obstruction is encountered in real clinical _____.

1.3.3 practical skill station: airway devices

Hands-on competence with the full range of airway equipment

This practical skill station, applying the specific device knowledge established in ANE 601, provides structured, hands-on practice with oropharyngeal and nasopharyngeal airways, laryngeal mask airway insertion, and endotracheal intubation using appropriate airway manikins, allowing genuine, repeated practice of correct device selection and insertion technique.

Competent, confident performance at this specific skill station, discussed earlier in this sub-Part, generally requires demonstrating correct technique across the full stepwise range of airway devices, discussed further in this course, reflecting the genuinely progressive, escalating approach to airway management established in earlier theoretical coursework.

Fill in the blank: The practical skill station on airway devices provides structured, hands-on practice with oropharyngeal and nasopharyngeal airways, laryngeal mask airway insertion, and endotracheal _____.

Pilot questions 1.3

1. List the bedside airway assessment techniques practised in simulation. (Linked to SLO 1.5)
2. Explain the value of repeated airway assessment practice. (Linked to SLO 1.5)
3. Describe the non-invasive manoeuvres rehearsed in simulated airway obstruction scenarios. (Linked to SLO 1.5)
4. Explain how simulated rehearsal helps convert knowledge into clinical reflex. (Linked to SLO 1.5)
5. Describe the range of airway devices practised at the airway devices skill station. (Linked to SLO 1.6)

1.4 Simulated Induction of Anaesthesia

1.4.1 simulated intravenous induction

Practising the standard adult induction sequence

Simulated intravenous induction, applying the specific technique established in ANE 601, requires the trainee to practise the standard sequence of preoxygenation, administration of an intravenous induction agent, and confirmation of adequate depth before proceeding to airway instrumentation, using an appropriately programmed simulation manikin or scenario.

This structured, repeated practice, discussed earlier in this sub-Part, allows the trainee to develop genuine fluency and confidence in the standard induction sequence before performing this same sequence on a genuine patient, meaning simulated induction practice represents an essential, foundational rehearsal step in anaesthetic training.

Fill in the blank: Simulated intravenous induction requires the trainee to practise the standard sequence of preoxygenation, administration of an intravenous induction agent, and confirmation of adequate _____.

1.4.2 simulated rapid sequence induction

Rehearsing a genuinely time-critical, high-stakes sequence

Simulated **rapid sequence induction**, applying the specific technique established in ANE 601, allows the trainee to practise this genuinely time-critical sequence, preoxygenation, rapidly acting induction agent immediately followed by rapidly acting muscle relaxant, and cricoid

pressure, discussed in relation to full-stomach anaesthetic technique in an earlier related course, under simulated, realistic clinical conditions.

This specific scenario, discussed earlier in this sub-Part, carries particular educational value given the genuinely high stakes and time-critical nature of real rapid sequence induction, meaning repeated, deliberate simulated practice of this specific sequence directly supports safer, more confident performance when genuinely required in real emergency or obstetric anaesthetic practice.

Fill in the blank: Simulated rapid sequence induction carries particular educational value given the genuinely high stakes and time-critical nature of real rapid sequence _____.

1.4.3 practical skill station: anaesthetic machine check

A systematic safety check that must become genuinely routine

This practical skill station, applying the specific equipment principles established in ANE 601, requires the trainee to perform a systematic anaesthetic machine check, confirming gas supply, breathing system integrity, and functioning safety alarms, before any simulated or genuine general anaesthetic is commenced.

Competent, confident performance of this specific check, discussed earlier in this sub-Part, represents a genuinely essential safety habit rather than an optional formality, meaning repeated simulated practice of this systematic sequence directly supports the development of the genuinely consistent, reliable checking behaviour safe anaesthetic practice demands.

Fill in the blank: Performing a systematic anaesthetic machine check, confirming gas supply, breathing system integrity, and functioning safety alarms, represents a genuinely essential safety habit rather than an optional _____.

Table 1.2: Key steps rehearsed in simulated induction of anaesthesia.

Sequence	Key step	Educational focus
Intravenous induction	Preoxygenation, induction agent, depth confirmation	Standard induction fluency
Rapid sequence induction	Preoxygenation, rapid agents, cricoid pressure	Time-critical, high-stakes sequence
Machine check	Gas supply, breathing system, safety alarms	Consistent, reliable safety habit

Pilot questions 1.4

1. Describe the standard sequence practised in simulated intravenous induction. (Linked to SLO 1.7)
2. Describe the sequence practised in simulated rapid sequence induction. (Linked to SLO 1.7)
3. Explain why rapid sequence induction carries particular educational value in simulation. (Linked to SLO 1.7)
4. List the components of a systematic anaesthetic machine check. (Linked to SLO 1.8)
5. Explain why the machine check is considered an essential safety habit. (Linked to SLO 1.8)

1.5 Applying Perioperative Principles in Simulation

1.5.1 simulated intraoperative monitoring and vigilance

Practising sustained, systematic clinical observation

Simulated intraoperative monitoring, applying the specific physiological principles established in ANE 601, requires the trainee to maintain sustained, systematic observation of vital signs, anaesthetic depth, and surgical progress throughout a simulated procedure, practising the genuine, ongoing vigilance safe anaesthetic practice demands.

This structured practice, discussed earlier in this sub-Part, allows the trainee to develop genuine fluency in recognising subtle, early changes in monitored parameters before they progress to genuinely significant clinical deterioration, meaning simulated vigilance practice directly supports the development of the anticipatory, proactive clinical awareness expert anaesthetic practice requires.

Fill in the blank: Simulated intraoperative monitoring requires the trainee to maintain sustained, systematic observation of vital signs, anaesthetic depth, and surgical _____.

1.5.2 simulated management of an intraoperative critical event

Rehearsing genuine crisis response before it is genuinely needed

Simulated critical event scenarios, applying the specific complication recognition and management principles established in ANE 601, present the trainee with recognisable, structured emergencies, including hypotension, hypoxaemia, or anaphylaxis, requiring prompt recognition and a systematic, appropriate emergency response.

This deliberate rehearsal, discussed earlier in this sub-Part, allows the trainee to practise genuine crisis resource management, including communication, task delegation, and structured decision-making under pressure, meaning simulated critical event management addresses both the specific clinical knowledge and the broader non-technical skills genuine crisis response demands.

Fill in the blank: Simulated critical event scenarios allow the trainee to practise genuine crisis resource management, including communication, task delegation, and structured decision-making under _____.

1.5.3 debriefing and feedback in perioperative simulation

Closing the loop between performance and lasting learning

Structured debriefing following every perioperative simulation exercise, discussed in relation to the general simulation session structure earlier in this Series, allows the trainee and facilitator to review performance objectively, identify both genuine strengths and areas requiring further development, and consolidate the specific learning points the scenario was designed to address.

Genuinely effective debriefing, discussed earlier in this sub-Part, generally follows a structured framework, encouraging the trainee's own reflection before facilitator input, meaning feedback in perioperative simulation should genuinely support, rather than simply evaluate, the trainee's own ongoing development toward confident, competent independent practice.

Fill in the blank: Genuinely effective debriefing generally follows a structured framework, encouraging the trainee's own reflection before facilitator _____.

Pilot questions 1.5

- Describe what simulated intraoperative monitoring aims to develop. (Linked to SLO 1.9)
- List examples of simulated intraoperative critical events. (Linked to SLO 1.9)
- Describe the non-technical skills practised during simulated critical event management. (Linked to SLO 1.9)
- Describe the purpose of structured debriefing following perioperative simulation. (Linked to SLO 1.10)
- Explain why debriefing should encourage trainee reflection before facilitator input. (Linked to SLO 1.10)

Series Summary

This opening Series established the principles of simulation-based learning in anaesthesia, its rationale, structure, and application of ANE 601 principles, before working through simulated preanaesthetic evaluation, simulated airway assessment and management, simulated induction of anaesthesia, and, finally, applying broader perioperative principles, monitoring, critical event management, and debriefing, within the simulation environment.

This foundation carries directly into theatre-based clinical skills and intraoperative simulation, examined in the next Series of this course.

Glossary of Terms

- **Simulation-based learning:** structured practice of clinical scenarios in a risk-free environment.
- **Technical skills:** hands-on clinical procedures, such as airway instrumentation, practised in simulation.
- **Non-technical skills:** communication, teamwork, and situational awareness practised alongside technical skills.
- **Briefing:** the orientation phase establishing psychological safety before a simulation scenario.
- **Debriefing:** structured reflection following a simulation scenario, central to genuine learning.
- **High-risk patient recognition:** the practised skill of identifying patients with elevated perioperative risk.
- **Rapid sequence induction:** a time-critical induction sequence minimising aspiration risk, rehearsed in simulation.
- **Anaesthetic machine check:** a systematic safety check performed before every general anaesthetic.
- **Intraoperative vigilance:** sustained, systematic monitoring throughout a surgical procedure.
- **Critical event:** a recognised intraoperative emergency, such as hypotension or anaphylaxis, rehearsed in simulation.
- **Crisis resource management:** the non-technical skills of communication, delegation, and decision-making under pressure.
- **Structured feedback:** a deliberate framework for reviewing performance following a simulation scenario.

Concept Check Questions [Series 1]

Objective questions

1. Simulation-based learning allows trainees to practise genuinely rare, high-stakes clinical scenarios repeatedly and without any risk of harm to a real _____.
2. Meaningful learning from simulation depends considerably more on careful, reflective debriefing following the scenario than on the scenario performance _____.
3. Simulated airway assessment allows the trainee to practise specific bedside techniques, building genuine confidence and consistency in predicting airway _____.
4. Simulated rapid sequence induction carries particular educational value given the genuinely high stakes and time-critical nature of real rapid sequence _____.
5. Genuinely effective debriefing generally follows a structured framework, encouraging the trainee's own reflection before facilitator _____.

Short-answer questions

6. Explain the rationale for simulation-based learning in anaesthesia.
7. Describe the three-phase structure of a simulation session.
8. Explain how simulated scenarios support practice in recognising the high-risk patient.
9. Describe the sequence practised in simulated rapid sequence induction.
10. Describe the purpose of structured debriefing following perioperative simulation.

Long-answer questions

11. Discuss the rationale, structure, and application of ANE 601 principles within simulation-based learning. (Linked to SLO 1.1, SLO 1.2)
12. Discuss simulated preanaesthetic evaluation, high-risk patient recognition, and premedication decision-making. (Linked to SLO 1.3, SLO 1.4)
13. Discuss simulated airway assessment, management of obstruction, and the airway devices skill station. (Linked to SLO 1.5, SLO 1.6)
14. Discuss simulated intravenous induction, rapid sequence induction, and the anaesthetic machine check. (Linked to SLO 1.7, SLO 1.8)
15. Discuss applying perioperative monitoring, critical event management, and debriefing within simulation. (Linked to SLO 1.9, SLO 1.10)

Answers to Concept Check Questions [Series 1]

Objective questions

1. Patient.

2. Itself.
3. Difficulty.
4. Induction.
5. Input.

Short-answer questions

6. It allows repeated practice of rare, high-stakes scenarios without risk of harm to a real patient.
7. Briefing, establishing psychological safety; the scenario itself; and debriefing, consolidating learning.
8. By deliberately incorporating high-risk patients into scenarios, allowing structured practice of risk stratification and planning.
9. Preoxygenation, rapidly acting induction agent immediately followed by rapidly acting muscle relaxant, and cricoid pressure.
10. To review performance objectively, identify strengths and areas for development, and consolidate learning points.

Long-answer questions

11. **Basic response:** Simulation-based learning allows safe, repeated practice of technical and non-technical skills, following a structured briefing-scenario-debriefing sequence.

Value-added response: Every scenario deliberately applies ANE 601 principles, providing the practical bridge between theoretical foundation and confident bedside competence.

12. **Basic response:** Simulated preanaesthetic evaluation practises systematic history, examination, and investigation review on simulated patients.

Value-added response: Deliberately incorporating high-risk and varied patient scenarios supports practice in risk recognition and individualised premedication decisions.

13. **Basic response:** Simulated airway assessment rehearses bedside prediction techniques, while obstruction scenarios rehearse rapid recognition and non-invasive manoeuvres.

Value-added response: The airway devices skill station provides hands-on practice across the full stepwise range of airway equipment.

14. **Basic response:** Simulated intravenous induction rehearses the standard adult sequence, while rapid sequence induction rehearses the time-critical, high-stakes emergency sequence.

Value-added response: The machine check skill station builds the consistent, reliable safety habit essential to every anaesthetic.

15. **Basic response:** Simulated monitoring and critical event management rehearse sustained vigilance and structured emergency response.

Value-added response: Structured debriefing consolidates this learning, encouraging trainee reflection before facilitator input.

Answers to Pilot Questions [Series 1]

Part 1.1

1. It allows repeated practice of rare, high-stakes scenarios without risk of harm to a real patient.
2. Technical skills are hands-on procedures such as airway instrumentation; non-technical skills include communication, teamwork, and situational awareness.
3. Briefing, establishing psychological safety; the scenario itself; and debriefing, consolidating learning.
4. Because meaningful learning depends considerably more on reflective debriefing than on the scenario performance itself.
5. Every scenario deliberately applies the specific principles established in ANE 601 to build practical, bedside competence.

Part 1.2

1. Systematic history, physical examination, and review of relevant investigations.
2. It allows the trainee to develop confident fluency before facing equivalent real clinical scenarios.
3. By deliberately incorporating patients with significant comorbidity, extremes of age, or emergency presentation.
4. Because simulated patients present with differing ages, comorbidities, and anxiety levels requiring genuinely tailored decisions.
5. It allows deliberate practice of risk stratification and planning before facing equivalent real decisions under pressure.

Part 1.3

1. Mallampati classification, thyromental distance, and neck mobility assessment.

2. It allows the trainee to develop a systematic, reliable personal approach to airway assessment.
3. Head tilt, jaw thrust, and chin lift.
4. By converting theoretical knowledge of the response sequence into an automatic, reliable clinical reflex through repetition.
5. Oropharyngeal and nasopharyngeal airways, laryngeal mask airway insertion, and endotracheal intubation.

Part 1.4

1. Preoxygenation, administration of an intravenous induction agent, and confirmation of adequate depth before airway instrumentation.
2. Preoxygenation, rapidly acting induction agent immediately followed by rapidly acting muscle relaxant, and cricoid pressure.
3. Because of the genuinely high stakes and time-critical nature of real rapid sequence induction.
4. Confirming gas supply, breathing system integrity, and functioning safety alarms.
5. Because it represents an essential safety habit rather than an optional formality.

Part 1.5

- Sustained fluency in recognising subtle, early changes in monitored parameters before significant deterioration develops.
- Hypotension, hypoxaemia, and anaphylaxis.
- Communication, task delegation, and structured decision-making under pressure.
- To review performance objectively, identify strengths and areas for development, and consolidate learning points.
- Because feedback should support, rather than simply evaluate, the trainee's own ongoing development.

References and Attributions [Series 1]

- Aitkenhead, A. R., Moppett, I. K., & Thompson, J. P. (2013). Smith and Aitkenhead's Textbook of Anaesthesia (6th ed.). Churchill Livingstone.
- Gaba, D. M. (2004). The future vision of simulation in health care. Quality and Safety in Health Care, 13(suppl 1), i2-i10.
- Rudolph, J. W., Simon, R., Raemer, D. B., & Eppich, W. J. (2008). Debriefing as formative assessment: closing performance gaps in medical education. Academic Emergency Medicine, 15(11), 1010-1016.
- Miller, R. D., et al. (2019). Miller's Anesthesia (9th ed.). Elsevier.

Figures, Plates, Tables, and Boxes

- Table 1.1: The three-phase structure of a simulation session. AI-generated using the prompt: "Create a clean education reference table titled The Three-Phase Structure of a Simulation Session, listing phase, purpose, and key focus. Medical education reference table style with outside border, no photographic elements."
- Figure 1.1: A diagram illustrating a simulated preanaesthetic assessment scenario, showing a trainee conducting a structured history and examination. AI-generated using the prompt: "A single clean, realistic clinical education illustration of a trainee clinician conducting a structured history and examination of a seated simulated patient in a clinical skills simulation setting, with an observer taking notes nearby, calm educational setting, no text overlays, no other panels, respectful depiction, no identifying facial features."
- Table 1.2: Key steps rehearsed in simulated induction of anaesthesia. AI-generated using the prompt: "Create a clean clinical education reference table titled Key Steps Rehearsed in Simulated Induction of Anaesthesia, listing sequence, key step, and educational focus. Medical education reference table style with outside border, no photographic elements."

