

Guidelines for Intensive Care Unit Admission, Discharge and Triage

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ABSTRACT

The Intensive Care Unit (ICU) is a highly specialized area within the medical facility where advanced and critically ill patients are managed and should be reserved for patients with reversible medical conditions with reasonable prospects of recovery. It involves both significant human and capital resources. This is particularly challenging in developing countries such as the Caribbean where limitation of both financial and human resources demands that ICU beds be appropriately utilized. This need calls for appropriate guidelines that will help the managers of these units to make decisions in resource allocations.

Keywords: Admission, ADT, discharge, intensive care unit, triage

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INTRODUCTION

The intensive care unit (ICU) is an area within a medical facility equipped with advanced technologies such as ventilators and personnel trained to provide intensive, advanced life-supportive care to critically ill patients.

Given the scarce human and economic resources available to support these units and the inappropriateness of delivering therapies that are not medically indicated, whether knowingly or not, the admission to these units and appropriate discharge, when indicated, is imperative (1).

This is particularly true in developing countries such as the Caribbean where cost containment is a necessity because of the shortage of human and material resources and the demand for ICU bed spaces far outweighs the number of available bed spaces (2).

What constitutes an ICU bed remains a subject of great debate with opinions varying between American definitions and those of European (3).

In Jamaica, with a population of 2 720 554 people, the total number of functional adult ICU beds is about 30. This is approximately one bed per 100 000 population.

In many parts of the world, the ICU capacity remains unknown (4).

Most regulatory and advisory bodies publish guidelines and parameters for the practice of critical care medicine, the challenges and sociocultural differences of each region dictates that each guideline should be adapted to meet the need of that region.

In June 2003, the Ministry of Health (MOH), Jamaica, published a policy manual for the ICU. This included admission and discharge criteria that were intended to direct the admission, discharge and triage of patients that required ICU admissions in Jamaican government hospitals (5).

This was revised by the University Hospital of the West Indies (UHWI) in 2015 and adopted as the Policy Manual for the Intensive Care Unit (ICU) at UHWI (6).

In January 2018, the UWI/UHWI set-up guidelines workshops and a committee to review current guidelines for the admission, discharge, and triage (ADT) of patients to the ICU, to provide a framework for practice and to make recommendations for change.

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This review does not address those areas that are comprehensively addressed in the 2003 MOH ICU Policy Manual or the UHWI ICU Policy Manual (2015). Instead it has focussed on those areas that were not clearly addressed.

Several aspects of caring for the critically ill are universal while there are some peculiarities due to geographical, sociocultural and regional differences (7).

The cost of care for critically ill patients in the United States in 2008 ranged between US\$121–263 billion [17–38% of hospital cost] (8). At the UHWI, Jamaica, ICU care cost about J\$3 billion (10%) of hospital annual budget (9).

The Society of critical care medicine (SCCM) first published its guidelines in 1988 and several societies, administration and practitioners have considered these guidelines in establishing practice criteria in their institutions (10).

In 2003, the Ministry of Health (MOH), Jamaica published its Intensive care policy manual which contained its ADT policy guidelines. In the last 15 years, several technological advances, healthcare policy changes, legislative changes and demographic shifts have dictated a need for the review of these guidelines (6).

The UWI/UHWI establish a guidelines committee to review and update these guidelines and to make recommendation for change. The structure of the review has followed that recommended by the SCCM and most of these guidelines and recommendations have been adopted from the most recent review of the guidelines by the SCCM in 2016 (11).

The level of evidence was based on the Grading of Recommendations, Assessment, Development and Evaluation (GRADE) criteria. A summary of the recommendation is presented.

The recommendations are divided into:

- ICU governance
- Admission criteria
- Nursing to Patient care ratio
- Discharge criteria
- Triage criteria
- Critical care outreach programme

Governance

Recommendation

- A Medical director (ICU Director) of the ICU shall be appointed by the hospital administration.
- The ICU director shall be a physician who on the basis of training is certified in critical care in a recognized fellowship programme.

