

EM PIONEERS

Emergency Medicine Education

Mastering of

A · B · C · D · E

**APPROACH TO THE
EMERGENCY PATIENT
CANDIDATE STUDY BOOK**

Complete Study Manual for the EM PIONEERS ABCDE Course
Modules 0–8 | All ABCDE Components | Clinical Pearls | Self-Test Questions

BY

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LEARNER DETAILS

Name: _____

Profession / Role: _____

Institution: _____

Enrolment Date: _____

Certificate	Target	Date:
_____	_____	_____

How to Use This Study Book

This study book is your written companion to the EM PIONEERS ABCDE video course. It is designed to be used alongside the video modules — not instead of them.

Each chapter corresponds to one module. Within each chapter you will find:

- The full learning objectives for that module
- Structured written notes covering every topic in the module
- Clinical pearls — the high-yield points that change how you practice
- Key tables and quick-reference summaries
- Self-test questions — apply what you have read before moving on
- A module summary card at the end of each chapter

How to get the most from this book:

1. Watch the video module first. The book reinforces — it does not replace.
2. Read the chapter while your memory is fresh from the video.
3. Highlight and annotate freely — this book is yours.
4. Attempt every self-test question before reading the answer.
5. Download and print the quick reference cards from the LMS platform — keep them at work.

THE GOLDEN RULE

ABCDE is not a checklist you recall. It is a system that becomes a reflex. The only way to build a reflex is repetition — reading, watching, practicing, and applying.

Use this book as the foundation. Use every patient as the practice.

Return to this book after each clinical shift and reflect on one case where these principles applied.

Course Overview

Mod	Title	Quiz	Deliverable
0	Introduction — Philosophy of ABCDE	5 Qs	Completion badge
1	A — Airway	15 Qs	Certificate + Airway Card
2	B — Breathing	15 Qs	Certificate + Breathing Card
3	C — Circulation	20 Qs	Certificate + Shock Card
4	D — Disability	15 Qs	Certificate + Neuro Card
5	E — Exposure	10 Qs	Certificate + Survey Checklist
6	Putting It All Together	15 Qs	Certificate + ABCDE Poster
7	Special Populations	20 Qs	Certificate + Reference Card
8	Final Assessment	40 MCQ + scenarios	Course Certificate

Total learning content: approximately 8–9 hours. | Total quiz questions: 155 |

MODULE 0**Introduction**

The Philosophy of Emergency Assessment

Module 0 — Introduction**Learning Objectives**

- Explain why a systematic approach is the non-negotiable foundation of safe emergency care
- Describe the origin and evolution of the ABCDE framework in emergency medicine
- Apply the treat-as-you-find principle from your very first patient encounter
- Identify the most common reasons patients die in emergency medicine — and how ABCDE addresses each one
- Understand who uses ABCDE and why it is universal across all emergency disciplines

Why Patients Die — The Uncomfortable Truth

ABCDE was not invented in a classroom. It was built from failure. From real patients who died — not because their clinicians did not care, but because they lacked a system. Understanding these failure modes is the reason the framework exists.

The Four Failure Modes

- **Missed airway:** the most preventable cause of death in the unconscious patient is airway obstruction. It kills in three minutes. It is missed when the clinician moves straight to the monitor, the drip, or the history.
- **Anchoring bias:** the clinician fixes on the first diagnosis that fits and stops looking. The tension pneumothorax goes untreated while attention is focused on the heart.

- **Late recognition of deterioration: the patient who arrests at 2 AM did not suddenly collapse. Their vital signs were deteriorating for hours — but nobody connected them into a picture using a framework.**
- **Communication failure: the paramedic, nurse, and doctor each had a different impression of the same patient. No common language. No shared framework. No shared urgency.**

ABCDE ADDRESSES ALL FOUR

1. Airway is always first — the most dangerous component is assessed and treated before anything else.
2. Sequential systematic assessment prevents anchoring — you cannot skip to the diagnosis before completing A, B, C, D, and E.
3. ABCDE used on every patient detects deterioration before it becomes catastrophic.
4. ABCDE is the universal emergency language — every discipline, every setting, every level.

The History of ABCDE

The ABCDE framework traces its origins to 1978, when trauma surgeon James Styner was involved in a light aircraft crash in Nebraska. His wife was killed and his children were critically injured. When he reached the nearest hospital, the care he witnessed was disorganized and reactive. That experience drove him to develop what became the Advanced Trauma Life Support course — ATLS.

For the first time, the principle of 'airway kills first — therefore assess it first' was codified, trained, and made universal. Over the following decades, the framework was adopted by Advanced Life Support, Pediatric Life Support, and every major emergency medicine training program worldwide.

Today, ABCDE is the closest thing emergency medicine has to a universal language. A clinician trained in Saudi Arabia and a clinician trained in the United Kingdom approach the same patient the same way.

The Treat-As-You-Find Principle

This is the most important principle in the framework. It is not written in the letters themselves — but it runs through every clinical decision you make.

Treat as you find means: when you identify a problem during your ABCDE assessment, you treat it before moving to the next letter.

You do not complete the full assessment before treating. You do not say 'let me see the full picture first'. You intervene at the point of finding.

A blocked airway at A is treated before you move to B. A tension pneumothorax at B is treated before you move to C.

Because in emergency medicine, a perfect assessment completed on a patient who died during it is not a success.

CLINICAL PEARL — Teams and Treat-As-You-Find

In a two-person team: one person can hold the airway open while the other moves to B.

ABCDE is not always a solo sequential process — it is a team framework.

But the principle never changes: find it, treat it, then move on.

Who Uses ABCDE

ABCDE belongs to everyone who cares for patients in an emergency. It is not a doctor's framework. It is not a hospital framework. It is not a trauma framework.

- The paramedic on the street
- The emergency nurse receiving a trauma activation
- The junior doctor called to the deteriorating ward patient at 3 AM
- The GP whose patient collapses in the waiting room

The military medic, the sports physician, the occupational health nurse

The assessment looks different in each setting. The tools are different. The team is different. But the framework never changes. Airway. Breathing. Circulation. Disability. Exposure. In that order. Every time.

Self-Test

Which of the following best describes the treat-as-you-find principle?

- A. Complete a full A–E assessment before starting treatment
- B. Treat each problem as you identify it before moving to the next letter
- C. Always treat airway problems first, regardless of other findings
- D. Document each finding before treating to ensure accurate records

ANSWER

B — Treat each problem at the point of finding, before moving to the next letter. This is the core of the ABCDE principle. Waiting until the full assessment is complete before treating violates the framework and delays life-saving intervention.

MODULE 0 SUMMARY

ABCDE was built from failure — not invented in a classroom.

Four failure modes: missed airway, anchoring bias, late recognition, communication failure.

Treat as you find — intervene at the point of discovery, not after the full assessment.

ABCDE is universal — same framework, same order, every patient, every setting.

Airway. Breathing. Circulation. Disability. Exposure. In that order. Every time.

MODULE 1**A****Airway**

Assessment · Obstruction · Positioning · Adjuncts · Escalation

Module 1 — A is for Airway

Learning Objectives

- Describe the anatomy of the upper and lower airway relevant to emergency assessment
- Perform a systematic airway assessment using look, listen, and feel
- Identify and classify airway obstruction by cause and severity
- Apply head-tilt chin-lift and jaw thrust techniques correctly
- Select, size, and insert an OPA and NPA
- Perform oropharyngeal suction safely
- Describe the escalation pathway when basic measures fail
- Recognize the difficult airway using the LEMON assessment

The Three-Minute Rule

The airway comes first because of one biological fact: the brain begins to die after four minutes without oxygen.

A blocked airway kills faster than a knife wound to the chest. Faster than cardiac arrest. Faster than almost any other emergency you will face.

Everything else in emergency medicine is worthless if the airway is not open. This is why A comes first — not by convention, but because it kills fastest when it fails.

Airway Anatomy

Upper Airway

- Oral cavity and nasal passages — entry point for air
- Pharynx — nasopharynx, oropharynx, hypopharynx
- Epiglottis — leaf-shaped cartilage acting as a trapdoor, deflects food from airway during swallowing
- Larynx — contains the vocal cords; the most critical landmark in airway management
- Glottis — the opening between the vocal cords; narrowest part of the adult airway

Lower Airway

- Trachea — 10–12 cm in adults, cartilage-ringed, rigid
- Carina — bifurcation into right and left main bronchi
- Right main bronchus — shorter, wider, more vertical. Misplaced tubes almost always enter here.