Series 2: Theatre-Based Clinical Skills and Intraoperative Simulation

- **Part 2.1: Theatre Environment and Team-Based Practice**
  - Sub Part 2.1.1: Orientation to the theatre environment
  - Sub Part 2.1.2: Roles within the theatre team
  - Sub Part 2.1.3: Communication and the surgical safety checklist
- **Part 2.2: Simulated Maintenance of Anaesthesia**
  - Sub Part 2.2.1: Simulated maintenance using volatile or intravenous agents
  - Sub Part 2.2.2: Simulated use of muscle relaxants and neuromuscular monitoring
  - Sub Part 2.2.3: The balanced anaesthesia concept applied in simulation
- **Part 2.3: Simulated Regional Anaesthesia in Theatre**
  - Sub Part 2.3.1: Simulated subarachnoid block technique
  - Sub Part 2.3.2: Simulated epidural technique
  - Sub Part 2.3.3: Simulated peripheral nerve block technique
- **Part 2.4: Patient Positioning and Intraoperative Care**
  - Sub Part 2.4.1: Principles of patient positioning
  - Sub Part 2.4.2: Positioning-related complications and prevention
  - Sub Part 2.4.3: Simulated intraoperative fluid and temperature management
- **Part 2.5: Simulated Termination of Anaesthesia and Handover**
  - Sub Part 2.5.1: Simulated emergence and extubation
  - Sub Part 2.5.2: Assessing readiness for PACU transfer
  - Sub Part 2.5.3: Structured handover to PACU staff

Introduction

The operating theatre is a genuinely distinct clinical environment, a physical space, a working team, and a specific sequence of intraoperative tasks that a trainee must become confidently,

practically familiar with well before managing a real patient there. This Series moves the simulation work of the previous Series directly into that theatre context, working through the **theatre environment and team**, **simulated maintenance of anaesthesia**, **simulated regional anaesthesia technique**, **patient positioning and intraoperative care**, and, finally, **simulated termination of anaesthesia and structured handover** to the recovery team.

The aim of this Series is to equip you with a thorough, practical understanding of applying the principles of anaesthesia within the theatre environment, through simulated maintenance, regional technique, positioning, intraoperative care, and termination of anaesthesia with structured handover.

This Series begins with the **theatre environment and team-based practice**, before turning to **simulated maintenance of anaesthesia**, **simulated regional anaesthesia in theatre**, and **patient positioning and intraoperative care**. It concludes with **simulated termination of anaesthesia and handover**.

Series Learning Outcomes

At the end of this Series, you should be able to:

- **SLO 2.1:** describe orientation to the theatre environment and roles within the theatre team
- **SLO 2.2:** apply communication and use of the surgical safety checklist
- **SLO 2.3:** demonstrate simulated maintenance of anaesthesia and the balanced anaesthesia concept
- **SLO 2.4:** demonstrate simulated use of muscle relaxants and neuromuscular monitoring
- **SLO 2.5:** demonstrate simulated subarachnoid, epidural, and peripheral nerve block technique
- **SLO 2.6:** describe the principles of patient positioning and positioning-related complications
- **SLO 2.7:** demonstrate simulated intraoperative fluid and temperature management
- **SLO 2.8:** demonstrate simulated emergence and extubation
- **SLO 2.9:** assess readiness for PACU transfer, and
- **SLO 2.10:** perform a structured handover to PACU staff.

2.1 Theatre Environment and Team-Based Practice

2.1.1 orientation to the theatre environment

Genuine familiarity with the physical space itself

Genuine orientation to the theatre environment, generally provided at the outset of this course, familiarises the trainee with the physical layout of the operating theatre, the location of the anaesthetic machine, monitoring equipment, and emergency equipment, discussed in relation to anaesthetic equipment established in ANE 601, and the specific workflow of the perioperative pathway itself.

This practical familiarity, discussed earlier in this sub-Part, allows the trainee to function genuinely efficiently and confidently within this specific clinical space, since uncertainty regarding equipment location or basic theatre workflow can meaningfully compromise both efficiency and safety during a genuine clinical emergency.

Fill in the blank: Genuine orientation to the theatre environment familiarises the trainee with the physical layout, equipment locations, and the specific workflow of the perioperative _____.

2.1.2 roles within the theatre team

A genuinely collaborative, multi-professional environment

The theatre team, discussed throughout this Part, comprises the anaesthetist, surgeon, scrub and circulating nurses, and, frequently, further specialist personnel, each with genuinely distinct, complementary responsibilities that must coordinate smoothly for safe, efficient surgical care to proceed.

Understanding each team member's specific role, discussed earlier in this sub-Part, and the genuine interdependence between these roles, supports effective communication and collaborative practice, meaning the anaesthetist's own effectiveness within theatre depends considerably on genuine understanding of, and respect for, the broader team's own working structure.

Fill in the blank: Understanding each team member's specific role and the genuine interdependence between these roles supports effective communication and collaborative _____.

2.1.3 communication and the surgical safety checklist

A structured tool supporting genuine team-wide safety

The **World Health Organization Surgical Safety Checklist**, discussed throughout this Part, provides a structured, standardised communication tool applied at three specific points, before induction, before skin incision, and before the patient leaves theatre, each confirming essential safety information across the entire team.

Simulated practice of this checklist, discussed earlier in this sub-Part, allows the trainee to develop genuine fluency and confidence in leading or participating in this structured communication process, meaning simulation-based checklist practice directly supports the development of the genuinely consistent safety culture effective theatre practice requires.

Fill in the blank: The World Health Organization Surgical Safety Checklist provides a structured, standardised communication tool applied at three specific points: before induction, before skin incision, and before the patient leaves _____.

Table 2.1: The three checkpoints of the WHO Surgical Safety Checklist.

Checkpoint	Timing	Purpose
Sign in	Before induction of anaesthesia	Confirms patient identity, procedure, and consent
Time out	Before skin incision	Confirms team introductions and critical safety steps
Sign out	Before the patient leaves theatre	Confirms procedure completion and postoperative plan

Pilot questions 2.1

- Describe the purpose of theatre environment orientation. (Linked to SLO 2.1)
- List the members of the theatre team and their general roles. (Linked to SLO 2.1)
- Explain why understanding team interdependence supports effective theatre practice. (Linked to SLO 2.1)
- Describe the three checkpoints of the WHO Surgical Safety Checklist. (Linked to SLO 2.2)
- Explain the value of simulated checklist practice. (Linked to SLO 2.2)

2.2 Simulated Maintenance of Anaesthesia

2.2.1 simulated maintenance using volatile or intravenous agents

Sustaining unconsciousness across the surgical procedure

Simulated maintenance of anaesthesia, applying the specific technique established in ANE 601, requires the trainee to practise sustaining adequate anaesthetic depth throughout a simulated surgical procedure using either continued volatile agent or intravenous infusion, adjusting dosing in response to simulated changes in surgical stimulation.

This practised adjustment, discussed earlier in this sub-Part, allows the trainee to develop genuine fluency in titrating anaesthetic depth against clinical signs and monitored parameters, meaning simulated maintenance practice directly supports the responsive, adaptive skill genuine intraoperative anaesthetic management demands.

Fill in the blank: Simulated maintenance of anaesthesia requires the trainee to practise sustaining adequate anaesthetic depth throughout a simulated surgical procedure, adjusting dosing in response to simulated changes in surgical _____.

2.2.2 simulated use of muscle relaxants and neuromuscular monitoring

Practising safe dosing and confirming adequate reversal

Simulated use of muscle relaxants, applying the specific pharmacology established in ANE 601, requires the trainee to practise appropriate dosing for intubation and ongoing surgical relaxation, together with correct application and interpretation of peripheral nerve stimulation for neuromuscular monitoring throughout the simulated procedure.

This structured practice, discussed earlier in this sub-Part, allows the trainee to develop genuine confidence in confirming adequate neuromuscular reversal before simulated extubation, discussed further later in this Series, meaning simulated neuromuscular monitoring practice directly supports the safe, confident termination sequence expected of competent anaesthetic practice.

Fill in the blank: Simulated use of muscle relaxants requires the trainee to practise correct application and interpretation of peripheral nerve stimulation for neuromuscular _____.

2.2.3 the balanced anaesthesia concept applied in simulation

Rehearsing the coordinated combination of anaesthetic components

The **balanced anaesthesia** concept, discussed in relation to combining hypnosis, analgesia, and muscle relaxation in ANE 601, is rehearsed throughout simulated maintenance scenarios,

requiring the trainee to practise coordinating these several distinct anaesthetic components rather than relying on any single agent alone.

This coordinated practice, discussed earlier in this sub-Part, allows the trainee to develop genuine fluency in recognising which specific component, hypnosis, analgesia, or relaxation, may be genuinely inadequate at any given point during a simulated procedure, and responding with the appropriately targeted adjustment rather than a generic, undifferentiated response.

Fill in the blank: Simulated practice of the balanced anaesthesia concept allows the trainee to develop genuine fluency in recognising which specific component may be genuinely inadequate and responding with the appropriately targeted _____.

Pilot questions 2.2

1. Describe what simulated maintenance of anaesthesia practice aims to develop. (Linked to SLO 2.3)
2. Explain why dosing must be adjusted in response to surgical stimulation. (Linked to SLO 2.3)
3. Describe simulated practice of neuromuscular monitoring. (Linked to SLO 2.4)
4. Explain the relevance of neuromuscular monitoring to safe extubation. (Linked to SLO 2.4)
5. Describe how the balanced anaesthesia concept is rehearsed in simulation. (Linked to SLO 2.3)

2.3 Simulated Regional Anaesthesia in Theatre

2.3.1 simulated subarachnoid block technique

Rehearsing sterile technique and needle placement

Simulated subarachnoid block, applying the specific technique established in ANE 601, allows the trainee to practise sterile preparation, patient positioning, and needle placement using appropriate spinal anaesthesia training manikins, building genuine tactile familiarity with the characteristic loss of resistance and cerebrospinal fluid flow confirming correct placement.

This structured, repeated practice, discussed earlier in this sub-Part, allows the trainee to develop genuine procedural confidence before performing this technique on a real patient, meaning simulated spinal anaesthesia practice represents an essential, foundational step toward safe, competent regional anaesthetic practice.

Fill in the blank: Simulated subarachnoid block allows the trainee to build genuine tactile familiarity with the characteristic loss of resistance and cerebrospinal fluid flow confirming correct _____.

2.3.2 simulated epidural technique

Rehearsing loss of resistance identification and catheter placement

Simulated epidural placement, applying the loss of resistance technique established in ANE 601, allows the trainee to practise the specific tactile skill of identifying epidural space entry, and subsequent catheter threading and securing, using appropriate epidural training manikins providing genuine, realistic resistance feedback.

This repeated practice, discussed earlier in this sub-Part, allows the trainee to develop the genuinely fine tactile discrimination this technique demands, meaning simulated epidural practice directly addresses the specific procedural skill gap that theoretical knowledge of the technique alone cannot adequately close.

Fill in the blank: Simulated epidural placement allows the trainee to practise the specific tactile skill of identifying epidural space _____, and subsequent catheter threading and securing.

2.3.3 simulated peripheral nerve block technique

Practising ultrasound-guided and landmark-based approaches

Simulated peripheral nerve block technique, applying the specific approaches established in ANE 601, allows the trainee to practise brachial plexus, femoral, and other common block techniques using appropriate ultrasound phantoms or manikins, building genuine familiarity with correct probe positioning and needle-nerve visualisation under simulated ultrasound guidance.

This practical rehearsal, discussed earlier in this sub-Part, allows the trainee to develop genuine competence in the specific hand-eye coordination ultrasound-guided regional technique demands, meaning simulated ultrasound practice represents a genuinely valuable, increasingly essential component of modern regional anaesthesia training.

Fill in the blank: Simulated peripheral nerve block technique allows the trainee to build genuine familiarity with correct probe positioning and needle-nerve visualisation under simulated ultrasound _____.

Figure 2.3: A diagram illustrating simulated ultrasound-guided peripheral nerve block practice using an ultrasound phantom.

Pilot questions 2.3

1. Describe what simulated subarachnoid block practice aims to develop. (Linked to SLO 2.5)
2. Describe the tactile skill rehearsed during simulated epidural placement. (Linked to SLO 2.5)
3. Explain why simulated practice is particularly valuable for epidural technique. (Linked to SLO 2.5)
4. Describe simulated peripheral nerve block practice using ultrasound phantoms. (Linked to SLO 2.5)
5. Explain the value of ultrasound simulation practice for regional anaesthesia training. (Linked to SLO 2.5)

2.4 Patient Positioning and Intraoperative Care

2.4.1 principles of patient positioning

Balancing surgical access against physiological safety

Patient positioning for surgery, discussed throughout this Part, must genuinely balance the surgical team's need for adequate access against the anaesthetised patient's own physiological safety, since the unconscious, often paralysed patient cannot protect their own pressure points, peripheral nerves, or airway in the way an awake person naturally would.

Common surgical positions, discussed earlier in this sub-Part, including supine, lateral, prone, and lithotomy, each carry genuinely specific physiological and safety considerations, meaning the anaesthetist must actively participate in, rather than passively accept, positioning decisions made by the wider surgical team.

Fill in the blank: Patient positioning for surgery must genuinely balance the surgical team's need for adequate access against the anaesthetised patient's own physiological _____.

2.4.2 positioning-related complications and prevention

Recognised, largely preventable positioning harm

Recognised positioning-related complications, discussed throughout this Part, include peripheral nerve injury from prolonged pressure or stretching, discussed in relation to peripheral nerve anatomy established in ANE 601, pressure sores at bony prominences, and, in prone or steep positions specifically, genuine risk of significant physiological compromise affecting ventilation and venous return.

Prevention, discussed earlier in this sub-Part, relies on careful padding of pressure points, avoiding extreme joint positions, and regular reassessment throughout prolonged procedures, meaning positioning-related harm, though genuinely serious when it occurs, remains largely preventable through careful, deliberate attention rather than being an unavoidable surgical consequence.

Fill in the blank: Prevention of positioning-related complications relies on careful padding of pressure points, avoiding extreme joint positions, and regular _____ throughout prolonged procedures.

2.4.3 simulated intraoperative fluid and temperature management

Rehearsing two genuinely continuous intraoperative responsibilities

Simulated intraoperative fluid management, applying the specific principles established in ANE 601, requires the trainee to practise ongoing fluid balance calculation and titration throughout a simulated procedure, while simulated **temperature management**, using active warming devices, addresses the genuine, common risk of intraoperative hypothermia.

This combined practice, discussed earlier in this sub-Part, reinforces the genuinely continuous, ongoing nature of intraoperative anaesthetic responsibility, since fluid and temperature management, unlike the more discrete events of induction or emergence, require sustained attention throughout the entire surgical procedure rather than at any single specific point alone.

Fill in the blank: Simulated intraoperative fluid and temperature management reinforces the genuinely continuous, ongoing nature of intraoperative anaesthetic _____.

Table 2.4: Common surgical positions and key associated risks.

Position	Common use	Key risk
Supine	Abdominal and general procedures	Occipital or sacral pressure injury
Lateral	Thoracic or hip procedures	Brachial plexus or peripheral nerve stretch injury
Prone	Spinal or posterior procedures	Ventilatory compromise and pressure injury

Pilot questions 2.4

1. Explain why positioning demands careful anaesthetic attention. (Linked to SLO 2.6)
2. List common surgical positions and their key associated risks. (Linked to SLO 2.6)
3. Describe prevention strategies for positioning-related complications. (Linked to SLO 2.6)
4. Describe simulated intraoperative fluid management practice. (Linked to SLO 2.7)
5. Explain why temperature management requires sustained attention throughout a procedure. (Linked to SLO 2.7)

2.5 Simulated Termination of Anaesthesia and Handover

2.5.1 simulated emergence and extubation

Rehearsing the same careful attention induction itself demands

Simulated emergence and extubation, applying the specific safe termination sequence established in ANE 601, requires the trainee to practise discontinuing anaesthetic agents, confirming adequate neuromuscular reversal, discussed earlier in this Series, and verifying return of protective airway reflexes before proceeding to simulated extubation.

This structured practice, discussed earlier in this sub-Part, reinforces the genuine principle that emergence demands the same careful, systematic attention as induction itself, meaning simulated emergence practice directly supports safer, more confident performance of this specific, genuinely vulnerable transition period in real clinical practice.

Fill in the blank: Simulated emergence and extubation reinforces the genuine principle that emergence demands the same careful, systematic attention as _____ itself.

2.5.2 assessing readiness for pacu transfer

Confirming stability before leaving the theatre environment

Assessing readiness for PACU transfer, discussed in relation to safe termination earlier in this Series, requires the trainee to confirm stable vital signs, adequate ventilation and oxygenation, and appropriate surgical site status before transferring the simulated patient out of the theatre environment.

This systematic assessment, discussed earlier in this sub-Part, represents a genuinely essential safety checkpoint, since premature transfer of an inadequately recovered patient risks genuine deterioration occurring outside the theatre environment's own immediate monitoring and intervention capacity, meaning this specific assessment should never be rushed or treated as a mere formality.

Fill in the blank: Assessing readiness for PACU transfer requires the trainee to confirm stable vital signs, adequate ventilation and oxygenation, and appropriate surgical site _____ before transfer.

2.5.3 structured handover to pacu staff

Communicating a complete, accurate clinical picture

Structured handover, discussed throughout this Part, requires the trainee to communicate a complete, accurate clinical picture to receiving PACU staff, including relevant patient history, the specific anaesthetic and surgical procedure performed, and any specific concerns or instructions for ongoing recovery care.

Using a structured handover framework, discussed earlier in this sub-Part, generally following a consistent, standardised format, helps ensure genuinely complete, reliable information transfer, meaning simulated handover practice directly addresses a recognised, common source of clinical communication error at this specific care transition.

Fill in the blank: Using a structured handover framework, generally following a consistent, standardised format, helps ensure genuinely complete, reliable information _____.