- The ICU director shall assume responsibility for ensuring the quality, safety and appropriateness of care in the ICU.
- The ICU director shall have ultimate authority for ICU admission, discharge and triage.
- The ICU director shall be the chairperson of the ICU management committee which shall comprise all the stakeholders in the management of ICUs at the hospital.
- This committee shall advise the hospital administration on matters related to ICU management including policy, procurement of equipment, training, appointment of staff, disciplinary matters, audit and quality assurance.
- The committee recommends that based on the needs of the adult population served by the ICU at the UHWI, a general intensive care unit, cardiac ICU, Neurosurgical/Trauma ICU and a Medical ICU model be developed (12–14).
- These could be bed and staff allocations within the same unit taking into consideration the limitation of staffing and other resources.
- Objective parameters for admission be developed with specific indications, prognosis, co-morbidities and bed availability.
- The ICU admission decisions can be based on several models. These models include: prioritization, diagnosis and objective parameters models (9). The committee recommends that a combination of all these models be used in developing admission criteria for the ICUs.
- Request for admission to the ICU should be directed to the consultant in charge of the ICU for the day (preferably in writing) and the nurse in charge must be informed. A clearly written procedure in the resolution of conflicts as it relates to ICU admission and discharge should be in place and if there are unresolved issues regarding admission/discharge, it should be referred to the ICU Director. The final authority for ICU admission/discharge should rest with the ICU Director (10).

ICU Admission Criteria

Patients with the following conditions are candidates for admission to the General Intensive Care Unit. The following conditions include, but are not limited to:

Respiratory

- Acute respiratory failure requiring intubation and mechanical ventilatory support

- Acute pulmonary embolism with haemodynamic instability
- Massive haemoptysis requiring lung isolation
- Upper airway obstruction requiring invasive airway

Cardiovascular

- Shock states
- Life-threatening dysrhythmias
- Dissecting aortic aneurysms
- Hypertensive emergencies
- Need for continuous invasive monitoring of the cardiovascular system

(Arterial pressure, central venous pressure, cardiac output)

Neurological

- Severe head trauma
- Status epilepticus
- Meningitis with altered mental status or respiratory compromise
- Acutely altered sensorium with the potential for airway compromise
- Progressive neuromuscular dysfunction requiring respiratory support and /or cardiovascular monitoring (myasthenia gravis, Guillain-Barre syndrome)
- Brain dead or potentially brain-dead patients who are being aggressively managed while determining organ donation status

Renal

- Requirement for acute renal replacement therapies in an unstable patient
- Acute rhabdomyolysis with renal insufficiency

Gastrointestinal

- Life-threatening gastrointestinal bleeding
- Acute hepatic failure leading to coma, haemodynamic instability
- Severe acute pancreatitis

Endocrine

- Diabetic keto-acidosis complicated by haemodynamic instability, altered mental status
- Severe metabolic acidotic states
- Thyroid storm or myxoedema coma with haemodynamic instability
- Hyperosmolar state with coma and/or haemodynamic instability
- Adrenal crises with haemodynamic instability

- Other severe electrolyte abnormalities, such as:
 - Hypo or hyperkalaemia with dysrhythmias or muscular weakness
 - Severe hypo or hypernatraemia with seizures, altered mental status
 - Severe hypercalcaemia with altered mental status requiring haemodynamic monitoring

Haematology

- Severe coagulopathy and/or bleeding diathesis
- Severe anaemia resulting in haemodynamic and/or respiratory compromise
- Severe complications of sickle cell crisis
- Haematological malignancies with multi-organ failure that is considered amenable to treatment

Obstetric

- Medical conditions complicating pregnancy
- Severe pregnancy induced hypertension/eclampsia
- Obstetric haemorrhage
- Amniotic fluid embolism

Surgical

- High-risk patients in the perioperative period
- Postoperative patients requiring continuous haemodynamic monitoring/ ventilatory support, usually following:
 - Vascular surgery
 - Thoracic surgery
 - Airway surgery
 - Craniofacial surgery
 - Major orthopaedic and spine surgery
 - General surgery with major blood loss/ fluid shift
 - Neurosurgical procedures

