

The evidence for acute internal medicine and acute medical units

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ABSTRACT

Acute medicine and acute medical units are relatively new innovations. The evolving evidence base is demonstrating the effectiveness of these in improving care given to patients with acute medical illness. This article reviews the available evidence.

KEYWORDS: Acute medicine, acute medical units

Introduction

Acute medical units (AMUs) have been defined by the Royal College of Physicians (RCP) as ‘a dedicated facility within a hospital that acts as the focus for acute medical care for patients who have presented as medical emergencies to hospital’.¹ In the past decade AMUs, as a base for the practise of acute internal medicine (AIM), have become integral to the care pathway of most patients who require hospital-based acute medical care in the UK.^{2,3} Other countries are increasingly adopting this model of care, including Ireland,⁴ Australasia^{5,6} and other parts of Europe.^{7–9}

AMUs first emerged in the 1990s often as a result of the local service recognising the need to improve acute medical care. However, there was limited evidence of the effectiveness of this model of care at that time. This review will discuss some of the evidence which supports the acute medical model of care for patients admitted on the medical take.

Acute medical unit standards of care

In the early 1990s it was recognised that the established model of medical patients being admitted from the emergency department (ED) directly to a ward bed was unsustainable in the face of reduced bed capacity and increasing patient attendances/admissions. Alternative models of care were required. AIM evolved to provide patients with acute medical illness with the best quality care, in the right environment, with assessment, diagnosis and treatment as actively managed components of that care.

The specialty of AIM was first introduced as a branch of general internal medicine (GIM) but by 2009 was legally

recognised as a separate specialty with defined training programmes.¹⁰ This organisation and specialisation means that the large majority of physician trainees now receive much of their training in the care of acutely unwell medical patients while working in the AMU environment.

The key features and objectives of AIM are:

- > clinical service delivered by consultant physicians within the AMU environs for at least 12 hours per day and seven days per week
- > medical leadership within an AMU in a service designed and managed by consultant physicians who specialise in AIM
- > service delivered by an AIM specialist and dedicated multidisciplinary team with timely and appropriate interaction with other specialties
- > service design informed by quality standards
- > performance benchmarked against key clinical quality indicators for AMU.

While surveys of care delivered within AMUs in the UK have consistently reported heterogeneity with regard to organisation, services and staffing,^{11–15} specific recommendations suggest that medical care provided for patients in the AMU should include the following.¹

1. Patient assessment both in an ambulatory emergency care setting and as part of a possible admission process
2. Treatment – first-line treatments are often commenced within the short stay area (48–72 hours) of the AMU.
3. Further care planning – decisions about further investigations and specialty referrals are made. Discharge planning should commence at the time of admission or a specialty bed requested. Effective multiprofessional teamworking is integral to optimal AMU functioning. Where required, complex ethical decisions are usually made in the AMU, such as cardiopulmonary resuscitation status or deprivation of liberty orders.
4. Practical procedures – a number of investigative and therapeutic procedures are provided in an AMU. Investigations such as lumbar puncture should be available in every AMU. The provision for other procedures is variable, such as echocardiography and ultrasound.
5. Delivery of high profile quality initiatives – there are a number of conditions where poor care is recognised in contributing to adverse patient outcomes. The highest profile examples are sepsis and acute kidney injury. Both are seen frequently in AMUs and initiatives have

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been undertaken to improve the care delivered for these conditions.

6. Higher level care – an AMU does not provide high-dependency care but in some AMUs enhanced levels of care, such as non-invasive ventilation or increased monitoring, may be provided.
7. Generic care – AMU is frequently the starting point for the care described in local commissioning for quality and innovation payments, eg assessment for and provision of VTE prophylaxis.
8. Access to diagnostic services – every AMU must be supported by a full range of diagnostic investigations.
9. Access to higher level care – every AMU must be supported by a critical care unit and coronary care unit.
10. Specialty in-reach – given the variety of patient presentations medical specialty in-reach or co-location from cardiology, medicine for care of the elderly and respiratory medicine is an absolute requirement. Ready availability of advice and specialty management pathways from the other medical specialties is critical. As well as medical specialities, AIM needs to work closely with other disciplines, for example surgical specialities, obstetrics and gynaecology, intensive care medicine and psychiatry.

The evidence for AMU care

Over the past decade, evidence has increasingly demonstrated the benefit of AMU models of care. Initial research has focused on the following outcomes as important quality indicators: mortality, hospital length of stay (LOS), hospital readmission and patient/staff satisfaction. These will be discussed in more detail here.

