Outreach critical care—cash for no questions?

Editor—We read with interest the Editorial by Cuthbertson, ‘Outreach critical care—cash for no questions?’,1 but we were startled by some of its omissions and conclusions. The call to break down the walls of the ICU has nothing to do with touchy-feely new age medicine, but is a very real cry for help from nurses and clinicians in general medicine and surgery for skills and knowledge in dealing with an increasingly sick population. For this reason outreach has to be, by definition, multidisciplinary.

Critical Care Outreach operates around three principles: (i) early detection of patients at risk of catastrophic deterioration; (ii) early treatment; and (iii) fault analysis. The means to achieve these are essentially educational.

(i) Contrary to Cuthbertson’s statement, the Modified Early Warning Score (MEWS) has been validated with data on sensitivity and specificity of the total score and its elements being in the public domain.2 Considering that MEWS is a screening tool and that the number of variables available at the bedside is limited, we do already have a good idea which variable combinations might be practical and significant.3

(ii) There is no doubt from recent studies that early treatment of the most severe conditions (e.g. myocardial infarction, severe sepsis) is better treatment, though we will need to measure whether outreach delivers this treatment earlier.

(iii) Feedback of ‘things gone wrong’ is a weakness of most current systems. American style ‘morbidity and mortality meetings’ might help to improve our standard of care for the critically ill patient on the general ward.

Evidence-based medicine is a frequently abused concept.4 Randomized controlled trials (RCT) are the gold standard to evaluate the effect of drug treatments in well-defined patient groups. We agree with Cuthbertson, however, that the RCT might not be the most appropriate means to evaluate complex processes of care involving multiple diagnostic and therapeutic steps in heterogeneous critically ill patients. The best example of this problem is the lack of Grade I evidence of the benefits of ICU- and HDU-care, with a recent RCT of HDU care reporting inconclusive results.5 For this reason, research into outreach could start by investigating possible changes in the steps of the care process by ‘near-patient’ education.6

The process of setting up outreach in England might have been flawed by a lack of standards. Scotland and Wales have the chance to learn from this difficulty. But, whichever way we look at it, the problem of sick patients outside the ICU will not go away. Solutions need to be found whatever their name.

E. Williams
C. P. Subbe
L. Gemmell
Wrexham, UK

Editor—Doctors and nurses involved in critical care service provision will read with interest the recent editorial.1 It sets out to critically evaluate the development of critical care outreach services over recent years.1 The author’s focal argument for exercising restraint in relation to further outreach service development appears to rest upon the absence of Level-1 evidence from RCTs demonstrating clear outcome benefits accruing from the provision of critical care outreach services.

I would contended that application of the rigours of the RCT to the chaotic complexities of the critically ill ‘patient journey’ and to so-called ‘global’ outcomes, is fraught with insurmountable difficulty. Table 1 illustrates a selection of the many confounding influences affecting eventual outcome for the critically ill patient. Such confounding influences must surely compromise any attempts at the standardization and control necessary for rigorous statistical analysis between groups of patients.

The conclusion that sub-optimal care of the patient with established or impending critical illness on general acute wards is a clear and present problem seems to be without dispute on both research1 11 and anecdotal bases. If we are to wait for reliable results from RCTs conducted against a background of the aforementioned confounding influences, we may never make progress with the preventive care of this immediately vulnerable group of patients.

It is an implicit ‘article of faith’ for health care professionals that ‘prevention is better than cure’. Indeed, much of what we do day-to-day in the workplace is conducted on this premise without any question of evidence base! Clearly, where a clinical care system comprises single, auditable management steps which do lend themselves to rigorous analysis, we are duty bound to conduct such analyses, at very least in parallel with the commitment of pilot resources, and certainly when services are funded on a recurring basis (service evaluation and audit). In view of the confounding influences given in Table 1, robust ‘global’ outcome measures for the critically ill, including critical physiological events, may prove difficult to validate. Simple and basic, single-process steps may be all that are universally auditables or measurable.

By way of example, early warning scoring systems (EWS) based on weighted aggregate scoring for physiological variables9 10 were originally developed with two specific aims: to facilitate timely recognition of the patients with established or impending critical illness—simple ‘red flag’ warning systems; and to empower nurses and junior medical staff to secure experienced help through the operation of a trigger threshold which, if reached, required mandatory attendance by a more senior member of staff.

With the publication of Comprehensive Critical Care in 200011 and the consequent drive to develop ‘critical care without walls’ and critical care outreach services, EWS systems have found a natural niche within the critical care outreach process. It should be emphasized, however, that neither the original aggregate system nor the individual physiological variables within it were initially promoted as ‘predictors’ of eventual outcome. Indeed such an aspiration, given the confounding influences already outlined, would seem unrealistically hopeful.

