Critical care outwith the intensive care unit

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The government report *Comprehensive critical care* suggests radical changes to the way critical care is delivered in the UK.[1] One of its many recommendations was the development of intensive care outreach teams. This recommendation compelled intensive care unit (ICU) staff to leave their traditional environment and start delivering critical care to sick patients around the hospital rather than waiting for them to deteriorate further and require ICU admission. Some have called this 'breaking down walls'. The aims of outreach services are to optimise patient care across the hospital three-fold by:

- averting admission to ICU
- facilitating discharge from ICU, and
- sharing skills throughout the hospital.

Ideally, outreach teams should be formed from practitioners trained not only in the clinical aspects of critical care but also in effective ways of sharing skills. The outreach team should be multidisciplinary, led by a qualified critical care practitioner – though the report does not state that this should be a doctor.

The contents of the report seemed clinically intuitive to ICU staff and have been surprisingly widely accepted by medical and surgical ward staff across the country. The need for such a system was derived from studies demonstrating that up to 41% of ICU admissions are potentially avoidable and up to 50% of patients admitted to ICU receive suboptimal care prior to their transfer.[2–5] Furthermore, it has been suggested that up to 70% of all adverse outcomes associated with medical management are preventable.[6]

Current evidence

The concept of outreach originated in Liverpool, New South Wales, in 1990 with the development of medical emergency teams (METs). Their original aim was to reduce the incidence and improve the outcome of cardiopulmonary arrests, utilising the principles of early recognition and rapid response to the deteriorating patient.[7] METs are clinician-led and include an experienced ICU nurse. It has been suggested that such teams lead to improved outcomes, with decreased incidence of respiratory failure, stroke, severe sepsis, acute renal failure, emergency ICU admission, death and reduced length of hospital stay. However, no report offers more than level 2 evidence.[8–10]

Key Points

- **Despite widespread acceptance and intuitive belief of benefit, there is a lack of evidence to support the use of outreach critical care**
- **There is variation in the availability of outreach teams**
- **No consensus exists about the ideal composition of outreach teams**
- **No consensus exists for an appropriate set of triggers to activate referral**
- **How outreach impacts on the hospital-at-night programme has not been studied**

KEY WORDS: acute medicine, high dependency care, intensive care, outreach critical care

The large, randomised Medical Early Response Intervention Therapy (MERIT) study in 23 Australian hospitals used a cluster-randomised trial design to test the effects of the introduction of the MET. It has just been completed and the results are eagerly awaited, although initial conference reports suggest no benefit in the intervention group. If the paper confirms these findings, this study will represent the first level 1 evidence in this field.

It could be argued, first, that many aspects of the delivery of outreach services in the UK differ from MET in Australia, and that these results cannot be extrapolated to the outreach system in this country which are currently predominantly nurse-led; secondly, that if a clinician-led service does not improve outcome, a nurse-led one is also unlikely to do so – although it may possibly be more cost-effective.

Nurse-led outreach in the UK

Evidence for the effectiveness of nurse-led outreach in this country is also lacking. There have been no randomised trials, but a number of published studies have examined the impact of the implementation of an outreach service:

1 Preistly and colleagues[11] performed a randomised cohort trial of phased introduction of critical care outreach to a general hospital. A nurse consultant led the team, with a group of experienced nurses providing 24-hour cover. Ward staff used a locally devised patient at-risk scoring system to trigger referral. There was a significant reduction in mortality in wards where the service operated compared with those without the service. Analysis of whether outreach increased the length of hospital stay was equivocal, and data on cardiac arrest rate, hospital mortality, placement of do-not-resuscitate orders and ICU admissions were not included and must be presumed to be not significant.

2 A non-randomised population-based study by Ball and co-workers[12] compared historical controls with patients cared for by a nurse-only

outreach team available for 12 hours a day. The operational policy of this team appears to have been limited to those patients previously discharged from the ICU rather than including new patients. After the introduction of the outreach team there was a significant increase in survival to hospital discharge and a significant decrease in ICU readmission rate – but only to the national average readmission rate. Although presenting interesting findings, this study was poorly controlled.

3 Garcea and colleagues[13] performed a retrospective observational study of the introduction of outreach services in surgical wards, using a before and after methodology. The team comprised two senior nurses and a nurse consultant, with an ICU consultant as the lead clinician but with an undefined level of involvement. The team's remit involved the follow-up of ICU and high dependency unit discharges and the education of ward staff about the recognition of the sick patient. It was later expanded to include direct referral of patients highlighted by an early warning scoring system. The tentative conclusion was that outreach teams may have a favourable impact on mortality rate amongst readmissions to critical care, but more data are needed from multicentre trials.

