Recognition and early management of the critically ill ward patient

Introduction

The management of general ward patients who develop critical illness is often suboptimal. There are many reasons for this including a lack of a systematic approach to these patients (Cullinane et al, 2005), over-burdened ward staff and deficiencies in medical training (Smith et al, 2007). Cardiac arrests occurring in ward patients are often preceded by many hours of untreated physiological deterioration (Franklin and Mathew, 1994). In addition up to 25% of admissions to intensive care from the ward have deteriorated to the point of cardiorespiratory arrest (Goldhill and Sumner, 1998). Knowledge of a simple practical approach to these patients can be life saving.

Definition of critical illness

Critical illness is any disease process which causes physiological instability leading to disability or death within minutes or hours. Perturbation of the neurological and cardiorespiratory systems generally has the most immediate life-threatening effects. Fortunately such instability can be reliably detected by deviations from the normal range in simple clinical observations such as level of consciousness, respiratory rate, heart rate, blood pressure and urinary output. This is why such measurements feature in scoring systems to assess the severity of many common diseases such as the CRB-65 score for pneumonia (Lim et al, 2003) and the Glasgow score for pancreatitis (Blamey et al, 1984).

Initial approach to a potentially critically ill ward patient

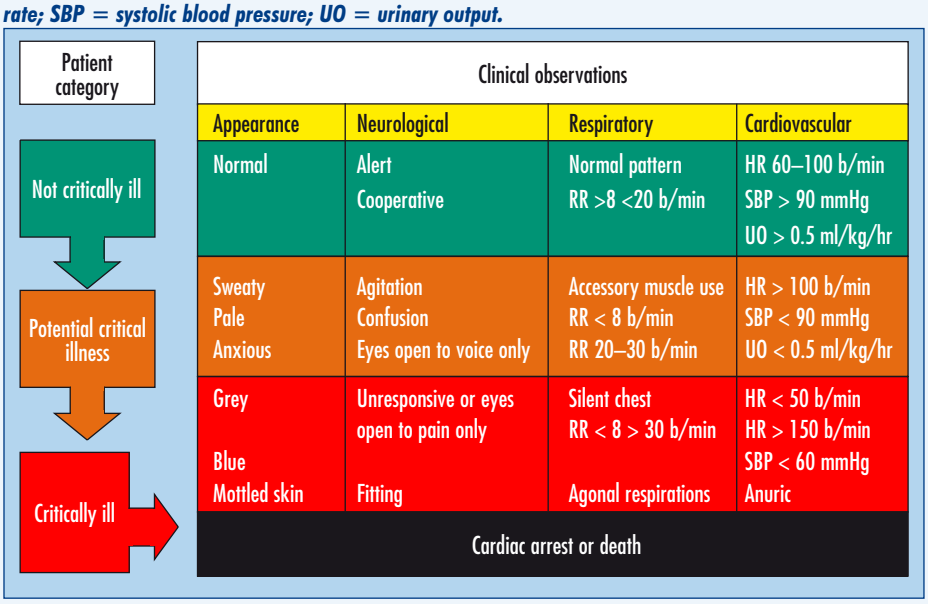
Junior doctors may be alerted to potentially critically ill patients by a variety of people including nursing staff, allied health professionals or even hospital visitors. Regardless of the role and occupation of the person expressing concern, it is important to take all such referrals seriously as, at this stage, no assumptions regarding the patient's true condition can be made. Outcomes from critical illness are time dependent and it is therefore vital to avoid lengthy interrogation of the person making the referral. Nonetheless it is important to record their name and role, time of the referral, reason for the referral, the patient's name, age, exact location, admission diagnosis and if known resuscitation status.

Although it may be possible, at this time, to make decisions regarding clinical management it is usually advisable to promptly attend and assess the patient at the bedside. Here a very brief examination for cardinal features of critical illness should be made that focuses on key aspects of neurological and cardiorespiratory function (*Figure 1*).