Paediatric Airway Differences

- Tongue proportionally larger relative to oral cavity
- Larynx higher and more anterior (C3–C4 vs C5–C6 in adults)
- Epiglottis omega-shaped, floppy, relatively larger
- Narrowest point is subglottic (not glottic as in adults)
- Infants under 6 months are obligate nasal breathers

CLINICAL PEARL — Most Common Obstruction

In the unconscious patient, the tongue falling posteriorly into the pharynx is the most common cause of airway obstruction.

As muscle tone is lost, the tongue blocks the airway.

A simple head-tilt chin-lift lifts the tongue off the posterior pharyngeal wall.

This is the single most important airway manoeuvre you will ever perform.

Airway Assessment — Look, Listen, Feel

The airway assessment takes fifteen seconds. Not fifteen minutes. Every patient. Every time.

Look

- Chest rise — symmetrical and adequate?
- Cyanosis — blue lips or fingernails (late sign — do not wait for this)
- Mouth — secretions, blood, vomit, foreign material visible?
- Accessory muscle use — sternocleidomastoid, intercostals, supraclavicular
- Level of consciousness — unconscious patient has no airway protective reflexes

Listen

- **Normal breathing is nearly silent — noisy breathing is obstructed breathing**
- Snoring — tongue obstruction. Treatable with positioning.
- Stridor — high-pitched sound of laryngeal/tracheal obstruction. Serious — escalate fast.
- Gurgling — fluid in the airway. Suction immediately.
- Silence in a non-breathing patient — the most alarming finding of all. Act now.

Feel

- Warm airflow against cheek or back of hand — confirms air movement
- Tracheal position at suprasternal notch — deviation is a late sign of tension PTX
- Surgical emphysema — crackling under the skin suggests pneumothorax or tracheal injury
- Jaw stability — fracture or fixed jaw affects airway management decisions

Causes of Airway Obstruction

Cause	Mechanism	First Action
Tongue (most common)	Loss of muscle tone — falls back in unconscious patient	Head-tilt chin-lift or jaw thrust
Foreign body	Food, object	Finger sweep (visible only), Magill forceps
Secretions/blood/vomit	Fluid obstruction	Suction immediately
Soft tissue swelling	Anaphylaxis, burns, angioedema	Adrenaline IM, escalate urgently
Laryngospasm	Vocal cord closure — crowing or silence	CPAP, jaw thrust, suxamethonium
Structural	Tumour, abscess, hematoma	Surgical consultation

Airway Positioning

Head-Tilt Chin-Lift — Non-Trauma Patients

1. Place one hand on the patient's forehead
2. Place two fingers under the bony part of the chin — not the soft tissue
3. Tilt head back with the forehead hand
4. Lift the chin upward simultaneously
5. Confirm airflow against your cheek

This maneuver lifts the tongue off the posterior pharyngeal wall and opens the airway in seconds.

Jaw Thrust — Trauma Patients (Cervical Spine Concern)

6. Position yourself at the patient's head
7. Place fingers behind the angle of the mandible bilaterally
8. Place thumbs on the chin
9. Push the mandible forward and upward — anterior displacement without neck extension
10. Confirm airflow

TRAUMA RULE

Use jaw thrust for any patient with suspected cervical spine injury.

Mechanism of injury: high-speed trauma, fall from height, diving injury, unexplained neurological deficit.

If in doubt — use jaw thrust.

An imperfect airway open is better than a perfect technique on a dead patient.

Airway Adjuncts

Oropharyngeal Airway (OPA — Guedel Airway)

- Purpose: maintains open airway when positioning alone is insufficient
- Sizing: measure from centre of mouth to angle of jaw
- Insertion (adults): insert upside down → rotate 180° at soft palate
- Insertion (children): insert directly with tongue depressor — NO rotation
- Contraindicated: conscious or semi-conscious patient with intact gag reflex

CLINICAL PEARL — OPA and Consciousness

If the patient tolerates the OPA without gagging — their airway is at serious risk.

A patient who does not gag has a GCS of approximately 8 or below.

Tolerance of OPA = compromised airway protective reflexes = act.

Nasopharyngeal Airway (NPA)

- Purpose: better tolerated by semi-conscious patients with some gag reflex
- Sizing: internal diameter = little finger diameter; length = tip of nose to tragus
- Always lubricate generously with water-soluble gel before insertion
- Insert bevel-first through more patent nostril, following the floor of the nasal passage
- If resistance: withdraw and try other nostril or use smaller size — never force

NPA CAUTION

Use with CAUTION in suspected basal skull fracture.

Signs: raccoon eyes, Battle's sign, CSF from nose/ears, blood behind eardrum.

Risk: NPA could enter cranial vault through cribriform plate fracture.

If complete obstruction is the alternative — NPA risk is acceptable. Document your reasoning.

Suction

- Suction before ventilation — always. Fluid in the airway must be cleared first.
- Equipment: Yankauer catheter (oropharyngeal), flexible catheter (nasopharyngeal)
- Pressure: 80–120 mmHg adults. Lower for children and neonates.
- Technique: insert under direct vision — not blindly. Apply suction on withdrawal only.
- Duration: maximum 10 seconds per pass. Oxygenate between passes.

Escalation Pathway

Rung	Intervention	When to Use
1	Positioning (head-tilt/jaw thrust)	All patients — first response always
2	Adjuncts (OPA / NPA)	When positioning alone insufficient
3	BVM ventilation	Inadequate breathing with open airway
4	Supraglottic airway (LMA/iGel)	BVM insufficient; bridge to intubation
5	RSI + Endotracheal intubation	Definitive airway required
6	Surgical airway (cricothyrotomy)	CICO — cannot intubate, cannot oxygenate

CLINICAL PEARL — Call for Help Early

The moment you Recognize that basic airway management is failing — call for help.

In pre-hospital: transmit early and request advanced support.

In hospital: activate the airway emergency protocol.

Calling for help is not failure. Waiting too long to call is.

The Difficult Airway — LEMON Assessment

Use LEMON to predict airway difficulty before your first attempt — not after the first failed attempt.

- **L — Look externally:** facial trauma, obesity, short neck, large beard, small mouth, large tongue
- **E — Evaluate 3-3-2 rule:** mouth opening (3 fingers), thyromental distance (3 fingers), thyroid-to-mouth (2 fingers)
- **M — Mallampati score:** class 3–4 (soft palate not visible) predicts difficult intubation
- **O — Obstruction:** any cause of airway obstruction makes management harder
- **N — Neck mobility:** limited by collar, arthritis, or injury

LEMON RULE

No single finding predicts certain difficulty.

Two or more findings — especially obstruction + limited neck mobility — demand a plan before you start.

Have your senior colleague present. Have surgical airway equipment open and ready.

Self-Test

A trauma patient has a suspected cervical spine injury. Which airway positioning technique should you use?

- E. Head-tilt chin-lift — it is faster and more effective
- F. Jaw thrust with manual in-line stabilisation of the cervical spine
- G. Recovery position only
- H. No airway manoeuvre until C-spine is cleared on X-ray

ANSWER

B — Jaw thrust with manual in-line stabilisation. Jaw thrust achieves anterior displacement of the mandible (lifting the tongue) without extending the cervical spine. Head-tilt chin-lift extends the atlanto-occipital joint and is contraindicated with suspected spinal injury.

MODULE 1 SUMMARY — AIRWAY

A kills in 3 minutes — it is always first. No exceptions.

Look (cyanosis, recession, mouth), Listen (snoring/stridor/gurgling/silence), Feel (airflow, trachea, emphysema).

Snoring = tongue = positioning. Stridor = larynx = escalate fast. Gurgling = fluid = suction.

Head-tilt chin-lift (no trauma). Jaw thrust (trauma / c-spine concern).

OPA: sized mouth-to-jaw, rotation technique adults ONLY, contraindicated if gag reflex present.

NPA: sized little-finger diameter, lubricate always, caution in basal skull fracture.

Suction before ventilation. Max 10 seconds per pass.

Escalation ladder: positioning → adjuncts → BVM → supraglottic → RSI → cricothyrotomy.

LEMON: 2+ findings = difficult airway — have a plan before you start.

MODULE 2

B

Breathing

Assessment · Oxygenation · Ventilation · Life-Threatening Emergencies

Module 2 — B is for Breathing

Learning Objectives

- Explain the difference between oxygenation and ventilation
- Perform a complete breathing assessment including rate, depth, symmetry, auscultation, and SpO₂
- Recognize the six life-threatening breathing emergencies
- Select and apply the correct oxygen delivery device for each clinical situation
- State target oxygen saturations for standard and COPD patients
- Describe the indications and technique for needle decompression
- Initiate CPAP and NIV at a basic level

Oxygenation vs Ventilation — The Critical Distinction

OXYGENATION	VENTILATION
Getting O ₂ into the blood	Moving air in/out — removing CO ₂
Measured by SpO ₂	Measured by RR, depth, and ET-CO ₂
Fails in: pulmonary oedema, consolidation, V/Q mismatch	Fails in: opioid overdose, COPD, neuromuscular disease
Treated with: supplemental oxygen	Treated with: assisted ventilation (NIV/intubation)
SpO ₂ target 94–98%	ET-CO ₂ target 35–45 mmHg

CRITICAL DISTINCTION

Supplemental oxygen does NOT fix ventilation failure.

