The critically ill patient: making the referral to intensive care

Introduction

Intensive care units are responsible for looking after patients with reversible life-threatening conditions, who need frequent and often invasive monitoring as well as support from mechanized equipment and pharmacological therapies to maintain normal body function and physiological parameters. A previous article highlighted how to recognize and stabilize the sick patient (Elnour and Shankar-Hari, 2011). Some patients may continue to deteriorate despite appropriate and prompt intervention. This article outlines the criteria for advanced life support interventions and hence admission to critical care. The focus of discussion will be patients in need of level 2 to 3 care requiring priority 1 to 2 admissions.

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The critical care unit in a hospital

The Department of Health (2000) report *Comprehensive Critical Care* defined four different levels of care that can be provided in hospital (*Table 1*). High dependency unit care often refers to level 1 or 2, whereas intensive care entails level 2 or 3 support. Patients requiring multi-organ support should be admitted to the intensive care unit while those requiring single organ support may be more suitable for high dependency.

The Society for Critical Care Medicine has classified critical care admissions into four categories outlined in *Table 2* (Egol et al, 1999).

Criteria for admission to intensive care unit

Patients may need admission to the high dependency unit or intensive care unit for ventilatory, cardiovascular or endocrine support, renal replacement or invasive neurological monitoring.

Respiratory support

When a patient's respiratory system can no longer provide adequate oxygenation and/or ventilation, mechanical ventilation with supplemental oxygen can be used. Ventilatory support can be given via a tight fitting face mask (non-invasive positive pressure ventilation) or via an 'invasive' endotracheal tube. Most patients requiring intensive care unit admission need invasive ventilation. The indications for intubation can be divided into those for securing the airway and those for control of ventilation.

Airway protection

- Threatened obstruction and aspiration: decreased conscious level (Glasgow Coma Scale score ≤8) leading to inadequate protective reflexes. These include the comatose, drug overdose or high grade encephalopathic patient
- Mechanical airway obstruction, including oedema, tumour and haemorrhage.

Mechanical ventilation

- Apnoea as a result of reduced central respiratory drive (most commonly drug induced)
- Impaired alveolar ventilation (indicated by raised arterial partial pressure of carbon dioxide) when accompanied by one or more of: depressed mental state, increasing fatigue, reduced partial pressure of oxygen that cannot otherwise be corrected, severe acidosis (pH <7.26) that cannot otherwise be corrected and/or compromise of lower airways (commonly by secretions or fluid)
- Low partial pressure of oxygen (<8 kPa) that cannot be improved with an inspired oxygen tension <0.50 and/or that is causing symptoms or seriously impairing bodily function
- High metabolic demand of work of breathing, for example in sepsis.

Table 1. Levels of inpatient care

Level 0	Patients whose medical needs can be met through normal ward care
Level 1	Patients at risk of clinical deterioration, or requiring higher levels of care whose needs can be met by advice and support from the critical care team
Level 2	Patients requiring more detailed observation or intervention such as patients who have undergone complex or prolonged operations or who may have single organ system failure
Level 3	Patients requiring advanced respiratory support alone (mechanical ventilation) or support of at least two organ systems

From Department of Health (2000)

Table 2. Critical care admission categories

Priority 1	Unstable patient requiring expedited admission for intensive treatment and monitoring that cannot be provided outside of the critical care unit
Priority 2	High risk of sudden deterioration, requiring invasive monitoring and potential need for immediate intervention
Priority 3	Reduced likelihood for recovery as a result of underlying chronic illness but may receive intensive treatment to relieve acute deterioration. This may be subject to therapeutic limits
Priority 4	Little or no anticipated benefit from critical care or patients with terminal and irreversible illness facing imminent death. Patients with brainstem death awaiting organ retrieval fall into this category

Adapted from Egol et al (1999)

The possibility of sudden, precipitous deterioration in respiratory function as indicated by a drop in forced vital capacity to <12–15 ml/kg in neuromuscular disorders (such as myasthenic crises or Guillain–Barré syndrome) and the need for intensive physiotherapy to clear secretions (at least 2-hourly) are also compelling reasons for admission to critical care (Department of Health, 1996).

Non-invasive ventilation can be safely instituted in a ward setting where staff with appropriate competencies and experience in setting up and monitoring patients on this mode of ventilation are available 24 hours/day. If non-invasive ventilation is used, it is essential that blood gases are taken as a minimum at 1, 4 and 12 hours after its initiation or change in settings, as they not only direct management but also, within the first 4 hours of non-invasive ventilation, guide the appropriateness of escalation to intubation (Roberts et al, 2008).

Circulatory support

Septic shock is the commonest presentation necessitating intensive care unit admission. There are a multitude of causes of cardiovascular failure but, regardless of the aetiology, management is targeted at increasing blood flow to vital organs. Vasopressors are drugs that induce vasoconstriction and thereby elevate mean arterial pressure. They differ from inotropes, which increase cardiac contractility, although many drugs have both vasopressor and inotropic effects. The use of vasoactive agents to support arterial pressure or cardiac output mandates either critical or coronary care admission.

Adequate fluid resuscitation and status assessment guided by clinical history, examination, lactate measurements, central venous pressure monitoring and central venous saturation levels should be instituted as early as possible, either in the emergency department or on the ward. However, cardiovascular instability of any cause that is unresponsive to modest volume replacement (evidenced by hypotension and/or rising lactate and base deficit levels) should be managed in the intensive care setting.

Renal support

Patients with hospital-acquired acute kidney injury are more likely than those with community-acquired acute kidney injury to require intensive care unit support. Indications for renal replacement therapy are well established although precise definitions are sometimes lacking (Palevsky, 2008). Acute dialysis also is indicated when acute kidney injury occurs in the setting of acute intoxication with a dialysable drug or toxin. Indications for renal replacement therapy in acute kidney injury are outlined in *Table 3*.

