Recognition and Management of the Deteriorating Patient

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LEARNING OBJECTIVES

At the end of this chapter the reader will be able to:

- ❒ discuss the importance of prevention of in-hospital adverse events
- ❒ identify the clinical signs of impending or established deterioration
- ❒ discuss the role of outreach and medical emergency teams
- ❒ discuss the importance of education and training in relation to the deteriorating patient.

INTRODUCTION

Critically ill patients are not necessarily located within intensive care or high dependency units (ICU and HDU), but are frequently managed within ward areas. There is irrefutable evidence to confirm that early identification and timely management of the deteriorating patient, may negate the need for transfer to these units and ultimately improve outcomes (Jones et al. 2007; NICE 2007). The literature states that, antecedents to deterioration are present in up to 80% of patients before an adverse event, cardiac arrest, unplanned ICU admission or death occurs (Kause et al. 2004). This is postulated to be because of both the inability to either recognise deterioration, and/or to act on it promptly and appropriately, compounded by existing poor communication channels (Schein et al. 1990; Franklin and Matthew 1994). Nurses, by definition, are at the forefront of monitoring and recognising

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Philip Jevon, Beverley Ewens.

deteriorating patients which, in turn, relies on appropriate monitoring and accurate interpretation of findings, accompanied by timely action. If patients are permitted to progress without prompt and appropriate management, adverse events will occur with associated poor survival rates.

The aim of this chapter is to understand the recognition and management of the deteriorating patient.

PREVENTION OF IN-HOSPITAL ADVERSE EVENTS

In-hospital adverse events have been defined as an unintended injury or complication resulting in prolonged length of stay, disability or death, not attributed to the patient's underlying disease process alone but by their health-care management (Baba-Akbari Sari et al. 2006; de Vries et al. 2007). The causes of this have been classified into three subthemes (NPSA 2007):

1. Failure to measure basic observations of vital signs
2. Lack of recognition of the importance of worsening vital signs
3. Delay in responding to deteriorating vital signs

The prevalence of adverse events has been estimated at between 3% and 17% of all hospital admissions, with resulting high human and financial costs (Baba-Akbari Sari et al. 2006). The most serious adverse events classified are unplanned admission to an ICU, cardiac arrest or death, 50% of which are estimated to be preventable (de Vries et al. 2007).

Survival to discharge from in-hospital cardiopulmonary arrest

In the UK, overall less than 20% of patients who have an in-hospital cardiopulmonary arrest survive to discharge (Meaney et al. 2010). These survival rates are also dependent upon the location and time of day at which they occur (Herlitz et al. 2002; Peberdy et al. 2008). Most of these survivors will have received prompt and effective defibrillation for a monitored and witnessed ventricular fibrillation (VF) arrest (Fig. 1.1) or pulseless ventricular tachycardia (VT), caused by primary myocardial ischaemia (Resuscitation Council UK 2010). Survival to discharge in these patients is very good, even as high as 37%) (Meaney et al. 2010).

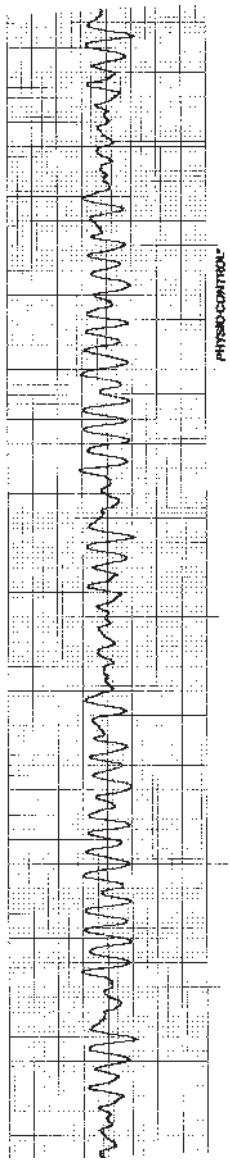

Fig. 1.1 Ventricular fibrillation (coarse).