A patient who is not moving air effectively will not be saved by oxygen alone.

A drowsy patient with SpO₂ 96% on supplemental oxygen may be in life-threatening CO₂ retention.

Always assess rate and effort alongside SpO₂.

Complete Breathing Assessment

1. Respiratory Rate

- Count for 30 seconds × 2. Do not tell the patient — they will alter their breathing.
- Normal adult: 12–20 breaths/min
- >20 = tachypnoea — warning sign. >25 = significant. >30 = emergency.
- <12 = bradypnoea — central respiratory depression. Think opioids, sedatives, head injury.
- Respiratory rate is the most sensitive early indicator of deterioration — it changes before blood pressure or heart rate.

2. Depth and Tidal Volume

- Shallow breathing at a normal rate means reduced minute ventilation and rising CO₂
- Rate AND depth together = tidal volume — both matter

3. Symmetry

- Asymmetrical chest movement is a critical finding
- Reduced movement on one side: pneumothorax, haemothorax, consolidation, rib fracture splinting

4. Work of Breathing

- Normal breathing should be effortless

- Intercostal recession — skin pulling in between ribs on inspiration
- Subcostal recession — below the rib cage
- Supraclavicular recession — above the clavicles
- Sternocleidomastoid activation — neck muscles contracting visibly
- Tracheal tug — trachea pulling downward on inspiration — severe distress
- Tripod position — sitting forward on hands — maximising accessory muscle advantage

5. Auscultation

- Normal: soft vesicular breath sounds bilaterally
- Absent/reduced unilaterally: pneumothorax, haemothorax, massive consolidation
- Fine crackles (bases): pulmonary oedema — alveoli popping open
- Coarse crackles: secretions in larger airways — clear with coughing
- Expiratory wheeze: asthma, COPD, bronchospasm
- Bronchial breathing: harsh sounds over consolidated lung
- Pleural rub: creaking leathery sound — pleuritis or PE

6. SpO₂

- Normal adult: 94–98%
- <94%: supplemental oxygen indicated
- <90%: significant hypoxaemia — urgent intervention
- <85%: life-threatening
- Limitations: unreliable in poor perfusion, falsely normal in CO poisoning, affected by nail varnish

The Six Life-Threatening Breathing Emergencies

Emergency	Key Signs	Percussion	Treatment
Tension Pneumothorax	Absent BS, haemodynamic collapse	Hyperresonant	Needle decompress 2nd ICS MCL → chest drain
Open Pneumothorax	Sucking chest wound	Hyperresonant	3-sided dressing → chest drain
Massive Haemothorax	Absent BS, haemodynamic collapse	Dull	Large-bore chest drain + blood products
Flail Chest	Paradoxical chest movement, crepitus	Variable	O ₂ + analgesia + PPV if needed
Acute Severe Asthma	Silent chest = life-threatening	Normal	O ₂ , back-to-back nebs, IV MgSO ₄
Acute Pulmonary Oedema	Bilateral crackles, orthopnoea, frothy sputum	Normal	Sit up + O ₂ + CPAP + furosemide

CLINICAL PEARL — The Silent Chest

The silent chest in asthma is not reassurance — it is pre-arrest.

Wheeze requires airflow. If wheeze disappears, the patient is too exhausted to move air.

Immediate senior involvement, aggressive bronchodilation, and intubation preparation.

Oxygen Therapy

Device	FiO ₂	Flow Rate	Use For
Nasal Cannula	24–44%	1–4 L/min	Mild hypoxaemia, eating, intolerant of mask
Simple Face Mask	35–50%	5–10 L/min (min 5)	Mild-moderate hypoxaemia
Venturi Mask	24/28/35/40/60%	Colour-coded	Precise FiO ₂ — COPD patients
Non-Rebreather Mask	85–95%	15 L/min	Severe hypoxaemia, trauma, cardiac arrest
High-Flow Nasal O ₂	Up to 100%	Up to 60 L/min	Hypoxaemic respiratory failure

OXYGEN TARGETS

Standard patients: target SpO₂ 94–98%.

COPD with known or suspected CO₂ retention: target SpO₂ 88–92% — use Venturi mask.

CO poisoning: 100% O₂ regardless of SpO₂ reading (SpO₂ unreliable in CO).

Never withhold O₂ from an acutely hypoxic patient — treat hypoxia first, then titrate.

Needle Decompression for Tension Pneumothorax

Tension pneumothorax is a clinical diagnosis. Do NOT wait for imaging.

Classic Landmark

- 2nd intercostal space, mid-clavicular line, on the affected side
- Insert ABOVE the upper border of the 3rd rib — to avoid the neurovascular bundle on the lower border of the 2nd rib

Technique

1. 14G or 16G cannula, at least 4.5 cm long
2. Perpendicular to chest wall
3. Advance until resistance gives — hiss of escaping air confirms diagnosis
4. Remove needle, leave cannula, reassess
5. Reassess: SpO₂ rise, BP recovery, improved breathing

This is a bridge. Definitive management requires chest drain insertion.

CLINICAL PEARL — Alternative Landmark

In obese patients or those with thick chest walls, the 2nd ICS MCL may fail — needle too short.

Alternative: 4th/5th intercostal space, anterior axillary line.

If first decompression fails to improve the patient — try the alternative site immediately.

CPAP vs NIV

	CPAP	NIV / BiPAP
Pressures	Single constant pressure	Two pressures: IPAP (higher) + EPAP (lower)
Primary benefit	Holds alveoli open — improves oxygenation	Supports ventilation — reduces CO ₂
Best for	Pulmonary oedema, OSA	COPD exacerbation, ventilatory failure
Typical settings	5–10 cmH ₂ O	IPAP 12–15, EPAP 4–5 cmH ₂ O

Self-Test

A patient with known COPD arrives breathless, SpO₂ 80%. What is the correct immediate oxygen approach?

- a. Apply NRM at 15 L/min — correct the hypoxia rapidly
- b. Withhold oxygen to protect the hypoxic drive
- c. Apply Venturi mask at 24%, target SpO₂ 88–92%, obtain blood gas
- d. Start NIV immediately without supplemental oxygen

ANSWER

C — Venturi mask at 24%, target 88–92%. A SpO₂ of 80% requires treatment — withholding oxygen from a severely hypoxic patient is dangerous. The NRM will overshoot the target and worsen CO₂ retention. Venturi mask at the lowest appropriate FiO₂ allows titration to target. Blood gas guides the NIV decision.

MODULE 2 SUMMARY — BREATHING

Oxygenation failure: low SpO₂ — treat with supplemental O₂.

Ventilation failure: rising CO₂ — treat with assisted ventilation.

Respiratory rate is the earliest sign of deterioration — count it every time.

6 life-threatening emergencies: Tension PTX, Open PTX, Massive haemothorax, Flail chest, Acute asthma, Pulmonary oedema.

Silent chest in asthma = life-threatening = pre-arrest.

Tension PTX = clinical diagnosis = needle immediately. Do not wait for X-ray.

COPD target: 88–92% via Venturi. Standard target: 94–98%.

CPAP = oxygenation (pulmonary oedema). NIV = ventilation (COPD).

MODULE 3

C

Circulation

Assessment · Shock · Haemorrhage Control · Resuscitation · CPR

Module 3 — C is for Circulation

Learning Objectives

- Perform a complete circulatory assessment
- Explain the pathophysiology of shock and why hypotension is a late sign
- Classify and identify the four types of shock
- Apply haemorrhage control techniques including tourniquet, wound packing, and direct pressure
- Establish IV and IO access and initiate fluid resuscitation
- Perform high-quality CPR and operate an AED
- Recognize the four cardiac arrest rhythms

Shock — The Definition That Matters

Shock is defined as inadequate tissue perfusion — insufficient delivery of oxygen to the cells to meet their metabolic demands.

It is NOT synonymous with low blood pressure. A patient can be in shock with a normal blood pressure. Waiting for hypotension is waiting too long.

