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From ICU to Outreach: A South African experience

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Introduction. The lack of critical care resources in South Africa can result in critically ill patients being nursed in the wards. Ward staff often lack the knowledge and skills to care for these patients adequately. Studies done internationally have revealed that ward patients often receive sub-optimal care before admission to the intensive care unit, with possible causes being cited as institutional failure, lack of knowledge, failure to appreciate urgency, and failure to seek advice. Furthermore, patients prematurely discharged from the ICU to the wards have an increased mortality rate. Internationally the critical care community is responding to these findings by taking steps to become proactive rather than reactive. This shift has led to the development of various approaches to assist in the recognition and early treatment of the deteriorating patient in the general wards. One such approach, introduced in the UK in 2000, is the Critical Care Outreach Programme instituted by the Department of Health as part of the Modernisation Programme. Reports in the literature suggest that this programme has positively impacted on emergency ICU admissions, ICU readmission rates, in-hospital mortality, and an improved level of knowledge and skills among ward nurses. An adapted form of this programme has been introduced in an urban public hospital in KwaZulu-Natal.

Method. A Critical Care Outreach Nurse was appointed at the target hospital to introduce the programme. The adapted form of the programme was introduced in two phases. Phase 1 consisted of following up of patients discharged from the ICU to the wards, and phase 2 incorporated the introduction of the Modified Early Warning Scoring System (MEWS) and referral algorithm to the surgical wards in the hospital. Owing to staff constraints the main focus of the programme was empowerment through knowledge. In this way a training programme was developed and implemented.

Results. Compliance with the scoring system was initially problematic but improved with the introduction of new forms. Night staff appears to be less compliant than day staff in the majority of wards. Respiration, the most sensitive indicator of critical illness, is recorded at 20 breaths/min in 77% of cases. Although the calculation of MEWS scores has improved it is still done inaccurately in 9% of cases. Scoring urine output is also problematic. Poor communication and lack of resources when managing acutely ill patients may potentially impact on the success of the scoring system. The nursing staff have generally responded positively to the MEWS, but there still appears to be a lack of awareness among medical staff.

Conclusion. Introduction of MEWS into the general wards in South Africa is potentially achievable but requires ongoing evaluation. The introduction of MEWS and Outreach may create a unique opportunity to improve the quality of care rendered to the patient in the general wards by relationship building and the sharing of ICU knowledge and skill through education and training.

The 2007 national audit of critical resources in South Africa revealed that only 23% of public sector hospitals have critical care facilities.[1] The lack of resources results in critically ill patients being nursed in general wards by nurses who are educationally unprepared in terms of knowledge and experience. The ability of the ward staff to care for the acutely ill patient adequately is supported by a study conducted in the UK in 1998 in which McQuillan *et al.*[2] inquired into the quality of care prior to intensive care unit admission. The study revealed that 41% of admissions might have been avoidable if intervention and treatment had taken place earlier; 69% of patients admitted were too ill for ICU intervention to make a difference; and 54% of patients admitted had sub-optimal care prior to admission (the mortality rate was 48% in this group). The authors further identified that the main causes of sub-optimal care included institutional failure, lack of knowledge among ward staff, failure to appreciate critical urgency, and failure to seek advice. Hillman *et al.*[3] identified that 37% of hospital deaths were potentially preventable and that 84% of in-hospital cardiac arrests are preceded

by a slow deterioration in vital signs. They also found that 25% of patients who died had had at least one entry made by either the nursing or junior medical staff expressing concern about the patient's condition within hours before their death. Similarly, a study conducted in 1994 by Franklin and Mathew[4] identified significant physiological changes 6 - 8 hours before cardiac arrest that can alert staff to deterioration and enable early intervention. Subsequent studies by Smith and Wood[5] in 1998 and Goldhill and McNarry[6] in 2004 support these findings. In the South African context, a study conducted by Bhengu in KwaZulu-Natal[7] noted that doctors are called to the wards to certify deaths rather than to resuscitate as a consequence of failure to report deterioration timeously.