Therefore, rather than trying to ‘validate’ physiological EWS systems against ‘global’ outcome measures, their validation should comprise fundamental ‘single step’ audit referable to the original expressed aims of those systems:

(i) Does the locally adopted EWS variant ‘miss’ patients who end up developing critical illness without timely warning? If so, what adjustments are necessary to improve sensitivity whilst retaining simplicity?

(ii) Do nurses and junior medical staff find the local EWS variant a helpful tool in securing experienced help for the sick patient? If not, why not?

(iii) Does the local EWS variant actively ‘interfere’ with effective communication in relation to care of the critically ill ward patient? If so, why?

(iv) Is the system over-sensitive for the local patient population and clinical organization, resulting in a loss of confidence in EWS by users? If so, what adjustments to trigger threshold or...
observational weightings are required in order to restore confidence in the system?

It is clear from the 2001 and 2002 national outreach surveys\(^{12}\) that hospitals in England with outreach services exhibit substantial heterogeneity in virtually every aspect of clinical and educational critical care activity. Whilst some of this heterogeneity results from unstructured, piecemeal introduction of services, much of it is determined by local patient profiles, case mix and organizational constraints. As such, Cuthbertson’s assertion that there ‘can only be one best framework for Outreach Critical Care’ is difficult to support without the acceptance of significant local variability. Critical Care Outreach framework principles may be more important than details.

Focus on crude mortality rate as that ‘benefit in which we are most interested’ may also be too simplistic. There is emerging evidence of a consistent and measurable impact of early warning scoring on timely Do Not Attempt Resuscitation decision making. Clearly, a dignified and timely death in appropriate circumstances represents an important humanitarian outcome whilst also reducing the frequency of protracted and often inappropriate use of resources.

In an attempt to address what is acknowledged to be a hitherto relatively unstructured approach to the development of critical care outreach services, the Modernisation agency is currently supporting work undertaken by participants in the National Outreach Forum (NORF). NORF comprises representatives from each critical care network group (nurses, doctors and physiotherapists) and from appropriate professional organizations (ICS, BACCN, CCIAG RCN etc.). The NORF group has generated a series of small working subgroups examining certain areas of critical care outreach (Table 2).

Each subgroup is charged with gathering available evidence, published and unpublished, relevant to its designated area, identification of examples of good practice, and the making of recommendations as appropriate in relation to standards and benchmarking. Future Department of Health policy in relation to a national service framework for critical care outreach services may then be more appropriately informed.

In summary, we should not withdraw or withhold services in such a vital area of demonstrable clinical need whilst we wait for Level-1 evidence of benefit (which may never be forthcoming). We must, however, make sure that we designate some resources to the audit of such quality standards as are genuinely auditable and to the measurement of such ‘single step’ outcomes as are meaningful.

In time, as the author suggests, critical physiological events such as cardiac arrest rates may turn out to be ‘more powerful in determining benefit from critical care outreach’...watch this space!

R. J. M. Morgan
Blackpool, UK

Editor—Dr Cuthbertson makes some interesting and valid points about the value of outreach in his editorial.\(^{1}\) He seems to be making a plea for Level-1 evidence while acknowledging that this may be difficult, if not impossible to obtain. We agree. However, some accepted aspects of medical care have never been subjected to this type of study and are considered the accepted standard of care. For example, it would not be acceptable for a surgeon who performed a major intra-abdominal operation not to see the patient again after surgery, delegating postoperative care to non-surgical staff and only waiting to be called if the patient collapses with intra-abdominal sepsis, despite the lack of study in this area. Is the care of the critically ill patient any different? Should we discharge patients from the ICU after weeks of intensive, specialized treatment and never see them again until they collapse? No has to be the answer. We therefore started routine twice-weekly follow-up ward rounds of patients discharged from the general ICU of this hospital two years ago. Funding was found from savings in the drugs budget. However, the hospital stipulated that when the consultant was away there would be no cover. In addition, when the consultant covering the ICU was away, the follow-up consultant would have to do ICU. We now report the first 6 months (January–July 2000) of the audit of this activity. The ethics committee gave approval to report the data we collected.

In a 6-month period, there were 32 ward rounds, which visited 210 patients. The mean (SEM, range) number of visits to each patient was 1.67 (0.09, 0–8) visits. The median age of patients was 63 (range 18–95) yr. Of the 210 patients discharged, two patients died and two went home before they could be followed-up. Seventeen patients had poorly controlled pain. Ten were given intercostal nerve blocks, which were successful in eight patients. Of interest was that three of these patients had late pain after liver transplantation, which occurred one or two blocks was completely resolved and in two patients enabled them to go home.