Unfortunately, most in-hospital cardiopulmonary arrests are caused by either asystole (39%) (Fig. 1.2) or pulseless electrical activity (PEA) (37%) (i.e. no pulse, but an ECG trace that would normally be expected to produce a cardiac output, (Fig. 1.3) Both of these non-shockable rhythms are associated with a very poor outcome (12% and 11% respectively – Meaney et al. 2010; Resuscitation Council UK 2010). These arrests are usually not sudden nor are they unpredictable: cardiopulmonary arrest usually presents as a final step in a sequence of progressive deterioration of the presenting illness, involving hypoxia and hypotension (Resuscitation Council UK 2010). In some studies it has been alleged that patients with abnormal vital signs before cardiac arrest have improved survival rates, compared with those who have normal vital signs, thus indicating the preventability of cardiac arrests (Skrifvars et al. 2006; Peberdy et al. 2008). Patients who experience cardiac arrest with non-shockable rhythms have a reduced chance of survival, so a vital approach that is likely to be successful is prevention of the cardiopulmonary arrest if at all possible. For this prevention strategy to be successful, early recognition and effective treatment of patients at risk of cardiopulmonary arrest are paramount. This strategy may prevent some cardiac arrests, deaths and unanticipated ICU admissions (Nolan et al. 2005). The statistics are irrefutable in that antecedents are present in 79% of cardiopulmonary arrests, 55% of deaths and 54% of unanticipated ICU admissions (Kause et al. 2004).

Suboptimal critical care

In a seminal study (McQuillan et al. 1998), it was demonstrated that the management of deteriorating inpatients in the UK is frequently suboptimal.

Two external reviewers assessed the quality of care in 100 consecutive unplanned admissions to ICU:

- Twenty patients were deemed to have been well managed and 54 to have received suboptimal management, with disagreement about the remainder.
- Case mix and severity of illness were similar between the groups, but the ICU mortality rate was worse in those whom both reviewers agreed received suboptimal care before ICU

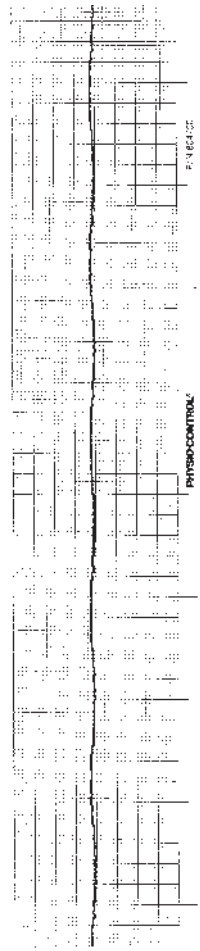

Fig. 1.2 Asystole.

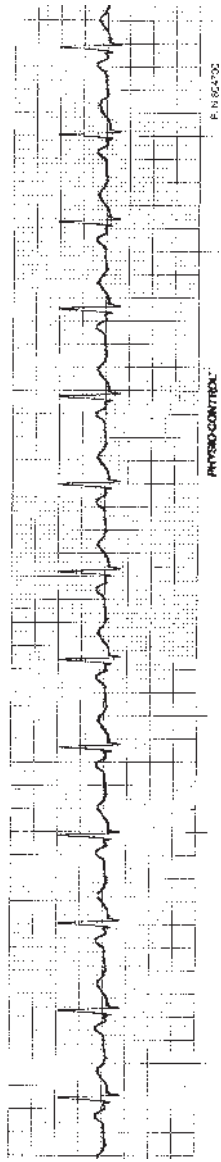

Fig. 1.3 Pulseless electrical activity (PEA)/sinus rhythm.

