

Progressing care in the Medical High Dependency Unit: unit configurations, staffing, standards, and daily routine

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Abstract

There are currently various models of care for provision of high dependency care for acutely ill medical patients across the UK. Acute Physicians are integral to the development and progression of this both challenging and rewarding area of medicine. This article outlines current standards, best evidence, and our own experience of both setting up and developing a medical high dependency unit (MHDU).

Keywords

Medical High Dependency, MHDU, Critical Care, Standards, Acute Medicine

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Introduction

Caring for the sickest medical patients in the high dependency unit (HDU) setting is both a challenging and rewarding part of the work of many acute physicians. The provision of such care is an expanding field and it is provided by clinicians from varied backgrounds and in varied settings. While various critical care bodies have made recommendations for the provision of HDU type care, there is currently no specific guidance for standalone medical HDUs (MHDUs). Acute physicians are frequently involved in the planning and development of such services.

This article is the first in a series of reviews looking at this developing field. In this article we will discuss aspects of MHDU services relevant to those involved in both setting up new services and progressing standards of care in existing MHDUs including unit configurations, staffing, standards, and the daily routine – drawing from UK critical care guidelines, current best evidence, and our experience of setting up and running medical HDUs. In subsequent articles we will cover further topics including respiratory support; haemodynamic support; and acute kidney injury and fluid management.

Levels of care – where HDU fits in

Levels of dependency are described in box 1. The term “high dependency” is generally used to describe

Box 1. Levels of dependency¹

- Level 0:** standard ward level care
- Level 1:** patients at risk of deterioration or recently stepped down from higher levels of care
- Level 2:** patients requiring single organ support (excluding invasive ventilation) or those requiring more detailed observation
- Level 3:** patients requiring invasive ventilation alone or multi organ support ie requiring Intensive Care Unit (ICU) level care

patients requiring level 2 care (see box 1). Such patients may be cared for in a comprehensive critical care unit (CCU) which can also care for level 3 (ICU) patients, or a dedicated high dependency unit (HDU) which cares for patients requiring level 2 and some requiring level 1 care depending on local arrangements. It may also be appropriate to provide support for patients with more than one failing organ system in HDU (excluding invasive ventilation) if it is felt that admission to ICU would not be in the patient’s best interests eg patient not for invasive ventilation requiring non-invasive respiratory support and vasopressors.

Examples of care provided by MHDUs

Medical High Dependency Units (MHDUs) are those HDUs which specialise in the management of patients with medical conditions. Although not intended as exhaustive lists, examples of medical conditions frequently requiring HDU admission, and supportive measures/therapies commonly available in HDU, are listed in boxes 2 and 3 respectively.

Importantly, within critical illness there is a spectrum of severity – individual patients can frequently oscillate between different ends of this

Box 2. Medical conditions frequently requiring admission to HDU

- Sepsis and septic shock
- COPD with type 2 respiratory failure
- Respiratory failure with FiO₂ >0.6
- Respiratory failure requiring nasal high flow oxygen
- Acute Kidney Injury
- Self-poisoning with requirement for detailed observation or evidence of organ dysfunction
- Severe diabetic ketoacidosis(DKA) eg PH<7.1
- Hyperosmolar hyperglycaemic state (HHS)
- Decompensated liver disease
- Upper GI bleed
- Patients stepping down from ICU
- Medical patients with tracheostomies

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Box 3. Therapies and supportive measures commonly available in MHDUs (measures available less commonly in italics)

- Non-invasive ventilation (NIV)
- Continuous positive airways pressure (CPAP)
- Nasal high flow oxygen (NHFO2) therapy
- Invasive central venous and arterial pressure monitoring
- Vasopressor support
- Inotropic support
- Tracheostomy management
- Access to point of care ultrasound devices as both diagnostic and procedural tools
- Renal replacement therapy
- Plasma exchange
- Cardiac output monitoring (*either invasive or noninvasive*)

spectrum. Requirement for level 2 critical care can often indicate an intermediate stage in a patient's deterioration – with this in mind, we do not recommend provision of ongoing level 2 care in sites which do not have access to level 3/ICU care onsite. Such patients should be identified and transferred to the nearest site with comprehensive critical care facilities (that is providing that the patient is considered appropriate for escalation to ICU).