Pilot questions 2.5

1. Describe the components of simulated safe emergence and extubation. (Linked to SLO 2.8)
2. Explain why emergence demands the same careful attention as induction. (Linked to SLO 2.8)
3. List criteria assessed before PACU transfer. (Linked to SLO 2.9)
4. Explain why PACU transfer readiness assessment should never be rushed. (Linked to SLO 2.9)
5. Describe the components of a structured handover to PACU staff. (Linked to SLO 2.10)

Series Summary

This Series worked through the theatre environment and team, orientation, roles, and structured communication through the surgical safety checklist, simulated maintenance of anaesthesia, muscle relaxants, neuromuscular monitoring, and the balanced anaesthesia concept, simulated regional anaesthesia technique, subarachnoid, epidural, and peripheral nerve blocks, patient positioning and intraoperative fluid and temperature management, and concluded with simulated termination of anaesthesia and structured handover to PACU staff.

This theatre-based foundation carries directly into ICU bedside skills for the critically ill patient, examined in the next Series of this course.

Glossary of Terms

6. **Theatre team:** the collaborative group including anaesthetist, surgeon, and nursing staff working within theatre.
7. **WHO Surgical Safety Checklist:** a structured checklist applied at sign in, time out, and sign out.
8. **Balanced anaesthesia:** combining hypnosis, analgesia, and muscle relaxation as distinct, coordinated components.
9. **Neuromuscular monitoring:** peripheral nerve stimulation used to assess depth of muscle relaxant blockade.
10. **Ultrasound-guided nerve block:** regional anaesthesia performed with real-time ultrasound visualisation of the target nerve.
11. **Patient positioning:** surgical positioning balancing operative access against physiological safety.
12. **Positioning-related nerve injury:** peripheral nerve damage from prolonged pressure or stretch during surgical positioning.
13. **Intraoperative temperature management:** active measures used to prevent perioperative hypothermia.
14. **Emergence:** the process of recovering from anaesthesia, including reversal and return of airway reflexes.
15. **PACU transfer readiness:** the assessed criteria confirming a patient is stable enough to leave theatre.
16. **Structured handover:** a standardised framework for communicating clinical information at a care transition.
17. **Surgical position (lateral, prone, lithotomy):** specific patient positions used for different surgical procedures, each with distinct risks.

Concept Check Questions [Series 2]

Objective questions

- The WHO Surgical Safety Checklist provides a structured, standardised communication tool applied at three specific points: before induction, before skin incision, and before the patient leaves _____.
- Simulated maintenance of anaesthesia requires the trainee to practise sustaining adequate anaesthetic depth, adjusting dosing in response to simulated changes in surgical _____.

- Simulated subarachnoid block allows the trainee to build genuine tactile familiarity with the characteristic loss of resistance and cerebrospinal fluid flow confirming correct _____.
- Prevention of positioning-related complications relies on careful padding of pressure points, avoiding extreme joint positions, and regular _____.
- Simulated emergence and extubation reinforces the genuine principle that emergence demands the same careful, systematic attention as _____ itself.

Short-answer questions

1. List the members of the theatre team and their general roles.
2. Describe the three checkpoints of the WHO Surgical Safety Checklist.
3. Describe simulated practice of neuromuscular monitoring.
4. List common surgical positions and their key associated risks.
5. Describe the components of a structured handover to PACU staff.

Long-answer questions

6. Discuss theatre environment orientation, team roles, and the surgical safety checklist. (Linked to SLO 2.1, SLO 2.2)
7. Discuss simulated maintenance of anaesthesia, muscle relaxants, and the balanced anaesthesia concept. (Linked to SLO 2.3, SLO 2.4)
8. Discuss simulated subarachnoid, epidural, and peripheral nerve block technique. (Linked to SLO 2.5)
9. Discuss principles of patient positioning, positioning-related complications, and intraoperative fluid and temperature management. (Linked to SLO 2.6, SLO 2.7)
10. Discuss simulated emergence, extubation, PACU transfer readiness, and structured handover. (Linked to SLO 2.8, SLO 2.9, SLO 2.10)

Answers to Concept Check Questions [Series 2]

Objective questions

11. Theatre.
12. Stimulation.
13. Placement.
14. Reassessment.
15. Induction.

Short-answer questions

16. Anaesthetist, surgeon, scrub nurse, and circulating nurse, each with distinct, complementary responsibilities.
17. Sign in before induction, time out before skin incision, and sign out before the patient leaves theatre.
18. Correct application and interpretation of peripheral nerve stimulation to assess depth of neuromuscular blockade.
19. Supine (occipital or sacral pressure injury), lateral (brachial plexus stretch injury), and prone (ventilatory compromise and pressure injury).
20. Relevant patient history, the specific anaesthetic and surgical procedure performed, and any specific concerns or instructions for ongoing care.

Long-answer questions

21. **Basic response:** Theatre orientation and understanding of team roles support efficient, confident practice within this specific clinical environment.

Value-added response: The WHO Surgical Safety Checklist provides structured communication at three key points, supporting a consistent safety culture.

22. **Basic response:** Simulated maintenance practice develops fluency in titrating anaesthetic depth and using muscle relaxants with neuromuscular monitoring.

Value-added response: The balanced anaesthesia concept is rehearsed by coordinating hypnosis, analgesia, and relaxation as distinct, targeted components.

23. **Basic response:** Simulated subarachnoid, epidural, and peripheral nerve block practice builds tactile and hand-eye coordination skills.

Value-added response: Manikins and ultrasound phantoms provide realistic feedback supporting genuine procedural confidence before real patient encounters.

24. **Basic response:** Patient positioning must balance surgical access against physiological safety, with common positions carrying specific recognised risks.

Value-added response: Intraoperative fluid and temperature management require sustained, continuous attention throughout the procedure.

25. **Basic response:** Simulated emergence rehearses the same careful attention as induction, followed by systematic assessment of PACU transfer readiness.

Value-added response: Structured handover ensures complete, reliable information transfer, addressing a recognised common source of clinical communication error.

Answers to Pilot Questions [Series 2]

Part 2.1

1. It familiarises the trainee with the physical layout, equipment locations, and workflow of the perioperative pathway.
2. Anaesthetist, surgeon, scrub nurse, and circulating nurse, each with distinct, complementary responsibilities.
3. Because the anaesthetist's own effectiveness depends on understanding and respecting the broader team's working structure.
4. Sign in before induction, time out before skin incision, and sign out before the patient leaves theatre.
5. It builds fluency and confidence in leading or participating in this structured communication process.

Part 2.2

6. Responsive, adaptive titration of anaesthetic depth against clinical signs and monitored parameters.
7. Because surgical stimulation varies throughout the procedure, requiring corresponding adjustment of anaesthetic depth.
8. Correct application and interpretation of peripheral nerve stimulation to assess blockade depth.
9. It confirms adequate reversal before extubation, supporting safe termination of anaesthesia.
10. By requiring the trainee to coordinate hypnosis, analgesia, and muscle relaxation as distinct, targeted components.

Part 2.3

11. Genuine tactile familiarity with loss of resistance and cerebrospinal fluid flow confirming correct placement.
12. Identifying epidural space entry through loss of resistance, and subsequent catheter threading and securing.
13. Because it demands genuinely fine tactile discrimination that theoretical knowledge alone cannot adequately develop.
14. Practising probe positioning and needle-nerve visualisation using ultrasound phantoms or manikins.
15. It develops the specific hand-eye coordination ultrasound-guided regional technique demands.

Part 2.4

1. Because the unconscious, often paralysed patient cannot protect their own pressure points, nerves, or airway.
2. Supine (occipital/sacral pressure injury), lateral (brachial plexus stretch injury), prone (ventilatory compromise and pressure injury).
3. Careful padding of pressure points, avoiding extreme joint positions, and regular reassessment throughout the procedure.
4. Ongoing fluid balance calculation and titration throughout a simulated procedure.
5. Because hypothermia risk persists throughout the entire procedure rather than at a single specific point.

Part 2.5

1. Discontinuing agents, confirming adequate neuromuscular reversal, and verifying return of protective airway reflexes.
2. Because emergence, like induction, represents a genuinely vulnerable transition period requiring the same careful, systematic attention.
3. Stable vital signs, adequate ventilation and oxygenation, and appropriate surgical site status.
4. Because premature transfer risks deterioration occurring outside theatre's immediate monitoring and intervention capacity.
5. Relevant patient history, the specific procedure performed, and any specific concerns or instructions for ongoing care.

References and Attributions [Series 2]

6. Aitkenhead, A. R., Moppett, I. K., & Thompson, J. P. (2013). Smith and Aitkenhead's Textbook of Anaesthesia (6th ed.). Churchill Livingstone.
7. World Health Organization (2009). WHO Guidelines for Safe Surgery: Safe Surgery Saves Lives.
8. Miller, R. D., et al. (2019). Miller's Anesthesia (9th ed.). Elsevier.
9. Haynes, A. B., et al. (2009). A surgical safety checklist to reduce morbidity and mortality in a global population. New England Journal of Medicine, 360(5), 491-499.

Figures, Plates, Tables, and Boxes

1. Table 2.1: The three checkpoints of the WHO Surgical Safety Checklist. AI-generated using the prompt: "Create a clean clinical reference table titled The Three Checkpoints of the WHO Surgical Safety Checklist, listing checkpoint, timing, and purpose. Medical reference table style with outside border, no photographic elements."
2. Figure 2.3: A diagram illustrating simulated ultrasound-guided peripheral nerve block practice using an ultrasound phantom. AI-generated using the prompt: "A single clean, realistic clinical education illustration of a trainee holding an ultrasound probe against a training phantom arm while advancing a needle under ultrasound guidance, with a nearby ultrasound screen showing a simplified nerve target, calm educational setting, no text overlays, no other panels, respectful depiction, no identifying facial features."
3. Table 2.4: Common surgical positions and key associated risks. AI-generated using the prompt: "Create a clean clinical reference table titled Common Surgical Positions and Key Associated Risks, listing position, common use, and key risk. Medical reference table style with outside border, no photographic elements."

Series 3: ICU Bedside Skills for the Critically Ill Patient

- **Part 3.1: Orientation to the ICU and the Critically Ill Patient**
  - Sub Part 3.1.1: The ICU environment and equipment
  - Sub Part 3.1.2: Recognising the critically ill patient
  - Sub Part 3.1.3: The ABCDE approach to bedside assessment
- **Part 3.2: Simulated Airway and Ventilatory Support in ICU**
  - Sub Part 3.2.1: Simulated airway management in the critically ill patient
  - Sub Part 3.2.2: Simulated initiation of mechanical ventilation
  - Sub Part 3.2.3: Simulated ventilator adjustment and weaning
- **Part 3.3: Simulated Cardiovascular Monitoring and Support**
  - Sub Part 3.3.1: Simulated invasive haemodynamic monitoring
  - Sub Part 3.3.2: Simulated management of shock
  - Sub Part 3.3.3: Simulated vasopressor and inotrope use
- **Part 3.4: Simulated Renal and Metabolic Bedside Skills**
  - Sub Part 3.4.1: Simulated fluid and electrolyte management
  - Sub Part 3.4.2: Simulated recognition and management of acute kidney injury
  - Sub Part 3.4.3: Simulated blood gas interpretation at the bedside
- **Part 3.5: Simulated Infection Control and Line/Tube Care**
  - Sub Part 3.5.1: Simulated central line insertion and care
  - Sub Part 3.5.2: Simulated infection prevention practices in ICU
  - Sub Part 3.5.3: Simulated safe handling of ICU tubes and drains

Introduction

The intensive care unit demands a genuinely distinct set of bedside skills from the operating theatre, sustained, ongoing physiological support delivered over hours and days rather than the more contained, discrete timeframe of a single surgical procedure. This Series moves simulation-based practice specifically into the ICU environment, working through **orientation to the ICU**

and the critically ill patient, **simulated airway and ventilatory support**, **simulated cardiovascular monitoring and support**, **simulated renal and metabolic bedside skills**, and, finally, **simulated infection control and line and tube care**.

The aim of this Series is to equip you with a thorough, practical understanding of demonstrating bedside skills required for the management of the critically ill patient in the ICU, applying the principles established in ANE 601 within a structured simulation environment.

This Series begins with **orientation to the ICU and the critically ill patient**, before turning to **simulated airway and ventilatory support**, **simulated cardiovascular monitoring and support**, and **simulated renal and metabolic bedside skills**. It concludes with **simulated infection control and line and tube care**.

Series Learning Outcomes

At the end of this Series, you should be able to:

- **SLO 3.1:** describe the ICU environment and recognise the critically ill patient
- **SLO 3.2:** apply the ABCDE approach to bedside assessment
- **SLO 3.3:** demonstrate simulated airway management and initiation of mechanical ventilation in ICU
- **SLO 3.4:** demonstrate simulated ventilator adjustment and weaning
- **SLO 3.5:** demonstrate simulated invasive haemodynamic monitoring and management of shock
- **SLO 3.6:** demonstrate simulated vasopressor and inotrope use
- **SLO 3.7:** demonstrate simulated fluid and electrolyte management
- **SLO 3.8:** demonstrate simulated recognition and management of acute kidney injury and bedside blood gas interpretation
- **SLO 3.9:** demonstrate simulated central line insertion and infection prevention practice, and
- **SLO 3.10:** demonstrate simulated safe handling of ICU tubes and drains.

3.1 Orientation to the ICU and the Critically Ill Patient

3.1.1 the icu environment and equipment

A genuinely dense, technology-rich clinical space

Genuine orientation to the ICU environment, discussed throughout this Part, familiarises the trainee with the specific monitoring equipment, mechanical ventilators, discussed in relation to artificial ventilation established in ANE 601, infusion devices, and invasive monitoring lines that together characterise this genuinely dense, technology-rich clinical space.

This practical familiarity, discussed earlier in this sub-Part, allows the trainee to function confidently and efficiently at the ICU bedside, since uncertainty regarding this specific equipment can meaningfully delay recognition and response to a genuinely deteriorating patient, meaning orientation represents a genuinely essential foundation before any specific bedside skill practice can proceed.

Fill in the blank: Genuine orientation to the ICU environment familiarises the trainee with the specific monitoring equipment, mechanical ventilators, infusion devices, and invasive monitoring _____.

3.1.2 recognising the critically ill patient

Identifying deterioration before it becomes genuinely catastrophic

Recognising the **critically ill patient**, discussed throughout this Part, requires the trainee to identify specific patterns of physiological deterioration, including abnormal vital signs, altered consciousness, and reduced urine output, each representing a genuinely important early warning sign of significant, ongoing physiological compromise.

Simulated scenarios, discussed earlier in this sub-Part, deliberately present the trainee with these specific recognisable deterioration patterns, allowing structured, repeated practice of prompt recognition before the same specific presentation is genuinely encountered in real clinical practice, meaning simulation-based recognition training directly supports earlier, more confident real clinical intervention.

Fill in the blank: Recognising the critically ill patient requires the trainee to identify specific patterns of physiological deterioration, each representing a genuinely important early warning _____.

3.1.3 the abcde approach to bedside assessment

A systematic sequence preventing missed critical findings

The **ABCDE approach**, **A**irway, **B**reathing, **C**irculation, **D**isability, and **E**xposure, provides a systematic, structured sequence for bedside assessment of the critically ill patient, discussed throughout this Part, ensuring genuinely life-threatening problems are identified and addressed in the correct priority order rather than being inadvertently overlooked.

Simulated practice of this specific sequence, discussed earlier in this sub-Part, allows the trainee to develop genuine fluency in applying this structured approach under simulated time pressure, meaning repeated ABCDE practice directly supports the systematic, reliable clinical habit safe critical care assessment genuinely demands.

Fill in the blank: The ABCDE approach provides a systematic, structured sequence for bedside assessment, ensuring genuinely life-threatening problems are identified and addressed in the correct priority _____.

Table 3.1: The ABCDE approach to bedside assessment.

Component	Focus	Example finding
Airway	Patency and protection	Obstruction, stridor
Breathing	Adequacy of ventilation and oxygenation	Respiratory rate, oxygen saturation
Circulation	Adequacy of perfusion	Blood pressure, capillary refill

Pilot questions 3.1

- Describe the purpose of ICU environment orientation. (Linked to SLO 3.1)
- List specific equipment characteristic of the ICU environment. (Linked to SLO 3.1)
- List patterns of physiological deterioration used to recognise the critically ill patient. (Linked to SLO 3.1)
- List the components of the ABCDE approach. (Linked to SLO 3.2)
- Explain why the ABCDE approach follows a specific priority order. (Linked to SLO 3.2)

3.2 Simulated Airway and Ventilatory Support in ICU

3.2.1 simulated airway management in the critically ill patient

Applying airway principles to a genuinely different clinical context

Simulated airway management in the critically ill patient, applying the specific principles established in ANE 601, requires the trainee to practise airway assessment and, where indicated, intubation in a patient who is frequently already physiologically unstable, discussed throughout this Part, a genuinely different clinical context from routine elective anaesthetic induction.

This specific practice, discussed earlier in this sub-Part, allows the trainee to develop genuine confidence in adapting standard airway management technique to the additional physiological demands of the critically ill patient, meaning simulated ICU airway practice directly addresses a genuinely important, distinct skill set beyond routine theatre airway management alone.