Multi-system

- Severe sepsis or septic shock
- Multi-organ dysfunction syndrome
- Polytrauma
- Dengue haemorrhagic fever/dengue shock syndrome
- Drug-overdose with potential acute decompensation of major organ systems
- Environmental injuries (lightning, near drowning, hypo/hyperthermia)
- Severe burns

Patients who are generally not appropriate for ICU admission

- Irreversible brain damage

- End-stage cardiac, respiratory and liver disease with no options for transplant
- Metastatic cancer unresponsive to chemotherapy and/or radiotherapy
- Brain dead patients who are non-organ donor (2)
- Patients with non-traumatic coma leading to a persistent vegetative state.

Nursing to patient care ratio

There are no internationally agreed recommendations for the nursing to patient care ratio in the ICU. In the USA, the state of California is the only state with mandated nurse: patient ratio and several other states have pending legislations.

In Jamaica, there are no published studies on the nurse: patient ratio. However, a local newspaper reports a ratio of 1:35 where a ratio of 1:10 is recommended at level 0 care (12).

In order to optimize resource allocation while providing the optimum level of care to the patients, types of patients and level of care required are divided into levels 0–4 (13).

Level	Nursing-to-Patient ratio	Interventions
0 = Ward care	≤ 1:8	Routine ward care
1 = Stable monitoring care	≤ 1:6	IV infusions. <i>eg</i> insulin, heparin
2 = Intermediate medical care	≤ 1:4	NIPPV, anti-arrhythmics, inotropes
3 = ICU	≤ 1:2	Highest level of care

The nursing to patient ratio in the ICU should depend on the severity of the illness and stability of the patient as well as the level of intervention (11).

Patients that require ICP monitoring, intra-aortic balloon pump, ECMO, CRRT and those with severe ARDS requiring prone ventilation, and multiple inotropic support should have at least 1:1 care (11).

Triage

It is the recommendation of the committee that clear policies for triaging of patients for ICU admission be developed in conjunction with the Emergency department.

These policies should take into consideration the availability of ICU beds, severity of illness, potential benefits of intervention, functional status and availability of advanced directives (16).

It is the recommendation of the committee that non-trauma patients be transferred to the ICU within four

hours and patients with traumatic injury within one-hour when a bed is available (17).

It is the recommendation of the committee that a person be designated daily to be in charge of triage during routine daily activities.

Those high-risk patients who are triaged to the ward should continue to be monitored by the ICU outreach team until they are no longer considered at-risk-patients for ICU care. Decisions for triaging to the ICU should not be based on chronological age, co-morbidities, gender, race, religion or sexual preferences (1).

It is the recommendation of the committee that when a bed is unavailable that critical care should be delivered to the patients in the emergency department by the ICU team and the patient should be reassessed frequently until a bed becomes available.

During a mass casualty (internal or external) and epidemic outbreaks, the committee recommends that critical care including full positive pressure ventilation be provided outside of the ICU and provision be made for this. In this regard, there should be a critical care mass casualty plan and the Director of ICU or a person designated by him/her should be in charge and coordinate the plan (10).

It is the recommendation of the committee that the triage team should clearly document when a patient is not considered for ICU admission during triage.

Discharge

- It is the recommendation of the committee that the ICU stipulate specific discharge criteria in its ADT policy (19).
- It is appropriate to discharge a patient from the ICU to a lower acuity area when a patient's physiologic status has stabilized and there is no longer a need for ICU monitoring and treatment (1).
- When a patient's physiological status has deteriorated and / or become irreversible and active interventions are no longer beneficial, withdrawal of therapy should be carried out in the ICU. Patient should be discharged to the ward if an ICU bed is required. The practice of keeping patients in the ICU when care is futile should be discouraged (1).
- The discharge parameters should be based on
 - ICU admission criteria
 - the admitting criteria for the next lower level of care
 - institutional availability of these resources such as intermediate care and long-term acute care patient

prognosis, physiologic stability and need for ongoing active interventions

The status of patients admitted to an ICU should be reviewed continuously to identify patients who may no longer need ICU care. This includes:

- Stable haemodynamic parameters
- Stable respiratory status (patient extubated with stable arterial blood gases) and airway patency
- Oxygen requirements not more than 60%
- Intravenous inotropic/vasopressor support and vasodilators are no longer necessary.
- Patients on low dose inotropic support may be discharged earlier if ICU bed is required.
- Cardiac dysrhythmias are controlled
- Neurologic stability with control of seizures

In order to improve resource utilization, discharge from the ICU is appropriate despite a deteriorated patient's physiological status if active interventions are no longer planned. Patients who can no longer benefit from ICU care or where treatment is considered futile should be discharged from the ICU (20).

- The committee recommends that a standardized process for discharge from the ICU should be followed; both oral and written formats for the report may reduce readmission rate (23).
- The committee recommends that discharge from ICU should be planned and facilitated in the day. When possible, avoid discharge from ICU "after hours" ("night shift", after 7:00 pm in institutions with 12-hour shifts] (21).
- It is the recommendation of the committee that the hospital should consider establishing a long-term acute care/weaning ward/transitional wards with capacity to support positive pressure ventilation. The nursing to patient ratio on such wards is significantly lower than that of the ICU or the High Dependency Unit (HDU). Patients admitted to that ward are stable and require more intensive programmes for weaning from the ventilator, rehabilitation and preparation for general ward care or home.
- General and specific severity-of-illness scoring systems can identify patient populations at higher-risk of clinical deterioration after ICU discharge. However, their value for assessing the readiness for transfer of individual patients to lower acuity care has not been evaluated. The committee does not recommend the use of scoring systems alone for individual transfers from ICU (22).

- The committee recommend (when possible) the discharge of patients at high-risk for mortality and readmission (high severity of illness, multiple comorbidities, physiologic instability and ongoing organ support) to a step-down unit or long-term acute care hospitals (LTACH) as opposed to the regular ward (1).

Readmission

The following factors were identified from the literature by the committee to be associated with readmission to the ICU after discharge.

- Readmission to the ICU after initial discharge is most often due to respiratory failure, cardiovascular failure, sepsis and neurologic issues (23).
- Prevention of the need for readmission is vital, as readmission adds to patient risk (24).
- Readmission to the ICU significantly increases mortality beyond that predicted by patient acuity alone.
- Knowledge of which patients are at risk for readmission to the ICU would enable the ICU team to either postpone discharge or identify the patients as high-risk during transfer to lower care units.
- General severity-of-illness scoring systems such as APACHE (II and III), SAPS II, SOFA, and the Therapeutic Intervention Scoring System have been shown to correlate with mortality after discharge from the ICU. It is the recommendation of the committee that the hospital adopt and use these scoring systems in order to quickly identify patients at high-risk for deterioration and readmission.
- In addition, multiple factors have been independently associated with unplanned readmission to the ICU, including age, co-morbidities, admission source other than planned surgery and ongoing requirements for organ support.
- Risk of readmission is greater when patients are discharged from the ICU to admit new patients to the ICU during periods of high demand.

In a qualitative study, nurses identified the following factors as associated with readmission to the ICU (25):

- Premature discharge from ICU
- Delayed medical care at the ward level
- Heavy nursing workloads
- Lack of adequately qualified staff and
- Clinically challenging patients.

At an urban teaching hospital, institution of a discharge process that included a transfer phone call, charted care summary, and discharge physical re-examination by the

discharging provider resulted in a decrease in readmission rate from 41% to 10% (26). Of those readmitted cases, 30% were found to be non-compliant with the new processes.

In another study, the institution of ICU discharge phone reports by the ICU physician or nurse practitioner, nurse and respiratory therapist also resulted in a significant decrease in readmissions.

Although they represent only two studies, these findings reinforce that we can improve patient outcomes after discharge from ICU.

- It is the recommendation of the committee that the critical care team follow-up post ICU discharge patients within four hours of discharge and twice daily for forty-eight hours post discharge.