admission (48% compared with 25% in the well-managed group).
- Admission to ICU was considered late in 37 patients in the suboptimal group. Overall, a minimum of 4.5% and a maximum of 41% of admissions were considered potentially avoidable.
- Suboptimal care contributed to morbidity or mortality in most instances.
- The main causes of suboptimal care were considered to be failure of organisation, lack of knowledge, failure to appreciate clinical urgency, lack of supervision and failure to seek advice. Junior staff frequently fail to recognise deterioration and appreciate the severity of illness and, when therapeutic interventions are implemented, these have often been delayed or are inappropriate. The management of deteriorating patients is a significant problem, particularly at night and at weekends, when responsibility for these patients usually falls to the on-call team whose main focus is on a rising tide of new admissions (Baudoin and Evans 2002).

Despite gaining criticism for alleged methodological weakness, this groundbreaking study was the catalyst for many other reviews and studies pertaining to the management of the deteriorating patient and the recognition of clinical antecedents.

Even more disturbingly, earlier studies of events leading to 'unexpected' in-hospital cardiac arrest indicate that many patients have clearly recorded evidence of marked physiological deterioration before the event, without appropriate action being taken in many cases (Schein, et al. 1990; Franklin and Matthew 1994).

Deficiencies in critical care management frequently involve simple aspects of care, e.g. failure to recognise and effectively treat abnormalities of the patient's airway, breathing and circulation, incorrect use of oxygen therapy, failure to monitor the patient, failure to ask for help from senior colleagues, ineffective communication, lack of teamwork and failure to use treatment limitation plans (McQuillan et al. 1998; Hodgetts et al. 2002).

The ward nurse is uniquely positioned to recognise that the patient is starting to deteriorate and to call for appropriate help (Adam and Osborne 2005). However, recognition of the deteriorating patient remains inadequate (Beaumont et al. 2008; Odell et al.

2009). Strategies to prevent in-hospital adverse events are based on certain elements: the early identification of the deteriorating patient, escalation of care, timely and appropriate management, and the early transfer to critical care areas as appropriate.

Guidelines have been produced to enable organisations and individual clinicians to design, implement and evaluate a strategy to identify and manage the deteriorating patient to improve outcomes.

Best practice – measurement and documentation of observation

The accurate measurement of physiological observations is essential in detecting the deteriorating patient and reducing adverse events.

- All patients in acute care settings should have observations performed
- All patients should have observations performed on admission (NICE 2007)
- Observations should comprise as a minimum:
  - ***Respiratory rate***
  - ***Oxygen saturation***
  - ***Heart rate***
  - ***Blood pressure***
  - ***Temperature***
  - ***Level of consciousness*** (NICE 2007; ACSQHC 2010)
- **Frequency of observations should be consistent with the condition of the patient, but at least once every 8 hours and documented in the monitoring plan**
- Observation charts should display observations in graphic format

Best practice

Escalation process should:

- be a formal documented escalation process that should be available and applicable to all patients at all times of the day
- support and authorise the clinician to escalate care until a satisfactory response is achieved
- be tailored to the organisation's characteristics and available resources
- allow for a graded response according to the degree of physiological abnormality, e.g. increase in frequency of observations, interventions

by ward staff, review by medical team, summoning urgent assistance, transfer to a higher level of care
- specify the levels of abnormality for which care should be escalated, for whom the care is escalated, who else to contact when care is escalated, timeframes for requested response and back-up options for obtaining a response if this fails
- consider the needs of patients with advance directives

(ACSQHC 2010)

CLINICAL SIGNS OF DETERIORATION

The clinical signs of deterioration and critical illness are usually similar regardless of the underlying cause, because they reflect compromise of the respiratory, cardiovascular and neurological systems (Nolan et al. 2005). These clinical signs are commonly:

- tachypnoea/breathlessness
- hypotension
- altered conscious level (e.g. lethargy, confusion, restlessness or falling level of consciousness). (Kause et al. 2004)

Tachypnoea, a particularly important indicator of an at-risk patient (Goldhill et al. 1999), is the most common abnormality found in critical illness (Goldhill et al. 2004). In an early study it was identified that a raised respiratory rate (>27/min) occurred in 54% of patients in the 72 hours preceding cardiac arrest, most of which occurred 72 hours before the event (Fieselmann et al. 1993).

