

Review

Clinical review: Outreach – a strategy for improving the care of the acutely ill hospitalized patient

Debby Bright¹, Wendy Walker² and Julian Bion³

¹Nurse Consultant, Critical Care/Outreach, University Hospital Birmingham NHS Trust, Birmingham, UK

²Nurse Consultant, Critical Care/Outreach, Mid Staffordshire General Hospitals NHS Trust, Stafford, UK

³Reader in Intensive Care Medicine, Birmingham University, Birmingham, UK

Correspondence: J Bion, J.F.Bion@bham.ac.uk

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Abstract

We examined the literature relating to the safe care of acutely ill hospitalized patients, and found that there are substantial opportunities for improvement. Recent research suggests substantial benefit may be obtained by systems of outreach care that facilitate better integration, co-ordination, collaboration and continuity of multidisciplinary care. Herein we review the various approaches that are being adopted, and suggest the need for continuing evaluation of these systems as they are introduced into different health care systems.

Keywords acute pain team, cardiopulmonary resuscitation, critical care, critical illness, patient at risk, suboptimal care

Introduction

Health care providers in many countries are increasingly aware that quality of care can be improved by measures to reduce errors. Evidence suggests that the greatest opportunities for improvement may be in the management of the acutely ill hospitalized patient, where uncertainty, urgency and lack of integration substantially increase the risk of errors leading to adverse outcomes. Different approaches to this problem have evolved, including hospitalists in the USA, medical emergency teams in Australia, and outreach care in the UK. Critical care has a central role to play in all three developments, which share the common aim of improving the safe care of acutely ill patients as they travel through the health care system. We will review the background, methods, roles and benefits of these various systems which we group under the heading of 'outreach' care.

Method

We focused on identifying research publications that examined ways of improving the integration of critical care with acute care services as a means of improving the safe care of acutely ill hospitalized patients. Publications were initially identified by an electronic search of Medline and Cinahl, and

the cited references provided additional material. The initial date range searched was 1995–2003 to ensure that current research and up to date literature was reviewed. However, this produced only a limited number of references, and the time period was therefore extended to 1990. Keywords searched singularly and in combination were 'acute pain team', 'suboptimal care', 'patient at risk', 'critical illness' and 'cardiopulmonary resuscitation'. Only English language references were included in the analysis.

Background

Trends in hospital care

Hospitals are becoming increasingly complex environments because of developments in medical technology, more potent treatments, and an ageing and dependent population of patients. The proportion of emergency admissions continues to rise in most countries [1], whereas the stock of hospital beds has fallen. Combined with political demands for cost containment, this has resulted in shorter hospital stays, and increased bed occupancy and throughput [2]. At the same time there has been a trend toward greater transparency in decision making, rising public expectations, and improved public access to information about quality of care and out-

comes from medical interventions. These changes have coincided with increasing difficulty with the recruitment and retention of trained nurses [3], and constraints on doctors' hours of work. The implementation of the European Working Time Directive [4], and similar trends in the USA [5], means that proportionately fewer staff are available to manage this increased workload, particularly the out-of-hours and emergency elements. Shorter training times reduce the expertise acquired through apprenticeship. The net effect is that sicker patients are receiving care from fewer and less experienced staff.

Error and quality in health care

These pressures have been accompanied by a growing awareness of the problem of error in health care and an exponential increase in litigation. The much quoted Institute of Medicine report 'To Err is Human' [6] estimated that between 44 000 and 98 000 patients die each year in the USA as a result of preventable clinical errors. Studies in Australia and the UK suggest that around 10–16% of hospitalized patients experience an adverse event related to clinical care, with a mortality rate in these patients of 5–8%, and overall financial costs in the range US\$4.7–29 billion [7–9]. Clinical error is now widely recognized as a systems problem; that is, adverse events affecting individual patients are usually caused by a sequence of events in the macro- and micro-environment that involve deficiencies in the structure and organization of health care, and are not simply a consequence of human error by the responsible clinician who is the terminal link in the chain. To improve safety and quality in health care requires a systems approach in which all participants – politicians, administrators and health care professionals – assume responsibility for patient outcomes. This ambitious task requires focusing of efforts on those patients most at risk.