Models of care – open or closed?

The UK has one of the lowest numbers of critical care beds per head of population in Europe,² in addition, provision of HDU beds for medical patients has been identified as a particular area of deficiency with a resulting expansion in HDU provision over the last decade.³ Exact models of HDU provision also vary. There are generally two main areas that define the model of HDU provision – physician staffing (eg “open” or “closed” model), and unit configuration.

“Closed” units are those which are managed by a dedicated specialist team– this team is in control of gatekeeping, patient care, and discharge decisions for the entirety of their HDU stay. “Open” units are those in which individual medical teams have admission rights and continue to look after their own patients following admission. There is some evidence that the “closed” unit model of care is associated with a lower hospital mortality rate when employed in ICUs.⁴

Frequently encountered unit configurations include combined critical care units – these units provide care for all patients requiring higher levels of care;

mixed HDUs – high dependency for patients from multiple specialties;

specialty specific HDU – high dependency for patients from a single specialty eg MHDU. The Scottish Intensive Care Society Audit Group's

(SICSAG) 2016 report reveals a variety of models of HDU provision – of the 11 dedicated MHDUs in Scotland, only 5 have 7 day a week dedicated consultant cover.⁵

Medical staffing

Current guidance in the UK suggests that a closed model of care is optimal for caring for patients with level 2 care needs or above – this includes high dependency units.^{2, 6, 7} There should be a designated consultant caring for patients on the unit available 24 hours a day, 7 days a week. Consultant to patient ratio should not exceed 1:15. The UK FICM guidance states that level 2 patients should be cared for by a Consultant in Intensive Care Medicine, however SICSAG guidance employed in Scotland suggests that care should be provided by an “appropriately trained” consultant.⁶ With the development of Acute Medicine and enhanced critical care training opportunities available in many specialties within current UK training programmes, it would seem reasonable that MHDUs were cared for by suitably trained colleagues from a variety of backgrounds, e.g. Acute Medicine, Respiratory Medicine, Intensive Care Medicine, Nephrology, and others. There should also be a Consultant in administrative charge of the unit with clear lines of managerial escalation.

MHDU provides excellent training opportunities for trainees from medical and critical care training programmes including experience in assessing and caring for the acutely ill adult, ongoing care of the critically ill, complex decision making, end of life care, and various procedural competencies, e.g. central venous catheter insertion, arterial line insertion, and pleural procedures. Training should be provided in line with the curriculum of the trainees recognised training programme, e.g. Acute Medicine or Intensive Care Medicine. FICM recommend a patient to trainee ratio no greater than 1:8⁷ – this should be maintained at all times.

From our own experience and from national audit data,⁵ it is clear that the recommended standards for medical staffing are often not met. We believe that as services develop there should be an emphasis on achieving these standards – the very nature of critical illness requires timely and recurrent access to senior medical decision makers and the implementation of complex plans and interventions which often require skilled senior clinicians.

Nurse staffing

Enhanced nursing ratios are perhaps the key aspect of HDU care and are essential to enable the high dependency patients' care needs to be met. It is recommended that patients requiring level 2 care are cared for in a ratio of 1 nurse to 2 patients.² These enhanced nursing ratios facilitate greater levels of

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Box 4. MHDU Daily ward round checklist

• Feeding plan reviewed?	Y	N	
• Thromboprophylaxis reviewed?	Y	N	
• Analgesia and sedation reviewed?	Y	N	
• Glucose control reviewed?	Y	N	
• Drugs reviewed?	Y	N	
• Delirium present (use CAM)?	Y	N	
• Sepsis present?	Y	N	
• Treatment escalation plan reviewed?	Y	N	
• Adults with incapacity in place and valid?	Y	N	NA
• DNACPR in place and valid?	Y	N	NA
• Ready for stepdown?	Y	N	
• Ward/specialty allocation on stepdown:			

nursing interventions; more complex therapies/supportive measures; and higher levels of observation than available in a general ward. There should also be a senior nurse overseeing the running of each shift in addition to the bedside nurses.