TRACK-AND-TRIGGER SYSTEMS

Most hospitals in the UK now use some form of track-and-trigger system, e.g. early warning scoring system (EWS), to identify deteriorating patients, and are an important component of risk management strategies (Donahue and Endacott 2010). There is a lack of rigorous evidence to support any single track-and-trigger system above the others, but it is important that organisations introduce a tool based on best evidence surrounding reliability, validity, specificity and sensitivity, and on local requirements (Gao et al. 2007). It has been recommended that some type of physiological track

and trigger system should be used to monitor all adult patients in acute hospital settings (NICE 2007).

EARLY WARNING SCORING SYSTEMS

The recommendations from *Comprehensive Critical Care* (Department of Health 2000) were the widespread implementation of EWS systems and outreach services. The EWS systems have been developed as a tool to enable ward staff to combine their regular observations to produce a physiological score (Sharpley and Holden 2004). They are based on the premise that there is a common physiological pathway of deterioration in the critically ill patient, which can be detected by simple ward-based observations (Goldhill 2001).

The most commonly used scoring system is an aggregated system wherein a weighted score is attached to a combination of blood pressure, pulse, respiratory rate, oxygen saturations, temperature, urine output and simplified level of consciousness (AVPU) (Fig. 1.4). A trigger response is activated when the patient reaches a certain score and the designated escalation process is triggered. Nursing and other healthcare staff must then alert the designated expert help following local protocols. Escalation policies are put in place whereby a failure to improve (or to receive prompt help) results in the immediate contact of more senior members (including consultant staff) (Baudouin and Evans 2002). Clear guidelines should be drawn up to guide the nurse in when escalation is necessary and whom to contact for help (Fig. 1.5).

Each hospital should instigate a track-and-trigger system that allows rapid detection of the signs of early clinical deterioration

- **A**lert
- Responds to **v**oice
- Responds to **p**ain
- **U**nconscious

(Resuscitation Council UK 2011)

Fig. 1.4 Level of consciousness.