Identifying at-risk populations

Acutely ill patients in general

The risk of error and adverse outcomes would appear to be higher in the context of acute and emergency care, for example in emergency departments [7] or in general medical (rather than elective surgical) admissions [8]. The elderly are more susceptible [7]; they are also more likely to be admitted as emergencies and exposed to emergency surgery [10]. Inexperienced clinicians and unsupervised trainees (who often deliver first-line care out-of-hours) have a higher error rate [11,12]. The risk for an adverse event increases by approximately 6% per day for patients admitted with emergency conditions [13], and is much increased in severely ill patients who undergo life-saving invasive interventions [14]. Discontinuities in care [15] created by shift working or poor information transfer contribute to error by failing to recognize trends in a deteriorating patient's condition.

Postoperative patients

In the UK the 1993 National Confidential Enquiry into Perioperative Deaths showed that two thirds of perioperative deaths

occurred 3 or more days after surgery when the patient had been returned to the ward. The majority of these deaths were from cardiorespiratory complications, and many were considered preventable by earlier identification and treatment [16]. The 1999 report [17] analyzed deaths within 30 days of a surgical procedure in elderly patients (>90 years), and found that suboptimal fluid management was a major cause of serious postoperative morbidity and mortality in this group. It recommended more accurate monitoring and recording of fluid balance and earlier recognition and correction of problems as a means of reducing the incidence of postoperative complications. The report also identified deficiencies in multi-disciplinary care, despite the high incidence of comorbid disease in these elderly patients, and recommended more collaborative working between surgeons, anaesthetists and physicians with expertise in the care of the elderly.

This type of audit based on a large observational database is essential for identifying current practice and opportunities for improvement. However, recommendations were based on peer review and data from questionnaires provided by assessors who were unblinded to clinical outcomes, examining only those patients who died – there are no denominator data.

Cardiopulmonary arrest

Hospitalized patients who undergo cardiopulmonary resuscitation commonly exhibit premonitory signs and symptoms many hours before the cardiac arrest [18–21]. Schein and coworkers [18] studied 64 patients following cardiac arrest, and reported that 84% of vital signs charts showed an acute deterioration in the patient's condition prior to arrest. Franklin and Mathew [20] examined the case notes of 150 consecutive patients who had suffered a cardiac arrest on a general ward, and found documented prior clinical deterioration in 99 (66%). A common finding was the failure of the nurse to notify a physician of deterioration in the patient's condition.

The interface with critical care

Critical illness increases the opportunity for clinical error [22,23], and this is related at least in part to the complexity of diseases, the multiplicity of therapies, frequent invasive interventions and, within the intensive care unit (ICU), the intensity of monitoring and observation, which may paradoxically increase the apparent error rate in this environment simply by improved detection. Iatrogenic complications are a common cause for ICU admission [24], and suboptimal care before referral to intensive care is associated with a markedly increased mortality [25]. Premature discharge from intensive care of patients recovering from critical illness is also associated with a markedly increased hospital mortality [26], supporting the view that organizational aspects of clinical care profoundly influence patient outcomes [27]. Common errors include lack of attention to detail, poor communication, failures of organization, lack of knowledge, failure to appreciate clinical urgency, insufficient supervision and failure to seek advice.

Treatment limitation decisions, futility, and end of life care

Studies in the USA and Europe have demonstrated considerable diversity of practice and opportunities for improving autonomy, patient centred decision making, and quality of end-of-life care [28,29]. The Study to Understand Prognosis and Preferences for Outcomes and Risks of Treatment in the USA [29] demonstrated that 31% of the cohort of patients admitted to intensive care would have preferred not to be resuscitated, but that clinicians were aware of this preference in only 47% of the subset and in half it had not been documented. Aarons and Beeching [30] surveyed the use of 'do not resuscitate' orders in a community hospital in the UK and suggested that end-of-life care of dying patients and their families in hospital could be substantially improved in terms of symptom relief, communication and respect for the patients' wishes. They also concluded that poor decision making by health care workers could be improved by education. One consequence of a lack of communication between staff and a reluctance to discuss these difficult issues with patients and families is the inappropriate resuscitation and subsequent admission to the ICU of patients for whom further intervention would be futile and add to the burden of suffering.