Circulatory Assessment — Seven Components

1. Heart Rate

- Normal adult: 60–100 bpm
- Tachycardia (>100): earliest compensatory response to circulatory compromise
- Bradycardia in shock: ominous — terminal pump failure, beta-blocker toxicity, or severe vagal response
- Assess: rate, rhythm, and character (thready vs bounding)

2. Blood Pressure

- Hypotension (systolic <90) is a LATE sign — may have lost 30–40% blood volume before BP falls
- Narrowed pulse pressure (systolic minus diastolic) is an early sign of hypovolaemia
- Normal pulse pressure: 40 mmHg. Narrowed <25 mmHg suggests significant compromise.
- Example: BP 110/90 (PP=20) in a previously normal patient = compensated shock

3. Capillary Refill Time (CRT)

- Press fingertip or sternum for 5 seconds, release, count return time
- Normal: <2 seconds. Prolonged: peripheral vasoconstriction.
- Check centrally (sternum) if periphery is cold — more reliable

4. Skin Findings

- Pallor — reduced perfusion or vasoconstriction
- Mottling — microcirculatory failure, poor prognosis
- Cool to elbows = more compromised than cool to fingers
- Warm/flushed — distributive shock (sepsis, anaphylaxis)
- Clammy/diaphoresis — adrenergic response to shock

5. JVP

- Flat JVP = empty tank (hypovolaemic or distributive shock)
- Elevated JVP = obstructed or failing pump (cardiogenic or obstructive shock)

6. Urine Output

- Target: 0.5 mL/kg/hr (approximately 30–50 mL/hr in adults)
- Oliguria = early sign of renal hypoperfusion
- Insert urinary catheter early in suspected shock — best real-time resuscitation monitor

7. Shock Index

- Formula: Heart Rate ÷ Systolic BP
- Normal: 0.5–0.7. Above 1.0 = significant compromise. Above 1.4 = critical.
- Example: HR 110, BP 100 → Shock Index 1.1 = significant, even with 'acceptable' BP

The Four Types of Shock

Type	Mechanism	JVP	First Treatment
Hypovolaemic	Loss of circulating volume	Flat	Stop bleeding + replace volume
Distributive (Sepsis/Anaphylaxis)	Vasodilation — tank too big	Flat	Fluids + treat cause + vasopressors
Cardiogenic	Pump failure	Elevated	Inotropes, cautious fluid, treat cause
Obstructive (Tamponade/PTX/PE)	Physical blockage of circulation	Elevated	Relieve the obstruction

CLINICAL PEARL — JVP as Diagnostic Tool

FLAT JVP + tachycardia + hypotension = Hypovolaemic or Distributive (tank is empty or too big)

ELEVATED JVP + tachycardia + hypotension = Cardiogenic or Obstructive (pump failing or blocked)

This single finding immediately guides your treatment direction.

Haemorrhage Control

1. Direct Pressure

- Firm, sustained pressure for minimum 5–10 minutes
- Do NOT lift the dressing to check — every lift disrupts the forming clot
- If soaked: add more dressings on top, never remove

2. Wound Packing

- For deep wounds that cannot be controlled with surface pressure
- Pack haemostatic gauze firmly into deepest point and fill outward
- Apply sustained direct pressure for at least 3 minutes after packing
- Do not remove the packing pre-hospital or in the ED

3. Tourniquet

- For life-threatening limb haemorrhage uncontrolled by direct pressure
- Position: 5–7 cm proximal to wound, NOT over a joint
- Tighten until bleeding STOPS — not until it hurts, not until it feels tight
- Record time of application — on the tourniquet or on the patient's forehead in MCI
- Duration: safe for up to 2 hours. Never remove pre-hospital.

TOURNIQUET ERRORS

Too distal: over the knee or elbow joint — ineffective and potentially harmful.

Too loose: reduces venous return without stopping arterial flow — makes bleeding WORSE.

Improvised (belt, tie): too narrow, cannot generate sufficient pressure. Use purpose-built device.

4. Pelvic Binder

- For suspected unstable pelvic fracture
- Apply at the level of the GREATER TROCHANTERS — not the iliac crests
- Apply ONCE — do not repeat pelvic spring test after first assessment

Vascular Access

Peripheral IV

- Size: 14–16G for major haemorrhage. Flow rate increases with 4th power of radius.
- Site: antecubital fossa (first choice). Forearm (second). Dorsum of hand (third).
- Confirm: flashback → advance cannula → remove needle → flush → check for swelling

IO Access

- Use when peripheral IV fails within 90 seconds in any critical patient
- Sites: proximal tibia (most common), distal tibia, proximal humerus (highest flow)
- Conscious patient: flush with 2% lidocaine 0.5–2 mL before starting infusion
- All drugs and fluids can be given IO — as effective as IV
- Can remain in situ up to 24 hours

Fluid Resuscitation

- Haemorrhagic shock: blood products are the resuscitation fluid, not crystalloid
- MTP ratio: 1 PRBC : 1 FFP : 1 platelets (1:1:1)
- Tranexamic acid (TXA): 1g IV within 3 hours of injury in trauma haemorrhage
- Permissive hypotension: target SBP 80–90 in penetrating trauma with uncontrolled haemorrhage
- Exception: target SBP ≥ 110 in traumatic brain injury
- Septic shock: 500 mL crystalloid bolus, reassess after each — do not flood with fluid

CPR — The Five Elements of Quality

Element	Standard	Common Error
Rate	100–120 compressions/min	Too slow (<100) or too fast (>120)
Depth	5–6 cm adults	Too shallow — inadequate pressure gradient
Recoil	Full chest return between compressions	Leaning — increases intrathoracic pressure
Interruptions	Max 5 seconds (rhythm check/shock)	Prolonged pauses — drops perfusion to zero
Ventilation	30:2 (unprotected airway)	Over-ventilation — raises intrathoracic pressure

Cardiac Arrest Rhythms

Rhythm	Shockable?	Management
Ventricular Fibrillation (VF)	YES	Defibrillate immediately — 200J biphasic
Pulseless VT (pVT)	YES	Defibrillate immediately — 200J biphasic
Pulseless Electrical Activity (PEA)	NO	CPR + adrenaline + 4 Hs & 4 Ts
Asystole	NO	CPR + adrenaline immediately + reversible causes

4 Hs AND 4 Ts — REVERSIBLE CAUSES

Hypoxia | Hypovolaemia | Hypo/Hyperkalaemia | Hypothermia

Tension pneumothorax | Tamponade | Toxins | Thrombosis (PE or MI)

Work through these systematically in every PEA arrest.

Self-Test

A patient has HR 118, BP 88/74 (pulse pressure 14 mmHg), CRT 3.5 seconds, and cool peripheries after a stab wound. What type of shock is this and what is the FIRST intervention?

- a. Cardiogenic shock — give inotropes
- b. Compensated haemorrhagic shock — control the haemorrhage first, then establish IV access
- c. Distributive shock — give IV fluids rapidly
- d. Obstructive shock — perform needle decompression

ANSWER

B — Compensated haemorrhagic shock. The narrowed pulse pressure (14 mmHg), tachycardia, and cool peripheries despite a systolic BP above 90 confirm compensated hypovolaemic shock. In haemorrhagic shock: stop the bleeding first. Everything else follows haemostasis.

MODULE 3 SUMMARY — CIRCULATION

Shock = inadequate tissue perfusion. NOT just hypotension — hypotension is late.

Narrowed pulse pressure is an early sign of hypovolaemia.

JVP: flat = empty tank. Elevated = blocked or failing pump.

Stop the bleeding before replacing the volume.

Tourniquet: 5–7 cm proximal to wound, over muscle not joint, tighten until bleeding stops.

IO: use after 2 failed IV attempts or 90 seconds in a critical patient.

Blood products 1:1:1 in major haemorrhage. TXA within 3 hours.

CPR quality: rate 100–120, depth 5–6 cm, full recoil, minimal interruptions.

VF/pVT = shock. PEA/asystole = CPR + 4Hs/4Ts.

MODULE 4

D

Disability

Consciousness · GCS · Pupils · Blood Glucose · Causes

Module 4 — D is for Disability

Learning Objectives

- Apply the AVPU scale as a rapid first-pass assessment
- Calculate the GCS accurately across all three components
- Perform a structured pupillary assessment
- Measure blood glucose and manage hypoglycaemia
- Apply AEIOU TIPS to identify causes of altered consciousness
- Recognize and initially manage acute seizures and status epilepticus
- Apply FAST for stroke recognition

AVPU Scale — The 15-Second Screen

Level	Definition	Approx GCS	Airway Risk
A — Alert	Awake, aware, responding normally	GCS 15	Low
V — Voice	Responds to verbal stimulus	GCS 12–13	Moderate — monitor closely
P — Pain	Responds only to painful stimulus	GCS 8	HIGH — assess airway immediately
U — Unresponsive	No response to any stimulus	GCS 3	CRITICAL — definitive airway needed

AVPU P OR U = AIRWAY AT RISK

Any patient at P or U on the AVPU scale requires immediate reassessment of A.

