Introducing an early warning scoring system in a district general hospital

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SUMMARY

• One of the critical care outreach service’s aims in this local hospital was to develop an assessment tool to help identify patients in danger of deterioration
• This paper describes the introduction of an early warning scoring system between April 2001 and March 2002 to the surgical unit of a district general hospital
• The informal and gradual approach used to optimize the effectiveness of introducing the early warning scoring system is highlighted
• Explanations are given of the training processes undertaken, the pilot evaluation and lessons learned from the process
• Using the experiences of the outreach service in introducing the early warning scoring system, this paper aims to provide thought for others considering a similar initiative in their area

Key words: Audit • Critical care outreach • Early warning scoring system

INTRODUCTION

In 1999, one of the Audit Commission’s recommendations was to improve services for patients on wards, who are at risk of deterioration, by reviewing the skills of recognizing early warning signs (Audit Commission, 1999). Guidelines to help nursing staff to identify when to call for specialist advice, and to support them when managing patients at risk, were called for. This was further supported by a review of adult critical care services in the document Comprehensive Critical Care (NHSE, 2000), with the development of a framework for future organization and delivery of critical care services. Recommendations were made to extend critical care services beyond the boundaries of intensive care and high-dependency units (HDUs), with attention focused on the establishment of critical care outreach teams.

An outreach service was initiated at Burnley General Hospital in October 2000. Burnley General Hospital is a district hospital in the northwest of UK and consists of over 600 acute beds. The Critical Care Outreach Service is nurse led, by up to three experienced intensive care nurses. Although it now operates 7 days a week, at the time of introducing the early warning scoring system (EWSS) it was a Monday-to-Friday service only.

As well as providing a support service for the continued recovery of patients following discharge from critical care, and sharing and developing skills for ward staff to enhance the care of patients on general wards, one of the main aims of outreach at this hospital was to develop assessment tools to help identify patients at risk of deterioration. This involved the introduction of an EWSS.

THE EARLY WARNING SCORING SYSTEM

Examining the literature has shown that with the introduction of EWSSs, critical care outreach teams and medical emergency teams, patient care and outcomes appear to be improving. For example, research carried out by McQuillan et al. (1998) concluded that suboptimal care of severely ill patients before admission to intensive care was common. Over half of the patients in their study received suboptimal management of oxygen therapy, airway, breathing, circulation and monitoring, and at least 39% of acute adult emergency patients were admitted to intensive care late in the clinical course of their illness.
Buist et al. (2002) investigated whether earlier clinical intervention by a medical emergency team prompted by clinical instability in a patient could reduce the incidence of and mortality from unexpected cardiac arrest in hospital. By carrying out a non-randomized, population-based study before and after introduction of the medical emergency team in a 300-bed tertiary referral teaching hospital, they concluded that:

In clinically unstable inpatients early intervention by a medical emergency team significantly reduces the incidence of and mortality from unexpected cardiac arrest in hospital. (Buist et al., 2002)

Morgan et al. (1997) had found that the use of an EWSS led to much earlier referrals of patients to high-dependency and intensive care. This EWSS was designed to measure patients’ routine physiological observations and provide an indication of their overall condition, thus acting as a reliable indicator of impending critical illness. The outreach service at Burnley felt that this system would be particularly useful. Therefore, the EWSS introduced at Burnley was adapted from the modified EWSS (Morgan et al., 1997), as used by the Queens Hospital, Burton-Upon-Trent, and first devised at the James Paget Hospital, Great Yarmouth.

The EWSS is essentially a tool, based upon the Acute Physiology and Chronic Health Evaluation (APACHE) II scoring system used for patients admitted to intensive care unit (ICU), that enables ward staff to combine their routine observations to produce an aggregate physiological score. The further the deviation from physiological norm, the higher the score and the sicker the patient. This dynamic scoring system is used to target appropriate help and treatments, at the right patients, at the right time. If the score remains persistently high, then an outreach nurse and the patient’s parent medical team should become involved. This may prevent an admission to the ICU, but if admission becomes necessary, it will be at an earlier stage of the patient’s illness (Table 1).

Existing ward charts were adapted so that the scoring system could be included, whilst maintaining the same format that the nurses were already familiar with. In addition, a flowchart was devised to provide guidelines on further action (Figure 1).

INTRODUCING THE EWSS
In the long term, it was planned to introduce the EWSS to all areas throughout the hospital, but, as a first step, it was initially presented to the general surgical wards. Once the ward staff became familiar with the outreach service and a good rapport had been developed, the suggestion of using the EWSS was put forward by the outreach team leader at the monthly general surgical ward sisters’ meeting. This was met with mixed views. Some ward sisters were grateful for any assistance that would help them to identify that their patients may be at risk of deterioration, whilst others felt that their staff were already competent at recognizing the warning signs and felt that the tool was unnecessary. It was, therefore, decided as a pilot, to initially introduce the EWSS to one surgical ward where the ward sister had shown great interest in the system and was particularly eager to put it into use. This ward was a general mixed surgical ward, typical in size and type of the hospital, with 28 beds.