Hospital length of stay

Hospital LOS represents a composite measure which not only indicates effectiveness of clinical treatment but also the efficiency of processes of care. Hospital LOS has been assessed in many recent studies.^{7,8,16–26} The majority of studies demonstrated a statistically significant difference in favour of AMU care. In the studies that reported the mean LOS for the two groups, the reduction ranged from 0.3 to 2.62 days. However, only three of these attempted to adjust for confounding factors.

In the first, which used propensity score matching, the mean reduction in LOS was 0.8 days in the matched analysis versus 0.11 days in the unmatched. Both studies showed a statistically significant reduction in length of stay.¹⁷ A second study in which adjustment was made for secular trends, demonstrated that the LOS was 0.73 days less in the AMU group when compared to the non-AMU group (95% confidence interval (CI) –1.5, 0.04; $p = 0.067$).¹⁸ A final study used multiple linear regression analysis to demonstrate that patients being cared for entirely in the AMU were found to have a mean LOS 5.7 days less than patients being cared for entirely on the ward ($p < 0.001$).¹⁹ This, however, was not the case when the ward group was compared with those patients first treated in the AMU and then transferred to the ward, with the latter group having a mean LOS just under a day longer than the ward group ($p = 0.04$). In general, these studies suggest that hospital LOS benefits from the presence of an AMU, but by contrast, that

transfers from an AMU following admission may introduce further delay.

Mortality

Mortality data presented in several studies were assessed at a variety of time points: in-hospital, 30-day post admission, 30-day post discharge and annual.^{7,16–19,23,24,26,27} In many of the studies, patient admission to the AMU was associated with reduced mortality by comparison with patients admitted under non-AMU models of care. By contrast, one study has reported non-significant increases in 30-day and in-hospital mortality in those receiving AMU care. It is notable however that in this study baseline mortality rates were higher than those in comparable studies.⁷ In these nine studies the absolute change in mortality between the AMU and non-AMU groups ranged from +1.3% to –8.8%. Four studies attempted to adjust for confounding factors. The first demonstrated that while not all patients could be allocated to the AMU due to capacity constraints, the univariate odds ratio of an in-hospital death by day 30 for a patient initially allocated to the AMU, compared with an initial ward allocation was 0.76 (95% CI 0.71, 0.82; $p < 0.001$). The fully adjusted risk for patients was 0.67 (95% CI 0.62, 0.73; $p < 0.001$).¹⁶ A second study using propensity score matching demonstrated a non-significant reduction in in-hospital mortality in the AMU cohort compared with the non-AMU cohort (unmatched analysis 3.7 vs 4.6%; matched analysis 4.2 vs 4.6%).¹⁷ Investigators undertaking a third study adjusted for time based changes in mortality in the population. In addition to an overall trend towards reduced mortality implementation of specialty triage was associated with a significant reduction in the subsequent mortality of the under 65 age group by a further 0.64% (95% CI 0.11, 1.17%; $p = 0.021$), equivalent to approximately 51 fewer deaths per year. There was, however, no significant effect of specialty triage for those aged over 65 or all age groups combined.¹⁸ A final study used logistic regression to adjust for confounding factors including comorbidities, illness severity score and disease category. A significant reduction in in-hospital mortality in the AMU group by comparison with the non-AMU group was reported (adjusted odds ratio 0.28; 95% CI 0.23, 0.35).²⁷ In general, these studies suggest that the admission of patients to AMU in acute medical illness decreases overall mortality.

Hospital readmission

Hospital readmissions following discharge are rightly considered an adverse outcome. While a failure of social and other community care may contribute to readmissions rates, such events are nevertheless regarded as markers of suboptimal healthcare delivery. The studies quoted above have evaluated the change in the proportion of patients readmitted to hospital. These were again measured at varying time points: 7, 28 or 30 days.^{7,17–19,25,26} Review of seven-day readmission demonstrated a non-significant reduction in the proportion of patients readmitted in the AMU group compared to the non-AMU group (range 0.1–0.7%).^{17,18,25} For patients readmitted within 28 or 30 days, three studies found a decrease in the AMU group compared to the non-AMU group^{7,17,18} (range 0.7–5.2%) with only one reaching statistical significance. Only one study took

measures to control for confounding factors. Using a time series analysis to compare summary changes between non-AMU and AMU groups, investigators demonstrated no significant difference in either 7-day readmission (summary change -0.02 ; 95% CI $-0.07, 0.03$; $p = 0.365$) or 28-day readmission rates (-0.04 , 95% CI $-0.15, 0.07$; $p = 0.49$).¹⁸ Therefore, to date there are no significant data demonstrating that hospital readmissions are decreased when an AMU is involved in acute medical patient care.