Outflow limitation

Although outflow limitations and bottlenecks produced in the ICU discharge process are common in daily practice, this problem has not received enough attention in the past. Levin *et al* have reported that among 856 attempts to discharge 703 patients over a period of 16 months, 18% (153 attempts) of the discharges could not be completed within 24 hours. Forty-six per cent of the failures to discharge were associated with lack of beds on the floors or lack of agreement with the accepting teams outside the ICU (25). In addition, a simulation model identified the ICU as the first potential bottleneck in surge capacity during disasters.

The committee recommends:

- Further research in the area of outflow limitations and the impact of high hospital bed occupancy rates on ICU utilization and outcomes in Jamaica.
- Further intervention studies on reducing rates of readmission to the ICU, evaluating transfer location and staffing levels.
- The need for increase in the number of nurses trained in critical care to improve the current level of shortage of ICU nurses
- Decreasing outflow limitations and improving on bed management and governance structure in post ICU care.

CONCLUSION

The ICU is a highly resourced environment with demand outstripping available beds frequently by a ratio of more than 3:1. The judicious use of these resources is imperative for proper functioning. In this regard guidelines are useful for admission, discharge and triage of patients

that are most likely to benefit from interventions and to prevent providing care to patients that are unwarranted or even harmful. These guidelines will help to prevent unnecessary delays in admission of patients, in triage and also facilitate discharge from ICU when care in the ICU is no longer beneficial. During an epidemic or a mass casualty, these guidelines will provide an administrative framework to guide the use of non-traditional settings to provide critical care when needed.

Summary of recommendations

ICU Admissions

The committee recommends

1. Based on the needs of the adult population served by the ICU at the UHWI, a general ICU and specialist ICU beds comprising of neurosurgical/trauma, cardiac and Vascular ICU model be developed.
Level of Evidence: Ungraded
2. Diagnosis, objective parameter, and prioritization models to be used in the criteria for admission to the ICU
Level of Evidence: 2D
3. Request for ICU admission should be directed to the ICU consultant (preferably in writing). This should have a clear indication for admission with date and time of the request.
Level of Evidence: Ungraded
4. The nurse: patient ratio should be based on the level of care, severity of illness and intervention required.
Level of Evidence: 2D
5. A clear written procedure for conflict resolution regarding admission and discharge should be established and the final decision regarding admission, discharge and triage shall rest with the ICU Medical Director.
Level of Evidence: Ungraded.

Discharge

It is the recommendation of the committee that

1. Discharge criteria be stipulated in the ADT policy of the unit
Level of Evidence: Ungraded
2. A standardized process of discharge from ICU should be followed in oral and written format.
Level of Evidence: 2C
3. Patient discharge from the ICU should be planned and facilitated in the day. When possible, avoid discharge from ICU "after hours" (night shift after 7:00 pm).

- Level of Evidence: 2C
- The hospital should consider a long-term acute care/ weaning/ transitional ward with capacity for positive pressure/ ventilatory support
Level of Evidence: Ungraded
 - Patients with significant risk for mortality and readmission should be discharged to a step down unit or long-term acute care ward as opposed to a regular ward
Level of Evidence: 2C

Summary of Recommendation

Triage

The committee recommends that

- Clear policies for triaging of patients for ICU admission be developed in conjunction with other stakeholders such as the Accident and Emergency Department.
Level of Evidence: Ungraded
- Non-trauma patients who are candidates for ICU admissions be assessed and when appropriate transferred within four hours of acceptance. Where it is impossible to transfer the patient within the time frame, critical care services should be provided to the patient by the ICU team within that time frame.
Level of Evidence: 2D
- Patients with traumatic injury should be transferred to the ICU within one hour when a bed is available.
Level of Evidence: 2C
- A physician should be designated daily to be in charge of triage
Level of Evidence: Ungraded
- When a bed is unavailable and a patient has been accepted for ICU care, critical care services should be delivered to patient in the emergency department/ward by the ICU team until a bed becomes available in the ICU.
Level of Evidence: Ungraded