Most of the required information can be acquired by carefully observing the patient during an introduction with a proffered handshake. This simple act will not only yield valuable clinical information such as an assessment of level of consciousness and peripheral perfusion but is also important in offering reassurance and establishing a rapport with a patient who may be both ill and frightened. At this point a few moments should be taken to review the clinical observation charts with the responsible nurse. Current recordings and trends in level of consciousness, respiratory rate, blood pressure, heart rate and urine output should be noted. The significance of the numerical value of these parameters has to be interpreted in light of the patient's age, the presence of co-morbidity, current drug treatment and, if available, the magnitude of the change from baseline values.

Clinical observations commonly associated with critical illness include hypotension, tachycardia, tachypnoea, a reduced level of urine output and altered consciousness. The sensitivity and specificity of these findings for critical illness are greatly improved if they are considered all together. The presence of two or more of these signs strongly suggests that the patient is critically ill and at risk of death. Indeed inpatient mortality can be defined by the number of physiological abnormalities, being 0.7% with none, 4.4% with one, 9.2% with two, and 21.3% with three or more (Goldhill and McNarry, 2004).

Figure 1. Bedside examination for cardinal features of critical illness. HR = heart rate; RR = respiratory rate; SBP = systolic blood pressure; UO = urinary output.



Dr Paul Frost *is Consultant in Intensive Care Medicine and* **Dr Matt P Wise** *is Consultant in Intensive Care Medicine, University Hospital of Wales, Cardiff CF14 4XW*

Correspondence to: Dr P Frost

By this time, based on appearance and simple clinical observations, it should be possible to triage the patient into one of three possible categories: critically ill, potentially critically ill and not critically ill. This is a vital first step, as it will dictate further management (*Figure 2*).

Management of the critically ill patient

Immediate measures need to be taken to prevent these patients from dying. The first step should be to call for help; some hospitals have an emergency response team for such patients, if this isn't available then a cardiac arrest should be called. While awaiting help, monitoring of cardiac rhythm, blood pressure and oxygen saturation should be rapidly established and resuscitation initiated using the stepwise airway, breathing, circulation, disability and exposure (ABCDE) approach (Soar and Spearpoint, 2005).

It is vital to remember that this algorithm is more than a simple mnemonic and provides a hierarchical approach to patient survival. Thus it is pointless attempting to correct a patient's hypotension if the airway is obstructed, as death will occur if an adequate airway is not established. Indeed it may be the airway obstruction and subsequent hypoxia which is the precipitant of hypotension.

Airway

The airway must be patent and safe; a partially obstructed airway associated with a diminished level of consciousness is quite common and produces noisy breathing. Stridor indicates obstruction at the larynx, while snoring often occurs when the tongue obstructs the oropharynx. In these circumstances simple airway-opening manoeuvres such as a chin lift or jaw thrust should be applied. A completely obstructed airway is rare and is characterized by paradoxical movement of the chest and abdomen with no detectable movement of air at the mouth.

Following the application of a simple airway opening manoeuvre the oropharynx should be inspected and, if present, easily accessible foreign bodies removed. The use of airway adjuncts, surgical airways and endotracheal intubation needs to be performed by appropriately trained staff, as inexpert application of these techniques can be harmful. It is important to remember that life-saving oxygenation and ventilation can usually be achieved with a simple airway opening manoeuvre and the application of mask-bag ventilation.

Breathing

Visual inspection is particularly informative with respect to breathing. It is essential to note the respiratory rate, as tachypnoea is a sensitive indicator of critical illness (Kause et al, 2004). Occasionally bradypnoea may be observed in the setting of drug toxicity or CNS infection or injury. An abnormal respiratory pattern or decreased expansion may be observed. The latter accompanies underlying disease such as extensive collapse, consolidation, pleural effusion or pneumothorax.