Fill in the blank: Simulated airway management in the critically ill patient requires the trainee to practise airway assessment and intubation in a patient who is frequently already physiologically _____.

3.2.2 simulated initiation of mechanical ventilation

Selecting and applying appropriate initial ventilator settings

Simulated initiation of mechanical ventilation, applying the specific principles established in ANE 601, requires the trainee to select appropriate initial ventilator settings, discussed in relation to ventilator modes established earlier in this course, based on the specific simulated patient's underlying condition and respiratory physiology.

This structured practice, discussed earlier in this sub-Part, allows the trainee to develop genuine confidence in the practical application of ventilator mode selection, meaning simulated ventilation initiation practice directly bridges the gap between theoretical understanding of ventilator modes and confident, practical bedside application.

Fill in the blank: Simulated initiation of mechanical ventilation requires the trainee to select appropriate initial ventilator settings based on the specific simulated patient's underlying condition and respiratory _____.

3.2.3 simulated ventilator adjustment and weaning

Responding to changing respiratory status and planning liberation

Simulated ventilator adjustment, discussed throughout this Part, requires the trainee to practise responding to simulated changes in the patient's respiratory status, adjusting ventilator settings appropriately, and recognising when a simulated patient meets criteria genuinely appropriate for beginning the **weaning** process, discussed in relation to ventilator weaning principles established in ANE 601.

This progressive practice, discussed earlier in this sub-Part, allows the trainee to develop genuine fluency in the ongoing, dynamic nature of mechanical ventilation management, meaning simulated weaning practice directly supports safe, confident clinical judgement regarding this specific, genuinely important transition from ventilatory support toward spontaneous breathing.

Fill in the blank: Simulated ventilator adjustment requires the trainee to recognise when a simulated patient meets criteria genuinely appropriate for beginning the _____ process.

Pilot questions 3.2

1. Explain why airway management in the critically ill patient differs from routine elective practice. (Linked to SLO 3.3)
2. Describe what simulated initiation of mechanical ventilation practice aims to develop. (Linked to SLO 3.3)
3. Explain how initial ventilator settings are selected. (Linked to SLO 3.3)
4. Describe simulated ventilator adjustment practice. (Linked to SLO 3.4)
5. Explain the purpose of simulated weaning practice. (Linked to SLO 3.4)

3.3 Simulated Cardiovascular Monitoring and Support

3.3.1 simulated invasive haemodynamic monitoring

Practising a genuinely more detailed level of cardiovascular assessment

Simulated invasive haemodynamic monitoring, applying the specific cardiovascular physiology established in ANE 601, requires the trainee to practise interpretation of arterial line pressure waveforms and central venous pressure measurement, providing considerably more detailed cardiovascular information than non-invasive monitoring alone can achieve.

This structured practice, discussed earlier in this sub-Part, allows the trainee to develop genuine confidence in interpreting these specific invasive monitoring parameters and applying that interpretation to guide clinical decision-making, meaning simulated invasive monitoring practice directly addresses a genuinely important skill gap beyond standard non-invasive perioperative monitoring.

Fill in the blank: Simulated invasive haemodynamic monitoring provides considerably more detailed cardiovascular information than non-invasive monitoring _____.

3.3.2 simulated management of shock

Recognising and classifying a genuine physiological emergency

Simulated shock scenarios, applying the specific recognition and management principles established in ANE 601, present the trainee with recognisable patterns of hypovolaemic, cardiogenic, or septic shock, each requiring prompt recognition and a genuinely specific, cause-directed management approach rather than a single uniform response.

This deliberate rehearsal, discussed earlier in this sub-Part, allows the trainee to practise distinguishing between these genuinely distinct shock categories based on their characteristic clinical presentation, meaning simulated shock management practice directly supports the specific diagnostic and therapeutic clinical reasoning safe critical care practice demands.

Fill in the blank: Simulated shock scenarios present the trainee with recognisable patterns of hypovolaemic, cardiogenic, or septic shock, each requiring a genuinely specific, cause-directed management _____.

3.3.3 simulated vasopressor and inotrope use

Practising titrated pharmacological cardiovascular support

Simulated vasopressor and inotrope use, discussed in relation to cardiovascular pharmacology, requires the trainee to practise appropriate selection and titrated dosing of these specific drug classes in response to simulated haemodynamic parameters, discussed earlier in this Series, reflecting the genuinely titratable, closely monitored nature of cardiovascular support in critical illness.

This structured practice, discussed earlier in this sub-Part, allows the trainee to develop genuine confidence in this specific titration process, meaning simulated vasopressor practice directly supports safe, confident clinical decision-making regarding this genuinely important, high-consequence category of critical care pharmacological intervention.

Fill in the blank: Simulated vasopressor and inotrope use requires the trainee to practise appropriate selection and titrated dosing in response to simulated haemodynamic _____.

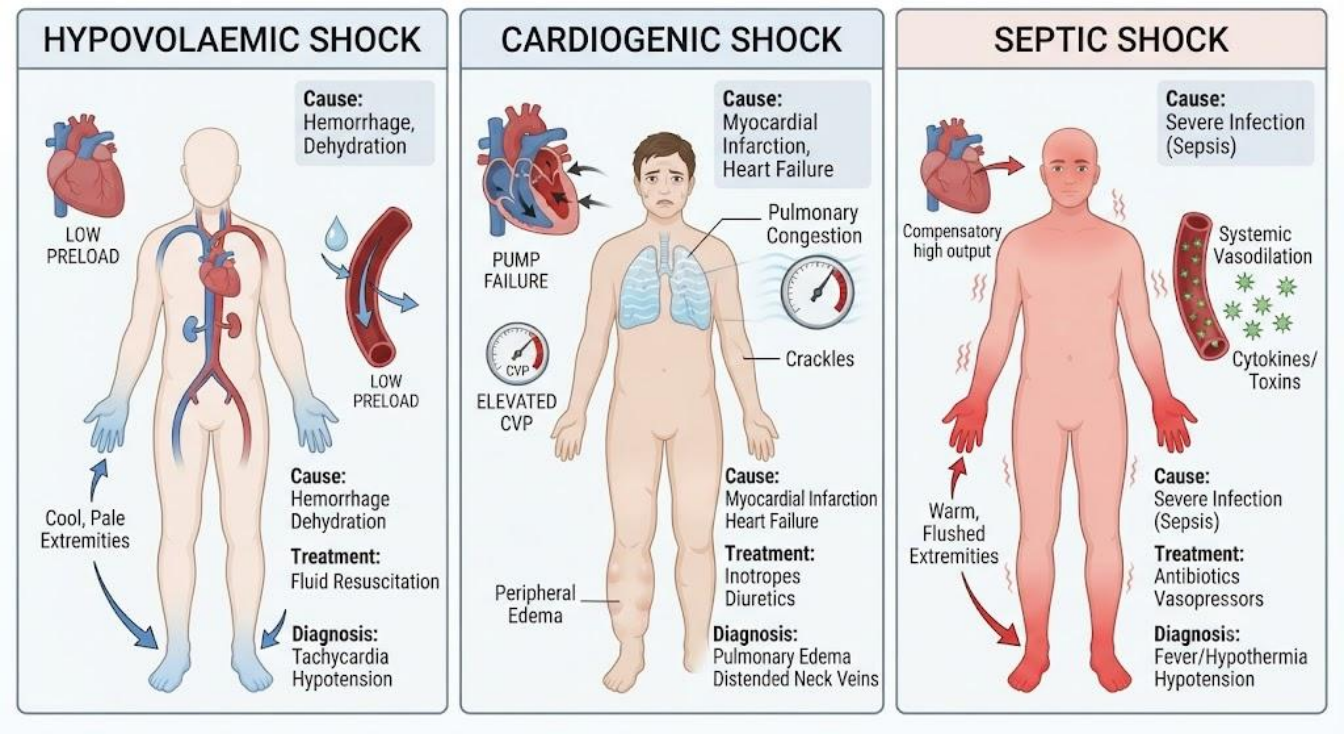

Figure 3.3: A diagram illustrating recognisable clinical patterns distinguishing hypovolaemic, cardiogenic, and septic shock.

Pilot questions 3.3

1. Describe what simulated invasive haemodynamic monitoring practice aims to develop. (Linked to SLO 3.5)
2. List the recognised categories of shock rehearsed in simulation. (Linked to SLO 3.5)
3. Explain why each category of shock requires a genuinely specific management approach. (Linked to SLO 3.5)
4. Describe simulated vasopressor and inotrope practice. (Linked to SLO 3.6)
5. Explain why vasopressor use is described as a titrated process. (Linked to SLO 3.6)

3.4 Simulated Renal and Metabolic Bedside Skills

3.4.1 simulated fluid and electrolyte management

Applying biochemistry principles at the critically ill bedside

Simulated fluid and electrolyte management, applying the specific biochemical principles established in ANE 601, requires the trainee to practise calculating and adjusting fluid and electrolyte therapy in response to simulated laboratory results and clinical parameters, reflecting the genuinely dynamic, ongoing nature of fluid balance in critical illness.

This structured practice, discussed earlier in this sub-Part, allows the trainee to develop genuine confidence in applying theoretical biochemistry knowledge to real-time bedside decision-making, meaning simulated fluid and electrolyte practice directly bridges the specific gap between classroom biochemistry teaching and confident clinical application.

Fill in the blank: Simulated fluid and electrolyte management requires the trainee to practise calculating and adjusting therapy in response to simulated laboratory results and clinical _____.

3.4.2 simulated recognition and management of acute kidney injury

Recognising a genuinely common critical illness complication

Simulated scenarios of **acute kidney injury**, discussed throughout this Part, present the trainee with recognisable patterns of reduced urine output and rising biochemical markers of renal impairment, requiring prompt recognition and appropriate initial management, including careful review of nephrotoxic medications and optimisation of renal perfusion.

This deliberate practice, discussed earlier in this sub-Part, allows the trainee to develop genuine confidence in recognising this genuinely common critical illness complication before it progresses to more severe, potentially irreversible renal impairment, meaning simulated acute kidney injury recognition directly supports earlier, more effective real clinical intervention.

Fill in the blank: Simulated acute kidney injury scenarios present the trainee with recognisable patterns of reduced urine output and rising biochemical markers of renal _____.

3.4.3 simulated blood gas interpretation at the bedside

Applying systematic interpretation under simulated clinical pressure

Simulated bedside blood gas interpretation, applying the specific systematic approach established in ANE 601, requires the trainee to practise interpreting simulated arterial blood gas results under realistic time pressure, integrating this interpretation with the broader simulated clinical picture rather than in isolation.

This repeated, contextualised practice, discussed earlier in this sub-Part, allows the trainee to develop genuine fluency in rapid, confident blood gas interpretation specifically within the pressured, time-sensitive context of genuine critical care practice, meaning simulated practice under realistic pressure represents a genuinely valuable complement to purely theoretical interpretation exercises.

Fill in the blank: Simulated bedside blood gas interpretation requires the trainee to practise interpreting results, integrating this interpretation with the broader simulated clinical picture rather than in _____.

Table 3.4: Simulated renal and metabolic bedside skills.

Skill	Focus	Clinical purpose
Fluid and electrolyte management	Calculating and adjusting therapy	Maintaining physiological balance in critical illness
Acute kidney injury recognition	Urine output and biochemical markers	Early detection before progression
Bedside blood gas interpretation	Systematic, contextualised analysis	Rapid, confident clinical decision support

Pilot questions 3.4

1. Describe what simulated fluid and electrolyte management practice aims to develop. (Linked to SLO 3.7)
2. List recognisable patterns used to identify acute kidney injury in simulation. (Linked to SLO 3.8)
3. Explain why early recognition of acute kidney injury is important. (Linked to SLO 3.8)
4. Describe simulated bedside blood gas interpretation practice. (Linked to SLO 3.8)
5. Explain the value of practising blood gas interpretation under realistic time pressure. (Linked to SLO 3.8)

3.5 Simulated Infection Control and Line/Tube Care

3.5.1 simulated central line insertion and care

Rehearsing sterile technique for a genuinely invasive procedure

Simulated **central line insertion**, discussed throughout this Part, allows the trainee to practise sterile insertion technique, correct anatomical landmark identification, and appropriate ongoing line care using appropriate central line insertion manikins, building genuine procedural confidence before performing this specific invasive procedure on a real patient.

This structured practice, discussed earlier in this sub-Part, allows the trainee to develop genuine fluency in both the technical insertion sequence and the ongoing, sustained sterile care this specific invasive device requires throughout its use, meaning simulated central line practice addresses the complete procedural lifecycle rather than insertion technique alone.

Fill in the blank: Simulated central line insertion allows the trainee to practise sterile insertion technique, correct anatomical landmark identification, and appropriate ongoing line _____.

3.5.2 simulated infection prevention practices in icu

Rehearsing the habitual, everyday behaviours preventing harm

Simulated infection prevention practice, discussed throughout this Part, requires the trainee to consistently demonstrate hand hygiene, appropriate personal protective equipment use, and correct aseptic technique throughout every simulated bedside interaction, reflecting the genuinely essential, everyday nature of infection prevention within the ICU environment.

This continuous, deliberately reinforced practice, discussed earlier in this sub-Part, allows the trainee to develop genuinely consistent, automatic infection prevention behaviour rather than treating these specific practices as an occasional, optional consideration, meaning simulated reinforcement directly supports the habitual, reliable behaviour genuine infection prevention demands.

Fill in the blank: Simulated infection prevention practice requires the trainee to consistently demonstrate hand hygiene, appropriate personal protective equipment use, and correct aseptic _____.

3.5.3 simulated safe handling of icu tubes and drains

Practising careful management of multiple invasive devices

Simulated safe handling of ICU tubes and drains, discussed throughout this Part, requires the trainee to practise correct management of endotracheal tubes, urinary catheters, and surgical drains, including safe securing, monitoring for complication, and appropriate technique when repositioning or transporting a critically ill patient with multiple such devices in place.

This structured practice, discussed earlier in this sub-Part, allows the trainee to develop genuine confidence in the specific, careful coordination multiple simultaneous invasive devices demand, meaning simulated tube and drain handling practice directly addresses a genuinely important, though frequently underemphasised, component of safe everyday ICU bedside care.

Fill in the blank: Simulated safe handling of ICU tubes and drains requires the trainee to practise correct management, including safe securing, monitoring for complication, and appropriate technique when repositioning or transporting a critically ill _____.

Pilot questions 3.5

1. Describe what simulated central line insertion practice aims to develop. (Linked to SLO 3.9)
2. List components of simulated infection prevention practice. (Linked to SLO 3.9)
3. Explain why infection prevention behaviour must be consistent and automatic. (Linked to SLO 3.9)
4. List examples of ICU tubes and drains requiring safe handling. (Linked to SLO 3.10)
5. Explain why careful coordination is required when a patient has multiple invasive devices in place. (Linked to SLO 3.10)

Series Summary

This Series worked through orientation to the ICU and the critically ill patient, environment, recognition, and the ABCDE assessment approach, simulated airway and ventilatory support, initiation, adjustment, and weaning, simulated cardiovascular monitoring and support, invasive monitoring, shock management, and vasopressor use, simulated renal and metabolic bedside skills, and concluded with simulated infection control and safe line and tube handling.

This ICU bedside foundation carries directly into further ICU monitoring, procedures, and simulation-based practice, examined in the next Series of this course.

Glossary of Terms

6. **ABCDE approach:** a systematic bedside assessment sequence: Airway, Breathing, Circulation, Disability, Exposure.
7. **Critically ill patient:** a patient showing significant, ongoing physiological compromise requiring intensive support.
8. **Mechanical ventilation weaning:** the gradual, structured process of transitioning a patient from ventilatory support toward spontaneous breathing.
9. **Invasive haemodynamic monitoring:** monitoring using arterial or central venous lines, providing detailed cardiovascular data.
10. **Hypovolaemic shock:** shock resulting from significantly reduced circulating blood volume.
11. **Cardiogenic shock:** shock resulting from inadequate cardiac pump function.
12. **Septic shock:** shock resulting from a dysregulated response to infection.
13. **Vasopressor:** a drug used to increase vascular tone and blood pressure in shock.
14. **Acute kidney injury:** a sudden decline in renal function, recognised through urine output and biochemical markers.
15. **Central line:** an invasive venous catheter placed in a large central vein, requiring sterile insertion technique.
16. **Aseptic technique:** practices minimising the introduction of infectious organisms during invasive procedures.
17. **ICU tubes and drains:** invasive devices including endotracheal tubes, urinary catheters, and surgical drains requiring careful handling.

Concept Check Questions [Series 3]

Objective questions

- Genuine orientation to the ICU environment familiarises the trainee with the specific monitoring equipment, mechanical ventilators, infusion devices, and invasive monitoring _____.
- The ABCDE approach provides a systematic, structured sequence for bedside assessment, ensuring genuinely life-threatening problems are identified and addressed in the correct priority _____.
- Simulated shock scenarios present the trainee with recognisable patterns of hypovolaemic, cardiogenic, or septic shock, each requiring a genuinely specific, cause-directed management _____.

- Simulated acute kidney injury scenarios present the trainee with recognisable patterns of reduced urine output and rising biochemical markers of renal _____.
- Simulated infection prevention practice requires the trainee to consistently demonstrate hand hygiene, appropriate personal protective equipment use, and correct aseptic _____.