Patient/staff satisfaction

Patient experience and satisfaction are increasingly seen as important indices of excellent care but also correlate with better clinical outcomes. Four recent studies have reviewed patient satisfaction in the context of the AMU model.^{20,28–30}

Hanlon and colleagues reported a statistically significant increase in the percentage of patients feeling ready for discharge, and reported that staff had time to explain their treatment in the AMU group.²⁸

A second study revealed contrasting results in a retrospective analysis of the Adult Inpatient Survey performed in the NHS in England on a total of 17,182 patients.³⁰ This study, however, compared the AMU group with short-stay elective patients or unscheduled non-medical admissions. The numbers reviewed in the other two studies did not allow for statistical analysis.

Three of these studies have also reported results of staff satisfaction surveys.^{20,28,29} Hanlon and colleagues again reported statistically significant positive and negative effects of the AMU model from surveys of a total of 50 consultants and 190 nurses.²⁷ Of note, non-consultant staff were less concerned about losing track of patients but were more concerned about 'blocked' beds, while nursing staff felt that there was more time for health promotion. In general, there was a perception of increased stress but better job satisfaction in the AMU model. In the other studies the majority of medical and nursing staff felt the AMU model to be better²⁰ and 75% of GPs preferred the AMU route for patients compared to the ED.²⁸

Discussion

Prior to the adoption of AIM and the AMU model of care there were a large variety of systems used within the NHS to configure the pathway undertaken by patients admitted to hospital with acute medical illness. Acute admissions were usually cared for by physicians who had trained in general medicine as well as another specialty. However, the competing demands of speciality medicine meant that the care of patients with acute medical illness was often not the principle focus of consultant physician workload. The development of AIM has occurred in tandem with the strengthening of governance systems and quality improvement processes within the NHS. Reflecting these changes, the AMU has become an important site for improvement in the care of patients with acute illness. For the first time, specialists from AIM, working in concert with specialty colleagues, focus on the care of patients admitted through this pathway to ensure the delivery of high-quality acute care. The majority of physician trainees gain experience admitting unselected medical patients in the AMU environment, thus there is significant overlap between AIM and GIM training.

The future for the AMU will almost certainly see it evolve not only as the principal site for medical admissions but also the main community-facing service providing integration of care with primary and social services. First, to manage and perhaps prevent admissions through the development of adequate patient assessment prior to admission, ambulatory care clinics and the coordination of specialist hot clinics but further, to facilitate discharge and follow-up care planning, and prevent readmission.

By comparison with most other UK specialities, AIM is yet in its infancy. Data, however, from investigations in the UK and elsewhere collected over the past five to ten years and presented here suggest that there are significant benefits for patients admitted under this model of care. Patient mortality and LOS, but also patient and staff experience outcomes, all show improvements. The evidence base requires further expansion and, indeed, the precise contribution of the various elements of the AMU to these outcomes is unclear and remains a topic for further research. In the meantime it is clear that the AIM with increasing numbers of acute physicians will be the most common site responsible for care of patients with unscheduled acute medical illness. Striving for excellence in the care delivered to patients in these units will be fundamental to the functioning of the hospital of the future. ■