A more appropriate approach to management of acutely ill patients at risk for critical illness or cardiac arrest would be to prevent these complications, or agree treatment goals and limitations, by earlier recognition of simple warning signs. We consider the various approaches that are being adopted below.

Systems for earlier recognition and management of patients at risk

The problems described above require a systems approach to improving the safe care of the acutely ill hospitalized patient. The USA, the UK, Australia, Canada and Denmark are instituting national systems for improving patient safety [31–33]. Within this general framework, three countries have specifically identified the need to improve the care of acutely ill patients. In the USA the Leapfrog Group [34] has recommended that ICUs be managed by intensivists – doctors specifically accredited in critical care medicine – while in a parallel development many hospitals are appointing 'specialist generalists' ('hospitalists') to provide inpatient care on the wards [35]. Australia has promoted the establishment of medical emergency teams (METs) led by doctors as an alternative to cardiac arrest teams [36,37]; and the UK has implemented the recommendation of the expert group report 'Comprehensive Critical Care' [38] to establish multidisciplinary outreach care. All these developments are based on the concept of earlier intervention by people with appropriate knowledge and skills in managing acutely ill patients. Is this concept valid, and which model is the best?

Structures and processes for early intervention

In the UK a survey of intensive care facilities found that, in 94% of the units questioned, staff regularly visited wards in

response to requests for advice from medical and nursing members of the admitting team [39], demonstrating that this is clearly an important role for intensive care staff. However, there is little information describing the experiences and perspectives of ward based staff who care for acutely ill patients outside the intensive care environment. Gibson [40] found that ward staff often lacked confidence and felt ill prepared to deal with acutely ill unstable patients, and that they experienced increased stress and anxiety. Such emotions are unlikely to enhance staff retention or reduce sickness rates. It therefore makes sense to put in place systems that improve the support not only of sick patients but also of the staff responsible for their care, and that reduce discontinuities in clinical care. The key to this is empowerment through adequate resourcing and training, and simple methods of clinical monitoring. Three models are currently employed: hospitalists in the USA, the MET in Australia, and outreach care in the UK.

Hospitalists

Hospitalists are internists who specialize in acute hospital medicine. This new speciality has appeared in the USA during the past 8 years in response to perceived difficulties with primary care clinicians maintaining continuity of care for their patients admitted to hospital. Currently at around 5000, their numbers are expected to increase rapidly. Hospitalists are usually salaried employees of managed care organizations, which favour their development as a means of reducing costs and duration of hospital stay [41,42]. The training of hospitalists is rooted primarily in internal medicine, but there is no national core curriculum. They do not appear to have responsibility for surgical patients, and therefore cannot be considered generalists in the sense of dealing with all acutely ill patients. The relationship between hospitalists and intensivists has not been defined [43], although there clearly are opportunities for interaction. Hospitalists occupy a role that is close to that of the general physician in UK hospitals, except that the latter group often have a subspeciality.

This model is suited to the system of care in the USA, where primary care physicians often have continuing responsibility for inpatient care. It might also be of value to other health care systems in which increasing specialization is creating a need for generalist acute care clinicians in hospital practice.

Acute pain teams

A joint expert committee report from a Royal College of Surgeons and College of Anaesthetists working party [44] reviewed the evidence related to postoperative pain management and recommended the establishment of an acute pain service in all major hospitals. However, the Audit Commission reported in 1997 [45] that only 57% of hospitals in the UK had established a pain service. The situation had improved by 2000 when the Clinical Standards Advisory Group found that 88% of responding UK hospitals had set up an acute pain service, although in some cases this was only a token service. The 1990 working party did not describe a model for the

ideal acute pain team [44], and this has led to many inconsistencies in the provision of pain management throughout the UK. Acute pain teams ensure adequate postoperative pain relief by supporting and educating ward staff [46]. Concerns have been expressed that they may de-skill ward nurses [47], although there is no research evidence to support this view.