GCS ≤ 8 — airway protective reflexes cannot be assumed.

Go back to A. Secure the airway before continuing D assessment.

Glasgow Coma Scale — Full Scoring

Eye Opening — E1 to E4

- E4 Spontaneous: eyes open without stimulus
- E3 To Voice: eyes open to verbal stimulus
- E2 To Pain: eyes open only to painful stimulus
- E1 None: no eye opening to any stimulus
- Note: periorbital swelling — document as 'C' (closed), not E1

Verbal Response — V1 to V5

- V5 Orientated: knows who, where, when — three points of orientation
- V4 Confused: speaking in sentences but not orientated
- V3 Words: individual words, not sentences
- V2 Sounds: moaning, grunting — no words
- V1 None: no vocalisation
- Intubated: document as VT

Motor Response — M1 to M6

- M6 Obeys Commands: follows a two-stage command — 'hold up two fingers'
- M5 Localises: hand moves purposefully toward source of pain — above the clavicle
- M4 Withdrawal: limb withdraws from peripheral pain — not directed toward source

- M3 Abnormal Flexion (Decorticate): arms flex, wrists curl, legs extend — injury ABOVE midbrain
- M2 Extension (Decerebrate): arms and legs extend with internal rotation — injury AT/BELOW midbrain
- M1 None: no motor response to any stimulus
- Always use the BEST response if asymmetry exists

CLINICAL PEARL — GCS Components

Always record components separately: E3V4M5 = 12 (not just '12').

E1V1M10 (intubated, sedated) is GCS 12 — clinically entirely different.

GCS trend is as important as the absolute number.

A fall from 15 to 12 over 30 minutes demands urgent reassessment — regardless of absolute value.

Pupillary Assessment

Normal Findings

- Size: 2–5 mm bilaterally. Up to 1 mm physiological asymmetry is normal.
- Reactivity: brisk direct and consensual response to light
- Document as: PEARL (Pupils Equal And Reactive to Light)

Abnormal Findings and Their Significance

Finding	Cause	Action
Unilateral dilated + fixed	CN III compression — HERNIATION	CALL NEUROSURGERY IMMEDIATELY
Bilateral dilated + fixed	Severe hypoxia, cardiac arrest, atropine	Address underlying cause urgently
Bilateral pinpoint (1–2 mm)	Opioid toxicity, pontine haemorrhage	Naloxone if opioid suspected
Unilateral small + ptosis	Horner's syndrome — sympathetic chain	Consider carotid dissection
RAPD (afferent defect)	Optic nerve or retinal disease	Ophthalmology review

Blood Glucose — Check Every Patient

- This is mandatory — not optional. Every patient with altered consciousness.
- Hypoglycaemia is the most reversible cause of altered consciousness in emergency medicine.

Critical Thresholds

- Normal: 4.0–7.8 mmol/L
- Hypoglycaemia: <4.0 mmol/L in context. Symptomatic: typically <3.5 mmol/L
- Severe: <2.5 mmol/L — consciousness almost always impaired
- Critical hyperglycaemia: >20–25 mmol/L — consider DKA or HHS

Management of Hypoglycaemia

Patient Status	Treatment
Conscious, able to swallow	Oral glucose 15–20g (gel, tablets, juice). Recheck BM in 15 min.
Unconscious / cannot swallow	150 mL 10% dextrose IV over 10 min OR 50–100 mL 20% dextrose IV
No IV access	IM glucagon 1 mg (takes 10–15 min; less effective in malnourished)
After treatment	Identify and address the cause. Complex carbohydrate snack. Monitor.

AEIOU TIPS — Causes of Altered Consciousness

Letter	Category	Key Conditions
A	Alcohol/Toxins	Alcohol intoxication, drug toxicity — diagnose by exclusion. Check glucose.
E	Epilepsy	Post-ictal state, non-convulsive status epilepticus (NCSE)
I	Infection	Meningitis, encephalitis, septic encephalopathy — assess for neck stiffness

O	Overdose/Oxygen	Opioids, benzodiazepines, tricyclics — also reassess A and B for hypoxia
U	Uraemia/Metabolic	Renal failure, liver failure, hyponatraemia, hypercalcaemia
T	Trauma	Head injury, extradural hematoma — note lucid interval
I	Insulin/Glucose	Hypoglycaemia or severe hyperglycaemia (DKA/HHS)
P	Psychiatric	Exclude organic cause FIRST before attributing to psychiatric disorder
S	Stroke/Structural	Ischaemic stroke, haemorrhagic stroke, subarachnoid haemorrhage, Tumor

CLINICAL PEARL — Diagnostic Priority

1. Blood glucose first — 30 seconds, most reversible cause.
 2. Reassess A and B — hypoxia causes altered consciousness.
 3. Medication review — opioids, sedatives, antiepileptics.
 4. Look for trauma — scalp lacerations, periorbital hematoma.
 5. Look for infection — neck stiffness, fever, rash.
- Structured approach finds the diagnosis. Haphazard approach misses it.

Status Epilepticus — Treatment Timeline

Time	Action
0–5 min	Safety, lateral position, O2, IV access, blood glucose check
5 min	Lorazepam 4 mg IV OR Diazepam 10 mg IV OR Midazolam 10 mg IM/buccal
10 min	Repeat benzodiazepine if no response
20 min	Second-line: Levetiracetam 60 mg/kg IV OR Sodium valproate 40 mg/kg IV OR Phenytoin 20 mg/kg IV
40–60 min	Refractory status: propofol/thiopentone infusion + intubation + ICU + EEG monitoring
Throughout	Investigate the CAUSE: glucose, electrolytes, CT head, toxicology

Stroke Recognition — FAST and BE-FAST

- **F — Face:** ask to smile — is there unilateral drooping?
 - **A — Arms:** raise both arms — does one drift or fall?
 - **S — Speech:** repeat a phrase — is it slurred or wrong words?
 - **T — Time:** note **LAST KNOWN WELL** time — activate stroke pathway immediately
-
- BE-FAST adds: B = sudden loss of Balance, E = sudden Eye/visual disturbance (posterior circulation)

STROKE TARGETS

IV thrombolysis window: 4.5 hours from symptom onset.

Door-to-CT target: 25 minutes. Door-to-needle target: 60 minutes.

Check blood glucose BEFORE activating stroke pathway — hypoglycaemia is the most common mimic.

Do NOT give aspirin until haemorrhagic stroke excluded on CT.

Self-Test

A patient has bilateral pinpoint pupils (1.5 mm), GCS 7, RR 8, SpO2 88%. What is the most likely diagnosis and the immediate treatment?

- Stroke — activate stroke pathway
- Opioid toxicity — naloxone 400 mcg IV or IM
- Hypoglycaemia — IV dextrose
- Epilepsy — benzodiazepine

ANSWER

B — Opioid toxicity. The triad of reduced consciousness + bradypnoea (RR 8) + bilateral pinpoint pupils is opioid toxicity until naloxone proves otherwise. Give naloxone 400 mcg IV/IM. Titrate to restore adequate ventilation — not to full reversal. Note SpO2 88% — airway and breathing must also be addressed simultaneously.

MODULE 4 SUMMARY — DISABILITY

AVPU P or U = GCS ≤ 8 = airway at risk — go back to A.

GCS: document E, V, M separately. Trend matters as much as absolute number.

Unilateral fixed dilated pupil + declining GCS = herniation = neurosurgical emergency.

Bilateral pinpoint = opioid toxicity until naloxone proves otherwise.

Blood glucose on every patient — before committing to any neurological diagnosis.

AEIOU TIPS — work through systematically in every unexplained altered consciousness.

Status epilepticus: 5 minutes = benzodiazepine. 20 minutes = second-line agent.

Stroke: check glucose, activate pathway, CT before treatment. Window: 4.5 hours.

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MODULE 5

E

Exposure

Examination · Head-to-Toe Survey · Temperature · AMPLE · Documentation

Module 5 — E is for Exposure

Learning Objectives

- Explain why Exposure is the most commonly skipped step and what gets missed
- Perform safe, efficient, and dignified full body exposure
- Execute the four-person log roll technique
- Conduct a systematic head-to-toe secondary survey
- Measure and interpret core body temperature
- Classify hypothermia and initiate appropriate rewarming
- Obtain a structured AMPLE history
- Deliver a structured MIST or SBAR handover

The Rule of E

You cannot find what you cannot see.

E is the most commonly skipped component of ABCDE — and the component that most often reveals the diagnosis that everything else missed.