TRAINING THE NURSING STAFF
A recent audit had shown that all nurses, including registered nurses and health care assistants, carry out physiological observations on patients within this hospital; therefore, training for the EWSS was provided for every nurse working on the pilot ward. For approximately 2 weeks, an outreach nurse spent time with small groups of four to five nurses, instructing them on how to use the new system. These sessions lasted approximately half an hour and involved using patient observations to enable nurses to practise using the EWSS, so that any queries could be clarified straight away. When all nurses had been trained and appeared ready to use the EWSS, it was incorporated within the regular physiological observations. During the pilot period, an outreach nurse continued to provide support for staff using the EWSS. Working on the ward with individual nurses whilst

| Table 1 | The early warning scoring system |
|-----------------|---------|-------|-------|-------|-------|-------|
| Response to stimulus | 3 | 2 | 1 | 0 | 1 | 2 | 3 |
| Temperature (°C) | <35 | 35-37.5 | >38 |
| Systolic blood pressure (mmHg) | Normal–50 | Normal–30-40 | Normal–20 | Normal | Normal+20 | Normal+30-40 | Normal+50 |
| Heart rate | <40 | 40-50 | 51-100 | 101-110 | 111-129 | >130 |
| Respiratory rate | <8 | 9-14 | 15-20 | 21-29 | >30 |
| Urine output (ml/h) | <30 | <50 | >100 |

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Figure 1 The early warning scoring system flowchart.

they were carrying out patient observations helped to ensure that they understood how to use the system and to highlight any problems with its implementation.

Guidelines had been given that any patient at risk of deterioration should be scored, with a suggested list of conditions that may put patients more at risk, e.g. emergency admissions, patients having had a major
surgery, post ICU/HDU patients or those with pre-existing respiratory, cardiac or renal disease. In addition, any patients who did not seem ‘just right’ to the nurse were to be scored, as it was essential that nurses’ intuitive responses to patients’ conditions were not undervalued. But it became apparent on discussion with the ward nurses that there remained some confusion as to which patients should be scored, and the outreach service feared that some at-risk patients may be missed. It was, therefore, decided to carry out an early warning score on admission and at least once a day, on each patient, so that it became an accepted practice.

To assess whether all nurses were competent in using the system, enquiries and informal checks were made by the outreach service. To formally assess its use, it was planned to carry out an extensive audit of the EWSS when it became an established practice.

PILOT EVALUATION
From April to September 2001, the EWSS appeared to be well utilized by the nurses on the pilot surgical ward and several positive comments were made regarding its perceived effectiveness. Its success meant that other surgical wards were also eager to introduce the EWSS and requested its implementation as soon as possible. But before its introduction onto further wards, a survey was carried out to evaluate its usefulness and make any necessary refinements. This was in the form of a self-administered questionnaire given to every member of nursing staff. (Questions referred to the value of the EWSS from a nurse’s perspective and invited comments and suggestions about its further use.) This small-scale survey showed that overall the EWSS was well received, with positive comments from the nurses. Criticisms were made about the clarity of scores attributed to urine output, originally based on 1ml/kg/weight/h, and calculations of the systolic blood pressure, based on a percentage of normal values. Scoring the urine output was therefore simplified. More teaching was delivered regarding estimation of systolic blood pressure in relation to the patient’s normal values, and changes were made to make scoring easier. But overall, nursing staff did feel that the EWSS had helped them to recognize patients who were deteriorating, aiding them in prioritizing care. Nurses described how the EWSS had often resulted in an earlier medical review for very sick patients than before its introduction, explaining how they felt empowered to call out medics, having the justification of a high early warning score. However, the nurses also felt that it was paramount that medical staff should be made more aware of the EWSS.

CONVINCING THE MEDICAL STAFF
Once the EWSS was launched onto further surgical wards, and received in a similar positive fashion by nursing staff, data collection and auditing of the early warning scores obtained on these wards (three general surgical wards with a total of 84 beds) by the outreach service allowed early facts and figures to be presented to surgical consultants and their teams. (Patient details were not used to maintain confidentiality.) Initial data demonstrated that patients with early warning scores of greater than 6 had a 70% mortality rate, whereas those identified with scores of 0–3 had only 1% (Table 2). Data collected on readmissions to the critical care unit since the outreach service had started, which had been supported by the EWSS, showed that more patients were readmitted for level 2 care (high-dependency care), than for level 3 (intensive care), which had been the case previously. This suggested that patients who did need readmission were being readmitted earlier. Some surgeons were already very supportive of the EWSS, but having this quantitative data helped to inform and convince others of its value. Although the EWSS was seen to be of benefit, it was essential to have medical support for it to be effective.