Central venous catheters often remain in place after discharge from the ICU. Thirty-three of these were badly dressed and 13 showed signs of infection. All radial artery cannulae are removed from patients before discharge unless they are going to the liver transplant high dependency unit. Patency of the radial artery was examined in all patients except those who still had an arterial line in place. The radial artery pulse was absent in 24 of the patients and was associated with thenar wasting in 12. Two of the remaining patients also had thenar wasting as part of their disease process.

Drug charts were inspected on every patient. There were 19 patients with prescriptions for drugs that should have been stopped before discharge from ICU (propofol 4, dopamine 5, dexamethasone 2, frusemide 2, morphine 2, vitamins 3). In a further patient, i.v. amiodarone had been stopped and should have been changed to oral therapy on the ward. Unfortunately, this was omitted and the patient went into rapid atrial fibrillation. When seen, the error was spotted and the drug restarted. Antibiotics caused problems in three patients; two were being given inappropriate antibiotics and in the third the antibiotics should have been stopped and had not been. An epidural and diazepam were recognized as the cause of

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**Table 1** Confounding influences upon eventual outcome for the patient with established or impending critical illness

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<th>Influence</th>
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<td>Severity of physiological compromise and co-morbidity at presentation</td>
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<td>Speed of recognition of impending or established critical illness</td>
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<td>Time of day or night of presentation and therapeutic intervention</td>
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<td>Timeliness and competence of the primary response</td>
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<td>Efficiency of implementation of the primary management plan</td>
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<td>Availability of diagnostic, therapeutic and critical care facilities</td>
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<td>Variability in the interpretation of Do Not Attempt Resuscitation policy</td>
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<td>Configuration of outreach service and referral algorithm if available</td>
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<td>Overall length of stay and quality of care in designated critical care facilities</td>
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<td>Variability in the implementation of treatment limitation, withdrawal and critical care readmission policies</td>
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<td>Availability of post critical care discharge follow-up skills and services for inpatients and outpatients</td>
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**Table 2** NORF working subgroups

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<th>Subgroup</th>
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<td>Service configuration and process</td>
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<td>Education and training</td>
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<td>Audit and evaluation</td>
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<td>Early warning tools</td>
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<td>Outpatient follow-up</td>
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excessive drowsiness in two patients and were stopped. In another, nifedipine had been started for transient hypertension and was stopped since the patient was normotensive. Corticosteroids, started for wheeze, were reduced from their high initial dose in a further patient. In one patient sucralfate was stopped, in another two other drugs were stopped (type unrecorded). Domperidone was added for nausea and omeprazole increased to a therapeutic level in the other patients. Some patients had more than one inappropriate prescription.

Sixteen potentially or actual harmful events were detected. The greatest number (5) resulted from discharging the patient from the ICU with a pulmonary artery catheter introducing sheath in place with no obturator through the haemostatic valve, giving rise to the risk of a fatal air embolism. Epidurals also posed risks to patients, with three catheters being unlabelled and tangled in a central venous line. Two epidurals from the ICU had a giving set with a side injection port. This increases the risk of an injection by the wrong route.

Humidifier problems resulting in a reduced FIO2 were identified in two patients. In one patient a tooth had become dislodged during a difficult intubation, and restorative dentistry was arranged. A further patient had suffered a radial nerve injury after an inappropriate heparin injection. Finally, one patient’s notes repeatedly alleged that the aspiration pneumonia had occurred during induction of anaesthesia. In fact it had occurred during part of their illness as a consequence of a decreased conscious level.

Most patients (110) could not remember their stay in the ICU. Of those that could, 46 did not have any dreams or hallucinations, but seven had found their stay distressing. Dreams, nightmares and hallucinations occurred in almost one-quarter (49) of patients, and 10% (22) found them distressing. Appropriate counselling and follow-up was arranged. All patients complaining of distressing dreams and hallucinations continuing were seen repeatedly until they had stopped. No patient went home complaining of distressing dreams or hallucinations. A temporal lobe infarct was identified in a patient who had suffered a major personality change after pancreatitis. Decisions not to readmit to the ICU were made in four patients. The remainder had improved with the exception of five in whom readmission to the ICU was arranged.

