

CHAPTER 1

General Principles of Intensive Care Management

Anna Batchelor¹ and Peter Nightingale²

¹Royal Victoria Infirmary, Newcastle-upon-Tyne, UK

²University Hospital of South Manchester, Manchester, UK

OVERVIEW

A critical care unit:

- is a specialized area concentrating care for the sickest patients in the hospital in one place
- is staffed by a multidisciplinary team of doctors, nurses, physiotherapists and dieticians, among others, who combine treatment with constant patient observation, monitoring and support
- has the equipment and medication required to provide multi-organ support
- needs to be physically close to operating theatres, emergency departments and radiology services
- is only the starting point for the patient. Patients and their families have needs beyond organ support: rehabilitation, both physical and psychological, should start during the time in critical care



Figure 1.1 A critical care unit.

Places, people and patients

The term 'critical care' is used to encompass both intensive and high-dependency patient care. This type of care is normally delivered in units separate from general wards where most patients are nursed. Some specialist wards may have 'high-care' areas, although these are seldom equipped or staffed to an equivalent degree. Patients who require intensive care are usually managed initially in wards, operating theatres, radiology or endoscopy suites, or the emergency department. The staff in these areas need to promptly assess the patient, recognize the severity of their underlying illness, and initiate immediate life-saving management, while, at the same time, contacting the intensive care unit (ICU). An online tutorial covering this aspect of pre-ICU care can be found at: <http://www.scottishintensivecare.org.uk/education/index.htm>

ICUs and high dependency units (HDUs) (Figure 1.1) are typically centrally located within a hospital near to the emergency department, operating theatres and radiology department, but may be located in other specialist areas such as burns centres. This central

location is important to facilitate smooth patient transfer, e.g. to theatre for surgery or to the radiology department for imaging.

Nursing staff dedicated to the care of critically ill patients are trained specifically for this work; such patients are considered too ill to be cared for in a normal ward.

Intensive care is also called Level 3 (Figure 1.2) care, and is for patients requiring either invasive ventilation or the support of two or more failing organ systems.

High dependency care, also called Level 2 (Figure 1.3) care, is for patients needing non-invasive respiratory or other single organ failure support.

Treatment during a critical illness is not just about the patient. Caring for very sick patients is highly stressful to family, friends and carers, who all need support. Intensive care thus involves holistic support of the patient, family and friends, and also the referring staff.

The unit

Critical care is a relatively new specialty with its beginnings rooted in the polio epidemics of the 1950s in Denmark, where mortality rates were drastically reduced by tracheal intubation, manual ventilation (by teams of medical students) and the gathering together of patients in a single site. Subsequent to this, Bjørn Ibsen established what is considered the first proper ICU in Copenhagen in 1953.

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Figure 1.2 A Level 3 patient.



Figure 1.3 A Level 2 patient.

Initially, only patients requiring artificial ventilation were admitted to ICUs but the recognition that there were other patients needing a higher level of monitoring, observation and care has led to the development of HDUs or units that cater for both Level 2 and Level 3 patients.

Units vary in size; in the UK most have between six and 20 beds. Some operate solely as ICUs admitting the most seriously ill patients, whereas some are a mixture of intensive and high dependency care. In smaller hospitals the coronary care unit may be utilized for high-dependency patients with non-cardiac problems. In critical care it is common to have many patients in a large open area with curtains or screens to ensure patient privacy, and to have a few separate cubicles in which patients who are infected or are at increased risk of infection (e.g. neutropenic patients) can be isolated. Nowadays units are being built with proportionately more cubicles. However, although single cubicles enhance privacy, maintain patient dignity, and possibly contribute to a reduction in cross-infection hazards, it can be more difficult and isolating

for both the patient and the nurse caring for them. Studies have reported a higher incidence of preventable adverse events in patients isolated for infection control.

Only 2% of UK hospital beds are in critical care units compared with up to 25% in some US and German hospitals. It is not unusual for a critical care unit to be full. In this situation clinicians need to balance the needs of all the patients requiring higher level care. Difficult decisions may need to be taken. Patients are sometimes transferred between units because their care can be better delivered in a more specialist unit, for example after a head injury. Transfers not for the benefit of a patient sometimes have to occur because another patient is too ill to move and the unit is full. It is generally acknowledged that this is never an ideal situation. The transfer must be undertaken safely and with the consent of the patient, if possible, and of their family. The principles of medical ethics, beneficence, non-maleficence, autonomy and justice can be used to guide practice.

There are many devices stationed by the bedside of a critically ill patient, including ventilators to support ventilatory function, machines to replace renal function (haemofiltration or haemodialysis), and a range of monitors, infusion and syringe pumps. Machines for blood gas analysis (including co-oximetry for carboxy- and met-haemoglobin) with the additional capability of measuring blood glucose, lactate, sodium, potassium, ionized calcium and total haemoglobin are usually sited within the ICU, thereby providing rapid access to these data.

A large amount of ancillary space is required for storage of equipment, including:

- gas cylinders with legal standards for storage
- disposable products
- a wide range of drugs
- laundry
- chairs for patients and visitors
- beds (for when patients are in chairs).