Because more complicated surgery is performed in older patients, who have more comorbidities, we can expect to see an increase in the number of life-threatening postoperative complications [16]. Surgical patients make up 60–70% of the workload of ICUs in the UK [48,49]. It has been suggested that the role of acute pain teams should be extended to identify nonpain problems in patients, and liaise with other specialties to manage them [46]. Some acute pain services have already extended their role from pain management to include fluid balance, oxygen therapy, management of nausea and vomiting, and anticoagulant prophylaxis [50]. This role extension requires proper training in the management of acutely ill patients and an understanding of the interface between acute medicine and intensive care.

Medical emergency teams

The concept of a better integrated, multidisciplinary approach to postoperative care [51,52] has been extended to other groups of patients in the form of specific groups or teams of clinicians, usually centred on the ICU. Examples of this evolution include postoperative care teams [53], patient at risk teams [54] and METs [36,48,52]. All suggest that the introduction of such teams to identify and manage complications on the ward might prevent unnecessary admissions to the ICU and reduce morbidity and mortality.

The team based approach uses calling criteria based on abnormal clinical or physiological variables, specific conditions, or patients causing concern to ward staff. The research evidence to support the validity of these criteria is limited by the practical and ethical difficulties of conducting randomized controlled trials in the clinical environment. Although postoperative care teams provide additional support, expertise and equipment for postoperative patients [54], and similar approaches could improve suboptimal ward care in general [25], there are no *a priori* definitions of inadequate care that have been prospectively calibrated against outcome in this context. However, pragmatic studies of the impact of METs indicate a reduction in cardiac arrest rates and in the use of intensive care resources for cardiac arrest survivors [55,56].

Critical care outreach

'Outreach' care is a systems approach for identifying and managing patients at risk of critical illness through collaborative care and education. Rather than providing a service through an external group, it aims to empower ward staff by offering them regular support, usually led by critical care trained nurses visiting the wards, with the facility to call on more expert assistance if required. Currently, critical care is

seen as occurring within a defined environment (the ICU) and patients must achieve a certain level of severity of illness to merit admission. Outreach services facilitate a more flexible approach that is based on the needs of the patients and the skills and abilities of the ward staff.

Both the Audit Commission [57] and the Department of Health working party report 'Comprehensive Critical Care' [55] supported the development of outreach care as a means of improving the care of acutely ill patients in hospital wards. The latter report identified three goals for a critical care outreach team. The first was to identify patients at risk for critical illness and either prevent their admission to ICU by timely interventions at a ward level or ensure early appropriate admission to ICU. The second was to facilitate timely and safe discharge from intensive care by following up patients discharged to the ward. The third was to share ICU skills with ward staff. Given the wide variations in hospital size, specialties, staff expertise and skills, the Department of Health report did not prescribe a standard structure for achieving these three goals. The development of outreach services should not be taken in isolation from other critical care initiatives and should be part of an integrated, multidisciplinary, hospital-wide delivery of critical care services that improves liaison between intensive, high dependency and ward care [56].

The majority of UK centres have nurse led outreach systems, supported by critical care doctors with sessional recognition for this service. However, the aim of outreach is to diffuse skills across many disciplines, and to enhance collaborative care. Many professional groups can therefore contribute to this approach, including physiotherapists and nutritionists as well as physicians. Studies are needed to evaluate the efficacy of this development, but current experience indicates a strongly favourable response from ward based staff. Standards for the development of outreach care are now available [58].

Identifying the patient at risk – scoring systems for decision support

Traditionally, the process of identifying critically ill and deteriorating patients has relied on the clinical intuition of staff. The value of experienced clinical judgement is well recognized [36,54,59,60], but given the trend toward shorter training times and reduced hours of work in the clinical environment, objective systems are becoming increasingly important because inexperienced practitioners may fail to recognize impending critical illness and the need for assistance [61].