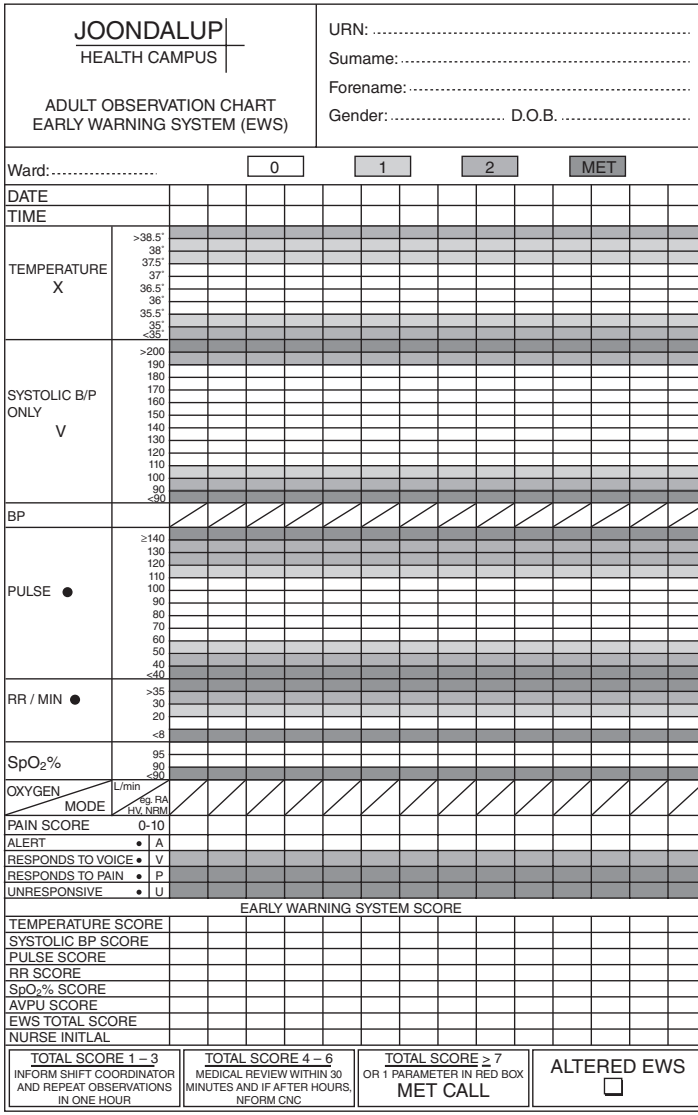

Fig. 1.5 Early warning system (EWS) algorithm, Joondalup Health Campus. (Reproduced by kind permission of Fiona Legg and Beverley Ewens.)

and an early and appropriate response (NCEPOD 2005). These track-and-trigger systems should be robust, cover all in-patients and be linked to a response team that is appropriately skilled to assess and manage the clinical problems (NCEPOD 2005).

The main advantages of EWS systems are as follows (Gwinnutt 2008):

- Simplicity: only the basic monitoring equipment is required (usually readily available on acute wards)
- Reproducibility between different observers
- Applicability to multiprofessional team
- Minimal staff training required.

The early recognition and treatment of the deteriorating patient can minimise the occurrence of adverse events and reduce the level of intervention that a patient may have otherwise needed (ACSQHC 2010). However, these clinical signs of deterioration are often subtle and can go unnoticed. It is therefore essential that tools and systems, based on best evidence and designed for individual organisations, be developed, put in place and evaluated, and available to help the practitioner identify signs of deterioration. Ultimately this may prevent adverse events and improve patient outcomes. However, over-reliance on a scoring system to identify the deteriorating patient should be used as an adjunct to clinical judgement not as a replacement for it.

The efficacy of a variety of EWS tools designed to enable practitioners to identify the deteriorating patient has undergone extensive evaluation and discussion in the literature. However, the reliability and validity of these varying systems are lacking and further work to validate them is recommended (Gao et al. 2007).

Best practice – Early warning scores (EWS)

EWS systems should be based on the best available evidence. EWS should reflect validity, reliability, specificity and sensitivity:

- EWS should be designed to reflect subtle changes in condition
- EWS chart should be straightforward to use and unambiguous in its design

- Implementation should be planned and coordinated
- Extensive education strategy is needed before implementation
- Specific escalation policy should be attached to the EWS, e.g. whom to call and when
- EWS calling criteria can be adjusted for specific patients, e.g. chronic disease
- Ongoing audit of EWS charts should be undertaken to assess completeness and accuracy
- Ongoing review of specific incidents where calling criteria were not adhered to
- There should be on-going education of staff and auditing of tool
- EWS systems should be designed for the organisation's requirements and resources
- EWS systems should be used as an adjunct to clinical decision making not as a replacement for.

ROLE OF RAPID RESPONSE TEAMS: OUTREACH AND MEDICAL EMERGENCY TEAMS

Critical care outreach teams

All acute trusts should have critical care outreach teams (CCOTs) in some format (NCEPOD 2005). It has become evident over the last decade that, due to escalating patient acuity, decreasing nursing numbers and skill mix initiatives, there has been an increasing need for critical care skills external to the critical care unit and the need for a formal CCOT available 24 hours a day, seven days a week has been acknowledged (NCEPOD 2005; Wolfe 2008). The seminal report – Comprehensive Critical Care (Department of Health 2000) – recommended the development of CCOTs in all acute trusts as a component of complete reorganisation of critical care services across the UK. These services have been established in accordance with the 'intensive care without walls' philosophy as one aspect of the critical care service outlined in *Comprehensive Critical Care*. The composition of this service will vary from hospital to hospital but it should comprise individuals with the skills and ability to recognise and manage the problems and complexity of critical illness (NCEPOD 2005). The composition of CCOTs has evolved to be senior ICU nurses and/or physiotherapy and medical staff. It is recommended that CCOTs should not replace the role of traditional medical teams in the care of inpatients, but should be seen as

complementary to them (NCEPOD 2005). The role of CCOTs can be variable and based on local needs, but fundamentally comprise (DoH 2007):