Short-answer questions

1. List patterns of physiological deterioration used to recognise the critically ill patient.
2. List the components of the ABCDE approach.
3. Explain how initial ventilator settings are selected.
4. List the recognised categories of shock rehearsed in simulation.
5. List examples of ICU tubes and drains requiring safe handling.

Long-answer questions

6. Discuss ICU environment orientation, recognition of the critically ill patient, and the ABCDE approach. (Linked to SLO 3.1, SLO 3.2)
7. Discuss simulated airway management, ventilation initiation, adjustment, and weaning in ICU. (Linked to SLO 3.3, SLO 3.4)
8. Discuss simulated invasive haemodynamic monitoring, shock management, and vasopressor use. (Linked to SLO 3.5, SLO 3.6)
9. Discuss simulated fluid and electrolyte management, acute kidney injury recognition, and bedside blood gas interpretation. (Linked to SLO 3.7, SLO 3.8)
10. Discuss simulated central line insertion, infection prevention, and safe tube and drain handling. (Linked to SLO 3.9, SLO 3.10)

Answers to Concept Check Questions [Series 3]

Objective questions

11. Lines.
12. Order.
13. Approach.
14. Impairment.
15. Technique.

Short-answer questions

16. Abnormal vital signs, altered consciousness, and reduced urine output.

17. Airway, Breathing, Circulation, Disability, and Exposure.
18. Based on the specific simulated patient's underlying condition and respiratory physiology.
19. Hypovolaemic, cardiogenic, and septic shock.
20. Endotracheal tubes, urinary catheters, and surgical drains.

Long-answer questions

21. **Basic response:** ICU orientation and recognition of physiological deterioration together support prompt, confident bedside assessment.

Value-added response: The ABCDE approach provides a systematic sequence ensuring life-threatening problems are addressed in correct priority order.

22. **Basic response:** Simulated airway management addresses the additional demands of the already unstable critically ill patient.

Value-added response: Ventilation initiation, adjustment, and weaning practice bridges theoretical ventilator knowledge and confident bedside application.

23. **Basic response:** Invasive haemodynamic monitoring provides detailed cardiovascular data supporting recognition and classification of shock.

Value-added response: Titrated vasopressor and inotrope use practice supports confident, safe pharmacological cardiovascular support.

24. **Basic response:** Fluid and electrolyte management practice applies biochemistry principles to real-time bedside decisions.

Value-added response: Acute kidney injury recognition and bedside blood gas interpretation support earlier, more effective clinical intervention.

25. **Basic response:** Central line insertion and infection prevention practice build sterile technique and consistent, automatic safety behaviour.

Value-added response: Safe tube and drain handling addresses the careful coordination multiple invasive devices genuinely demand.

Answers to Pilot Questions [Series 3]

Part 3.1

1. It familiarises the trainee with monitoring equipment, ventilators, and invasive lines characteristic of this technology-rich space.
2. Monitoring equipment, mechanical ventilators, infusion devices, and invasive monitoring lines.
3. Abnormal vital signs, altered consciousness, and reduced urine output.
4. Airway, Breathing, Circulation, Disability, and Exposure.
5. Because life-threatening problems must be addressed in the correct order to avoid missing critical, time-sensitive findings.

Part 3.2

6. Because the critically ill patient is frequently already physiologically unstable, unlike routine elective anaesthetic induction.
7. Confident, practical application of ventilator mode selection appropriate to the patient's condition.
8. Based on the specific simulated patient's underlying condition and respiratory physiology.
9. Responding to simulated changes in respiratory status and adjusting ventilator settings appropriately.
10. It develops safe, confident clinical judgement regarding the transition from ventilatory support toward spontaneous breathing.

Part 3.3

11. Confidence in interpreting arterial line waveforms and central venous pressure to guide clinical decision-making.
12. Hypovolaemic, cardiogenic, and septic shock.
13. Because each reflects a genuinely distinct underlying mechanism requiring a specific, cause-directed treatment approach.
14. Appropriate selection and titrated dosing of vasopressors and inotropes in response to simulated haemodynamic parameters.
15. Because dosing must be continuously adjusted against ongoing, closely monitored haemodynamic response.

Part 3.4

1. Confident application of biochemistry knowledge to real-time bedside fluid and electrolyte decisions.

2. Reduced urine output and rising biochemical markers of renal impairment.
3. Because early recognition allows intervention before progression to more severe, potentially irreversible renal impairment.
4. Interpreting simulated blood gas results under time pressure, integrated with the broader clinical picture.
5. Because critical care practice genuinely occurs under time pressure, and simulation reflects this realistic context.

Part 3.5

1. Genuine procedural confidence in sterile insertion technique and ongoing line care.
2. Hand hygiene, personal protective equipment use, and correct aseptic technique.
3. Because infection prevention must be applied consistently at every bedside interaction, not as an occasional consideration.
4. Endotracheal tubes, urinary catheters, and surgical drains.
5. Because uncoordinated handling of multiple devices risks dislodgement, complication, or patient harm during repositioning or transport.

References and Attributions [Series 3]

6. Marino, P. L. (2014). The ICU Book (4th ed.). Wolters Kluwer.
7. Aitkenhead, A. R., Moppett, I. K., & Thompson, J. P. (2013). Smith and Aitkenhead's Textbook of Anaesthesia (6th ed.). Churchill Livingstone.
8. Vincent, J. L., et al. (2013). Critical care medicine landmark articles: an overview. Critical Care, 17(suppl 1), S1.
9. Miller, R. D., et al. (2019). Miller's Anesthesia (9th ed.). Elsevier.

Figures, Plates, Tables, and Boxes

1. Table 3.1: The ABCDE approach to bedside assessment. AI-generated using the prompt: "Create a clean clinical reference table titled The ABCDE Approach to Bedside Assessment, listing component, focus, and example finding. Medical reference table style with outside border, no photographic elements."

2. Figure 3.3: A diagram illustrating recognisable clinical patterns distinguishing hypovolaemic, cardiogenic, and septic shock. AI-generated using the prompt: "A single clean, accurate schematic three-panel diagram, one panel labelled hypovolaemic shock showing cool, pale extremities, one labelled cardiogenic shock showing signs of fluid overload, one labelled septic shock showing warm, flushed extremities, textbook clinical diagram style, neutral background, no photographic realism, no other panels."
3. Table 3.4: Simulated renal and metabolic bedside skills. AI-generated using the prompt: "Create a clean clinical education reference table titled Simulated Renal and Metabolic Bedside Skills, listing skill, focus, and clinical purpose. Medical education reference table style with outside border, no photographic elements."

Series 4: ICU Monitoring, Procedures, and Simulation-Based Practice

- **Part 4.1: Neurological Monitoring and Sedation in ICU**
  - Sub Part 4.1.1: Simulated assessment of consciousness in ICU
  - Sub Part 4.1.2: Simulated sedation practice and assessment
  - Sub Part 4.1.3: Simulated delirium recognition and management
- **Part 4.2: Nutrition and Metabolic Support in Critical Illness**
  - Sub Part 4.2.1: Principles of nutritional support in ICU
  - Sub Part 4.2.2: Simulated enteral feeding practice
  - Sub Part 4.2.3: Simulated parenteral nutrition considerations
- **Part 4.3: Simulated ICU Procedures**
  - Sub Part 4.3.1: Simulated arterial line insertion
  - Sub Part 4.3.2: Simulated chest drain insertion
  - Sub Part 4.3.3: Simulated tracheostomy care
- **Part 4.4: Severity Scoring and Communication in ICU**
  - Sub Part 4.4.1: Severity of illness scoring systems
  - Sub Part 4.4.2: Simulated communication with family members
  - Sub Part 4.4.3: Simulated multidisciplinary team discussion
- **Part 4.5: Safe Transport and Transfer of the Critically Ill Patient**
  - Sub Part 4.5.1: Principles of intrahospital transport
  - Sub Part 4.5.2: Simulated preparation for transfer
  - Sub Part 4.5.3: Simulated management of complications during transport

Introduction

Beyond the core airway, cardiovascular, and renal skills already established, genuine ICU competence requires several further, equally important bedside capabilities, neurological assessment and sedation management, nutritional support, a range of specific invasive procedures, structured communication, and the safe transport of a critically ill patient between

clinical areas. This Series extends the simulation-based practice of the previous Series into each of these domains, **neurological monitoring and sedation**, **nutrition and metabolic support**, **simulated ICU procedures**, **severity scoring and communication**, and, finally, **safe transport and transfer** of the critically ill patient.

The aim of this Series is to equip you with a thorough, practical understanding of demonstrating further bedside skills required for the management of the critically ill patient in the ICU, applying the principles established in ANE 601 through structured simulation-based practice.

This Series begins with **neurological monitoring and sedation in ICU**, before turning to **nutrition and metabolic support**, **simulated ICU procedures**, and **severity scoring and communication**. It concludes with **safe transport and transfer of the critically ill patient**.

Series Learning Outcomes

At the end of this Series, you should be able to:

- **SLO 4.1:** demonstrate simulated assessment of consciousness and sedation practice in ICU
- **SLO 4.2:** demonstrate simulated delirium recognition and management
- **SLO 4.3:** describe principles of nutritional support and demonstrate simulated enteral feeding practice
- **SLO 4.4:** describe simulated parenteral nutrition considerations
- **SLO 4.5:** demonstrate simulated arterial line insertion and chest drain insertion
- **SLO 4.6:** demonstrate simulated tracheostomy care
- **SLO 4.7:** describe severity of illness scoring systems
- **SLO 4.8:** demonstrate simulated communication with family members and the multidisciplinary team
- **SLO 4.9:** describe principles of intrahospital transport and simulated preparation for transfer, and
- **SLO 4.10:** demonstrate simulated management of complications during transport.

4.1 Neurological Monitoring and Sedation in ICU

4.1.1 simulated assessment of consciousness in icu

A structured, reproducible measure of neurological status

Simulated assessment of consciousness, discussed in relation to central nervous system considerations established in ANE 601, requires the trainee to practise applying the **Glasgow Coma Scale**, systematically assessing eye opening, verbal response, and motor response, using simulated patients presenting with varying levels of neurological impairment.

This structured, repeated practice, discussed earlier in this sub-Part, allows the trainee to develop genuine fluency and consistency in applying this specific assessment tool, meaning simulated consciousness assessment practice directly supports the reliable, reproducible neurological monitoring genuine critical care practice demands.

Fill in the blank: Simulated assessment of consciousness requires the trainee to practise applying the Glasgow Coma Scale, systematically assessing eye opening, verbal response, and motor _____.

4.1.2 simulated sedation practice and assessment

Titrating sedation against a structured target

Simulated sedation practice, discussed throughout this Part, requires the trainee to select and titrate appropriate sedative agents against a specific, structured sedation target, generally using a validated sedation scale, reflecting the genuinely important principle that sedation in critical illness should be deliberately, actively targeted rather than applied without a specific, clear clinical goal.

This deliberate practice, discussed earlier in this sub-Part, allows the trainee to develop genuine confidence in avoiding both under-sedation, risking patient distress and self-harm, and over-sedation, risking delayed recovery and further complication, meaning simulated sedation practice directly supports the carefully balanced clinical judgement safe sedation management requires.

Fill in the blank: Sedation in critical illness should be deliberately, actively targeted rather than applied without a specific, clear clinical _____.

4.1.3 simulated delirium recognition and management

Recognising a genuinely common, under-recognised ICU complication

Simulated delirium scenarios, discussed throughout this Part, present the trainee with recognisable patterns of acute confusion, fluctuating attention, and altered level of arousal, using a validated delirium assessment tool, allowing structured practice of prompt recognition of this genuinely common, frequently under-recognised ICU complication.

This deliberate rehearsal, discussed earlier in this sub-Part, allows the trainee to develop genuine confidence in both recognising delirium and applying appropriate non-pharmacological and, where genuinely necessary, pharmacological management strategies, meaning simulated delirium practice directly addresses a genuinely important, though frequently underemphasised, component of comprehensive critical care.

Fill in the blank: Simulated delirium scenarios present the trainee with recognisable patterns of acute confusion, fluctuating attention, and altered level of _____.

Table 4.1: Simulated neurological monitoring and sedation skills.

Skill	Assessment tool	Clinical purpose
Consciousness assessment	Glasgow Coma Scale	Structured, reproducible neurological monitoring
Sedation assessment	Validated sedation scale	Deliberately targeted, balanced sedation
Delirium recognition	Validated delirium assessment tool	Prompt recognition of a common, under-recognised complication

Pilot questions 4.1

- Describe the components of the Glasgow Coma Scale. (Linked to SLO 4.1)
- Explain the value of repeated simulated consciousness assessment practice. (Linked to SLO 4.1)
- Explain why sedation should be deliberately targeted rather than applied without a clear goal. (Linked to SLO 4.1)
- Describe the risks of under-sedation and over-sedation. (Linked to SLO 4.1)
- Describe how delirium is recognised in simulation. (Linked to SLO 4.2)

4.2 Nutrition and Metabolic Support in Critical Illness

4.2.1 principles of nutritional support in icu

Supporting metabolic demand throughout critical illness

Nutritional support in critical illness, discussed in relation to nutrition principles established in ANE 601, requires careful consideration of the patient's own increased metabolic demand during critical illness, with the specific route, enteral where genuinely feasible or parenteral where enteral feeding is not tolerated, selected according to the patient's individual gastrointestinal function.

This individualised approach, discussed earlier in this sub-Part, reflects the genuinely important recognition that adequate nutritional support directly influences recovery, immune function, and overall outcome in critical illness, meaning nutrition should be considered a genuinely essential, active component of critical care management rather than a secondary, purely supportive consideration.

Fill in the blank: Nutritional support in critical illness requires careful consideration of the patient's own increased metabolic demand, with the specific route selected according to individual gastrointestinal _____.

4.2.2 simulated enteral feeding practice

Rehearsing the preferred, physiologically favoured feeding route

Simulated enteral feeding practice, discussed throughout this Part, requires the trainee to practise correct feeding tube placement confirmation, appropriate feed selection and rate calculation, and recognition of feeding intolerance, reflecting enteral feeding's genuinely preferred status given its more physiological delivery route and lower recognised complication profile compared with parenteral feeding.

This structured practice, discussed earlier in this sub-Part, allows the trainee to develop genuine confidence in the practical, everyday management of enteral feeding, meaning simulated enteral feeding practice directly supports the confident, competent bedside nutritional management genuine critical care practice requires.

Fill in the blank: Enteral feeding is genuinely preferred given its more physiological delivery route and lower recognised complication profile compared with parenteral _____.

4.2.3 simulated parenteral nutrition considerations

Recognising when the alternative route becomes necessary

Simulated **parenteral nutrition** scenarios, discussed throughout this Part, present the trainee with situations where enteral feeding is genuinely not feasible, requiring recognition of this specific clinical circumstance and appropriate initiation of intravenous nutritional support, together with awareness of its recognised additional complications, including line infection and metabolic derangement.

This deliberate practice, discussed earlier in this sub-Part, allows the trainee to develop genuine confidence in recognising when parenteral nutrition genuinely becomes clinically necessary, meaning simulated parenteral nutrition scenarios directly support sound, judicious clinical decision-making regarding this specific, genuinely more complication-prone nutritional route.

Fill in the blank: Simulated parenteral nutrition scenarios present the trainee with situations where enteral feeding is genuinely not feasible, together with awareness of its recognised additional _____.

Pilot questions 4.2

1. Explain why nutritional support demands careful consideration in critical illness. (Linked to SLO 4.3)
2. Describe how the route of nutritional support is selected. (Linked to SLO 4.3)
3. Describe simulated enteral feeding practice. (Linked to SLO 4.3)
4. Explain why enteral feeding is generally preferred over parenteral feeding. (Linked to SLO 4.4)
5. Describe recognised complications of parenteral nutrition. (Linked to SLO 4.4)

4.3 Simulated ICU Procedures

4.3.1 simulated arterial line insertion

Practising a genuinely common, technically demanding ICU procedure

Simulated **arterial line insertion**, discussed in relation to invasive monitoring earlier in this Series, allows the trainee to practise sterile insertion technique, correct anatomical site selection, generally the radial artery, and appropriate line securing and calibration, using appropriate arterial line training manikins providing realistic tactile feedback.

This structured, repeated practice, discussed earlier in this sub-Part, allows the trainee to develop genuine procedural confidence before performing this specific, technically demanding procedure

on a real patient, meaning simulated arterial line practice directly addresses an essential, frequently required ICU procedural skill.

Fill in the blank: Simulated arterial line insertion allows the trainee to practise sterile insertion technique, correct anatomical site selection, and appropriate line securing and _____.

4.3.2 simulated chest drain insertion

Rehearsing a genuinely important emergency and elective procedure

Simulated **chest drain insertion**, discussed throughout this Part, allows the trainee to practise correct anatomical landmark identification, the specific insertion technique, and appropriate drain securing and connection, using appropriate chest drain training manikins, building genuine procedural confidence for both elective and emergency indications.

This structured practice, discussed earlier in this sub-Part, allows the trainee to develop genuine confidence in recognising the specific anatomical landmarks and avoiding recognised complications, including incorrect placement or injury to underlying structures, meaning simulated chest drain practice directly supports safe, confident performance of this important procedure.