Not only are there concerns regarding critically ill patients being nursed in the wards, but there is evidence that patients discharged prematurely from the ICU have an increased mortality rate.[8,9] Bhengu's study also reported that patients discharged from a prolonged stay in ICU to the wards were perceived to be at the same acuity level as any other general ward patient, but were often more ill than the average ward patient.

The international critical care community has responded to the above findings by taking steps to be more proactive rather than reactive. This shift in focus has led to the development of various approaches to assist in the recognition and early treatment of the deteriorating patient in the general ward. Programmes such as the Medical Emergency Teams (MET, Australia); Patient at Risk Team (PART, UK); and Rapid Response Teams (USA) are already up and running. As part of the Modernisation Programme initiated by the Department of Health in 2000, the Critical Care Outreach Programme (ICU Outreach) was introduced in the UK. Australia has introduced a similar concept, that of the ICU Liaison Nurses. The programmes use scoring systems based on physiological parameters to identify the deteriorating patient, which would then trigger a multidisciplinary team response. An exploratory study conducted by Endacott and Chaboyer[10] highlighted the differences between these programmes. According to their study, MET and PART tended to be reactive with the response being triggered by a change in the patient's condition, whereas the ICU Outreach Nurse and ICU Liaison Nurse tended to be more proactive, providing support to ward staff caring for acutely ill patients before they trigger MET or PART.

Watson[11] noted that 'Recording baseline observations is no longer sufficient … a greater level of skill is needed.' This would possibly support the introduction of a Modified Early Warning Scoring System (MEWS). Subbe *et al.*[12] supported the use of MEWS to identify the deteriorating patient; however, on reviewing the study, Aneman and Parr[13] felt that scoring patients alone would be insufficient to change the management of the acutely ill patient. This would mean that the main focus would be an educational programme to assist the nursing staff in identifying deterioration in the patient's condition.

Critical Care Outreach

In an attempt to address similar problems in South Africa, the above programmes were reviewed to ascertain their potential suitability. An adaption of the Critical Care Outreach Programme appeared to potentially offer some solution in the South African context, particularly in KwaZulu-Natal.

What is Critical Care Outreach?

Critical Care Outreach can be described as a systems approach for identifying and managing patients who are at risk of deteriorating, through the provision of collaborative care and education.[14]

Aims of Critical Care Outreach

The overall aim of the Critical Care Outreach programme is to provide critical care wherever it is needed. To achieve this aim the following objectives have been described:

- To avert admission to the ICU or ensure that such admissions are timely by early identification of the deteriorating patient
- To enable discharge from the ICU
- To promote continuity of care
- To share critical care skills with staff in the wards and community, thus improving the quality of patient care.[15]

Components of Critical Care Outreach

The Critical Care Outreach programme has three components:

1. Use of a scoring system such as MEWS to assist nursing staff at ward level to identify the deteriorating patient early
2. A referral algorithm to establish early and appropriate interventions, e.g. use of the Critical Care Outreach Nurse
3. Training and skills development.

Impact of Critical Care Outreach

There have been varying reports in the literature regarding the impact of ICU Outreach. The variation between hospitals may be the result of inconsistency in implementation. Pittard[16] reported that emergency ICU admissions decreased from 58% to 48%, length of ICU stay for emergency admissions decreased from 7 days to 4.8 days, and the mortality rate among this group dropped from 28.6% to 23.5%. This study also showed a reduction in the ICU readmission rate (from 5.1% to 3.3%). In 2004 Priestley *et al.*[17] reported that ICU

Outreach reduced in-hospital mortality and possibly increased length of hospital stay. The previously noted study by Subbe *et al.*[12] demonstrated that the introduction of MEWS did not change outcomes, but did note a trend of earlier ICU admission. These authors also reported that the use of MEWS identified sick patients and emphasised the severity of their condition to the nursing staff. Further to this finding, the study convincingly showed that MEWS was a suitable tool to identify patients at risk. Ward nurses assessing the impact of Outreach stated that their level of knowledge had improved (93%), they had better skills (90%), and that Outreach had provided them with advice or support (92%).[18]