The knife in the back that nobody found because nobody looked. The meningococcal rash invisible beneath clothing. The hypothermic patient whose temperature was never measured.

Exposure Technique

Clothing Removal

- In trauma: cut clothing with trauma shears along seams — never pull or drag
- In medical patients: remove clothing systematically — expose, examine, cover, move on
- Forensic cases: cut along seams, place in paper bags (not plastic — traps moisture, degrades DNA)

Dignity Preservation

- Expose one region at a time: expose → examine → cover → next region
- Use warm blankets immediately after each examination
- Explain to the conscious patient before each step
- Gender-sensitive care — important in the Gulf region and across the Arab world

Heat Loss Prevention

- Warm the environment — close doors and windows
- Warm blankets over unexposed areas
- Warm IV fluids — cold fluids worsen hypothermia
- Reflective emergency blankets — reduce radiant heat loss by up to 80%

The Log Roll — Four-Person Technique

Position		Role
Person (Head)	1	Leader — maintains manual in-line c-spine stabilisation. Gives ALL instructions. Controls timing.
Person (Chest)	2	Positioned at chest and upper arm
Person (Hips)	3	Positioned at hips and thigh
Person (Legs)	4	Positioned at lower leg and feet

Count: 'Roll on three. One, two, three — ROLL.' All three helpers move the patient as a single rigid unit. Hold at 30–45 degrees.

Examine during the roll: scalp, posterior neck, posterior chest, entire spine (palpate spinous processes), flanks, buttocks.

Head-to-Toe Secondary Survey

Region	What to Assess
Head and Scalp	Lacerations, boggy swelling, bony deformity. Raccoon eyes (orbital hematoma), Battle's sign (post-auricular), CSF rhinorrhoea/otorrhoea = basal skull fracture
Face	Eyes (pupil, conjunctiva, hyphaema), nose (septal deviation, CSF), mouth (teeth, mucosa, blood), mandible (stability, crepitus)
Neck	Tracheal position, JVP, wounds, surgical emphysema, anterior tenderness, posterior c-spine palpation
Chest	Clavicles, sternum, ribs (rib spring test), surgical emphysema — anterior and posterior
Abdomen	Inspect (bruising, distension, seat belt sign), auscultate, palpate 4 quadrants (tenderness, guarding, rigidity)
Pelvis	Single spring test — ONCE ONLY. Instability = pelvic binder at greater trochanters immediately
Perineum	Blood at urethral meatus = do NOT catheterise — possible urethral injury
Lower Limbs	Deformity, long bone fractures, joints. Neurovascular: pulse, sensation, movement bilaterally
Upper Limbs	Deformity, forearm compartments, hands. Neurovascular assessment bilaterally
Back (log roll)	Posterior chest wounds, spine palpation, flanks, sacrum

Temperature

Core Temperature Measurement

- Peripheral/tympanic: unreliable in hypothermia or poor perfusion states

- Core methods (order of accuracy): Oesophageal (most accurate) → Rectal → Tympanic
- Always use rectal or oesophageal in any patient with suspected hypothermia

Hypothermia Classification and Treatment

Class	Temperature	Clinical	Rewarming
Mild	32–35°C	Shivering, tachycardia, confusion	Passive — insulate, remove wet clothes
Moderate	28–32°C	Shivering stops, drowsy, AF risk	Active external — warm air blanket
Severe	<28°C	Unconscious, VF risk, handle gently	Active internal — warm IVF, humidified O2
Arrested	<28°C arrested	May appear dead	ECMO/bypass rewarming — 'warm and dead'

HYPOTHERMIA AND VF

The hypothermic heart is extremely irritable — VF can be triggered by rough handling.

Handle all hypothermic patients gently.

No patient is dead until they are WARM and dead.

VF below 30°C may not respond to defibrillation — rewarm first.

Heat Stroke

- Definition: core temperature >40°C with CNS dysfunction
- Classic: elderly, gradual onset, during heat waves — hot DRY skin
- Exertional: young/fit, rapid onset during exercise — Hajj, military, construction (Gulf context)
- Treatment: PHYSICAL COOLING immediately — ice water immersion, ice packs to axillae/groins/neck, cold IV fluids
- Target: reduce core temperature below 39°C within 30 minutes

ANTIPYRETICS DO NOT WORK IN HEAT STROKE

Heat stroke is NOT fever — the hypothalamic set point is not elevated.

Paracetamol, ibuprofen, aspirin have NO role in heat stroke.

Do not waste time — cool the patient physically.

AMPLE History

Letter	Stands For	Clinical Significance
A	Allergies	Drug allergies — identify before prescribing
M	Medications	Anticoagulants, antiepileptics, beta-blockers, insulin, immunosuppressants — each changes management
P	Past Medical History	Relevant conditions, previous operations, cardiac/respiratory history
L	Last Meal	Fasting status — determines aspiration risk for intubation. Full stomach = RSI precautions.
E	Events	Mechanism, sequence of symptoms, what was given already, witnesses

Handover Tools

MIST — Pre-Hospital Handover

- M — Mechanism of injury: what happened, how fast, what forces
- I — Injuries found and suspected
- S — Signs: vital signs at scene and on arrival, GCS, glucose, temperature
- T — Treatment given and response to treatment

SBAR — In-Hospital Handover

- S — Situation: who is the patient, what is the problem right now
- B — Background: relevant history, medications, previous assessments
- A — Assessment: what do you think is happening
- R — Recommendation: what do you need — be SPECIFIC

CLINICAL PEARL — The Missing R

The R in SBAR is the most commonly missed component.

Do not end with 'I'm worried' — end with 'I need you at the bedside now' or 'I recommend we activate the stroke pathway'.

A vague recommendation transfers no urgency and invites no action.

Self-Test

You are performing the secondary survey on a trauma patient. You palpate the pelvis and feel instability. What do you do?

- Repeat the test to confirm the finding
- Apply a pelvic binder at the greater trochanters — do NOT retest the pelvis
- Request urgent CT pelvis before applying a binder
- Apply the binder at the iliac crests

ANSWER

B — Apply pelvic binder at the greater trochanters and do NOT repeat the test. Repeated pelvic spring testing disrupts forming clots and can precipitate catastrophic retroperitoneal haemorrhage. A single test is sufficient. The binder is applied at the level of the greater trochanters — not the iliac crests.

MODULE 5 SUMMARY — EXPOSURE

You cannot find what you cannot see. Full exposure — every patient.

Expose → Examine → Cover. Dignity preserved throughout.

Log roll: Person 1 at head controls everything. Move as a single rigid unit.

Pelvic spring test: ONCE only. Instability = binder at greater trochanters immediately.

Blood at urethral meatus = no catheter until urethra cleared.

Core temperature measurement essential — tympanic unreliable in hypothermia.

Hypothermia: passive (mild) → active external (moderate) → active internal (severe).

Heat stroke: physical cooling only. Antipyretics have no role.

AMPLE: 60 seconds. Changes management every time.

SBAR: state the Recommendation specifically — 'I need you at the bedside now.'

MODULE 6**Integration**

Putting It All Together — Team · Reassessment · Cognitive Errors

Module 6 — Putting It All Together

Learning Objectives

- Apply the complete ABCDE framework to complex multi-problem patients
- Demonstrate treat-as-you-find under time pressure
- Identify and avoid common cognitive errors in emergency assessment
- Reassess the patient systematically after every intervention
- Lead or participate in a structured team resuscitation
- Communicate findings using SBAR and MIST in real time

The Five Principles of Integration

6. **Treat as you find — non-negotiable.** Find it, fix it, move on. Never complete the assessment on a dying patient.
7. **ABCDE is cyclic, not linear — reassess from A after every intervention and every clinical change.**
8. **The most dangerous finding rules — prioritise by how quickly each problem kills.**
9. **When the picture does not fit — go back to A.** The diagnosis is wrong, not the patient.
10. **Communicate everything — say what you see, what you think, and what you are about to do.**

Team Dynamics — Roles in Resuscitation

Role	Responsibilities
Team Leader	Steps BACK. Sees the whole patient. Directs the team. Does NOT perform procedures.
Airway Clinician	Owens A and B. At the head. Manages adjuncts, BVM, escalation.
Circulation Clinician	Owens C. IV access, bloods, drugs, fluids, haemorrhage.
Documentation	Records ALL findings and interventions with timestamps. Does not treat.
Runner	Obtains equipment, drugs, blood products. Liaises with pharmacy and blood bank.

CLINICAL PEARL — Team Leadership

The most powerful thing a team leader can do is nothing — and observe everything.

A team leader performing a procedure has abandoned situational awareness.

Build in a deliberate pause every 2–3 minutes: step back, look at the whole patient, ask 'What am I missing?'