Fill in the blank: Simulated chest drain insertion allows the trainee to practise correct anatomical landmark identification, insertion technique, and appropriate drain securing and _____.

4.3.3 simulated tracheostomy care

Rehearsing ongoing management of an established airway

Simulated **tracheostomy care**, discussed in relation to airway management established in ANE 601, requires the trainee to practise correct suction technique, tracheostomy tube cleaning and, where indicated, changing, and prompt recognition and management of tracheostomy-related complications, including tube displacement or obstruction.

This structured practice, discussed earlier in this sub-Part, allows the trainee to develop genuine confidence in the ongoing, sustained management this specific established airway requires, meaning simulated tracheostomy care practice directly addresses a genuinely important, though frequently underemphasised, component of comprehensive ICU airway management.

Fill in the blank: Simulated tracheostomy care requires the trainee to practise correct suction technique, tracheostomy tube cleaning, and prompt recognition and management of tracheostomy-related _____.

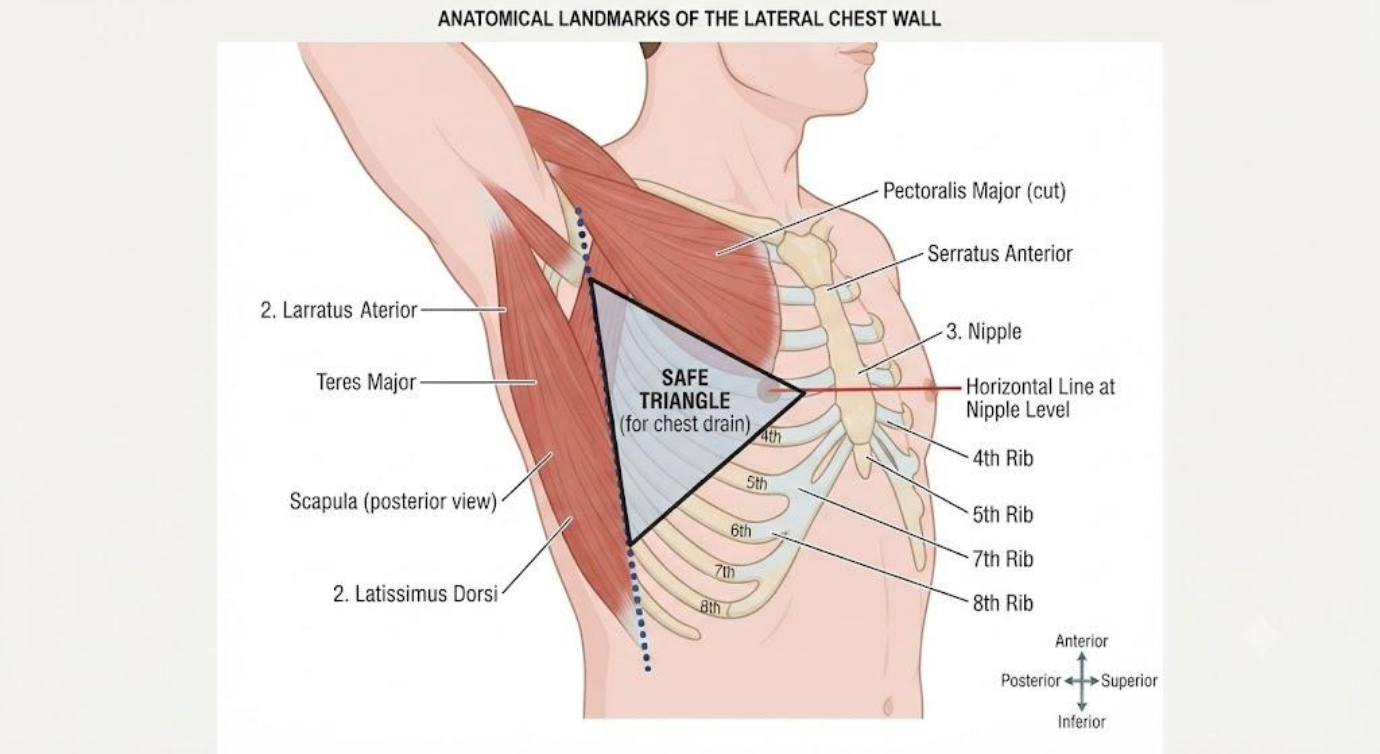

Figure 4.3: A diagram illustrating correct anatomical landmarks for chest drain insertion within the safe triangle.

Pilot questions 4.3

1. Describe what simulated arterial line insertion practice aims to develop. (Linked to SLO 4.5)
2. State the typical anatomical site for arterial line insertion. (Linked to SLO 4.5)
3. Describe what simulated chest drain insertion practice aims to develop. (Linked to SLO 4.5)
4. List complications avoided through correct chest drain landmark identification. (Linked to SLO 4.5)
5. Describe simulated tracheostomy care practice. (Linked to SLO 4.6)

4.4 Severity Scoring and Communication in ICU

4.4.1 severity of illness scoring systems

Standardised tools quantifying overall critical illness severity

Severity of illness scoring systems, discussed throughout this Part, use a combination of physiological parameters and laboratory values to generate a standardised, numerical estimate of

a patient's overall critical illness severity and associated prognosis, supporting consistent communication and comparison across different patients and clinical settings.

Familiarity with these specific scoring systems, discussed earlier in this sub-Part, and their appropriate application and interpretation, allows the trainee to genuinely contribute to structured, evidence-based clinical decision-making and prognostic discussion, meaning understanding these tools represents an essential component of comprehensive critical care competence.

Fill in the blank: Severity of illness scoring systems use a combination of physiological parameters and laboratory values to generate a standardised, numerical estimate of overall critical illness severity and associated _____.

4.4.2 simulated communication with family members

Rehearsing a genuinely challenging, emotionally demanding conversation

Simulated communication with family members, discussed throughout this Part, requires the trainee to practise conveying genuinely difficult, emotionally significant information, including prognosis and treatment goals, with appropriate clarity, empathy, and honesty, using structured communication frameworks and simulated family members or trained actors.

This deliberate, repeated practice, discussed earlier in this sub-Part, allows the trainee to develop genuine confidence and skill in this specific, genuinely challenging communication domain before encountering equivalent real conversations, meaning simulated family communication practice directly addresses a component of critical care competence frequently underemphasised relative to purely technical skill training.

Fill in the blank: Simulated communication with family members requires the trainee to practise conveying genuinely difficult, emotionally significant information with appropriate clarity, empathy, and _____.

4.4.3 simulated multidisciplinary team discussion

Practising structured, collaborative clinical decision-making

Simulated **multidisciplinary team discussion**, discussed throughout this Part, requires the trainee to practise structured, collaborative clinical decision-making, presenting relevant patient information clearly and concisely, and genuinely engaging with contributions from other simulated team members, including nursing, allied health, and further medical specialty perspectives.

This structured practice, discussed earlier in this sub-Part, allows the trainee to develop genuine competence in this specific, genuinely essential collaborative skill, meaning simulated multidisciplinary discussion practice directly supports the team-based, collaborative approach that safe, high-quality critical care genuinely requires.

Fill in the blank: Simulated multidisciplinary team discussion requires the trainee to practise presenting relevant patient information clearly and concisely, and genuinely engaging with contributions from other simulated team _____.

Table 4.4: Communication skills practised in ICU simulation.

Skill	Context	Educational focus
Severity scoring interpretation	Prognostic discussion	Standardised, evidence-based communication
Family communication	Difficult, emotionally significant conversations	Clarity, empathy, and honesty
Multidisciplinary discussion	Structured team decision-making	Collaborative, team-based practice

Pilot questions 4.4

1. Describe the purpose of severity of illness scoring systems. (Linked to SLO 4.7)
2. Explain the value of familiarity with severity scoring tools. (Linked to SLO 4.7)
3. Describe simulated family communication practice. (Linked to SLO 4.8)
4. Explain why family communication is considered a genuinely challenging skill worth deliberate practice. (Linked to SLO 4.8)
5. Describe simulated multidisciplinary team discussion practice. (Linked to SLO 4.8)

4.5 Safe Transport and Transfer of the Critically Ill Patient

4.5.1 principles of intrahospital transport

Extending critical care support beyond the ICU's own walls

Intrahospital transport of the critically ill patient, discussed throughout this Part, requires genuinely careful planning, since moving a physiologically unstable patient to another department, for imaging or further procedures, carries genuine, recognised risk of deterioration given the reduced monitoring and intervention capacity available outside the ICU environment.

This recognised risk, discussed earlier in this sub-Part, means every transport decision should genuinely weigh the clinical benefit of the planned destination against this specific transport risk, meaning safe transport represents a genuinely deliberate clinical decision rather than a routine, low-risk logistical exercise.

Fill in the blank: Intrahospital transport carries genuine, recognised risk of deterioration given the reduced monitoring and intervention capacity available outside the ICU _____.

4.5.2 simulated preparation for transfer

A systematic checklist ensuring genuine readiness before departure

Simulated preparation for transfer, discussed throughout this Part, requires the trainee to practise a systematic pre-transport checklist, confirming adequate oxygen and monitoring equipment, appropriate personnel accompanying the patient, and secure airway and vascular access, before the simulated transport itself begins.

This structured practice, discussed earlier in this sub-Part, allows the trainee to develop genuine fluency in this specific systematic preparation sequence, meaning simulated transfer preparation practice directly supports the consistent, reliable preparatory habit safe intrahospital transport genuinely demands.

Fill in the blank: Simulated preparation for transfer requires the trainee to practise a systematic pre-transport checklist, confirming adequate oxygen and monitoring equipment, appropriate personnel, and secure airway and vascular _____.

4.5.3 simulated management of complications during transport

Rehearsing response when things go wrong away from full ICU resources

Simulated complications during transport, discussed throughout this Part, present the trainee with recognisable scenarios, including equipment failure, haemodynamic deterioration, or accidental line or tube displacement, occurring during simulated transport, requiring prompt recognition and appropriate response using the genuinely limited resources available outside the ICU.

This deliberate rehearsal, discussed earlier in this sub-Part, allows the trainee to develop genuine confidence in managing these specific recognised transport complications, meaning simulated transport complication practice directly supports safer, more confident real clinical transport of critically ill patients, a scenario genuinely carrying elevated risk relative to routine, stationary ICU care.

Fill in the blank: Simulated complications during transport present the trainee with recognisable scenarios requiring prompt recognition and appropriate response using the genuinely limited resources available outside the _____.

Pilot questions 4.5

1. Explain why intrahospital transport carries genuine recognised risk. (Linked to SLO 4.9)
2. Describe the components of a systematic pre-transport checklist. (Linked to SLO 4.9)
3. Explain why transport decisions should weigh clinical benefit against risk. (Linked to SLO 4.9)
4. List examples of complications rehearsed in simulated transport scenarios. (Linked to SLO 4.10)
5. Explain why transport complications carry elevated risk relative to stationary ICU care. (Linked to SLO 4.10)

Series Summary

This Series worked through neurological monitoring and sedation in ICU, consciousness assessment, sedation, and delirium recognition, nutrition and metabolic support, enteral and parenteral considerations, simulated ICU procedures, arterial line, chest drain, and tracheostomy care, severity scoring and communication, and concluded with safe transport and transfer of the critically ill patient.

This foundation carries directly into basic life support and emergency simulation in theatre and ICU, examined in the final Series of this course.

Glossary of Terms

6. **Glasgow Coma Scale:** a structured tool assessing eye opening, verbal response, and motor response.
7. **Sedation target:** a specific, structured clinical goal guiding sedative titration in critical illness.
8. **Delirium:** an acute confusional state with fluctuating attention, common and often under-recognised in ICU.
9. **Enteral feeding:** nutritional support delivered via the gastrointestinal tract, generally the preferred route.

10. **Parenteral nutrition:** intravenous nutritional support used when enteral feeding is not feasible.
11. **Arterial line:** an invasive catheter, generally radial, used for continuous blood pressure monitoring.
12. **Chest drain safe triangle:** the anatomical region used to guide safe chest drain insertion.
13. **Tracheostomy care:** ongoing management of an established surgical airway, including suction and tube care.
14. **Severity of illness scoring system:** a standardised tool quantifying critical illness severity and prognosis.
15. **Multidisciplinary team discussion:** structured, collaborative clinical decision-making involving multiple professional perspectives.
16. **Intrahospital transport:** movement of a critically ill patient between departments within the same hospital.
17. **Pre-transport checklist:** a systematic preparation sequence confirming readiness before patient transport.

Concept Check Questions [Series 4]

Objective questions

- Simulated assessment of consciousness requires the trainee to practise applying the Glasgow Coma Scale, systematically assessing eye opening, verbal response, and motor _____.
- Enteral feeding is genuinely preferred given its more physiological delivery route and lower recognised complication profile compared with parenteral _____.
- Simulated arterial line insertion allows the trainee to practise sterile insertion technique, correct anatomical site selection, and appropriate line securing and _____.
- Severity of illness scoring systems use a combination of physiological parameters and laboratory values to generate a standardised, numerical estimate of overall critical illness severity and associated _____.
- Intrahospital transport carries genuine, recognised risk of deterioration given the reduced monitoring and intervention capacity available outside the ICU _____.

Short-answer questions

1. Explain why sedation should be deliberately targeted rather than applied without a clear goal.
2. Describe how the route of nutritional support is selected.
3. State the typical anatomical site for arterial line insertion.

4. Describe simulated family communication practice.
5. Describe the components of a systematic pre-transport checklist.

Long-answer questions

6. Discuss simulated consciousness assessment, sedation practice, and delirium recognition in ICU. (Linked to SLO 4.1, SLO 4.2)
7. Discuss principles of nutritional support and simulated enteral and parenteral feeding practice. (Linked to SLO 4.3, SLO 4.4)
8. Discuss simulated arterial line insertion, chest drain insertion, and tracheostomy care. (Linked to SLO 4.5, SLO 4.6)
9. Discuss severity of illness scoring systems and simulated family and multidisciplinary communication. (Linked to SLO 4.7, SLO 4.8)
10. Discuss principles of intrahospital transport and simulated preparation and complication management during transfer. (Linked to SLO 4.9, SLO 4.10)

Answers to Concept Check Questions [Series 4]

Objective questions

11. Response.
12. Nutrition.
13. Calibration.
14. Prognosis.
15. Environment.

Short-answer questions

16. Because deliberate targeting avoids both under-sedation and over-sedation, each carrying genuine recognised risk.
17. According to the patient's individual gastrointestinal function, enteral where feasible, parenteral where not tolerated.
18. Generally the radial artery.
19. Practising conveying difficult, emotionally significant information with clarity, empathy, and honesty using structured frameworks.
20. Confirming adequate oxygen and monitoring equipment, appropriate accompanying personnel, and secure airway and vascular access.

Long-answer questions

21. **Basic response:** Consciousness assessment uses the Glasgow Coma Scale, while sedation practice requires deliberate titration against a structured target.

Value-added response: Delirium recognition addresses a common, under-recognised complication requiring both non-pharmacological and pharmacological management strategies.

22. **Basic response:** Nutritional support route is selected according to gastrointestinal function, with enteral feeding generally preferred.

Value-added response: Parenteral nutrition is recognised and initiated when enteral feeding is genuinely not feasible, with awareness of its additional complications.

23. **Basic response:** Arterial line and chest drain insertion practice build sterile technique and anatomical landmark confidence for common ICU procedures.

Value-added response: Tracheostomy care practice addresses the ongoing, sustained management this established airway requires.

24. **Basic response:** Severity scoring systems support standardised, evidence-based prognostic communication.

Value-added response: Family and multidisciplinary communication practice addresses genuinely challenging interpersonal and collaborative skills often underemphasised relative to technical training.

25. **Basic response:** Intrahospital transport carries genuine risk requiring careful, deliberate preparation before every transfer.

Value-added response: Simulated complication management builds confidence in responding to recognised transport risks using the limited resources available outside the ICU.

Answers to Pilot Questions [Series 4]

Part 4.1

1. Eye opening, verbal response, and motor response.
2. It develops genuine fluency and consistency in applying this specific assessment tool.
3. Because deliberate targeting avoids both under-sedation and over-sedation, each carrying genuine risk.

4. Under-sedation risks patient distress and self-harm; over-sedation risks delayed recovery and further complication.
5. Through recognisable patterns of acute confusion, fluctuating attention, and altered arousal using a validated assessment tool.

Part 4.2

6. Because critical illness produces increased metabolic demand directly influencing recovery and outcome.
7. According to the patient's individual gastrointestinal function.
8. Feeding tube placement confirmation, feed selection and rate calculation, and recognition of feeding intolerance.
9. Because it offers a more physiological delivery route and a lower recognised complication profile.
10. Line infection and metabolic derangement.

Part 4.3

11. Genuine procedural confidence in sterile insertion technique before performing the procedure on a real patient.
12. Generally the radial artery.
13. Confidence in anatomical landmark identification, insertion technique, and complication avoidance.
14. Incorrect placement and injury to underlying structures.
15. Correct suction technique, tube cleaning and changing, and recognition of tube displacement or obstruction.

