ICU admission and discharge criteria

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Key points

◆ The decision to admit or discharge a patient is the responsibility of the intensive care specialist.
◆ Decisions will be based on the severity of the illness, chronic health and physiological reserve, and therapeutic susceptibility, and will be informed by the patient’s wishes.
◆ Admission and discharge decisions involve balancing the needs of individual patients against those of society.
◆ Wide variations in admission and discharge practices between centres and countries probably reflect differences in resources, cultures, and clinician beliefs.
◆ Outcomes of intensive care are affected by the timing of admission and discharge, and the quality of care outside the ICU.
Background

The decision to admit patients to intensive care or discharge them to a hospital ward (or even directly back home) is a daily task for intensivists, a life-changing event for patients and families, and in aggregate a major strategic issue for health care systems worldwide [1]. Decisions must often be made rapidly in conditions of uncertainty involving substituted judgements about relative risks and benefits, framed by sociocultural factors that are not well characterized. The outcomes of the decision are strongly influenced by available resources, staffing, and skills throughout the patient pathway.

Intensive care developed in response to the polio epidemics in the early 1950s. Survival rates were transformed by concentrating technology and expertise in one location, substituting invasive mechanical ventilation for the iron lung, and introducing the science of physiological measurement. With the progressive eradication of polio, the criteria for admission to intensive care shifted to ventilatory support for other causes of acute respiratory failure, and then to the support of other failing organ systems. Single-speciality high-dependency units (HDUs) were established for patients with isolated non-respiratory organ failures (cardiac, renal, neurological, burns), while intensive care was reserved for those with, or at risk of, multiple organ failure or requiring invasive mechanical ventilation. Over the years, the hospital case mix has become more elderly, complex, and dependent, driven by a combination of demographic changes, cost-containment, and technological advances. As the number of hospital beds has diminished, intensive care has expanded in response to the growing demand for multiple organ support. Additional demands come from elective high-risk elective surgery and, more recently, from the transplant community, for the admission of potential organ donors. One of the most important roles for the intensivist, therefore, is in managing this diverse and competing demand to greatest effect through informed and patient-focused decisions about admission and discharge.
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Intensive care is a package of interventions, which consists of specific therapies for the disease, technologies for physiological monitoring and organ system support, and integrated multidisciplinary decision-making. Organ system support is not, in itself, therapeutic. Part of the art of intensive care lies in minimizing its burdens. Admission to intensive care implies that the benefits will outweigh these burdens, and that the potential lost opportunity costs for other patients and society are justifiable. Therefore, the intensivist functions as custodian of a scarce resource, balancing a fiduciary duty to individual patients against the interests of wider society. The manner in which this duty is expressed is influenced by the context in which admission and discharge decisions are taken.

Determinants of admission and discharge decisions

Context

Admission and discharge processes and outcomes vary widely between hospitals and between countries. For example, half of all deaths in England and one-third in the USA occur in hospital, but in England only 10.1% of hospital deaths involve intensive care unit (ICU) admission compared with 47.1% in the USA. Of the ICU deaths, patients over the age of 85 accounted for 1.9% of non-operative and 8.5% of operative deaths in England, but 31.5 and 61%, respectively, in the USA [2]. The USA has 5.7 times the number of ICU beds per capita that of the UK [1] and makes greater use of chronic ventilator units outside acute hospitals, facilitating ‘discharge’, but not necessarily improving outcomes [3].

Patients admitted to ICUs in the UK have a much higher severity of illness, are more likely to be intubated, and those with sepsis are less likely to be admitted directly from the emergency department (ED) [4], transiting instead via the ordinary wards. These different admission pathways impact on mortality. Emergency hospital admissions transferred to a ward and, subsequently, to an ICU have a higher mortality than those admitted directly to ICU from the ED, as do high-risk surgical patients admitted from a surgical ward, instead of directly from the operating theatre.