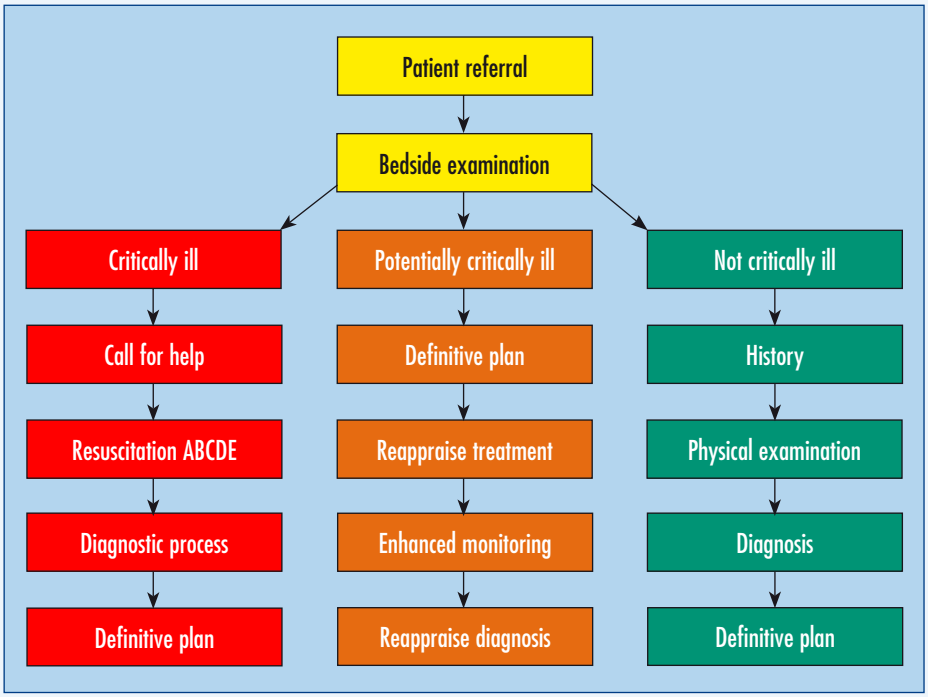
Hypoxaemia is potentially deadly and must be relieved (Bateman and Leach, 1998). In most patients this requires the immediate application of high concentrations of oxygen with the aim of maximizing the inspired oxygen concentration (FiO_2). The FiO_2 depends on the minute ventilation and the flow rate of supplemental oxygen. A patient with respiratory distress may have a minute ventilation of 30 litres/min and in such circumstances a simple face mask with an oxygen flow rate of 12 litres/min will only provide a FiO_2 of around 50%. The most reliable way to achieve a higher FiO_2 is by using a mask with a reservoir bag (non-rebreathing bag) or an anaesthetic bag and mask. A note should be made of the FiO_2 and oxygen saturation.

This approach should be modified when the patient has type II respiratory failure as a result of chronic obstructive airways disease. In some of these patients a high FiO_2 may reduce hypoxic respiratory drive and lead to hypercapnic respiratory coma. Here oxygen therapy should be commenced at approximately 40% and titrated upwards if saturations fall below 90% and downwards if the patient becomes drowsy or if the saturation exceeds 93–94% (National Institute for Clinical Excellence, 2004).

Circulation

Circulatory shock is associated with an altered mental state, prolonged capillary refill, tachycardia, hypotension and oliguria. It is important to remember that hypotension may be a late feature of shock. Additionally an apparently normal blood pressure may represent hypotension in a patient with pre-existing hypertension. Two 18-gauge intravenous lines should be rapidly inserted and carefully secured. Usually veins in the antecubital fossa are easiest to access; blood for urgent laboratory analysis may be drawn through these lines. Insertion of a central venous catheter

Figure 2. Recognition and early management of the critically ill ward patient.



should only be attempted if peripheral access has been unsuccessful. If the external jugular vein is visible then its cannulation can be more rapid and associated with fewer complications than attempts to cannulate deeper veins.

If circulatory shock is suspected then a fluid challenge is appropriate. This should take the form of rapid, i.e. over 10–15 minutes, administration of 250 ml of crystalloid or an equivalent volume of colloid (Antonelli et al, 2007). The effects of the fluid challenge should be assessed by its impact on pulse rate, blood pressure, peripheral perfusion, urine output, conscious level and lactate when measured. Repeated aliquots of fluid may be required. Even in the presence of cardiogenic shock the circulation will often improve with fluid although its administration should be avoided if the patient has pulmonary oedema.

Disability and exposure

Observing the patient's response to a verbal or painful stimulus can rapidly assess level of consciousness. The patient may be Alert, responding only to Voice, responding only to Pain or be Unresponsive (AVPU). At this juncture hyper- or hypoglycaemia should be excluded. Finally, where possible, full exposure of the patient will facilitate physical examination.