CLOSED-LOOP COMMUNICATION

Leader: 'Give 1 gram TXA IV now.'

Receiver: 'Understood — 1 gram TXA IV.' [performs task]

Receiver: '1 gram TXA given.'

Leader: 'Thank you — noted.'

This three-step loop ensures nothing is given twice or missed.

The Six Cognitive Errors

Error	Definition	ABCDE Defence
Anchoring bias	First diagnosis becomes only diagnosis	Complete all ABCDE letters regardless of working diagnosis
Premature closure	Stopping the diagnostic search too early	Always finish the full assessment
Framing effect	Handover label colours your assessment	Form your own impression from clinical findings
Availability bias	Recent cases colour current diagnosis	Let findings drive diagnosis, not case mix
Confirmation bias	Seeking only confirming evidence	Actively ask: what if I am wrong?
Tunnel vision	Focusing on one procedure, missing the patient	Team leader steps back and observes whole patient

Reassessment — The Sixth Letter

Every intervention changes the patient. Every change requires reassessment.

When to Reassess

- After every intervention — did it work?
- After every clinical change — expected or unexpected
- Every 2–3 minutes in critical patients
- Every 5–10 minutes in stable patients
- Whenever the clinical picture does not fit the diagnosis

When the Patient Deteriorates Unexpectedly

- Stop. Go back to A.
- The most common cause of unexpected deterioration is a problem at A or B not present on first assessment.
- GCS falls during resuscitation? The patient may have aspirated.
- BP drops after intubation? Consider tension pneumothorax from high airway pressures.

Go back to A. Every time. It takes thirty seconds.

MODULE 6 SUMMARY — INTEGRATION

Five integration principles: treat-as-you-find, cyclic reassessment, dangerous finding rules, questioning the diagnosis, communicate everything.

Team leader steps back — observing everything is more powerful than doing anything.

Closed-loop communication: instruction → acknowledgement → completion confirmation.

Six cognitive errors: anchoring, premature closure, framing, availability, confirmation, tunnel vision.

When the patient deteriorates unexpectedly — go back to A.

Reassess: after every intervention, every clinical change, every 2–3 min in critical patients.

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MODULE 7

Special Populations

Paediatrics · Pregnancy · Elderly · Trauma

Module 7 — Special Populations

Learning Objectives

- Apply ABCDE adaptations for children with correct age-specific vital sign thresholds
- Identify how pregnancy changes every component of ABCDE
- Recognize how frailty and polypharmacy affect emergency assessment in the elderly
- Apply ABCDE within the C-ABCDE trauma framework
- Initiate damage control resuscitation for major trauma

Paediatrics

Vital Signs — Age-Specific Normal Ranges

Age Group	HR (bpm)	RR (/min)	SBP lower limit	SpO2 target
Newborn	120–160	40–60	60–80	>95%
Infant <1yr	100–150	30–40	70–90	>95%
Toddler 1–2yr	90–140	25–35	80–95	>95%
Child 2–5yr	80–120	25–30	80–100	>95%
Child 5–12yr	70–110	20–25	90–110	>95%
Adolescent >12yr	60–100	15–20	100–120	>95%

SBP lower limit formula: $70 + (2 \times \text{age in years})$

Hypotension in children is a PRE-ARREST sign — compensatory mechanisms fail suddenly and catastrophically.

Paediatric ABCDE Key Adaptations

- A: Infant positioning — towel under SHOULDERS (not head) to counteract large occiput
- A: OPA — direct insertion with tongue depressor. NO rotation technique in children.
- A: ETT size (uncuffed): $\text{age}/4 + 4 \text{ mm}$
- B: Recession in children is significant at lower thresholds than adults
- B: Grunting in infants = serious respiratory compromise
- C: Fluid bolus: 10 mL/kg isotonic, reassess each, maximum 40 mL/kg
- C: IO after 2 failed IV attempts or 90 seconds in critical child
- C: CPR: 15:2 (two rescuers). Depth: one-third chest diameter.
- D: Paediatric GCS verbal component modified for age
- E: Non-mobile infant + bruising = NAI until proven otherwise

NON-ACCIDENTAL INJURY

Any bruising in a non-mobile infant is suspicious for non-accidental injury.

Mnemonic: 'If they don't cruise, they don't bruise.'

Document objectively. Alert safeguarding. Do NOT confront the carer.

Pregnancy

Key Physiological Changes

- Blood volume +40–50% — can lose significant volume before showing signs of shock
- HR +10–15 bpm baseline — normal tachycardia of pregnancy
- FRC reduced 20% — faster oxygen desaturation during apnoea (2–3 min vs 6–8 min)
- Aspiration risk elevated — reduced LOS tone, delayed gastric emptying
- From 20 weeks: gravid uterus compresses IVC in supine position (aortocaval compression)

ABCDE Adaptations in Pregnancy

- A: Difficult airway — mucosal oedema, breast enlargement, weight gain. Use short-handle laryngoscope.
- B: SpO₂ target $\geq 95\%$. Pre-oxygenate before any airway procedure.
- C: Left lateral tilt 15–30° or manual uterine displacement from 20 weeks — ALWAYS
- D: Eclampsia — Magnesium sulphate 4g IV load, 1g/hr maintenance. Calcium gluconate antidote.
- D: Wernicke's — give thiamine BEFORE glucose in hyperemetic patient with altered consciousness
- E: Perimortem caesarean section (PMCS) if no ROSC at 4 minutes — target delivery at 5 minutes

PMCS RULE

Cardiac arrest at ≥ 20 weeks gestation.

4 minutes without ROSC → prepare for PMCS.

Target delivery within 5 minutes of arrest.

Primary goal = maternal resuscitation (relieves aortocaval compression).

Continue CPR throughout the procedure.

The Elderly Patient

How Ageing Changes ABCDE

- A: Decreased cough reflex, reduced muscle tone, dental status
- B: Reduced respiratory reserve — decompensates faster
- C: Maximum achievable HR reduced ($220 - \text{age}$). Beta-blockers blunt response further.
- C: Relative hypotension — compare to the patient's OWN usual BP, not population norms
- D: Acute confusion (delirium) = medical emergency requiring cause identification
- D: Silent MI — up to 40% of MI in elderly present atypically. ECG on every acutely unwell elderly patient.
- E: Hypothermia risk — reduced thermogenic capacity. Always measure core temperature.

Polypharmacy — The Hidden Variable

- Beta-blockers: mask tachycardia of shock
- Anticoagulants (warfarin, DOACs): change haemorrhage management completely
- ACE inhibitors: contribute to hypotension in volume depletion — consider holding
- Metformin: must be held in shock, AKI, or serious illness — lactic acidosis risk
- Steroids: mask fever and signs of peritonism
- Opioids: profound respiratory depression at lower doses than in young adults

Major Trauma — C-ABCDE

C Before A — Pre-Hospital Modification

In pre-hospital and military settings: C-ABCDE places catastrophic haemorrhage control first.

Exsanguinating haemorrhage from a limb can kill in seconds. Tourniquet first. Airway second.

Damage Control Resuscitation — Three Principles

- **Permissive hypotension:** target SBP 80–90 in penetrating/uncontrolled haemorrhage. Exception: SBP $\geq$ 110 in TBI.
- **Haemostatic resuscitation:** blood products (PRBC:FFP:platelets = 1:1:1). Not crystalloid.
- **Damage control surgery:** achieve haemostasis rapidly, temporise, rewarm, then repair.

THE LETHAL TRIAD

Hypothermia + Acidosis + Coagulopathy

Each element worsens the others. Prevention is easier than reversal.

Warm the patient from first contact. Use blood products early. Achieve haemostasis fast.

Secondary Brain Injury Prevention in TBI

- SpO₂ ≥95% — hypoxia worsens secondary brain injury
- SBP ≥110 mmHg — cerebral perfusion pressure must be maintained
- Glucose 5–10 mmol/L
- Temperature 36–37.5°C

Self-Test

A 4-year-old child, 16 kg, presents in septic shock. What is the correct initial fluid bolus?

- 500 mL crystalloid — the standard shock bolus
- 10 mL/kg = 160 mL isotonic crystalloid, reassess after infusion
- 20 mL/kg = 320 mL as a single rapid bolus
- 1 L/kg crystalloid over 1 hour

ANSWER

B — 10 mL/kg = 160 mL for a 16 kg child. Paediatric fluid resuscitation uses weight-based 10 mL/kg boluses with reassessment after each. Maximum 40 mL/kg (640 mL in this child) before escalating to blood products and vasopressors. Hypotension in a child is a pre-arrest sign — act immediately.