The South African context

Anecdotal evidence suggests that the above situation also applies in South Africa. The feasibility of the introduction of a programme such as ICU Outreach in South Africa was therefore explored. Closer examination of the ICU Outreach programme identified the components of the Critical Care Outreach Team. The size and composition of these teams varies in the literature, depending on the extent of the service provided. A typical team providing 24-hour cover 7 days a week might consist of a nurse consultant, 2 critical care specialist nurses and 8 Outreach Nurses, with medical backup being provided by the ICU registrar and consultant. It is evident that with the shortage of nurses in South Africa[19-21] staffing on this scale would not be possible, and the introduction of an Outreach programme would require significant modification. Apart from staffing, however, the other components of ICU Outreach, namely the use of MEWS in conjunction with a referral algorithm and training and skills development, could undoubtedly be introduced.

Method

To facilitate the introduction of a modified Outreach programme, a Critical Care Outreach Nurse with ICU qualifications and experience was appointed at the target hospital, and was to be available from 07h00 to 16h00 from Monday to Thursday and from 07h00 to 13h00 on Fridays. It was decided that the programme in its adapted form would be introduced in two phases, initially in the surgical wards. The phases are outlined in Fig. 1.

Implementation

Before implementation of ICU Outreach, the various stakeholders – medical consultant and senior nursing and medical staff – were consulted with regard to its feasibility, the MEWS and a suitable algorithm.

Phase 1 involved the Outreach Nurse attending ward rounds in the ICU on a daily basis and following up patients discharged from the ICU to the ward. Follow-up of discharged patients involved assessment of the patient's clinical status and identification of any problems related to the care the patient was receiving. Input was provided to the nursing staff in the wards aimed at education, advice and support to ensure that the patients received the appropriate level of care. Phase 2 was then introduced.

Phase 1

Aim

- To facilitate the transition of patients from ICU to the wards
- To introduce the concept of the scoring system to wards
- To establish relationships between the Critical Care Outreach Nurse and the ward staff

Method

- Follow-up of patients discharged from ICU to the wards
- Communication and feedback to ward staff

Phase 2

Aim

- To teach staff how to anticipate, recognise and prevent critical illness at an early stage in order to prevent unnecessary morbidity and mortality and thus improve the quality of care

Method

- Introduction of MEWS and referral algorithms to identified areas
- Work-based education and training on clinical assessment, recognition and treatment of the acutely ill patient

Fig. 1. Phases for introduction of ICU Outreach.

Introduction of MEWS

The scoring system and algorithm were introduced to one ward at a time over a period of 2 months. Fig. 2 illustrates an example of the MEWS system used. The algorithm used is outlined in Fig. 3. In-service training was provided to both day and night staff in all the wards, followed by a supervised introduction to address problems encountered. The Outreach Nurse was available for advice and support when any patient triggered the MEWS algorithm or when the ward staff was concerned about a patient. Much debate was generated regarding who should be scored and when. It was felt that scoring all patients with every set of observations would be burdensome to nurses; however, scoring only certain patients is problematic as it is frequently the supposedly 'stable' patient who develops problems and whose deterioration may be missed. It was therefore decided that all patients were to be scored, with each set of observations and actions implemented according to the algorithm.

Modified Early Warning Score

Score	3	2	1	0	1	2	3
Heart Rate	<40		41 - 50	51 - 100	101 - 110	111 - 129	≥130
Sys. BP	<70	71 - 80	81 - 100	101 - 179	180 - 199	200 - 220	>220
Resp Rate		<8	8 - 11	12 - 20	21 - 25	26 - 29	≥ 30
Urine Output	Nil	<0.5ml/kg/hr	0.5ml/kg/hr	1ml/kg/hr	>3ml/kg/hr		
RTS			Confused	Awake	Verbal	Pain	Unresponsive
Temp		<35		35 - 38.4		>38.4	
O_2 Therapy			O_2 Therapy	Room Air			
O_2 Sats	<86%	86 - 89%	90 - 94%	>95%			

Fig. 2. Modified early warning scoring system (RTS = response to stimuli).