Management following immediate resuscitation

Resuscitation is the first priority and the simplest elements of this are unaltered by the underlying disease. Providing a safe airway, administering an appropriate concentration of oxygen and establishing venous access is never wrong and may be life saving in the short term. However, the longer-term outcome depends on the diagnosis and it is fundamentally important to establish this. It may be difficult or even impossible to take a history directly from the patient. If communication is possible then a balance has to be struck between eliciting key information and needlessly exhausting the patient with less relevant questions. The patient best describes important symptoms such as pain but other elements of the history should be obtained from relatives, nurses or the medical notes.

Physical examination has to be conducted in such a way that minimizes any physical effort by the patient. Prolonged, irrelevant examination, particularly if associated with patient exertion and inappropriate positioning, can easily precipitate cardiac arrest. The emphasis should be on eliciting clinical signs, such as those associated with meningitis or peritonitis, that will influence further management and cannot be reliably obtained should the patient require general anaesthesia.

A blood gas is useful to measure adequacy of ventilation ($PaCO_2$), oxygenation (PaO_2, A-a gradient) and circulation (pH and lactate) and can guide response to treatment or alert to further deterioration.

Careful consideration has to be given before requesting investigations, particularly if these involve moving the patient, as this can be extremely hazardous. If the investigation is for diagnostic refinement but will not affect immediate management, then it is best deferred. Where possible diagnostic imaging such as ultrasonography should be done at the patient's bedside. Transfer may be required for other imaging modalities, such as computed tomography; this should be undertaken according to published guidelines (Whitely et al, 2002).

In the early stages of this diagnostic process, advice should be sought from a senior clinician. This is particularly important if there is uncertainty about the appropriateness of resuscitation (General Medical Council, 2002). At this stage a decision will be taken as to whether the patient should remain on the ward or be transferred. Once a definitive plan is made it should be carefully communicated to staff, the patient and the patient's family.

Management of the potentially critically ill patient

This category of patient is quite difficult to deal with, as there is uncertainty about the clinical course that the patient will take. Although these patients have adverse clinical observations, not all develop critical illness and it is difficult to prospectively identify those that will.

The first step should be a thorough reappraisal of the admission diagnosis and treatment. Occasionally misdiagnosis can lead to inappropriate treatment or prescribed therapy may not have been given. Alternatively the patient may have developed a complication of the presenting disease or even a new illness. It is useful to seek a senior clinical opinion in these cases.

Regardless of the cause, adverse trends in clinical observations should be interpreted as evidence for deteriorating physiology and measures should be taken to ameliorate this. The patient may require additional intravenous fluid or an increase in supplemental oxygen. More frequent clinical observations by the bedside nurse are often required as is enhanced monitoring, for example by the use of a pulse oximeter or the passage of a urinary catheter to measure urine output. Medical and nursing staff must remain vigilant and frequent review to assess progress is mandatory.

Sometimes because of staff constraints all of this may not be possible on a general ward and these patients may need transfer to a high dependency unit. Finally, as with a critically ill patient, it is imperative that the definitive management plan is carefully communicated to staff, the patient and the patient's family.

KEY POINTS

- General ward patients who develop critical illness are often sub-optimally managed.
- Cardiac arrest is often preceded by unrecognized physiological deterioration.
- A bedside examination based on observation and simple physiological measurements can be used to rapidly screen for critical illness.
- In critically ill patients dysfunction of the airway, breathing or circulation can lead to immediate death and so assessment and treatment should focus on these systems.
- Potentially critically ill patients need diagnostic reappraisal, enhanced monitoring and regular review.
- Help from a senior doctor should be sought early to refine the diagnosis, treatment and resuscitation status.

Management of the patient who is not critically ill

These patients can be managed conventionally by taking a full history and conducting a thorough physical examination.

Conclusions

Triage of ward patients using a bedside examination based on simple clinical observations can rapidly detect critical illness and facilitate appropriate treatment. It is recommended that trainee doctors adopt this approach in their routine practice. **BJHM**

Conflict of interest: none.

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