MODULE 7 SUMMARY — SPECIAL POPULATIONS

Paediatrics: age-specific norms essential. Hypotension = pre-arrest sign. IO early. OPA = direct insertion.

Pregnancy: left lateral tilt from 20 weeks. Difficult airway. SpO₂ ≥95%. PMCS at 4 minutes.

Elderly: relative hypotension. Blunted tachycardia. Polypharmacy review. Delirium = medical emergency.

Trauma: C-ABCDE. Permissive hypotension (not in TBI). Blood products 1:1:1. Lethal triad prevention.

MODULE 8

Final Assessment

Preparation Guide · What to Expect · How to Succeed

Module 8 — Final Assessment Preparation

Assessment Structure

Part 1 — MCQ	40 questions Pass mark 28/40 (70%) No time limit No negative marking
Part 2 — Scenarios	3 integrated case-based scenarios with structured written responses
Part 3 — Skills Certificate	Practical skills self-declaration checklist Issued within 24 hours of successful completion 8 CME hours declared
Retake	1 free retake within 30 days if below pass mark

MCQ Distribution — By Module

Module	Questions	Focus
Module 1 — Airway	Q1–5	LEMON, OPA/NPA, suction, CICO
Module 2 — Breathing	Q6–10	Silent chest, COPD oxygen, haemothorax, NIV
Module 3 — Circulation	Q11–15	Shock index, CPR timing, shock types, IO, TXA
Module 4 — Disability	Q16–20	GCS, posturing, SAH, status epilepticus, stroke
Module 5 — Exposure	Q21–24	Log roll findings, hypothermia, AMPLE, Grey Turner's
Module 6 — Integration	Q25–29	Reassessment, cognitive errors, team communication
Module 7 — Special Populations	Q30–35	Paediatric fluids, PMCS, elderly, TBI, NAI
Cross-Module	Q36–40	Complex multi-system clinical scenarios

Top 20 High-Yield Points for the Final Assessment

1. Airway kills in 3 minutes, always first, always treated before moving to B
2. Treat as you find — intervene at point of discovery, not after full assessment
3. Stridor = laryngeal obstruction — urgent escalation. Snoring = tongue = positioning.
4. LEMON: 2+ findings = difficult airway — have a plan and surgical airway backup ready
5. CICO: immediate cricothyrotomy — no further intubation attempts
6. Oxygenation failure $\neq$ ventilation failure. Supplemental O₂ does not fix CO₂ retention.
7. Tension PTX: absent BS + hyperresonance + haemodynamic compromise = clinical diagnosis = needle
8. Silent chest in asthma = life-threatening = pre-arrest — do not be reassured
9. COPD target: 88–92% SpO₂. Standard: 94–98%. CO poisoning: 100% regardless of SpO₂.
10. Narrowed pulse pressure is an early sign of hypovolemia, before BP falls
11. Shock Index >1.0 = significant haemodynamic compromise regardless of absolute BP
12. JVP flat = empty tank. JVP elevated = blocked or failing pump.
13. Tourniquet: proximal to wound, never over joint, tighten until bleeding STOPS, record time
14. IO: after 2 IV fails or 90 seconds in critical patient. Proximal humerus = highest flow.
15. CPR: rate 100–120, depth 5–6 cm, full recoil, max 5 sec interruptions
16. VF = shock. PEA = CPR + 4Hs/4Ts. Adrenaline after 3rd shock in VF.
17. GCS ≤ 8 : airway at risk. Document E, V, M separately. Trend matters.
18. Bilateral pinpoint pupils = opioid toxicity. Unilateral dilated fixed = herniation = neurosurgery now.
19. Blood glucose on EVERY patient with altered consciousness. BEFORE any neurological diagnosis.
20. Paediatric hypotension is pre-arrest. SBP lower limit = $70 + (2 \times \text{age in years})$.

Common MCQ Pitfalls

WATCH OUT FOR THESE

COPD oxygen: never withhold from severely hypoxic patient — treat hypoxia first, then titrate. Target 88–92%.

Tension PTX vs haemothorax: tension = hyperresonant. Haemothorax = dull on percussion.

OPA rotation technique: adults ONLY. Never in children.

Pelvic spring test: ONCE only. Never repeat.

Permissive hypotension: standard trauma SBP 80–90. TBI: SBP ≥ 110 . Not interchangeable.

TXA: within 3 hours of injury. After 3 hours it may be harmful.

PMCS: prepare at 4 minutes without ROSC. Target delivery at 5 minutes.

Status epilepticus starts at 5 minutes — not 10, not 30.

The Scenario Questions — How to Approach

The case-based scenarios in Part 2 test your ability to apply ABCDE to complex multi-system patients. Each scenario has structured questions.

- Read the full case before answering any question
- Apply ABCDE in sequence — even if the question focuses on one component
- State the diagnosis AND the immediate intervention — both are expected
- Use clinical language: 'needle decompression at 2nd ICS MCL' not just 'treat the pneumothorax'
- Reference the treat-as-you-find principle explicitly in complex scenarios
- Demonstrate awareness of competing management priorities (e.g. haemorrhage vs TBI BP targets)
- SBAR responses: include all four components and a SPECIFIC recommendation

FINAL PREPARATION CHECKLIST

Re-read each module summary at the end of each chapter in this book.

Attempt every self-test question without looking at the answer first.

Download and review the quick reference cards from the LMS platform.

Think of one patient from your practice for each module — where would this knowledge have helped?

Review the answer key in Module 8 for any questions you are unsure about.

If you score below 70% on the mock questions in this book — rewatch those module segments before sitting the final.

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Master Quick Reference — All Five Letters

Keep this section open during study. Laminate and carry the quick reference cards at work.

A — AIRWAY

Assessment: Look (cyanosis, recession, mouth) | Listen (snoring/stridor/gurgling/silence) | Feel (airflow, trachea, emphysema)

Positioning: No trauma = head-tilt chin-lift | Trauma = jaw thrust + MILS

OPA: mouth-to-jaw sizing | rotation adults | direct + tongue depressor children | contraindicated if gag intact

NPA: little-finger diameter | nose-to-tragus length | always lubricate | caution basal skull fracture

Escalation: positioning → adjuncts → BVM → supraglottic → RSI → CRICOTHYROTOMY

B — BREATHING

Assessment: RR (12–20 norm, >30 emergency) | Depth | Symmetry | Work of breathing | Auscultation | SpO₂

6 Threats: Tension PTX (hyperresonant) | Open PTX | Massive haemothorax (dull) | Flail chest | Acute asthma | Pulmonary oedema

O₂ targets: Standard 94–98% | COPD 88–92% (Venturi) | CO poisoning 100%

Needle decompress: 2nd ICS MCL | above 3rd rib | 14G | hiss = diagnosis confirmed

C — CIRCULATION

Assessment: HR | BP + pulse pressure | CRT (<2s) | Skin | JVP (flat=empty, elevated=blocked/failing) | UO (0.5 mL/kg/hr)

Shock types: Hypovolaemic (flat JVP) | Distributive (warm, flat JVP) | Cardiogenic (elevated JVP, cold) | Obstructive (elevated JVP)

Haemorrhage: direct pressure | packing | tourniquet (5–7cm proximal, not over joint) | pelvic binder (greater trochanters, once)

CPR: 100–120/min | 5–6cm depth | full recoil | max 5s interruptions | VF = shock | PEA = 4Hs/4Ts

D — DISABILITY

AVPU: P or U = GCS ≤ 8 = AIRWAY AT RISK — return to A

GCS: document E ___ V ___ M ___ separately | ≤ 8 = airway risk | trend matters

Pupils: unilateral dilated fixed = HERNIATION = neurosurgery now | bilateral pinpoint = opioids = naloxone

Blood glucose: EVERY patient with altered consciousness | before any neurological diagnosis

Status epilepticus: 5min = benzodiazepine | 20min = second-line IV agent |

Stroke: check glucose, CT, 4.5h thrombolysis window

E — EXPOSURE

Technique: cut clothing (trauma), expose→examine→cover (dignity), warm blankets, forensic bags (paper)

Log roll: Person 1 at HEAD controls roll | spine palpation | one-leader rule

Pelvis: spring test ONCE ONLY | instability = binder at greater trochanters | blood at meatus = NO catheter

Temperature: rectal/oesophageal for accuracy | mild (32–35, passive) | moderate (28–32, active external) | severe (<28 , active internal)

AMPLE: Allergies | Medications | Past Hx | Last meal | Events | Heat stroke: PHYSICAL cooling only, no antipyretics

EM PIONEERS

Mastering Emergency Medicine — One Golden Hour at a Time

A · B · C · D · E

Sequential. Systematic. Treat as you find.

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