Both admission and discharge involve a change of location with the potential for gaps in communication and loss of continuity of care. There is growing research evidence showing that the outcomes of intensive care are affected by the timing of admission and discharge decisions, which in turn are influenced by resource availability in the ICU and probable inexpert care on the ordinary wards. Admission to the ICU from 00:00–07:00 hours, and at weekends is associated with a higher mortality, as is discharge from the ICU to the ordinary ward at night [5]. Readmission to intensive care is associated with a hospital death rate 2–10 times that of non-readmitted patients [6], and can be mitigated by intensive care outreach in the form of intensivist-led rapid response teams [7]. Of high-risk surgical patients admitted to intensive care in 28 European
countries, 43% of deaths occurred after discharge to the ordinary ward [8], suggesting substantial opportunities for improving discharge planning and post-discharge care. Unintentional discontinuation of chronic medications is also common following discharge from the ICU, and is associated with adverse patient outcomes [9].
Patient factors

Decisions to admit patients to ICU or discharge them to the ward are determined by the severity of their illness. Severity of illness is a composite of the magnitude of the acute disease, the patient’s physiological reserve, and the concurrent level of treatment and organ system support. Of these three variables, physiological reserve is the most difficult to quantify and modify. It is generally assessed using functional capacity, co-morbid disease, and age. Loss of functional capacity is an important predictor of frequent hospitalization and death, and co-morbid disease impacts on ICU and hospital outcomes [10]. The benefits of intensive care for very old patients are uncertain, although there may be an increased risk of disability for the elderly when compared with younger patients [11]. However, chronological age is a poor substitute for ‘biological age’ when deciding on who to admit to intensive care.

Diagnosis and prognosis are intimately linked to therapeutic specificity, and advances in treatment will alter prognosis. Diagnoses that would once have justified non-admission to intensive care are now much more treatable. Patients with AIDS-related critical illness have better outcomes because of antiretroviral therapy [12]; those with haematological malignancy now have much improved survival rates [13]; and outcomes are improving generally across ICUs.

Patient preferences are fundamental determinants of ICU admission and discharge decisions, and in setting levels or limits on intensity of care. However, loss of capacity caused by critical illness means that substituted decision-making is common and this may contribute to substantial variation in practice between centres. Failure by physicians to understand patient preferences to forego life-sustaining treatments, and failure of the health care system to offer alternatives to hospitalization, result in excess burdens and costs of care. The challenge lies in early identification of patients at risk of critical illness to permit informed discussions with intensive care staff, while the patient still has capacity. With a rapidly ageing population, opportunities should be taken to discuss advance planning in the community; doing so reduces unwanted medical treatment (including ICU admission), and stress and depression in family members.

Decision support

Scoring systems

Physiological severity scoring, in particular the Acute Physiology and Chronic Health Evaluation (APACHE) system, was a transformational concept, introduced as a tool to characterize patient populations and to inform decision-making about individual patients. Physician experience may be a valuable tool for contextualizing population-based prognostic estimates for individual patients, but it is an unreliable device for
constructing those population estimates for which large observational databases are far better. Scoring systems based on very large patient numbers capture more population information than the individual clinician can acquire in a lifetime, but the clinician will know more about the individual patient than any scoring system can. For this reason, predictive systems may inform clinical judgement, but cannot replace it. Triage protocols to maximize use of scarce resources in pandemics have been modelled prospectively and retrospectively, demonstrating theoretical value in releasing intensive care beds by denying admission to those categorized as being too well or too sick to benefit.

Several models have been developed to inform safe and timely ICU discharge decisions. Simple univariate risk factors include prolonged length of stay, unstable vital signs including tachypnoea or tachycardias, and poor pulmonary function [6]. Badawi and Breslow [14] have modelled post-ICU mortality and ICU readmission, using data from more than 700,000 patients, incorporating admission diagnosis, severity of illness, laboratory values, and physiological variables in the last 24 hours of the ICU stay. The Stability and Workload Index for Transfer score [15], and a model developed in France [16], have similar predictive precision for ICU readmission. Others have identified the potential for important reductions in mortality had triage models been used to avoid premature ICU discharge. All methods need prospective validation.

Guidelines for ICU admission and discharge

The UK guidelines on admission to and discharge from ICUs and HDUs [17] were developed in response to adverse publicity surrounding the lack of intensive care beds. The working party chose simple criteria based on dependence on organ system support linked to intensive care (level 3) or high dependency care (level 2) (see Table 20.1). The classification has stood the test of time, perhaps because it is permissive, rather than constraining.