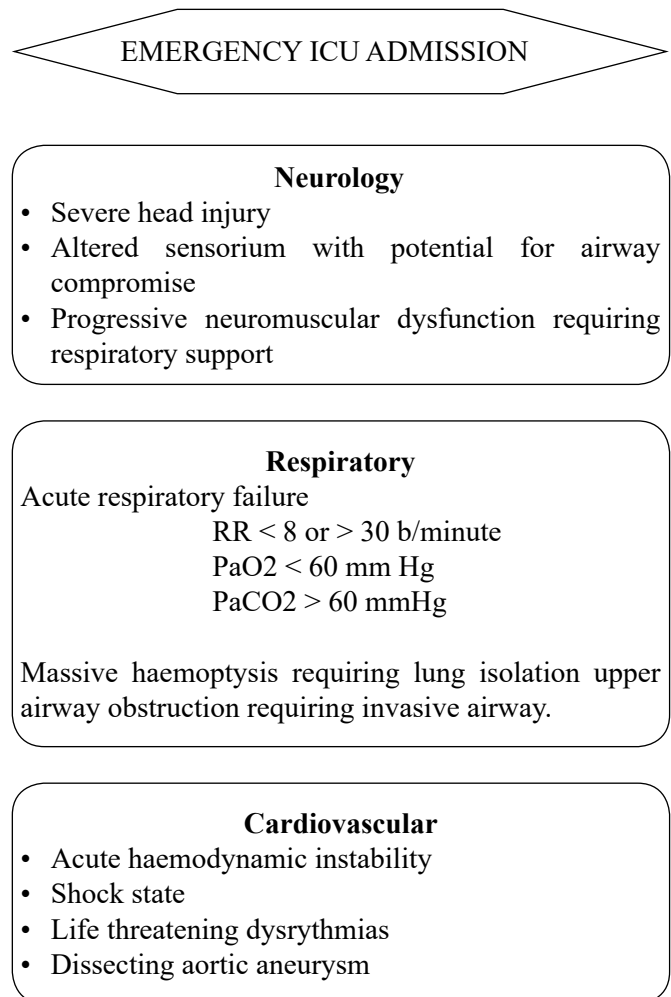
Readmission

The committee recommends the following to reduce the rate of readmission to the ICU

- Establish a critical care outreach programme to decrease the rate of readmission
Level of Evidence: 2D
- Post ICU discharge patients should be followed up by the ICU outreach team for 48 to 72 hours to identify patients at risk for readmission
Level of Evidence: Ungraded

- The hospital administration should address factors associated with the risk of readmission
Level of Evidence: Ungraded
- The use of daily charting of a scoring system should be encouraged to risk stratify and identify patients at high-risk of readmission
Level of Evidence: Ungraded
- Further research in identifying the risk factors associated with readmission as well as the mortality and morbidity associated with readmitted patients to the ICU
Level of Evidence: Ungraded

Patients who meet the following criteria with potentially reversible condition may be admitted to the Intensive Care Unit.



Multi-system

- Severe sepsis or septic shock
- Multi-organ dysfunction syndrome
- Severe burns
- Polytrauma
- Environmental injuries: lightning, near drowning, drug-overdose with potential for acute decompensation

INTENSIVE CARE UNIT DISCHARGE

Patient that meet the following criteria and are stable for 12- 24 hours may be discharged from the Intensive Care Unit.

Neurology

- Patient obeys commands or back to pre-admission status
- No seizures or seizures are controlled
- Irreversible brain injury and no active intervention are planned or interventional no longer beneficial

Respiratory

- Patient is extubated or has a tracheostomy
- Does not need frequent suctioning
- $FIO_2 < 60\%$
- Respiratory rate $> 8 < 30$ breaths / minute
- Negative inspiratory force > 15 cm H_2O

Cardiovascular

- Stable arterial blood gases
- SBP > 90 mmhg
- Intravenous inotropic support and vasodilators no longer necessary
- Cardiac dysrhythmias are controlled
- No active ongoing blood loss

Renal

- No longer requires acute renal replacement in an unstable patient.
- No acute rhabdomyolysis with renal insufficiency

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