- Supporting hospital education programmes and initiatives by sharing critical care skills
- Monitoring and auditing the management of at-risk ward patients and working with ward staff to improve processes
- Providing expert skills to critically ill patients in ward areas
- Expediting admission of the critically ill patient to critical care areas and providing safe transfer
- Contributing to the early rehabilitation of patients, recently stepped down from critical care areas
- Delivering a follow-up service for ICU survivors after hospital discharge
- Delivering safe critical care practice to patients being kept in ward areas until a critical care bed is available
- Assisting in the identification of patients, for whom critical care services would be futile
- Undertaking evaluation and education of track and trigger systems and rapid response teams.

Best practice – critical care outreach teams

- Clear operational guidelines of the service
- Structured work practices
- Ownership by senior hospital managers and clinicians
- Clear lines of communication and accountability throughout the organisation
- Strong links with other teams to share practice and disseminate ideas
- Identify and address training needs in ward areas
- Act as a resource and support for ward staff

Despite widespread acceptance and intuitive belief in the benefit of outreach teams, there is an overall lack of evidence to support their use (Holder and Cuthbertson 2005; Gao et al. 2007). However, recent evidence does allude to the benefit of CCOT follow-up visits to ward patients after ICU discharge and the associated potential reduction in mortality and hospital length of stay (Harrison et al. 2010).

Medical emergency teams

Medical emergency teams (MET) is an example of a rapid response system which have been introduced in many hospitals to identify, review and treat at-risk patients during the early phase of their deterioration (Jones et al. 2007). The MET model has replaced the more reactive cardiac arrest teams, wherever they have been implemented. The MET responds not only to patients in cardiopulmonary arrest, but also to those with acute physiological deterioration, usually in response to a recognised single system trigger (Jones et al. 2007). MET was first developed in Australia in the 1990s in response to the evidence that delays in treatment could result in preventable deaths (Jones, et al. 2007; Schmid-Mazzoccoli et al. 2008). They are now commonplace in Australia (Cuthbertson 2007). The MET system is an example of a system designed to provide pre-emptive management of the patient at risk.

METs rely on calling criteria (Table 1.1) whereby the team will automatically be alerted. They will then attend, assess and treat the patient as required with the explicit aim of preventing deterioration. There is conflicting evidence that indicates that MET is associated with longer-term survival in some patient groups undergoing major surgical procedures (Jones et al. 2007). However, activation of a MET relies on the system's users and, despite MET being well established in many health-care systems, delayed responses by staff have been reported in the literature (Galhotra et al. 2007; Calzavacca et al. 2008). Members of the MET may include:

- experienced ICU nurse
- anaesthetist
- physician.

Best practice – Medical emergency team (MET)

- Calling criteria should be evidence based
- Staff must be aware of the MET calling criteria
- MET calling criteria should be visible in all wards and departments
- Staff should carry individual copies of MET calling criteria
- A designated leader coordinates MET calls, e.g. medical registrar
- Regular education sessions to update staff

Continued

- MET education sessions on all staff orientation programmes
- Audit of all MET calls to identify trends and deficiencies
- Audit of cardiac arrests
- Utilise data as part of a learning needs analysis
- Inappropriate MET calls should be dealt with sensitively so that staff are not discouraged to call the MET in the future