Renal replacement therapies can be categorized as continuous or intermittent. In the UK, continuous therapies predominate. Continuous renal replacement therapy usually involves the removal and return of blood through a single cannula placed in a large vein (venovenous therapy). Both forms of renal replacement therapy can cause haemodynamic instability (although continuous renal replacement therapy less so than intermittent renal replacement therapy) and require specialist expertise.

Neurological monitoring and support

Any cause of CNS depression sufficient to compromise the airway and protective reflexes warrants intubation and hence intensive care admission. CNS depression corresponds to a Glasgow Coma Score ≤8 or a response to pain only on the alert/verbal/pain/unresponsive (AVPU) score. Fluctuation in level of consciousness may not necessarily require immediate intubation but does necessitate close neurological observation in a level 2 setting. Some neurological conditions may lead to inadequate ventilation and subsequent need for intubation, ventilation and sometimes tracheostomy formation.

A common neurological presentation requiring intensive care unit admission is status epilepticus. Its definition is evolving, but traditionally the term is defined as 30 minutes of continuous seizure activity or a series of seizures without return to full consciousness. The longer seizure activity continues, the greater the likelihood of neuronal damage, systemic complications and unresponsiveness to treatment. If seizures continue for longer than half an hour despite optimal medical therapy (including lorazepam and phenytoin) or if the terminated seizure was prolonged, the patient must be transferred to an intensive care setting.

Patients requiring intracranial pressure monitoring should be cared for in a dedicated neuro-intensive care unit. Intracranial pressure is normally 7–15 mmHg; at 20–25 mmHg, the upper limit of normal, treatment to reduce intracranial pressure is required. Indications for invasive intracranial pressure monitoring are listed in *Table 4*.

Endocrine disorder monitoring and correction

There are a multitude of endocrine disorders that are safely managed on general medical wards. However, some severe disturbances may require critical care

Table 3. Indications for renal replacement therapy in acute kidney injury

Fluid overload (despite diuretic therapy)
Acute hyperkalaemia or associated with electrocardiographic changes (>6.5 mmol/litre despite medical therapy)
Metabolic acidosis despite medical therapy
Uraemic complications including encephalopathy or pericarditis

Table 4. Indications for invasive intracranial pressure monitoring

Severe head injury (Glasgow Coma Scale 3–8)	Abnormal computed tomography scan
	Abnormal computed tomography scan, age >40 years, blood pressure <90 mmHg, or abnormal posturing
Moderate head injury (Glasgow Coma Scale 9–12)	If anaesthetized or sedated
	Abnormal computed tomography scan

Adapted from Narayan et al (1982)

admission, especially when associated with reduced level of consciousness, respiratory compromise or haemodynamic instability. Some of these are outlined in *Table 5*.

Who is not suitable for referral?

Patients' autonomy should always be respected. Advance directives refusing admission to the intensive care unit or invasive interventions are legally binding. If a patient is unable to express an opinion, speaking to the relatives may be helpful in the decision-making process. However, relatives do not have the right to refuse or insist on admission (except those with lasting power of attorney).

Patients who have a 'do not attempt resuscitation' order may sometimes be admitted to critical care for reversible organ support to prevent arrest, although those with poor physiological reserve or those in whom therapy is unlikely to improve length or quality of life are unlikely to benefit from admission. This decision often requires input from senior members of the referring team. Factors that may help in determining the likelihood of benefit from intensive care unit management are: diagnosis, severity of current illness, coexisting disease and prognosis, as well as response to treatment to date.

Making the referral

When referring a patient, use a similar structure to that which was used to review the patient (*Figure 1*). It is important to have established what forms of system support are required for your patient to warrant intensive care unit admission.

Table 5. Metabolic disorders which may require critical care admission

Diabetic ketoacidosis
Thyroid storm
Myxoedema coma
Adrenal crisis
Severe hypocalcaemia
Severe hypo- or hypernatraemia
Severe hypo- or hyperkalaemia

Adapted from Egol et al (1999)

TOP TIPS

- Ask for help early. This includes nursing staff, porters and physiotherapists as well as doctors.
- Ensure early procurement of transfer equipment, oxygen cylinders and attachment of monitoring to facilitate quick and safe transfer.
- Do not forget to update the patient's next of kin when appropriate.
- Document, date and time all interventions and referrals accurately.

Conclusions

Intensive care is appropriate for patients requiring or likely to require advanced organ support. Trainees should be conversant with evaluation and stabilizing measures needed for the management of critically ill patients as well as the limits of ward level care. Patients who are likely to benefit from critical care intervention should be promptly referred. Ascertainment of key physiological parameters and the nature of response to treatment will greatly facilitate assessment by the critical care team. BJHM

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Figure 1. Referral structure. Adapted from Smith and Nielsen (1999).

Name and age	
Reason behind admission to hospital or presentation to the emergency department and duration of stay so far	
Relevant medical history	
Resuscitation status	
Assessment:	A: Ability to maintain own airway, pattern of respiration
	B: Respiratory rate, arterial blood gas results on stated inspired concentration of oxygen, breath sounds on auscultation, chest X-ray result if available, treatment given and response
	C: Heart rate, rhythm, blood pressure, amount of fluid given and response including urine output. Examination findings. Haemoglobin, lactate, base deficit results
	D: Glasgow Coma Scale score, glucose and temperature
	E: Medications and infusions patient is on. Progress or deterioration since admission
Discussions with consultant responsible for the patient's care and any limitations for therapy set	

KEY POINTS

- Intensive care is appropriate for patients requiring or likely to require advanced organ support.
- Prompt review, stabilization and determination of need for organ support are vital.
- Some patients may not be suitable for admission to intensive care.