There are several such systems that utilize combinations of physiological variables as indicators of risk [36,54,56, 62–66]. A summary of component variables is given in Table 1. Hodgetts and coworkers [67] analyzed factors that predicted risk for cardiac arrest and could therefore be used as triggers to call for help ('activation criteria'). Variables with predictive capacity included chest pain, staff concern, sys-

Table 1**Variables used by different scoring systems to trigger referral to a critical care service**

Variable	Critical care service [reference]						
	MET [36]	MET [63]	MET [62]	PART [54]	CCLS [56]	EWS [64]	MEWS [65,66]
Airway	✓		✓				
Breathing							
SpO ₂ /arterial blood gas		✓	✓	✓	✓		
Respiratory rate	✓	✓	✓	✓	✓	✓	✓
Circulation							
Heart rate	✓	✓	✓	✓	✓	✓	✓
Systolic blood pressure		✓	✓	✓	✓	✓	✓
Neurology	✓	✓	✓	✓	✓	✓	✓
Renal		✓		✓			✓
Temperature						✓	✓
Clinical concern	✓	✓	✓	✓			✓

CCLS, critical care liaison service; EWS, early warning scoring system; MET, medical emergency team; MEWS, modified early warning score; PART, patient at risk team; SpO₂, pulse oximeter oxygen saturation.

tolic blood pressure, oximetry, pulse and respiratory rate, and temperature. The choice of vital signs is necessarily constrained to those that are easy to record in the ward environment. More finesse may be achieved with the inclusion of laboratory tests such as serum electrolytes, blood sugar and acid–base analysis, or the inclusion of diagnosis, but the problem with this approach is that recording vital signs is often omitted or inaccurate [17,54], and the greater the degree of complexity, the more likely it is that errors or omissions will occur. Scoring systems for use in ordinary wards must be simple, and should direct attention to patients who need more intensive observation; they should be a trigger for investigation, not a precise tool for predicting individual patient outcomes. Thus, although physiological abnormalities may be unreliable predictors of the need for intensive care admission, they remain important stimuli for empowering staff to call for assistance in improving simple aspects of care of acutely ill patients.

Does earlier intervention improve outcome?

It may seem unnecessarily argumentative to suggest that something that is so evidently ‘good’ requires evaluation. Is it not self-evident that the earlier a life-threatening disease process is identified and treated, the better? This may be so, but complex systems – of which the acutely ill patient is one example – demonstrate sensitivity to initial conditions; that is, the outcome may be more difficult to predict with earlier application of an intervention. The outcome from cardiopulmonary resuscitation is well defined – a survival rate of around 10–15%, with death usually occurring when resuscitation attempts are discontinued. Is it not possible that earlier intervention that prevents cardiac arrest might result in

delayed death following prolonged organ system support in the ICU, with the attendant suffering that this may cause? What is the cost–benefit of implementing the different models of care? Who will manage the process of discussing treatment goals or limitations with patients, and what do patients themselves feel about it?

Physiological goals

The literature relating to preoperative optimization of systemic oxygen delivery in high-risk surgical patients suggests that early intervention is beneficial [68–72]. However, a recent large-scale study [73] conducted in surgical patients did not confirm this in terms of benefit from goal-directed therapy guided by pulmonary artery catheterization, perhaps because patients in the control group were already being optimally managed (and experienced a low overall mortality) as a result of improvements in clinical practice derived from earlier research.

In critically ill septic patients, early intervention to optimize oxygen delivery with fluid resuscitation, vasoactive drugs and respiratory support appears to reduce mortality [74], whereas similar interventions applied later in the course of illness do not [75–77]. It seems reasonable to conclude that using fluids and supplemental oxygen to optimize circulating volume, cardiac output and systemic oxygen delivery as early as possible in acutely ill hospitalized patients will tend to reduce the incidence and severity of organ dysfunction related to a systemic oxygen debt. These simple measures may need to be supplemented later by more complex interventions, but the ability to manage the initial phase of preventive care should be within the ability of most health care staff.