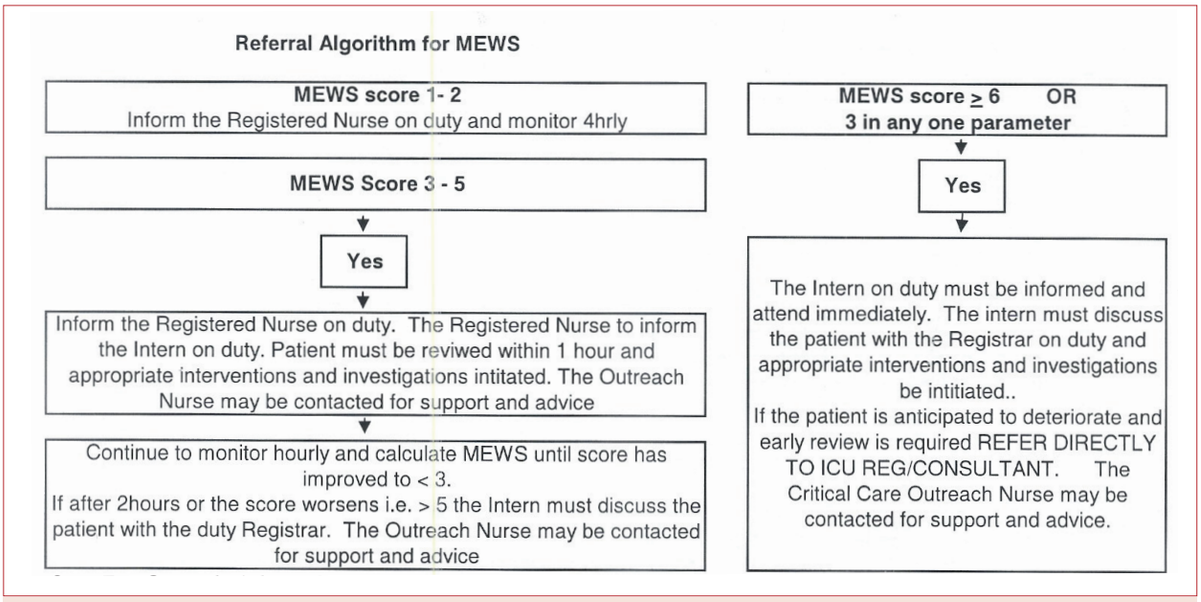

Fig. 3. Referral algorithm.

Knowledge and skills development

Two approaches were taken to meet the objective of empowerment through knowledge, namely the use of the 'teachable moment' at the bedside and introduction of the formal training course. The course was initially offered to the operational unit managers with suitable candidates attending weekly for 2 hours over a 10-week period, in an attempt not to exacerbate the nursing shortage. The course is case study based with the focus being on the recognition and nursing management of the deteriorating patient and the integration of MEWS and the referral algorithm. The goal was to provide the course to all registered nurses working in the clinical setting.

Evaluation

The scoring system was introduced to all the surgical wards. Initially compliance was problematic. It was discovered that at least 59% of patients did not have the scoring forms in their files, and this figure may have been closer to 86% as on the day of the audit a registered nurse had placed the charts in the patients' folders. This indicated lack of compliance, which could have resulted from poor supervision during some shifts. As a result of this omission and in consultation with the ward staff, the forms were changed to incorporate the observation chart and scoring charts on one form. Permission for the introduction of this adapted form was obtained from the nursing management for a trial period (Fig. 4 is an example of the new forms).