DISCUSSION
After a period of 12 months, the EWSS has been well received on the surgical wards in this hospital. But, as the outreach service itself was relatively new, this could not have been achieved without the support and collaboration of others. Since the publication of the Comprehensive Critical Care document (NHSE, 2000), outreach services have been developed in many areas nationally. Through attending various study days, conferences and networking with others, e.g. the Critical Care Zonal Network Outreach Group for Lancashire and South Cumbria, it has been possible to share ideas and support each other with these new developments.

It has also been essential to have the cooperation and support from the hospital’s critical care unit, as well as from all acute ward staff, involving nursing, medical and management teams. To gain acceptance of this EWSS, a multidisciplinary approach was necessary. Although its introduction has been primarily nurse led, after initial consultation with medical staff,

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other disciplines have become involved, particularly the physiotherapy department who were involved with training and support of the EWSS.

As in any change process, it is important to anticipate some degree of resistance, due to reasons such as a lack of information, lack of perceived benefits and fear of increased workload or disruption of routine. Therefore, it was important that outreach provided continued support for the ward staff, listened to their concerns and involved all users in the training and introduction of the EWSS. Where there had been some doubt about the necessity of an EWSS, this was overcome by providing clear information about its benefits, with evidence from the literature showing that ‘early detection of disordered physiology and initiation of prompt simple actions reduces complications and saves lives’ (Smith, 2000; p. 5) and evidence from authors such as McQuillan et al. (1998) and Buist et al. (2002) which suggest that patient care and outcomes can be improved by earlier intervention. Previous studies have shown that prior to cardiac and respiratory arrests, patients on wards often have severe physiological abnormalities which are not acted upon (Schein et al., 1990; Franklin and Mathew, 1994; Rich, 1999). Data on cardiac arrests recorded on the pilot ward over the 5-month period were found to be three times less than on comparable surgical wards not using the EWSS. (Four cardiac arrests were recorded on the pilot ward and 12 and 13 on two other surgical wards.)

One concern was that, although diligently carrying out and recording observations on patients, some health care assistants were not always aware of their importance and the implications of abnormal findings. Therefore, although it was acknowledged that they did pass on results of early warning scores to the responsible registered nurse, it was decided to arrange formal study days to increase their awareness of these physiological observations. These short courses were met with enthusiasm, and feedback from them was very positive.

Implementation of the EWSS has highlighted the importance of monitoring and recording respiratory rates, with the need for prompt medical intervention when physiological abnormalities in respiratory function occur. This is supported by evidence in the literature demonstrating that increased respiratory rates are usually the first indication of patient deterioration (Goldhill et al., 1999; Kenward et al., 2001). Previously, an audit on nursing observations within the hospital had shown that this simple, but vital, observation was often overlooked by general ward nurses, even though temperature, heart rate and blood pressure had been recorded. In order to complete the early

**PLANS**

Since the successful introduction on the surgical wards, the outreach service continued to introduce the EWSS in a similar fashion to the urological, orthopaedic and gynaecological wards. Senior management then called for its application within the acute medical setting. As this involved a much larger area, consisting of 14 wards with almost 300 beds, formal presentations as well as informal sessions were provided. A multidisciplinary approach, involving physicians, was used to establish further adaptation of the scoring system that would be useful for medical patients, including those who are chronically sick.

Introduction of the EWSS is still in progress, with the outreach service aiming to establish the EWSS throughout the Hospital. The EWSS is now accepted practice on the surgical, urological, orthopaedic and gynaecological wards and most medical areas. Other local hospitals are also intending to introduce an EWSS and through collaboration the outreach service at Burnley are able to share valuable lessons gained from their experiences. Education of ward staff will continue, and study days, such as those on physiological observations created for non-registered nurses, and A.L.E.R.T. (Acute Life-Threatening Events, Recognition and Treatment) for all health professionals within the Hospital, are ongoing with encouraging feedback and results. Frequent auditing on the EWSS is to be carried out to evaluate its effectiveness and identify where improvements may be made. This will involve auditing the types and responses to trigger scores as well as the length of time before patients are seen by medical staff. Hopefully, results from these audits may be ready for publication soon.

**CONCLUSION**

Where the EWSS has been introduced in this hospital, there is now a greater understanding of the advantages of early recognition of patient deterioration. This not only has important benefits for patients but also can help nurses and doctors to target interventions and prioritize care.

The EWSS that was introduced by the Critical Care Outreach Service at Burnley could not have been implemented successfully without continued support and the development of good working relationships with acute ward staff. Using an informal and interactive approach in training ward nurses and improving communications with members of the multidisciplinary team have helped optimize the effectiveness of this EWSS.
REFERENCES