Clinical outcomes

Early intervention may reduce morbidity and mortality, but it is also possible that the earlier application of supportive treatment could contribute additional burdens. Buist and colleagues [62] demonstrated that the introduction of a MET contributed to a reduction in ward cardiac arrest rates, but this was also associated with an increase in emergency admissions to intensive care with no significant change in ICU mortality rates. This suggests that for some patients earlier intervention may have the effect of shifting the burden of mortality from the ward to the ICU, replacing a 'cheap' death with an expensive one. More recently, however, Bellomo and colleagues [63] also demonstrated a marked reduction in cardiac arrest rates associated with the introduction of a MET, and a parallel reduction in the use of intensive care resources on cardiac arrest survivors. It seems likely, therefore, that hospitals with high ward based cardiac arrest rates may well benefit from the introduction of systems aimed at identifying and managing sick patients earlier. Further multicentre studies from Australia are awaited.

Autonomy and treatment limitation decisions

In an ideal world we would all possess clear advance directives giving guidance on how we would wish to be treated given differing circumstances. However, treatment preferences will not be static over time and are likely to be influenced by circumstances and the provision of information. How do patients respond to opportunities to discuss treatment preferences? Studies conducted in elective or outpatient settings demonstrate that many patients wish to be involved in decisions about treatment goals and intensity. They also demonstrate that the accuracy of information substantially alters preferences for resuscitation [78]. In the acute care context, however, there is considerable variability in clinical practice; moreover, many patients may not wish to discuss their preferences [79], even though this results in inappropriate treatment decisions [80]. It is clear that discussions about treatment preferences must be conducted with sensitivity by staff with appropriate experience and training, who have had an opportunity to develop a relationship of trust with the patient. This mandates a collaborative approach between the various medical and nursing teams, the patient and the family. Early intervention may buy time for these complex discussions to take place and an appropriate decision to be made.

Changing behaviour through education and training

The key to improving safe care of acutely ill hospitalized patients is through team working and education, combined with improvements in resources for integrated delivery of care. In accident and emergency care, team based working reduces clinical error rates and enhances overall quality of care [81,82], and the principles of crew resource management drawn from aviation have important messages for clinical practice in this respect, by empowering all members of

the team to make contributions to safety [83]. To achieve this we must incorporate team based attitudes in medical education, starting at undergraduate level and following this through into speciality training so that there is more overlap between disciplines than is currently the case. A competency based core curriculum for acute care that incorporates education in patient safety is essential. This process has started in intensive care medicine [84], and it is hoped that other disciplines will follow.

Personal responsibility and continuity of care are important features of quality care, and one of the challenges of implementing outreach is that it may encourage the attitude that someone else is responsible for the patient, and thus disempower and de-skill ward staff [85]. Team working and continuity of care may be secured through the development of collaboratively produced guidelines or protocols that seek to support and guide the interaction between ward and outreach staff. Outreach staff should also recognize the limitations of their own expertise. Education is a key element in outreach activities, and is a two-way process that requires sharing of expertise, collaborative support, and blurring of traditional boundaries [86]. Important attitudinal attributes of outreach staff must therefore include the capacity to teach, learn from, and support other clinicians, sometimes under difficult circumstances.

Conclusion

There are substantial opportunities for improving the safety and quality of care delivered to acutely ill hospitalized patients. The methods which are adopted will vary according to local circumstance, but common elements include the need for better integration of care across disciplines and systems for earlier identification of patients at risk, and we refer to these as 'outreach' care. We do not yet know which of these various approaches will best improve patient outcomes, and there is a need for prospective studies in this area which take into account the difficulties of using randomization and controls, and which employ long-term follow-up. METs appear to reduce the incidence of cardiac arrests in ordinary wards, and consequential use of scarce intensive care resources. Outreach-based systems which support and educate ward-based staff in delivering clinical care appear to have achieved a high degree of acceptance in the UK. Health care managers need to work closely with clinicians to introduce these methods of team-working into hospital practice, while evaluating their effectiveness.

Competing interests

None declared.

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