Formal follow-up ward rounds are uncommon in UK intensive care practice and it is only recently that we have started doing them. Intensive care doctors having dealt with the immediate problem often assume that the referring team will `pick up' and deal with any problems relating to the patients’ stay in intensive care. The problem has been made worse by the lack of continuity in ward care as a result of the reduction in junior doctors’ hours. However, with the increasing complexity of intensive care, ward staff may lack the knowledge of ICU specific problems and in poorly staffed wards do not have the time to detect them. We do not believe that our ICU is different from others and their patients may be having the same problems. Many of the problems we identified were in patients who were discharged when the ICU was under pressure. At these times the fittest patient, who is next to be discharged, is often looked after by a junior nurse who may not be familiar with the discharge process. The medical and senior nursing staff will often be busy coping with the other ill patients and cannot give the discharge of a reasonably well patient much attention. This may explain the problems seen with drug charts and cannula site dressings.

The incidence of disturbing dreams and hallucinations in 10% of patients was less than others have reported (54%), but this study, unlike ours, only examined 26 patients who had stayed in the ICU more than five days and saw them in the outpatient clinic after discharge from ICU. A further study in 45 patients, investigated two and eight weeks after discharge, showed that 33 had delusional memories and, of these, nine patients had no factual memories. Those patients with no factual memory of intensive care had higher post-traumatic stress levels after discharge than those who had factual memories, even if they were unpleasant. Whether detecting the problem before discharge reduces long term morbidity is likely but unproven.

As a result of these data we have instituted several new practices. Discharge planning now occurs earlier with removal of unnecessary or potentially dangerous central venous lines. The patients used to be discharged to the ward with a specific ICU drug chart, which was valid for the first 24 h after discharge. This practice has stopped and all patients are discharged with a ward prescription chart written by the ICU staff to ensure that the correct drugs are continued. The management of distressing dreams, nightmares and hallucinations has also been addressed by arranging early follow-up.

This is not Level-1 evidence, but equally asking surgeons not to see patients again after major operations would be ethically and morally wrong. Have we lagged behind our colleagues? We have a duty to follow-up patients with serious diseases after we have managed patients associated with high risks whilst they are in intensive care. It is time we started following-up our patients, regardless of the source of the financial support and routinely and not just hope that the house officer on the busy surgical wards copes with the morbidity associated with intensive care.

G. R. Park
M. McElligot
C. Torres

Cambridge, UK

Editor—Thank you for the opportunity to reply to the letters about my editorial. I agree with Dr Williams and colleagues when they state that ‘the call to break down the walls of the ICU are nothing to do with touchy-feely new age medicine’. I also broadly agree with the authors’ three operational principles of outreach and its multidisciplinary nature. However, I do not agree that the paper by Dr Subbe and colleagues can be classified as ‘validation’ of the MEWS. Although the work is to be commended, it represents a small single centre observational study in a selected group of medical patients over a short period of time. It is valid if the ROC numbers in this cohort are reasonable, individual components of the score lack diagnostic sensitivity and do not increase the risk of reaching their defined ‘endpoints’. The authors comment on the difficulties in carrying out research in this area and the lack of evidence in areas such as HDU and ICU care, and I keenly await publication of the ‘recent RCT on HDU care now reporting inconclusive results’. I have not seen these unpublished results but we should keep our minds open to the fact that these findings may be attributable to a lack of benefit from HDU care in this group of patients, not just another example of the difficulties in carrying out critical care research. Their points hardly add up to the stated ‘startling omissions and conclusions’ in my arguments.

The letter by Richard Morgan is fascinating. His thoughts on difficulties and confounders in outreach research are valid and echo my own. I also agree that we should not be ‘unrealistically hopeful’ about what we can achieve in terms of outreach validation. But we should also not be unrealistically pessimistic about what can be achieved with well-designed validation studies. His comments on the importance of audit and the NHS Modernisation Agency are also in line with my own. Finally, I would point out that I did not suggest ‘withdrawing or withholding services in such a vital area while we await Level-1 evidence’. Instead I suggested that when rigorous multicentre clinical trials are proposed we should be willing, at that time, to withdraw outreach services to allow proper evaluation. We should not refuse to take part in such studies...
Correspondence

because of an unwillingness to subject to study a system which we falsely believe to be a ‘standard of care’.

Dr Park and colleagues also raise some fascinating issues relating to ICU follow-up. I agree with all that they say about following up critically ill patients after ICU. I do see this as being a high standard of care and I have never stated that lack of evidence-base should paralyse us from striving for higher standards of care. Their audit results are to be commended; they report some interesting results and the exercise should be repeated in other centres. Although outreach and ICU follow-up are commonly rolled together as functions of an ‘outreach team’, I see them as being slightly different aspects of care of the critically ill.

B. H. Cuthbertson

Aberdeen, UK

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