References

- 1 Acute Medicine Task Force. *Acute medical care. The right person in the right setting – first time*. London: RCP, 2007.
- 2 Beckett DJ, Raby E, Pal S, Jamdar R, Selby C. Improvement in time to treatment following establishment of a dedicated medical admissions unit. *Emerg Med J* 2009;26:878–80.
- 3 McNeill GBS, Brahmabhatt DH, Prevost AT, Trepte NJB. What is the effect of a consultant presence in an acute medical unit? *Clin Med* 2009;9:214–8.
- 4 Watts M, Powys L, Hora CO *et al*. Acute medical assessment units: an efficient alternative to in-hospital acute medical care. *Ir Med J* 2011;104:47–9.
- 5 Providence C, Gommans J, Burns A. Managing acute medical admissions: a survey of acute medical services and medical assessment and planning units in New Zealand. *Intern Med J* 2012;42:51–6.
- 6 McNeill GBS, Brand C, Clark K *et al*. Optimizing care for acute medical patients: the Australasian Medical Assessment Unit Survey. *Int Med J* 2011;41:19–26.
- 7 Vork JC, Brabrand M, Folkestad L *et al*. A medical admission unit reduces duration of hospital stay and number of readmissions. *Dan Med Bull* 2011;58:A4298.
- 8 Diepeveen BA. *Performance analysis and improvement at the acute admissions unit of Máxima Medical Centre*. Master of Science in Operations Management and Logistics [dissertation]. Eindhoven: Technische Universiteit Eindhoven, 2009.
- 9 Realdi G, Giannini S, Fioretto P *et al*. Diagnostic pathways of the complex patients: rapid intensive observation in an Acute Medical Unit. *Int Emerg Med* 2011;6 Suppl 1:85–92.
- 10 JRCPTB. *Acute internal medicine curriculum*. London: JRCPTB website, 2009 (modified 2012).
- 11 Ward D. Acute medical care. The right person, in the right setting first time: how does practice match the report recommendations? *Clin Med* 2009;9:553–6.
- 12 Jayawarna C, Atkinson D, Ahmed SV, Leong K. Acute medicine units: the current state of affairs in the North-West of England. *J R Coll Physicians Edinb* 2010;40:201–4.

- 13 Ilyas M, Zahid M, Roseveare C. Acute medical care. *Clin Med* 2010;10:304.
- 14 Le Jeune I, Masterton-Smith C, Subbe CP, Ward D. "State of the Nation"—the Society for Acute Medicine's Benchmarking Audit 2013 (SAMBA '13). *Acute Med* 2013;12:214–9.
- 15 Wood I. Medical assessment units in the West Midlands region: a nursing perspective. *Accid Emerg Nurs* 2000;8:196–200.
- 16 Coary R, Byrne D, O'Riordan D *et al*. Does admission via an acute medical unit influence hospital mortality? 12 years' experience in a large Dublin hospital. *Acute Med* 2014;13:152–8.
- 17 Li JYZ, Yong TY, Bennett DM *et al*. Outcomes of establishing an acute assessment unit in the general medical service of a tertiary teaching hospital. *Med J Aust* 2010;192:384–7.
- 18 Moore S, Gemmell I, Almond S *et al*. Impact of specialist care on clinical outcomes for medical emergencies. *Clin Med* 2006;6:286–93.
- 19 Suthers B, Pickles R, Boyle M *et al*. The effect of context on performance of an acute medical unit: experience from an Australian tertiary hospital. *Aust Health Rev* 2012;36:320–4.
- 20 McLaren EH. Re-organising emergency medical admitting: the Stobhill experience, 1992–1997. *Health Bull (Edinb)* 1999;57:108–17.
- 21 Moloney ED, Smith D, Bennett K, O'Riordan D, Silke B. Impact of an acute medical admission unit on length of hospital stay, and emergency department 'wait times'. *QJM* 2005;98:283–9.
- 22 Moloney ED, Bennett K, O'Riordan D, Silke B. Emergency department census of patients awaiting admission following reorganisation of an admissions process. *Emerg Med J* 2006;23:363–7.
- 23 Moloney ED, Bennett K, Silke B. Effect of an acute medical admission unit on key quality indicators assessed by funnel plots. *Postgrad Med J* 2007;83:659–63.
- 24 Conway R, O'Riordan D, Silke B. Long-term outcome of an AMAU—a decade's experience. *QJM* 2014;107:43–9.
- 25 St Noble VJ, Davies G, Bell D. Improving continuity of care in an acute medical unit: initial outcomes. *QJM* 2008;101:529–33.
- 26 Brand CA, Kennedy MP, King-Kallimanis BL *et al*. Evaluation of the impact of implementation of a medical assessment and planning unit on length of stay. *Aust Health Rev* 2010;34:334–9.
- 27 Rooney T, Moloney ED, Bennett K, O'Riordan D, Silke B. Impact of an acute medical admission unit on hospital mortality: a 5-year prospective study. *QJM* 2008;101:457–65.
- 28 Watts M, Powys L, Hora CO *et al*. Acute medical assessment units: an efficient alternative to in-hospital acute medical care. *Ir Med J* 2011;104:47–9.
- 29 Hanlon P. Coping with the inexorable rise in medical admissions: evaluating a radical reorganisation of acute medical care in a Scottish district general hospital. *Health Bull (Edinb)* 1997;55:176–84.
- 30 Sullivan P, Harris ML, Bell D. The quality of patient experience of short-stay acute medical admissions: findings of the Adult Inpatient Survey in England. *Clin Med* 2013;13:553–6.

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