SECTION 1

Presentations in Acute Medicine

General

CHAPTER 1

The critically ill patient

Marlies Ostermann and David Sprigings

Key features of the critically ill patient are severe respiratory, cardiovascular or neurological derangement, often in combination, reflected in abnormal physiological observations (Tables 1.1 and 1.2). Principles of management are summarised in Box 1.1 and Figure 1.1.

Priorities

Make a rapid but systematic assessment using the ABCDE approach.

While doing this, collect information about the patient, the current problem, the context and comorbidities. Attach monitoring (ECG and oxygen saturation) and secure venous access.

Box 1.1 The critically ill patient: principles of management (Resuscitation Council (UK))

Use the Airway, Breathing, Circulation, Disability, Exposure (ABCDE) approach to assess and treat the patient.

Do a complete initial assessment and re-assess regularly.

Treat life-threatening problems before moving to the next part of assessment.

Assess the effects of treatment.

Recognize when you will need extra help. Call for appropriate help early.

Use all members of the team. This enables interventions (e.g. assessment, attaching monitors, intravenous access), to be undertaken simultaneously.

Communicate effectively – plan approach.

The aim of the initial treatment is to keep the patient alive, and achieve some clinical improvement. This will buy time for further treatment and making a diagnosis.

Remember: it can take a few minutes for treatments to work, so wait a short while before reassessing the patient after an intervention.

Acute Medicine: A Practical Guide to the Management of Medical Emergencies, Fifth Edition. Edited by David Sprigings and John B. Chambers.

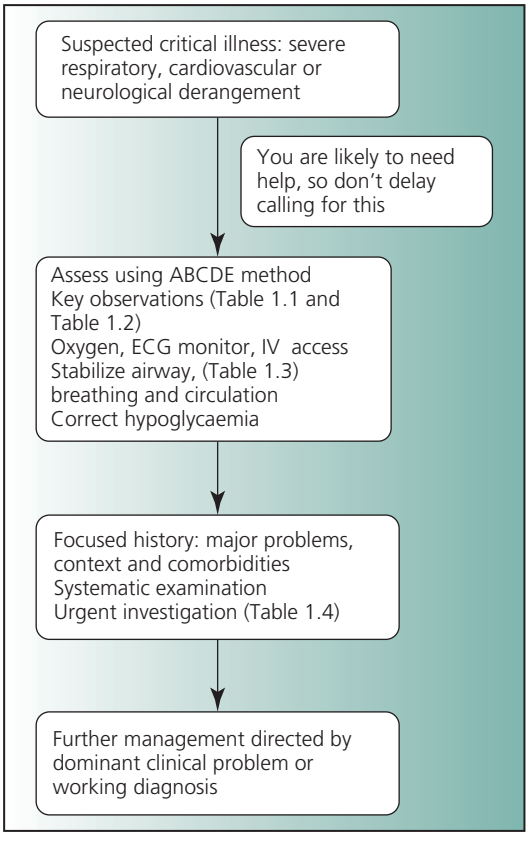

Figure 1.1 Approach to the patient with suspected critical illness.

Airway and breathing

- Ensure the airway is clear. If the patient is unconscious, remove dentures if loose and aspirate the pharynx, larynx and trachea with a suction catheter. See Chapter 112 for detailed advice on airway management.
- If there is no reflex response (gagging or coughing) to the suction catheter or the respiratory rate is <8/min, a cuffed endotracheal tube should be inserted, preferably by an anaesthetist. Before this is done, ventilate the patient using a bag-mask system with 100% oxygen.
- What is the respiratory rate? Rates <8 or >30/min signify potential critical illness. Is there respiratory distress, shown by dyspnoea, tachypnoea, ability to speak only in short sentences or single words, agitation and sweating? Is arterial oxygen saturation <90% despite breathing 40% oxygen? This indicates severe impairment of gas exchange. See Chapter 11 for management of respiratory failure.

Circulation

- Remember that a 'normal' blood pressure may be maintained by vasoconstriction and does not mean that organ perfusion is adequate. Signs of low cardiac output include confusion and agitation, cold extremities, sweating, oliguria and metabolic acidosis.
- Heart rates <40 or >130/min with signs of low cardiac output require urgent correction: see Chapters 39–44 for management of arrhythmias.
- If systolic BP is <80 mmHg, or has fallen by more than 40 mmHg and there are signs of low cardiac output, urgent correction is needed. Look carefully at the JVP, which may provide an important clue to the diagnosis.

Table 1.1 Nine key observations in suspected critical illness.