There should be a robust nursing management structure headed by a ward manager for the HDU. Education is a cornerstone of the nursing programme and senior nurses with dedicated time for practice development and education are essential to ensure quality of care is maintained and to ensure nursing revalidation criteria are met.

Professions allied to medicine staffing

From the acute resuscitative phase through stabilisation and rehabilitation, MHDU is truly a multidisciplinary enterprise with attention to medication, nutrition, communication, swallowing, neuromuscular function, and mobility essential to the patient's recovery. With this in mind there should be regular input from pharmacy, physiotherapy, speech and language therapy, dietetics and nutrition, and occupational therapy – it is recommended that these services are accessible 24 hours a day.^{2,6,7}

Daily ward round and documentation

National standards recommend a twice daily consultant led multidisciplinary ward round with a documented management plan – this should occur 7 days a week, every week of the year.^{2,6,7} Due to the complex nature of the critically ill patient we advocate a comprehensive structured approach to the ward round. We also recommend use of a daily ward round checklist again due to the complex nature of critical illness, the potential for harm from various critical care interventions (e.g. prolonged use of central venous catheters, broad spectrum antimicrobials), and the need for frequent review of escalation plans. The use of checklists in critical care ward rounds was popularised in the ICU,⁸ there has since been adoption of daily ward round checklists in multiple specialties with evidence that they may enhance communication and reduce patient harm.^{9,10} Checklists are also an ideal way

of engendering a culture of safety within the unit and promoting routine screening for deleterious conditions such as sepsis and delirium. An example of a medical HDU daily ward round checklist is illustrated in Box 4.

Medical handover

MHDU patients are often complex and the models of care employed in MHDUs within the UK often involve multiple transitions of care (eg day time team cover to hospital at night team, weekday team to weekend team) and as such a structured handover is essential to maintain patient safety, there is also some evidence that a recorded structured handover may improve outcomes in MHDU.¹¹ Ideally, handover should occur at each transition of care, i.e. at least twice daily depending on medical staff working model. For governance purposes an attendance register and written record should be kept. Information communicated should include diagnosis, management plan, current organ support, escalation plan, and cardiopulmonary resuscitation status.

Escalation – patient selection to HDU and further escalation

Decision making around ceilings of treatment and withdrawal of active treatment are amongst the hardest that any clinician is involved in. Both the decision to admit the patient to HDU, and the escalation plan thereafter are complex. Such decisions also require regular review and clear communication to both patient/relatives and the multidisciplinary team. While traditionally a lot of weight is given to the concept of “futility”, there does not exist a widely agreed scientific and legal definition of this in clinical practice.¹²

In our experience, the fundamental guiding principles of such decisions of escalation in critical care are whether the underlying condition has a degree of reversibility, and whether the burden of the proposed treatment is acceptable to the patient taking into account of the potential range of likely outcomes (eg recovery, partial recovery, mild to moderate disability, profound disability, death). Unfortunately, a significant proportion of deteriorating patients are incapacitated and as such unable to make such a decision – in this circumstance attempts should be made to assess what the patient would want in the given situation by discussing with those who know the patient best, e.g. previously expressed opinions, cultural, religious beliefs.