CLINICAL HANDOVER

The role of accurate, appropriate and succinct clinical handover in the management of the deteriorating patient cannot be overestimated. In recent years the importance of a systematic and structured clinical handover has been recognised. Many systems have been developed that attempt to standardise medical and nursing handover processes. One such system is ISOBAR, which has been

Table 1.1 Medical emergency team (MET) calling criteria, Joondalup Health Campus

Acute changes in	Physiology
Airway	Threatened
Breathing	• **Respiratory arrest** • Respiratory rate <8 breaths/min • Respiratory rate >36 breaths/min
Pulse oximetry; saturation <90% despite oxygen administration	
Circulation	• **Cardiac arrest** • Heart rate <40 beats/min • Heart rate >140 beats/min • Systolic blood pressure <90 mmHg
Neurology	• Sudden fall in level of consciousness • Fall of Glasgow Coma Scale score >2 points
Urine output	• <50 ml total over 4 hours
OR	
Staff member is seriously concerned about the patient	

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recognised to be applicable for interprofessional handover and transferable between clinical settings (Yee et al. 2009):

I identification of the patient
S situation and status of patient
O observations of the patient
B background and history
A action, agreed plan and accountability
R responsibility and risk management

CLASSIFICATION AND PROVISION OF CRITICAL CARE

'Critical care without walls'

Comprehensive Critical Care (DoH 2000) recommended that critical care should be delivered encapsulating the philosophy 'critical care without walls', i.e. the needs of the critically ill must be met, no matter where such patients are physically located within the hospital. Critical care should be mobile, offering advice, assistance and education outside the traditional confines of the ICU (Baudouin and Evans 2002).

Classification of critical care

Classification of critical care patients should focus on the level of care that individual patients require, regardless of their location (DoH 2000). This approach sees a shift of emphasis away from defining patient needs in terms of hospital geography, e.g. ICU, HDU, etc., and towards a classification system that describes escalating levels of care for individual patients, independent of their location within the hospital (Table 1.2) (Gwinnutt 2008).

The Intensive Care Society (2009) has provided more detailed explanations and definitions of the classification levels. These definitions facilitate the assessment and quantification of the hospital-wide demand for the different levels of care, removing geographical location from being the defining factor for patients accessing critical care (Adam & Osborne 2005).

Provision of critical care

ICU bed provision in the UK currently has one of the lowest numbers of ICU beds in the developed world (3.5 per 100 000) compared with Germany (24.6) and the USA (20.0). The demand

Table 1.2 Classification of critical care patients

Level	Description
Level 0	Patients whose needs may be met through normal ward care in an acute hospital
Level 1	Patients at risk of their condition deteriorating, or those recently relocated from higher levels of care, whose needs can be met on an acute ward with additional advice and support from the critical care team
Level 2	Patients requiring more detailed observation or intervention including support for a single failing system or postoperative care and those 'stepping down' from higher levels of care
Level 3	Patients requiring advanced respiratory support alone or basic respiratory support together with support of at least two organ systems. This level includes all complex patients requiring support for multiorgan failure

Department of Health (2000).

for ICU beds will inevitably increase in the future due to advances in medical technology, epidemics such as H1N1 and SARS (severe acute respiratory syndrome), natural disasters, conflict, but also for preventive reasons, such as the recognition of the necessity to transfer high-risk patients to critical care areas early in the course of their illness (Adhikari et al. 2010). Unlimited expansion of critical care beds may not necessarily be economically viable, but the focus on the development of preventive and therapeutic interventions for the sickest patients may hold the key to the future availability of critical care beds (Adhikari et al. 2010).

TRAINING HEALTHCARE STAFF

Several studies have demonstrated that both medical and nursing staff lack the necessary knowledge, skills and confidence to manage acutely ill patients and often do not follow a systematic approach to assessing them (Nolan et al. 2005). In addition, deficiencies in acute care often involve simple interventions, e.g. treating prob-

lems affecting airway, breathing and circulation (McQuillan et al. 1998). The combination of poor early recognition and lack of key skills in responding to acute deterioration probably contributes to poor patient outcome (Adam and Osborne 2005).