Observation	Signs of critical illness	Action
Airway	Evidence of upper airway obstruction (Table 1.3)	See Table 1.3 and Chapter 112 for management of the airway
Respiratory rate	Respiratory rate <8 or >30/min	Give oxygen (initially 60–100%) Connect a pulse oximeter Check arterial oxygen saturation and blood gases See Chapter 11 for management of respiratory failure
Arterial oxygen saturation	SaO_2 <90%	Give oxygen (initially 60–100% if there are other signs of critical illness) Check arterial blood gases (Chapter 118)
Heart rate	Heart rate <40 or >130/min with signs of impaired organ perfusion	Give oxygen 60–100% Connect an ECG monitor and obtain IV access See Chapters 39–44 for management of cardiac arrhythmias
Blood pressure	Systolic BP <90 mmHg or fall in systolic BP by more than 40 mmHg, with signs of impaired organ perfusion	Give oxygen 60–100% Connect an ECG monitor and obtain IV access See Chapter 2 for management of hypotension/shock
Perfusion	Signs of impaired organ perfusion: cool/mottled skin with capillary refill time >2 s; agitation/reduced conscious level; oliguria	Give oxygen 60–100% Connect an ECG monitor and obtain IV access See Chapter 2 for management of hypotension/shock
Conscious level	Reduced conscious level (unresponsive to voice)	Stabilize airway, breathing and circulation Endotracheal intubation if GCS 8 or less Exclude/correct hypoglycaemia Give naloxone if opioid poisoning is possible See Chapter 3 for further management of the patient with reduced conscious level
Temperature	Core temperature <36 or >38 °C, with hypotension, hypoxaemia, oliguria or agitation/reduced conscious level	See Chapter 35 for further management of sepsis syndrome
Blood glucose	Blood glucose <4 mmol/L with signs of hypoglycaemia (sweating, abnormal behaviour, reduced conscious level, seizures)	Give 100 mL of 20% glucose or 200 mL of 10% glucose over 15–30 min IV, or glucagon 1 mg IV/IM/SC See Chapter 81

GCS, Glasgow Coma Scale score
AVPU scale: alert = GCS 14 or 15; voice responsive = GCS 12; pain responsive = GCS 8; unresponsive = GCS 3.

If there are no signs of pulmonary oedema, give IV fluid (500 mL crystalloid over 15 min). If hypovolaemia or vasodilatation is likely (suspect vasodilatation if the pulses are bounding), lay the patient flat and elevate the foot of the bed. See Chapter 2 for further management of hypotension and shock.

Neurological status ('disability' – 'da brain')

- What is the conscious level (assessed using the Glasgow coma scale score (GCS) (p. 20))? If the GCS is <9, contact an anaesthetist immediately, as the patient may need urgent endotracheal intubation.
- If the conscious level is reduced, you must exclude hypoglycaemia by immediate stick test. If blood glucose is <4.0 mmol/L, give 100 mL of 20% glucose or 200 mL of 10% glucose over 15–30 min IV, or glucagon 1 mg IV/IM/SC. Recheck blood glucose after 10 min, if still below 4.0 mmol/L, repeat the above IV

Table 1.2 National Early Warning Score (NEWS).

National Early Warning Score (NEWS)*

PHYSIOLOGICAL PARAMETERS	3	2	1	0	1	2	3
Respiratory Rate	≤8		9 - 11	12 - 20		21 - 24	≥25
Oxygen Saturations	≤91	91 - 93	94-95	≥96			
Any Supplemental Oxygen		Yes		No			
Temperature	≤35.0		35.1 - 36.0	36.1 - 38.0	38.1 - 39.0	≥39.1	
Systolic BP	≤90	91 - 100	101 - 110	111 - 219			≥220
Heart Rate	≤40		41 - 50	51 - 90	91 - 110	111 - 130	≥131
Level of Consciousness				A			V, P, or U

*The NEWS initiative flowed from the Royal College of Physicians' NEWS Development Implementation Groups NEWSDIG, and was jointly developed and funded in collaboration with the Royal College of Physicians, Royal College of Nursing, National Outreach Forum and NHS Training for innovation.
Source: Royal College of Physicians. National Early Warning Score (NEWS): Standardising the assessment of acute illness severity in the NHS. Report of a working party. London: RCP, 2012.

Level of Consciousness: A, Alert; V, responds to Voice; P, responds to Pain; U, Unresponsive.

The NEWS scoring system

In some settings, patients will have a impaired level of consciousness as a consequence of sedation, eg following surgical procedures. Thus, the assessment of consciousness level and necesslty to escalate care should be considered in the time-limited context of the appropriateness of the consciousness level in relation to recent sedation.