Part 4.4

1. To generate a standardised, numerical estimate of critical illness severity and prognosis.
2. It allows the trainee to genuinely contribute to structured, evidence-based clinical decision-making.
3. Practising difficult, emotionally significant conversations using structured frameworks and simulated family members.
4. Because it is a genuinely challenging skill frequently underemphasised relative to purely technical training.
5. Presenting patient information clearly and engaging with contributions from other simulated team members.

Part 4.5

1. Because reduced monitoring and intervention capacity outside the ICU increases risk of deterioration.
2. Confirming adequate oxygen and monitoring equipment, appropriate personnel, and secure airway and vascular access.
3. Because transport itself carries genuine risk that must be justified by the clinical benefit of the destination.
4. Equipment failure, haemodynamic deterioration, and accidental line or tube displacement.
5. Because ICU's full monitoring and intervention resources are not available during transport.

References and Attributions [Series 4]

6. Marino, P. L. (2014). The ICU Book (4th ed.). Wolters Kluwer.
7. Ely, E. W., et al. (2001). Delirium in mechanically ventilated patients: validity and reliability of the confusion assessment method for the intensive care unit. JAMA, 286(21), 2703-2710.
8. Warren, J., et al. (2004). Guidelines for the inter- and intrahospital transport of critically ill patients. Critical Care Medicine, 32(1), 256-262.
9. Miller, R. D., et al. (2019). Miller's Anesthesia (9th ed.). Elsevier.

Figures, Plates, Tables, and Boxes

1. Table 4.1: Simulated neurological monitoring and sedation skills. AI-generated using the prompt: "Create a clean clinical education reference table titled Simulated Neurological Monitoring and Sedation Skills, listing skill, assessment tool, and clinical purpose. Medical education reference table style with outside border, no photographic elements."
2. Figure 4.3: A diagram illustrating correct anatomical landmarks for chest drain insertion within the safe triangle. AI-generated using the prompt: "A single clean, accurate anatomical diagram of the lateral chest wall with a clearly labelled triangular region bordered by the anterior axillary line, latissimus dorsi, and a horizontal line at nipple level, textbook anatomical diagram style, neutral background, no photographic realism, no other panels."
3. Table 4.4: Communication skills practised in ICU simulation. AI-generated using the prompt: "Create a clean clinical education reference table titled Communication Skills

Practised in ICU Simulation, listing skill, context, and educational focus. Medical education reference table style with outside border, no photographic elements."

Series 5: Basic Life Support and Emergency Simulation in Theatre and ICU

- **Part 5.1: Foundations of Basic Life Support Simulation**
  - Sub Part 5.1.1: Simulated recognition of cardiopulmonary arrest
  - Sub Part 5.1.2: Simulated chest compression and ventilation technique
  - Sub Part 5.1.3: Simulated use of an automated external defibrillator
- **Part 5.2: Emergency Simulation in the Operating Theatre**
  - Sub Part 5.2.1: Simulated management of intraoperative cardiac arrest
  - Sub Part 5.2.2: Simulated management of anaphylaxis in theatre
  - Sub Part 5.2.3: Simulated management of malignant hyperthermia
- **Part 5.3: Emergency Simulation in the ICU**
  - Sub Part 5.3.1: Simulated management of cardiac arrest in the ventilated ICU patient
  - Sub Part 5.3.2: Simulated management of acute airway emergencies in ICU
  - Sub Part 5.3.3: Simulated management of massive haemorrhage
- **Part 5.4: Team-Based Crisis Resource Management**
  - Sub Part 5.4.1: Principles of crisis resource management
  - Sub Part 5.4.2: Simulated leadership and role allocation in emergencies
  - Sub Part 5.4.3: Simulated closed-loop communication during resuscitation
- **Part 5.5: Integrated Assessment and Course Consolidation**
  - Sub Part 5.5.1: Integrated perioperative and ICU emergency scenario
  - Sub Part 5.5.2: Structured debriefing and performance feedback
  - Sub Part 5.5.3: Consolidating competence across the course

Introduction

Every skill practised throughout this course, airway management, cardiovascular monitoring, regional and general anaesthetic technique, ICU bedside procedures, converges in this final Series on the single most time-critical scenario a trainee will ever face, a patient in genuine,

immediate danger of death. This Series works through the foundations of **basic life support** simulation, **emergency scenarios specific to the operating theatre**, **emergency scenarios specific to the ICU**, the **crisis resource management** skills that determine whether a team responds effectively under pressure, and, finally, an **integrated assessment** consolidating the full range of competence developed across this entire course.

The aim of this Series is to equip you with a thorough, practical understanding of providing basic life support care under emergency conditions, and of managing genuine emergency scenarios specific to both the operating theatre and ICU environments through structured simulation-based practice.

This Series begins with **foundations of basic life support simulation**, before turning to **emergency simulation in the operating theatre**, **emergency simulation in the ICU**, and **team-based crisis resource management**. It concludes with **integrated assessment and course consolidation**.

Series Learning Outcomes

At the end of this Series, you should be able to:

- **SLO 5.1:** demonstrate simulated recognition of cardiopulmonary arrest and chest compression and ventilation technique
- **SLO 5.2:** demonstrate simulated use of an automated external defibrillator
- **SLO 5.3:** demonstrate simulated management of intraoperative cardiac arrest, anaphylaxis, and malignant hyperthermia
- **SLO 5.4:** demonstrate simulated management of cardiac arrest and acute airway emergencies in the ICU
- **SLO 5.5:** demonstrate simulated management of massive haemorrhage
- **SLO 5.6:** describe the principles of crisis resource management
- **SLO 5.7:** demonstrate simulated leadership and role allocation in emergencies
- **SLO 5.8:** demonstrate simulated closed-loop communication during resuscitation
- **SLO 5.9:** participate in an integrated perioperative and ICU emergency scenario, and
- **SLO 5.10:** engage in structured debriefing and consolidate competence developed across the course.

5.1 Foundations of Basic Life Support Simulation

5.1.1 simulated recognition of cardiopulmonary arrest

Practising immediate, confident recognition without hesitation

Simulated recognition of cardiopulmonary arrest, applying the specific principles established in ANE 601, requires the trainee to practise prompt, confident assessment of responsiveness and breathing, without unnecessary delay, using a simulation manikin programmed to present a recognisable arrest scenario.

This deliberate, repeated practice, discussed earlier in this sub-Part, allows the trainee to develop genuine automatic fluency in this specific recognition sequence, meaning simulated recognition practice directly supports the immediate, confident response that survival following genuine cardiac arrest genuinely requires.

Fill in the blank: Simulated recognition of cardiopulmonary arrest requires the trainee to practise prompt, confident assessment of responsiveness and breathing, without unnecessary _____.

5.1.2 simulated chest compression and ventilation technique

Building genuinely correct, effective physical technique

Simulated chest compression and ventilation technique, applying the specific sequence established in ANE 601, requires the trainee to practise correct hand positioning, adequate compression depth and rate, and effective rescue breath delivery, using a simulation manikin providing genuine, objective feedback on compression quality.

This structured, repeated practice, discussed earlier in this sub-Part, allows the trainee to develop and maintain genuinely correct technique, since research consistently demonstrates that compression quality deteriorates without regular practice, meaning simulated skills maintenance represents an essential, ongoing component of basic life support competence rather than a single, one-time achievement.

Fill in the blank: Research consistently demonstrates that compression quality deteriorates without regular practice, meaning simulated skills maintenance represents an essential, ongoing _____ of basic life support competence.

5.1.3 simulated use of an automated external defibrillator

Rehearsing rapid, correct defibrillator application

Simulated use of an automated external defibrillator, discussed throughout this Part, requires the trainee to practise rapid pad placement, correct interpretation of the device's rhythm analysis prompts, and safe shock delivery, using a training defibrillator integrated with the simulation scenario.

This structured practice, discussed earlier in this sub-Part, allows the trainee to develop genuine confidence in this specific device operation under simulated time pressure, meaning simulated defibrillator practice directly supports the prompt, effective early defibrillation that meaningfully improves survival from shockable cardiac arrest rhythms.

Fill in the blank: Simulated use of an automated external defibrillator requires the trainee to practise rapid pad placement, correct interpretation of the device's rhythm analysis prompts, and safe shock _____.

Table 5.1: Key skills rehearsed in basic life support simulation.

Skill	Key focus	Educational value
Recognition	Prompt, confident assessment without delay	Reduces time to resuscitation initiation
Compressions and ventilation	Correct technique and adequate quality	Maintains skill quality over time
AED use	Rapid, correct device operation	Supports prompt, effective early defibrillation

Pilot questions 5.1

- Describe what simulated cardiopulmonary arrest recognition practice aims to develop. (Linked to SLO 5.1)
- List the key technical components of correct chest compression technique. (Linked to SLO 5.1)
- Explain why regular simulated practice is required to maintain compression quality. (Linked to SLO 5.1)
- Describe simulated automated external defibrillator practice. (Linked to SLO 5.2)
- Explain the importance of prompt defibrillation for shockable rhythms. (Linked to SLO 5.2)

5.2 Emergency Simulation in the Operating Theatre

5.2.1 simulated management of intraoperative cardiac arrest

Applying resuscitation principles within the specific theatre context

Simulated intraoperative cardiac arrest, applying the specific resuscitation principles established earlier in this Series, presents the trainee with a genuinely distinct clinical context from standard basic life support, requiring the team to consider surgery-specific causes, including haemorrhage or anaesthetic agent effect, alongside the standard resuscitation sequence.

This structured practice, discussed earlier in this sub-Part, allows the trainee to develop genuine confidence in adapting standard resuscitation principles to this specific, genuinely complex intraoperative context, meaning simulated intraoperative arrest practice directly addresses a scenario carrying particular relevance given the anaesthetist's own central role in theatre.

Fill in the blank: Simulated intraoperative cardiac arrest requires the team to consider surgery-specific causes, including haemorrhage or anaesthetic agent effect, alongside the standard resuscitation _____.

5.2.2 simulated management of anaphylaxis in theatre

Recognising and treating a genuine, rapidly evolving emergency

Simulated anaphylaxis scenarios, discussed throughout this Part, present the trainee with recognisable patterns of sudden hypotension, bronchospasm, and skin changes following drug administration, requiring prompt recognition and immediate treatment with intramuscular adrenaline, together with supportive airway and cardiovascular management.

This deliberate rehearsal, discussed earlier in this sub-Part, allows the trainee to develop genuine confidence in recognising this specific, genuinely rapidly evolving emergency and responding without delay, meaning simulated anaphylaxis practice directly supports prompt, life-saving intervention when this recognised complication is genuinely encountered.

Fill in the blank: Simulated anaphylaxis scenarios present the trainee with recognisable patterns of sudden hypotension, bronchospasm, and skin changes, requiring prompt recognition and immediate treatment with intramuscular _____.

5.2.3 simulated management of malignant hyperthermia

Rehearsing recognition and treatment of a genuine rare emergency

Simulated **malignant hyperthermia** scenarios, discussed in relation to this specific complication established in ANE 601, present the trainee with recognisable early signs, including unexplained tachycardia, rising end-tidal carbon dioxide, and muscle rigidity, requiring immediate cessation of triggering agents and prompt administration of **dantrolene**.

This deliberate rehearsal, discussed earlier in this sub-Part, carries genuine particular educational value given this condition's rarity, since most anaesthetists will genuinely encounter malignant hyperthermia rarely, if ever, in real clinical practice, meaning simulated exposure represents essentially the only reliable way to maintain genuine readiness for this specific, life-threatening emergency.

Fill in the blank: Simulated malignant hyperthermia rehearsal carries genuine particular educational value given this condition's rarity, since simulated exposure represents essentially the only reliable way to maintain genuine readiness for this specific, life-threatening _____.

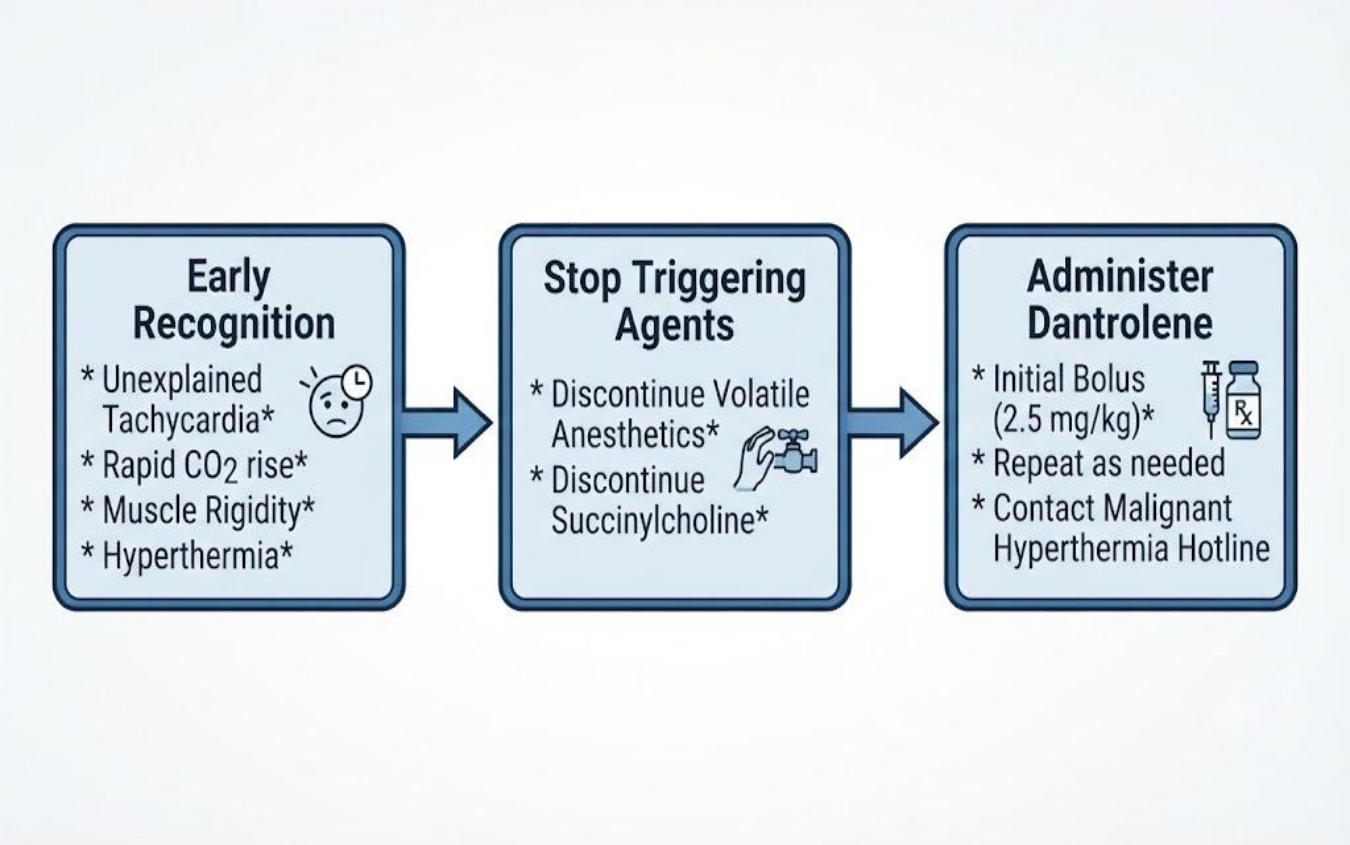

Figure 5.2: A diagram illustrating the recognition and response sequence for malignant hyperthermia, from early signs through treatment with dantrolene.

Pilot questions 5.2

1. Describe how intraoperative cardiac arrest management differs from standard basic life support. (Linked to SLO 5.3)
2. List surgery-specific causes to consider during intraoperative arrest. (Linked to SLO 5.3)
3. Describe the recognisable features of anaphylaxis rehearsed in simulation. (Linked to SLO 5.3)
4. Describe the immediate treatment of anaphylaxis. (Linked to SLO 5.3)
5. Explain why simulated malignant hyperthermia practice carries particular educational value. (Linked to SLO 5.3)

5.3 Emergency Simulation in the ICU

5.3.1 simulated management of cardiac arrest in the ventilated icu patient

Adapting standard resuscitation to an already instrumented patient

Simulated cardiac arrest in the ventilated ICU patient, discussed throughout this Part, requires the trainee to practise adapting standard resuscitation technique to a patient already receiving mechanical ventilation and multiple infusions, discussed in relation to ICU equipment established earlier in this course, considering ventilator-related and line-related causes alongside standard resuscitation priorities.

This structured practice, discussed earlier in this sub-Part, allows the trainee to develop genuine confidence in this specific, genuinely complex resuscitation context, meaning simulated ICU cardiac arrest practice directly addresses a scenario carrying particular complexity given the additional equipment and physiological support already in place.

Fill in the blank: Simulated cardiac arrest in the ventilated ICU patient requires the trainee to consider ventilator-related and line-related causes alongside standard resuscitation _____.

5.3.2 simulated management of acute airway emergencies in icu

Rehearsing response to a genuinely established airway going wrong

Simulated acute airway emergencies in ICU, discussed throughout this Part, present the trainee with recognisable scenarios including endotracheal tube displacement, tracheostomy tube

obstruction, discussed in relation to tracheostomy care established earlier in this course, and acute desaturation despite established mechanical ventilation, requiring prompt, systematic troubleshooting.

