Criteria for intensive care unit admission and severity of illness

Miriam Baruch

Ben Messer

Abstract

This article explores the provision and organization of critical care services in the UK and examines the issues surrounding admission to, discharge from and the withholding of critical care. Critical care expansion in the UK in recent years has centred on the provision of increased numbers of beds and the development of outreach services. Despite the expansion in critical care there is difficulty in matching supply and demand for beds. There remains controversy regarding the effectiveness of outreach in improving outcomes for patients referred to critical care. The discharge of patients from critical care has also come under scrutiny since mortality rates are higher for patients discharged out-of-hours. Patients' needs following critical care are carefully planned with the base medical teams because readmission to critical care is associated with increased mortality. Scoring systems are used in critical care to compare outcomes between critical care units and to facilitate research but cannot predict outcome for individual patients. The decision that patients will not benefit from critical care admission can be one of the most difficult. Many patients who would not have been considered for organ support previously are now admitted to critical care with pre-determined limits of treatment. Involvement of the base team is integral to making decisions for these patients.

Keywords APACHE; critical care ethics; critical care scoring systems; Early Warning Scores; ICNARC; Intensive Care Society; levels of critical care; outreach; standardized mortality ratio

Introduction

The provision of critical care beds in England has increased by over 800 in the last 10 years,[1] a rise of almost 30%. Figures from January 2011 reveal there are 3747 adult critical care beds in England, 45% in high-dependency units (HDU) and 55% in intensive care units (ICU). Ideally this provision should be able to accommodate peaks and troughs in demand but it is not uncommon for hospital trusts to postpone major surgery for patients who require perioperative critical care due to demand for beds.

The admission of a patient to critical care takes place after considering the patient's acute illness and the degree of reversibility in the context of their background medical problems and physiological reserve.

Miriam Baruch *FRCA is a Consultant in Anaesthesia and Intensive Care at Royal Victoria Infirmary, Newcastle upon Tyne, UK. Conflicts of interest: none declared.*

Ben Messer *MA DICM is a Consultant in Anaesthesia and Intensive Care at Royal Victoria Infirmary, Newcastle upon Tyne, UK. Conflicts of interest: none declared.*

Admission criteria and levels of care

In the document '*Levels of Critical Care for Adult Patients*' published in 2009 by the Intensive Care Society (ICS) patients in hospital are assigned a level of care from 0 to 3 based on an assessment of their clinical needs. This is shown in Table 1. The level of care is not governed by the location of the patient and equally the level of care assigned does not necessarily determine the nurse- to-patient ratio for that particular patient. The identification of patients whose clinical condition is deteriorating or at risk of deteriorating to the point of requiring critical care team review can be done by ward-based medical teams. If the patient is designated level 2 or 3 they will almost certainly be moved to a critical care area. Patients who are currently level 2 but at significant risk of becoming level 3 will often be admitted directly to an ICU where their needs are most easily met.

Some patients who may not previously have been considered for admission to critical care are now being considered in certain circumstances. Examples include patients with multiple co-morbidities where specific limits of treatment are set and in other patients after the decision to initiate palliative care to facilitate organ donation after cardiac death.

- **Critical care has been organized into levels of care depending upon the level of organ support and observation that an individual patient requires**
- **The levels of care are from 0 to 3, with 0 being standard ward care and observation and level 3 being what is traditionally thought of as intensive care**

Early Warning Scores

Track and trigger systems are used to identify patients at risk of deterioration. An integral part of these is the Early Warning Score. Early Warning Scores (EWS) have been developed to increase awareness and recognition of acute illness by assigning a graded score to increasingly deranged physiological parameters. A National Early Warning Score (NEWS) has been developed by a Royal College of Physicians working party[2] and will be implemented across the NHS starting in 2014. The score is based on six physiological parameters: respiratory rate, oxygen saturation, core temperature, systolic blood pressure, heart rate and level of consciousness. The scores across the domains are added to give a NEWS which can then be entered into an algorithm to establish the most appropriate course of action which is defined by the frequency of subsequent observation and by the experience of the medical review that the NEWS should trigger. We include the NEWS used in our hospital in Figure 1.

During the 1990s there was increasing recognition that care prior to critical care admission was often suboptimal with regard to simple management of airway, breathing, circulation, oxygen therapy and monitoring requirements. In one study of patients admitted to critical care, care was suboptimal in more than half of admitted patients and could have contributed to mortality in a third of patients.[3] Furthermore, cardiac arrest and critical care admission are often preceded by derangements in acute physiology. This has

Levels of critical care for adult patients as described by the Intensive Care Society

Level	Criteria	Examples
0	• Medical and nursing needs can be met with standard ward-based care	• Intravenous fluid and antibiotic therapy • 4-hourly observations
1	• Patients recently discharged from critical care • Patients requiring supplementary clinical monitoring • Patients referred for critical care team review or being seen regularly by the outreach service	• Patients at risk of clinical deterioration • Epidural analgesia or patient-controlled analgesia in use requiring specific nursing observations • Tracheostomy in-situ without respiratory support • Patients who have a chest drain in-situ • Parenteral nutrition
2	• Patients receiving single organ support (Basic respiratory and basic cardiovascular support together can be considered as level 2)	• Basic respiratory support ○ Mask/hood/tracheostomy continuous positive airway pressure or non-invasive bi-level ventilation ○ $FiO_2 \geq 0.5$ delivered via facemask • Basic cardiovascular support ○ Use of arterial line for invasive blood pressure monitoring or arterial blood gas sampling ○ Single intravenous vasoactive drug infusion • Advanced cardiovascular support ○ Multiple vasoactive/inotropic drug infusions • Renal support ○ Acute renal replacement therapy • Neurological support Continuous intravenous medication to control seizures
3	• Patients receiving advanced respiratory support • Patients receiving a minimum of two organs supported	• Ventilatory support via an endotracheal tube (including tracheostomy)

Table 1

been documented by the National Confidential Enquiry into Patient Outcome and Death (NCEPOD) report of 2005 which found that 66% of patients admitted to critical care exhibited physiological instability for more than 12 hours prior to admission.

EWS have subsequently been developed and introduced often alongside an outreach service. EWS have been validated in both medical and surgical populations and higher scores correlate with a higher hospital mortality and an increased likelihood of critical care admission. The use of EWS as part of a track and trigger system is now a NICE guideline.[4]

- **Early Warning Scores were developed and introduced after studies found that patients admitted to critical care showed physiological deterioration prior to admission**
- **Basic clinical observations are noted and correspond to a score dependent upon the degree of abnormality of the observations**
- **An overall score determines the frequency of observation and the seniority of medical review required**

Outreach

The development of Critical Care Outreach was one of the key recommendations in the Audit Commission's Report 'Critical to Success' published in 1999. It was envisaged to be part of a service improvement for Critical Care allowing units to become more integrated within their trusts.

'Comprehensive Critical Care' published by the Department of Health in 2000 considered the provision of critical care services in the UK and how the service should be organized and delivered in the future. Outreach featured prominently in the plan and it was thought that it would influence care in three ways, to:

- identify patients who are deteriorating on the wards and facilitate their timely admission to critical care if required
- provide continuity of care for patients discharged from critical care to the wards and follow-up after hospital discharge
- have a significant role in education and sharing of skills with ward nurses and doctors, allowing them to identify patients in their care at risk of deterioration and assisting in the management of patients recently discharged from critical care.