For patients with known hypercapnoeic respiratory failure due to chronic obstructive pulmonary disease (COPD), recommended British Thoracic Society target saturations of 88–92% should be used. These patients will still 'score' if their oxygen saturations are below 92 unless the score is 'reset' by a competent clinical decision-maker and patient-specific target oxygen saturations are prescribed and documented on chart and in the clinical notes.

All supplemental oxygen when administered, must be prescribed.

The National Early Warning Score (NEWS) thresholds and triggers

NEWS	Clinical risk
0	Low
Aggregate 1 – 4	
RED score* (Individual parameter scoring 3)	Medium
Aggregate 5 – 6	
Aggregate 7 or more	High

glucose treatment. In patients with malnourishment or alcohol use disorder, there is a remote risk of precipitating Wernicke encephalopathy by a glucose load: prevent this by giving thiamine 100 mg IV before or shortly after glucose administration. See Chapter 81 for further management of hypoglycaemia.

- If the respiratory rate is <12/min or the pupils are pinpoint, or there is other reason to suspect opioid poisoning, give naloxone. Give up to 4 doses of 800 μgm IV every 2–3 min until the respiratory rate is around 15/min. Further doses may be needed (see p. 233).
- If you suspect benzodiazepine overdose may be the cause, give flumazenil, 200 μgm IV over 15 s; if needed, further doses of 100 μgm can be given at 1-min intervals up to a total dose of 2 mg.
- If there are recurrent or prolonged major seizures, treat with diazepam 10–20 mg IV or lorazepam 2–4 mg IV: see Chapter 16 for management of seizures.
- Examine the eyes and pupils, and check for neck stiffness.
- Make a rapid assessment of limb tone and power: is there lateralized weakness?

Exposure (entire examination)

- Check for abdominal tenderness and guarding. If the patient has severe abdominal pain or generalized abdominal tenderness, and is shocked (systolic BP <90 mmHg with cold skin), the likely diagnosis is generalized peritonitis, mesenteric infarction, severe pancreatitis or ruptured abdominal aortic aneurysm (Table 21.1).
- Examine the limbs, spine and perineum for evidence of ischaemia or a septic focus.

Further management

Investigation of the critically ill patient is given in Table 1.4. Further management is directed by the dominant clinical problem or working diagnosis.

Table 1.3 Assessment and stabilization of the airway.

	Signs of acute upper airway obstruction	Causes of acute upper airway obstruction	Action if you suspect upper airway obstruction
Conscious patient	Respiratory distress* Inspiratory stridor Suprasternal retraction Abnormal voice Coughing/choking	Foreign body Anaphylaxis (Chapter 38) Angioedema (Chapter 27)	Sit the patient up Give high-flow oxygen Call for urgent help from an anaesthetist and ENT surgeon Specific management of cause of obstruction
Unconscious patient	Respiratory arrest Inspiratory stridor Gurgling Grunting/snoring	Above causes Tongue and soft tissues of oropharynx Inhalation of foreign body, secretions, blood, vomitus	Head-tilt/chin-lift manoeuvre Remove dentures if loose and aspirate the pharynx, larynx and trachea with a suction catheter Call for urgent help from an anaesthetist See Chapter 112 for management of the airway Specific management of cause of obstruction

* Respiratory distress is shown by dyspnoea, tachypnoea, ability to speak only in short sentences or single words, agitation and sweating.

Table 1.4 Investigation of the critically ill patient.

Immediate
Arterial blood gases, pH and lactate
ECG
Blood glucose
Plasma sodium, potassium, urea and creatinine
Full blood count
Urgent
Chest X-ray
Echocardiography if hypotension/shock
Cranial CT if reduced conscious level or focal signs
Coagulation screen if low platelet count, suspected coagulation disorder, jaundice or purpura
Biochemical profile
Amylase if abdominal pain or tenderness
C-reactive protein
Blood culture if suspected sepsis
Urine stick test
Toxicology screen (serum 10 mL and urine 50 mL) if suspected poisoning

Further reading

Capana M, Ivya J, Rohlederb T, Hickman J, Huddleston JM. (2015) Individualizing and optimizing the use of early warning scores in acute medical care for deteriorating hospitalized patients. *Resuscitation* 93, 107–112.

Royal College of Physicians (2012) *National Early Warning Score (NEWS): Standardising the assessment of acute illness severity in the NHS*. Report of a working party. London: RCP. https://www.rcplondon.ac.uk/projects/outputs/national-early-warning-score-news.