<table>
<thead>
<tr>
<th>Intensive care is appropriate for:</th>
<th>High dependency care is appropriate for:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patients requiring or likely to require advanced respiratory support alone</td>
<td>Patients requiring support for a single failing organ system, but excluding those needing advanced respiratory support</td>
</tr>
<tr>
<td>Patients requiring support of two or more organ systems</td>
<td>Patients who can benefit from more detailed observation or</td>
</tr>
</tbody>
</table>
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<table>
<thead>
<tr>
<th>Patients with chronic impairment of one or more organ systems sufficient to restrict daily activities (co-morbidity) and who require support for an acute reversible failure of another organ system</th>
<th>Patients no longer needing intensive care, but who are not yet well enough to be returned to a general ward</th>
<th>Post-operative patients who need close monitoring for longer than a few hours</th>
</tr>
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</table>

The guidelines provided by the Society of Critical Care Medicine in the USA [18] offer four alternative classifications:

- A prioritization model with four categories based on different sets of patient characteristics.
- A diagnosis model.
- An objective parameters model based on physiology or investigations.
- Discharge Criteria linked to physiological stability.

This guidance is currently under review with the publication in 2015 of the Guidelines on the Provision of Intensive Care Services by the UK Faculty of Intensive Care Medicine and the Intensive Care Society [19]. Night-time discharge in particular should be avoided, and if it occurs should be treated as a critical incident, accompanied by measures to protect patient safety [20].

**Decision processes**

Admission and discharge decisions should be made by the specialist intensivist, and taken in collaboration with the referring team, and the patient and family where circumstances permit. Early involvement of the intensivist permits more effective planning, e.g. rapid response teams (intensive care outreach) have an important role in facilitating end-of-life care discussions in order to avoid futile and burdensome treatments.

The provision of futile care is usually driven by family expectations and lack of agreement among the treating team. Discussions involve value judgements—clinicians should be aware of biases based on their own personal views, family requests, or inadequate resources. While caring for the family is an essential component, the primary duty is to the patient. Outcomes are strongly affected by the degree of trust that can be
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established between the intensivist, family, and referring team. Decisions not to admit a patient to the ICU on grounds of futility or to discontinue a patient for palliative care, should be taken by senior staff following a broad consensus, the reasons clearly documented, and with a support plan in place both for the patient and the family.

In conditions of uncertainty about the best course of action, a formal second opinion should be obtained, and for admission to intensive care, a trial of treatment may be offered with explicit and agreed limits, including the withdrawal of support if no improvement occurs. Trials of intensive care discharge is more problematic, as de-escalation involves a loss of process control, if discharge involves an abrupt change in both location and quality of care. Longer-term ICU patients need a planned and supervised trajectory for progressive restoration of physical and psychosocial independence, to realize the investment of intensive care resources in full. Premature discharge from intensive care carries a significant increase in mortality [5], which cannot be acceptable to a modern health care system.

**Outcomes**

Effective admission and discharge processes will minimize avoidable morbidity, mortality, and ICU readmissions, and maximize family and patient satisfaction and cost-efficacy. However, reaching the most effective level of practice involves balances and compromises—a permissive admissions policy and conservative discharge policy will increase ICU bed occupancy with the potential for refused admissions and lost opportunity costs elsewhere in the health system. Given the uncertainties that surround decision making, and the balance between sensitivity and specificity of decision-support tools, experienced clinical judgement remains a key element in defining suitability of individual patients for ICU admission and discharge.

Objective benchmarked comparative data linking suboptimal processes, such as night-time discharge [5] or unintentional medications discontinuation [9], with undesirable outcomes (ICU readmission rates or post-ICU mortality [6] should be used to determine the quality of local practices, and from this to identify the changes required in resources or processes of care. These changes will be located along the patient pathway, not just in the ICU, and will include senior involvement in decision making, engagement of intensivists with community care and palliative care medicine, earlier identification of critical illness and involvement of intensive care staff, electronic prescribing and compilation of patient records to bridge changes in patient location, and engagement of families in decision making and the provision of care.
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References


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