Documented treatment escalation plan (TEP) proformas are an effective way of prompting such discussions with patients and those close to them, and they are also a valued means of communicating such plans to the wider MDT.¹³ Admission to MHDU can be a sign of a major deterioration in a patient's

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condition and, as such, we would recommend considering what the TEP should be at this point. For many patients, full escalation will be appropriate. However, in some cases, careful consideration and discussion with the patient may help avoid unwanted and potentially harmful interventions.

Benchmarking and quality indicators

There are 2 main national audits of critical care in the UK – in England, Wales and Northern Ireland this is performed by the Intensive Care National Audit and Research Centre (ICNARC) and in Scotland by the Scottish Intensive Care Society Audit Group (SICSAG). Both audits publish results against national quality indicators and minimum standards – the results are published online and are open access. The data they provide is valuable for benchmarking and for focussing improvement work within trusts and individual units. The ICNARC and SICSAG standards are similar allowing for a few subtle differences. We would advise that all MHDUs report to their relevant national audit – this should facilitate both transparency and a drive to continually improve standards. The ICNARC quality indicators are summarised in box 5.

Morbidity and mortality discussions and learning from excellence

It is recommended that all deaths within HDUs are reviewed and discussed as part of a formal mortality review process.^{2, 6, 7} This can be a useful way of identifying clinical and system issues and generating learning points. There should be a robust method of communicating any learning generated by the mortality review process, in order to allow patients to benefit from this learning. Adverse event reporting and discussion of such events is also an important part of a unit's clinical governance framework, often these can be discussed in the same forum as the mortality reviews.

While it is clearly important to learn from mortality and morbidity, it is increasingly recognised that there is significant merit in learning from what we do well and through this the concept of learning from excellence has developed.¹⁵ The current focus on learning from death and through reporting of adverse events can lead to a detrimental culture of fear and may discourage innovation and open discussion of quality of care. Yet, most patients will have aspects of excellent practice during their admission. Every patient is different and the healthcare environment is imperfect and is prone to multiple influences and variations, learning from excellence recognises this and encourages colleagues to report instances of excellent practice. The reported incidents are then analysed with key messages of the excellent practice generated and distributed. It is hoped that this focus

Box 5. ICNARC quality indicators for critical care¹⁴

- Unit acquired blood stream infections
- Out of hours critical care discharges -defined as between 2200 and 0659
- Non clinical transfers out – patients transferred to another hospital for level 2 care due to lack of capacity in the unit
- Unplanned readmissions within 48 hours of discharge
- Delayed discharges – discharge >8 hours after being declared ready for step down to the ward
- Risk adjusted hospital mortality
- Risk adjusted hospital mortality with predicted mortality risk <20%
- High risk sepsis admissions
- Data completeness

on spreading excellent practice will lead to improved patient outcomes.¹⁵

Conclusion

MHDU remains an expanding field with large variation in how it is provided. We acknowledge that many of the concepts discussed in this article are aspirational for most units (including our own), however, we should strive to provide our sickest and most complex patients with the very best of care.

Acute physicians are ideally placed to drive forward the provision and development of such services in collaboration with colleagues from medical specialties and critical care. We would also encourage acute physicians to consider dual training in Intensive Care Medicine (ICM), although we do not believe it should be mandatory to do so in order to look after level 2 patients in an MHDU setting. MHDU also provides acute physicians with valuable variation in their job plan; from our experience, this has certainly been an attractive element to acute physicians applying for consultant posts. MHDU experience is also an essential part of both the training of acute physicians and many other acute medical specialties: we cannot deprive trainees of this experience by devolving it purely to colleagues from critical care yet simultaneously bemoan a loss of skills in dealing with the medically sick patient.

In summary, MHDU should not merely be a label on a door – units should be able to deliver high quality level 2 critical care in line with best practice and current guidance. They are also a valuable training environment. Acute physicians should work with partner specialties to facilitate excellence in this valuable and rewarding part of our practice.

Conflicts of interest

We are both physicians working in critical care and we are both dual trained in acute medicine and intensive care medicine.

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