There have been several educational initiatives to improve multidisciplinary knowledge, skills and attitudes concerning the management of the critically ill patient (Kause et al. 2004), some of which are described below.

ALERT course

The ALERT (Acute Life-threatening Events – Recognition and Treatment) course was developed at Portsmouth University in 1999 with the aim of improving acute care of both 'at-risk' and critically ill adult patients. It was specifically designed to address the anxieties and areas of perceived weakness in the management of the acutely ill patient, previously identified by ward nurses and pre-registration house officers. It has several aims:

- A reduction in avoidable cardiac arrests
- A reduction in avoidable hospital deaths
- A reduction in avoidable ICU admissions
- Better recognition of the 'at-risk' or acutely ill patient
- Better clinical management of the 'at-risk' or acutely ill patient
- Better partnership and teamwork between health-care professionals
- Better written and verbal communication.

A simple assessment and management system is described which can be used for ill patients with a wide range of underlying clinical conditions, both medical and surgical. The course is mainly designed to train pre-registration house officers and junior nurses. However, other staff groups, e.g. medical students, senior house officers and senior nurses, may also find it helpful.

The 1-day ALERT course has been designed so that medical and nursing staff can train together using a common approach. It is designed on sound principles of adult education – active involvement, personal motivation, experience-centred learning, relevance to practice, regular feedback, clear goals and the use of reflective practice. For further information see www.port.ac.uk.

Advanced Trauma Life Support (ATLS) course
The 2.5-day ATLS course, developed by the American College of Surgeons in the 1980s, has now been adopted in over 30 countries worldwide. It teaches a simple systematic approach to the management of trauma patients, treating the most life-threatening injury. A highly interactive course, it combines lectures, discussions, interactive tutorials, skills teaching and simulated patient management scenarios (moulage). For further information: Royal College of Surgeons of England, tel: 020 7869 6309, email: atls@rcseng.ac.uk.

Advanced Life Support (ALS) course
The Resuscitation Council (UK) ALS course aims to teach the theory and practical skills to effectively manage cardiorespiratory arrest, peri-arrest situations and special circumstances. There is a big emphasis on prevention of cardiopulmonary arrest. The 2-day course comprises lectures, practical skill stations, workshops and assessments. Candidates are sent a course manual to read 4 weeks before the course. For further information see www.resus.org.uk.

Immediate Life Support (ILS) course
The ILS course is mainly designed to equip the first responder with the necessary skills to manage a cardiac arrest while awaiting the arrival of the cardiac arrest team. In particular, there is a big emphasis on cardiac arrest prevention and the ABCDE approach to assess an acutely ill patient. For further information see www.resus.org.uk.

Care of the Critically Ill Surgical Patient (CCrISP)
This 2.5-day course is designed to advance the practical, theoretical and personal skills necessary for the care of critically ill surgical patients. It is aimed at surgeons and those dealing with surgical patients who are completing basic surgical training. All participants on the course should have completed at least 1 year of basic surgical training (not including house jobs), commenced 6 months general surgery and ideally completed an ATLS course, although this is not a prerequisite.

START Surgery

The Systematic Training in Acute Illness Recognition and Treatment for Surgery (START Surgery) course is designed for surgical foundation trainees. It is designed to advance the practical, theoretical and personal skills necessary for the care of critically ill surgical patients. For further information see www.rcseng.ac.uk.

CONCLUSION

Critically ill patients have a high morbidity and mortality. Prognosis following an in-hospital cardiopulmonary arrest is poor. Prompt recognition and early appropriate management of critically ill patients are essential to prevent deterioration. Track-and-trigger systems and efficient, easily accessed escalation procedures should be in place to identify at-risk patients and alert expert help. Healthcare staff should be appropriately trained in the recognition and management of the deteriorating patient.

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