The main published literature of scoring systems used in medical environments comes from a study by Subbe *et al*,[14] which suggested a useful role for the modified early warning score in acute medical admissions. However, the results of the study did not provide strong support for this statement.

The evidence suggests, by no means convincingly, possible benefit of outreach services as applied in the UK. It represents more evidence than was available in *Comprehensive critical care*, but clearly more work is required before outreach can become an accepted standard of care.

The future

Outreach services are likely to continue to operate regardless of the evidence, but several key operational issues need to be determined and standardised (Table 1). There is striking heterogeneity in the level and coverage of service currently offered across the UK. Published work and national surveys of practice reveal marked variation in temporal availability, composition and coverage of teams and the scoring systems utilised. To help standardise outreach services, a high quality research evidence base is required to guide practice and a nationwide audit to allow comparisons and quality improvements in the service offered. This would also allow establishment of evidence-based standards of best practice.

A standardised, validated scoring system is needed with a simple calling algorithm that defines the situation and scenarios for activating referral to an outreach team. A wide variety of existing scores utilise a varied set of physiological parameters and ranges, all lacking validation. The inclusion of non-physiological criteria such as 'nursing concern' and 'marginal deterioration in observations' would broaden the inclusion criteria and might improve the sensitivity of scores but at the cost of reduced specificity.[7,15] An example of a trigger chart is shown in Table 2.

The application of outreach would intuitively be most appropriate when medical and nursing staffing levels are at their lowest, outside normal working hours. This view has most recently been expounded in a recent report from the National Confidential Enquiry into Patient Outcome and Death (NCEPOD) suggesting that an over-reliance on junior staff in the out-of-hours situation leads to suboptimal care for patients.[16] If outreach is to be effective, perhaps it should be available either 24 hours or at night only. This is partly enshrined in the hospital-at-night programme, but the impact of such a change has not been studied.[17]

The composition of outreach teams should be examined in more detail as a

Table 1. Current issues in outreach provision.

- Unproven benefit
- Optimal composition of teams
- Definition of necessary skills and competencies
- Lack of national standards
- Meeting the aims of *Comprehensive critical care*
- Relationship with medical take and cardiac arrest teams

Table 2. The Princess Alexandra Hospital NHS Trust Critical Care Outreach Team patient assessment using the Harlow Outreach Team (HOT) tool.

A patient who fulfils one or more of the criteria below or is causing concern needs urgent intervention	
Breathing	Respiratory rate <8 or >25 per min Oxygen saturation <90%, despite oxygen PaO_2 <8 kPa on an arterial blood gas sample, despite oxygen
Circulation	Pulse <45 or >125 per min Systolic blood pressure <90 or >200 mmHg or a sustained fall >40 mmHg from patient's normal value pH <7.3 Base excess <–7 mmol/l
Renal	Urine output <30 ml/hour for 3 consecutive hours Evidence of deteriorating renal function
Conscious level	Patient does not respond to voice Glasgow Coma Score 8
OR patient looks unwell or you feel worried about their clinical condition	
Care of all patients remains the responsibility of the admitting team	
Phone 2222 and ask for the Critical Care Outreach Team	

truly multidisciplinary approach is most likely to be beneficial. The teams should include senior clinicians and nurses from around the hospital (not just ICU staff) incorporated into teams, rather than a purely nurse-led service. Again, the comparison between the two systems has not been studied. If the former approach were to be adopted it would represent a resource issue above the already significant cash injection of £142.5 million which followed *Comprehensive critical care*.

Finally, the question of education must be raised. The changes in junior doctors' hours leads to less exposure to critically ill patients, so outreach teams should include junior medical and nursing staff for training purposes. If trainee medical staff are no longer responsible for the recognition of the failing patient, their ability to respond to such individuals will be further diminished.

All these functions could best be standardised and monitored by a national body such as the Intensive Care Society or the NHS Modernisation Agency. They are both well placed to audit the application and effectiveness of such guidance on a national level to ensure they are as sensitive and specific as possible.[18]

Conclusions

The weight of evidence grows slowly in support of outreach critical care outside the physical boundaries of the ICU in the UK, but it is not strong in other national settings. Many questions are left unanswered as to how best to deliver this service. These questions should be addressed before there is further investment in such services.

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