This deliberate rehearsal, discussed earlier in this sub-Part, allows the trainee to develop genuine confidence in this specific, genuinely time-critical troubleshooting sequence, meaning simulated ICU airway emergency practice directly supports safer, more confident real clinical response when an established airway device genuinely malfunctions.

Fill in the blank: Simulated acute airway emergencies in ICU require prompt, systematic troubleshooting of scenarios including endotracheal tube displacement and tracheostomy tube _____.

5.3.3 simulated management of massive haemorrhage

Rehearsing coordinated response to genuine, rapid blood loss

Simulated **massive haemorrhage** scenarios, applying the specific blood loss and replacement principles established in ANE 601, present the trainee with rapidly evolving blood loss requiring prompt recognition, activation of a massive transfusion protocol, and coordinated team response addressing both the underlying source of bleeding and ongoing physiological resuscitation.

This structured practice, discussed earlier in this sub-Part, allows the trainee to develop genuine confidence in this specific, genuinely high-stakes coordinated response, meaning simulated massive haemorrhage practice directly supports the rapid, effective team-based intervention this genuinely time-critical emergency demands.

Fill in the blank: Simulated massive haemorrhage scenarios require prompt recognition, activation of a massive transfusion protocol, and coordinated team response addressing both the underlying source of bleeding and ongoing physiological _____.

Pilot questions 5.3

1. Explain why cardiac arrest management in the ventilated ICU patient requires additional consideration. (Linked to SLO 5.4)
2. List recognisable scenarios rehearsed in simulated ICU airway emergencies. (Linked to SLO 5.4)
3. Describe the systematic troubleshooting approach practised for airway emergencies. (Linked to SLO 5.4)

4. Describe the components of simulated massive haemorrhage management. (Linked to SLO 5.5)
5. Explain why massive haemorrhage demands a coordinated team response. (Linked to SLO 5.5)

5.4 Team-Based Crisis Resource Management

5.4.1 principles of crisis resource management

The non-technical skills determining team-level success

Crisis resource management, discussed in relation to non-technical skills established earlier in this course, describes the specific principles governing effective team performance during a genuine emergency, including clear leadership, appropriate task distribution, and maintaining overall situational awareness even while individual team members focus on specific tasks.

These principles, discussed earlier in this sub-Part, recognise that genuine emergency outcomes depend considerably on team-level coordination and communication, not merely on the sum of individual technical skill, meaning crisis resource management represents a genuinely essential, learnable competency in its own right rather than an automatic byproduct of individual clinical expertise.

Fill in the blank: Crisis resource management recognises that genuine emergency outcomes depend considerably on team-level coordination and communication, not merely on the sum of individual technical _____.

5.4.2 simulated leadership and role allocation in emergencies

Practising the specific skill of directing a team under pressure

Simulated leadership practice, discussed throughout this Part, requires the trainee to practise clearly establishing themselves as team leader during a simulated emergency, explicitly allocating specific roles to other team members, and maintaining an overall, coordinated view of the evolving clinical situation rather than becoming absorbed in any single specific task.

This deliberate rehearsal, discussed earlier in this sub-Part, allows the trainee to develop genuine confidence in this specific leadership role, meaning simulated leadership practice directly addresses a genuinely important skill that many trainees have limited opportunity to practise during routine, non-emergency clinical training alone.

Fill in the blank: Simulated leadership practice requires the trainee to explicitly allocate specific roles to other team members and maintain an overall, coordinated view of the evolving clinical _____.

5.4.3 simulated closed-loop communication during resuscitation

A structured technique confirming instructions are genuinely received

Closed-loop communication, discussed throughout this Part, requires the team member receiving an instruction to explicitly acknowledge and confirm that instruction, and, once completed, explicitly confirm its completion back to the team leader, reducing the genuine risk of missed, misunderstood, or duplicated instructions during a genuine emergency.

Simulated practice of this specific communication technique, discussed earlier in this sub-Part, allows the trainee to develop genuine, consistent fluency in its application, meaning simulated closed-loop communication practice directly supports the reliable, error-resistant team communication genuine emergency response demands.

Fill in the blank: Closed-loop communication requires the team member receiving an instruction to explicitly acknowledge it, and, once completed, explicitly confirm its completion back to the team _____.

Table 5.4: Key principles of crisis resource management.

Principle	Description	Value
Clear leadership	One person explicitly establishes team leadership	Coordinates overall team response
Role allocation	Specific tasks explicitly assigned to team members	Prevents duplication and confusion
Closed-loop communication	Instructions acknowledged and confirmed on completion	Reduces missed or misunderstood instructions

Pilot questions 5.4

1. Define crisis resource management. (Linked to SLO 5.6)
2. Explain why crisis resource management is considered a distinct, learnable competency. (Linked to SLO 5.6)
3. Describe simulated leadership practice during emergency scenarios. (Linked to SLO 5.7)
4. Define closed-loop communication. (Linked to SLO 5.8)

5. Explain how closed-loop communication reduces the risk of missed or misunderstood instructions. (Linked to SLO 5.8)

5.5 Integrated Assessment and Course Consolidation

5.5.1 integrated perioperative and icu emergency scenario

Combining every skill developed across the entire course

The **integrated scenario**, discussed throughout this Part, deliberately combines preoperative assessment, intraoperative management, and potential ICU transfer within a single, extended simulation exercise, requiring the trainee to draw upon and integrate the full range of skills developed across every previous Series of this course.

This genuinely comprehensive scenario, discussed earlier in this sub-Part, allows both the trainee and their assessors to evaluate genuinely integrated clinical competence, rather than isolated, discrete individual skills, meaning this specific exercise represents a genuinely authentic reflection of the real, interconnected demands of actual clinical practice.

Fill in the blank: The integrated scenario deliberately combines preoperative assessment, intraoperative management, and potential ICU transfer within a single, extended simulation _____.

5.5.2 structured debriefing and performance feedback

Closing the final loop of this course's genuinely central learning method

Structured debriefing following the integrated scenario, discussed in relation to debriefing principles established earlier in this course, allows genuinely thorough, comprehensive review of the trainee's overall performance across every domain assessed, technical skill, clinical reasoning, and crisis resource management, discussed earlier in this Series.

This final, comprehensive debriefing, discussed earlier in this sub-Part, provides genuinely valuable, consolidated feedback drawing together the trainee's overall development across the entire course, meaning this specific debriefing represents a genuinely important capstone learning opportunity rather than simply another routine scenario review.

Fill in the blank: Structured debriefing following the integrated scenario allows genuinely thorough, comprehensive review of the trainee's overall performance across every domain assessed, technical skill, clinical reasoning, and crisis resource _____.

5.5.3 consolidating competence across the course

Reflecting on the complete journey from ANE 601 to confident practice

Consolidating competence across this entire course, discussed throughout this Series, requires the trainee to genuinely reflect on their own progression from the theoretical foundation established in ANE 601 through the perioperative, theatre-based, and ICU-based simulation practice examined throughout this course, toward genuinely confident, integrated clinical competence.

This final, deliberate reflection, discussed earlier in this sub-Part, supports genuine ongoing professional development beyond the formal conclusion of this course itself, meaning the specific habits of reflective practice, simulation-based rehearsal, and structured debriefing established throughout this course should genuinely continue to inform the trainee's own ongoing clinical development well beyond its formal completion.

Fill in the blank: The specific habits of reflective practice, simulation-based rehearsal, and structured debriefing established throughout this course should genuinely continue to inform the trainee's own ongoing clinical _____ well beyond its formal completion.

Pilot questions 5.5

1. Describe the purpose of the integrated perioperative and ICU emergency scenario. (Linked to SLO 5.9)
2. Explain why the integrated scenario provides a genuinely authentic reflection of real clinical practice. (Linked to SLO 5.9)
3. Describe the scope of structured debriefing following the integrated scenario. (Linked to SLO 5.10)
4. Explain why this final debriefing is considered a capstone learning opportunity. (Linked to SLO 5.10)
5. Explain why reflective practice habits should continue beyond the formal completion of this course. (Linked to SLO 5.10)

Series Summary

This final Series worked through the foundations of basic life support simulation, recognition, compressions, and defibrillator use, emergency simulation specific to the operating theatre,

cardiac arrest, anaphylaxis, and malignant hyperthermia, emergency simulation specific to the ICU, cardiac arrest, airway emergencies, and massive haemorrhage, team-based crisis resource management, leadership and closed-loop communication, and concluded with an integrated assessment scenario consolidating competence developed across the entire course.

Across this entire course, you have now worked through perioperative management principles and preoperative simulation, theatre-based clinical skills and intraoperative simulation, ICU bedside skills for the critically ill patient, further ICU monitoring, procedures, and simulation-based practice, and, finally, basic life support and emergency simulation in theatre and ICU, together forming a genuinely comprehensive, practical bridge from the theoretical foundation of ANE 601 toward confident, competent clinical practice addressed throughout ANE 603.

Glossary of Terms

6. **Compression quality:** the correctness and consistency of chest compression rate, depth, and hand position.
7. **Automated external defibrillator (AED):** a device delivering an electrical shock to restore normal cardiac rhythm.
8. **Intraoperative cardiac arrest:** cardiac arrest occurring during a surgical procedure, requiring consideration of surgery-specific causes.
9. **Anaphylaxis:** a rapidly evolving, severe allergic reaction requiring immediate adrenaline treatment.
10. **Malignant hyperthermia:** a rare, genetically predisposed hypermetabolic reaction treated with dantrolene.
11. **Massive transfusion protocol:** a structured, coordinated response to rapidly evolving, significant blood loss.
12. **Crisis resource management:** the non-technical principles governing effective team performance during emergencies.
13. **Situational awareness:** maintaining an overall, coordinated understanding of an evolving clinical situation.
14. **Closed-loop communication:** a technique in which instructions are explicitly acknowledged and confirmed on completion.
15. **Integrated scenario:** a comprehensive simulation combining multiple clinical domains within a single exercise.
16. **Capstone learning opportunity:** a final, comprehensive educational experience consolidating skills developed across a course.
17. **Reflective practice:** the ongoing habit of reviewing and learning from one's own clinical performance.

Concept Check Questions [Series 5]

Objective questions

- Research consistently demonstrates that compression quality deteriorates without regular practice, meaning simulated skills maintenance represents an essential, ongoing _____ of basic life support competence.
- Simulated malignant hyperthermia rehearsal carries genuine particular educational value given this condition's rarity, since simulated exposure represents essentially the only reliable way to maintain genuine readiness for this specific, life-threatening _____.
- Simulated cardiac arrest in the ventilated ICU patient requires the trainee to consider ventilator-related and line-related causes alongside standard resuscitation _____.
- Crisis resource management recognises that genuine emergency outcomes depend considerably on team-level coordination and communication, not merely on the sum of individual technical _____.
- Closed-loop communication requires the team member receiving an instruction to explicitly acknowledge it, and, once completed, explicitly confirm its completion back to the team _____.

Short-answer questions

1. List the key technical components of correct chest compression technique.
2. Describe the immediate treatment of anaphylaxis.
3. List surgery-specific causes to consider during intraoperative arrest.
4. Describe simulated leadership practice during emergency scenarios.
5. Describe the purpose of the integrated perioperative and ICU emergency scenario.

Long-answer questions

6. Discuss the foundations of basic life support simulation: recognition, compressions, and defibrillator use. (Linked to SLO 5.1, SLO 5.2)
7. Discuss simulated management of intraoperative cardiac arrest, anaphylaxis, and malignant hyperthermia. (Linked to SLO 5.3)
8. Discuss simulated management of cardiac arrest, airway emergencies, and massive haemorrhage in the ICU. (Linked to SLO 5.4, SLO 5.5)
9. Discuss the principles of crisis resource management, leadership, and closed-loop communication. (Linked to SLO 5.6, SLO 5.7, SLO 5.8)
10. Discuss the integrated assessment scenario and consolidation of competence across the course. (Linked to SLO 5.9, SLO 5.10)

Answers to Concept Check Questions [Series 5]

Objective questions

11. Component.
12. Emergency.
13. Priorities.
14. Skill.
15. Leader.

Short-answer questions

16. Correct hand positioning, adequate compression depth and rate, and effective rescue breath delivery.
17. Immediate intramuscular adrenaline, together with supportive airway and cardiovascular management.
18. Haemorrhage and anaesthetic agent effect.
19. Clearly establishing team leadership, allocating specific roles, and maintaining overall situational awareness.
20. To combine preoperative, intraoperative, and ICU transfer management within a single, extended, integrated exercise.

Long-answer questions

21. **Basic response:** Basic life support foundations include prompt recognition, correct compression and ventilation technique, and confident AED use.

Value-added response: Regular simulated practice is essential given the recognised tendency for compression quality to deteriorate without maintenance.

22. **Basic response:** Intraoperative arrest, anaphylaxis, and malignant hyperthermia each present genuinely distinct recognisable patterns requiring specific management.

Value-added response: Simulated exposure to these scenarios, particularly rare events like malignant hyperthermia, represents essentially the only reliable route to genuine readiness.

23. **Basic response:** ICU cardiac arrest, airway emergencies, and massive haemorrhage each demand adaptation of standard principles to the specific ICU context.

Value-added response: Simulated practice builds confidence in troubleshooting and coordinated team response within this genuinely complex environment.

24. **Basic response:** Crisis resource management principles, leadership, role allocation, and closed-loop communication, determine team-level emergency success.

Value-added response: These non-technical skills are genuinely learnable competencies distinct from individual technical clinical expertise.

25. **Basic response:** The integrated scenario combines every skill developed across the course into a single, authentic exercise.

Value-added response: Comprehensive debriefing and ongoing reflective practice extend the course's learning habits well beyond its formal completion.

Answers to Pilot Questions [Series 5]

Part 5.1

1. Immediate, automatic fluency in confident, prompt recognition without hesitation.
2. Correct hand positioning, adequate compression depth and rate, and effective rescue breath delivery.
3. Because research demonstrates compression quality deteriorates without regular, ongoing practice.
4. Rapid pad placement, correct interpretation of rhythm analysis prompts, and safe shock delivery.
5. Prompt defibrillation meaningfully improves survival from shockable cardiac arrest rhythms.

Part 5.2

6. It requires considering surgery-specific causes, such as haemorrhage or anaesthetic effect, alongside standard resuscitation.
7. Haemorrhage and anaesthetic agent effect.
8. Sudden hypotension, bronchospasm, and skin changes following drug administration.
9. Immediate intramuscular adrenaline, with supportive airway and cardiovascular management.
10. Because most anaesthetists rarely encounter it in real practice, making simulation essentially the only reliable readiness route.

Part 5.3

11. Because ventilator-related and line-related causes must be considered alongside standard resuscitation priorities.
12. Endotracheal tube displacement, tracheostomy tube obstruction, and acute desaturation despite ventilation.
13. Prompt, systematic troubleshooting of the specific airway device and ventilator system.
14. Prompt recognition, massive transfusion protocol activation, and coordinated response addressing bleeding source and resuscitation.
15. Because it is a rapidly evolving, high-stakes emergency requiring simultaneous, coordinated actions across the team.

Part 5.4

1. The non-technical principles governing effective team performance during a genuine emergency.
2. Because emergency outcomes depend considerably on team-level coordination, not merely individual technical skill.
3. Explicitly establishing leadership, allocating roles, and maintaining overall situational awareness.
4. A technique in which instructions are explicitly acknowledged by the receiver and confirmed once completed.
5. By ensuring instructions are actively confirmed rather than assumed to have been heard and understood.

Part 5.5

1. To combine preoperative, intraoperative, and ICU transfer management within a single, extended exercise.
2. Because it reflects the real, interconnected demands of actual clinical practice rather than isolated skills.
3. Technical skill, clinical reasoning, and crisis resource management across the entire scenario.
4. Because it draws together the trainee's overall development across the entire course into a single, consolidated review.
5. Because ongoing professional development genuinely continues well beyond any single course's formal conclusion.

References and Attributions [Series 5]

6. Resuscitation Council UK (2021). Adult Basic Life Support Guidelines.
7. Gaba, D. M. (2004). The future vision of simulation in health care. Quality and Safety in Health Care, 13(suppl 1), i2-i10.
8. Aitkenhead, A. R., Moppett, I. K., & Thompson, J. P. (2013). Smith and Aitkenhead's Textbook of Anaesthesia (6th ed.). Churchill Livingstone.
9. Marino, P. L. (2014). The ICU Book (4th ed.). Wolters Kluwer.

Figures, Plates, Tables, and Boxes

1. Table 5.1: Key skills rehearsed in basic life support simulation. AI-generated using the prompt: "Create a clean clinical education reference table titled Key Skills Rehearsed in Basic Life Support Simulation, listing skill, key focus, and educational value. Medical education reference table style with outside border, no photographic elements."
2. Figure 5.2: A diagram illustrating the recognition and response sequence for malignant hyperthermia, from early signs through treatment with dantrolene. AI-generated using the prompt: "A single clean, accurate schematic flow diagram with three labelled sequential boxes, Early Recognition, Stop Triggering Agents, and Administer Dantrolene, connected by directional arrows, textbook clinical diagram style, neutral background, no photographic realism, no other panels."
3. Table 5.4: Key principles of crisis resource management. AI-generated using the prompt: "Create a clean clinical education reference table titled Key Principles of Crisis Resource Management, listing principle, description, and value. Medical education reference table style with outside border, no photographic elements."