Clean and dirty utility areas and facilities for disposal of rubbish are also mandatory. Visitors should have a dedicated waiting area, preferably with comfortable chairs and television, and possibly with refreshment facilities. Quiet interview rooms for discussions with family members are essential. With office space, this all necessitates at least as much space again as that occupied by patients.

People

Critical care is delivered by a multidisciplinary team led by consultant intensivists. Intensivists are expert in the management of the critically ill patient. They have undertaken training over a wide range of medical areas including anaesthesia, general medicine and intensive care. They have the necessary skills to deliver and supervise the care given to patients with a wide range of organ dysfunctions and disease processes. They see acutely ill patients wherever they are located within the hospital, and not just within the ICU. They have skills in unit management, including the areas of finance, personnel and administration. They are educators at the bedside and in the classroom, not only to fellow doctors but to all members of the

team. They show leadership, both clinical and managerial. They are the patient's advocate.

The referring clinician should visit the unit regularly and consult on their patient's management. However, while in the unit, the patients are managed hour by hour by the intensivist. Trainee doctors will also be present in the unit 24 hours a day, usually at a ratio of one for every eight beds.

Training in intensive care in the UK has been overseen by the Intercollegiate Board for Training in Intensive Care Medicine; however, this function has now been assumed by the Education and Training Committee of the recently formed Faculty of Intensive Care Medicine. Training is in a base specialty plus periods of intensive care and complementary specialty training. A curriculum for a training programme leading to the award of either a single Certificate of Completion of Training (CCT) or dual CCTs in Intensive Care Medicine and another specialty has been approved by the General Medical Council and the first trainees will be admitted in 2012.

Nurses working in critical care require the skills necessary to care for severely ill patients, including the use of the multiplicity of equipment needed to keep these patients alive. In the UK the nurse-patient ratio is usually 1:1 for intensive care and 1:2 for high dependency care, compared to the ratio of between 1:6 and 1:10 on a general ward. They may be assisted by one or more support workers.

Other members of the multidisciplinary team include physiotherapists, pharmacists, dieticians, microbiologists, ward clerks and data clerks. Important input comes from other groups including the radiology and pathology departments.

Patients

The patients in the ICU are the sickest in the hospital. They will have at least one and often several organ systems that are failing and needing support. About 40% of admissions are due to a surgical cause; many of these patients will be admitted immediately after major elective surgery. The remainder will have a medical diagnosis and be referred from either the emergency department, general wards, other departments or transferred from other hospitals.

In assessing a patient for potential admission it is important to consider if their situation is reversible and if they have potential for recovery. An ICU admission is unpleasant and expensive and should generally be reserved for patients who can recover; an obvious exception is for patients who are potential organ donors. It is often difficult to be sure which patients will survive so, inevitably, many patients die in the ICU. Depending on the type of unit, about 20% of ICU patients will not survive. Of those who die most will do so because of failure to respond to treatment or because, in the long term, they are unable to overcome the stress of their illness, often because of severe underlying comorbidities. In these cases interventional treatment is withdrawn, after detailed discussion with colleagues and family members.

Care of the critically ill patient requires a systematic approach to assessment and management. When requesting an admission

the referring consultant or delegated senior member of the team should provide a comprehensive history, results of investigations, the diagnosis and plan of action. Referrals should be seen as soon as possible and the treatment plan agreed. On admission the appropriate monitoring and treatment is undertaken and physiological goals are set. These are reviewed frequently and changed as necessary depending on the results of investigations or response to interventions.

In addition to support for their failing organs, ICU patients need fundamental care including adequate nutrition, pressure area care, thrombo-embolic and stress ulcer prophylaxis, oral hygiene and psychological support. Much of this is provided by the nurse caring for the patient.

Many patients with infections will be admitted to intensive care so it is important to avoid transmitting infections between patients by the adoption of good hygiene techniques that are rigorously followed.

Relatives

Most units adopt an open visiting policy. The ICU is an alien and frightening environment so the presence of familiar faces and voices can be beneficial to patients. As critically ill patients may be limited in their ability to make or communicate decisions about their treatment, it is usual to ask relatives what choices the patient would likely have made had they been able to do so.

Problems after discharge

Many patients who survive an episode of critical illness have significant physical and/or psychological problems that may be life-long. Planning for rehabilitation now starts while the patient is still in the ICU. Merely surviving is not enough: it is crucial to ensure that the quality of life after intensive care is as good as possible within the bounds of any residual health problems.

Further reading

- Critical Insight.* The Intensive Care Society 2003. http://www.ics.ac.uk/patients_relatives/critical_insight.
- Evolution of Intensive Care.* The Intensive Care Society 2003. http://www.ics.ac.uk/intensive_care_professional/standards_and_guidelines/evolution_of_intensive_care_2003.
- An Introductory Guide to Critical Care.* The Intensive Care Society 2004. http://www.ics.ac.uk/education/a_guide_for_medical_students_and_junior_doctors.
- Discharge from Intensive Care.* The Intensive Care Society 2010. http://www.ics.ac.uk/patients_relatives/discharge_from.
- General Information for Patients and Relatives.* The Intensive Care Society 2010. http://www.ics.ac.uk/patients_relatives/patients_and_relatives.
- Your stay in Intensive Care.* The Intensive Care Society 2010. http://www.ics.ac.uk/patients_relatives/your_stay_in_intensive_care.