It would appear that the change in charts has improved compliance, with a recent snapshot audit revealing that only 17% of patients had the incorrect form, i.e. the old observation chart, at the bedside. Of the 242 observation cycles audited, 57 were not scored (23.6%), indicating a significant improvement and that the revised form is more user friendly. Compliance still varies between wards, which may suggest that leadership styles and degree of supervision are important variables. In the majority of cases it would appear that the night staff are less compliant (61.5% of observations not scored) than day staff (38.5% of observations not scored). Research has shown that respiration is the most sensitive indicator in the deteriorating patient,[22] yet it is notoriously inaccurately measured. The Outreach audit revealed that respiration was recorded at 20 breaths/min in 77% of cases and that in 7.5% it was not recorded at all in spite of in-service education. Although calculation of MEWS scores has improved, it is done inaccurately in 9% of cases. Scoring for urinary output was also seen as problematic.

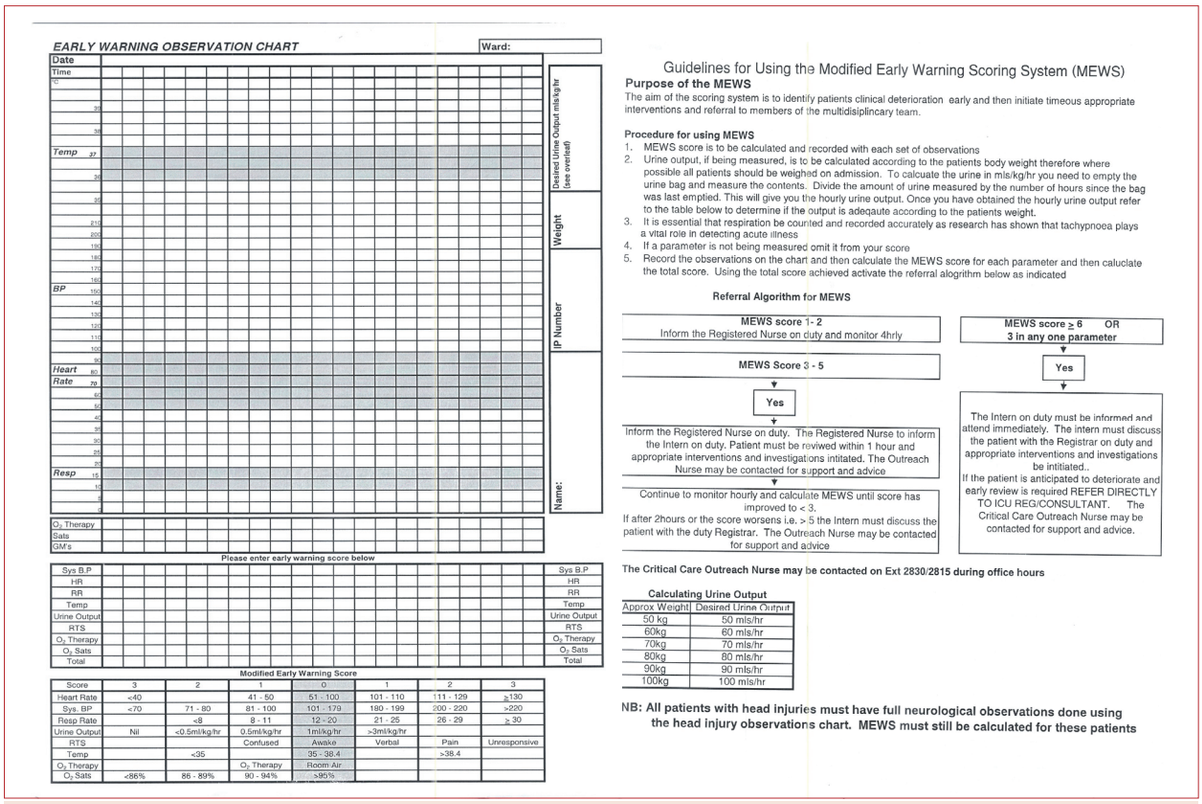

Fig. 4. Observation forms incorporating MEWS.

Patients tend to be referred to the Outreach Nurse only on 'trawl' rounds. Scores triggering the MEWS algorithm ranged from 3 to 10 with a mean of 6. In most cases the patient's deterioration was referred to the intern on duty. This is often not reflected in the patient records, and any actions taken are not recorded. Fig. 5 outlines the common interventions instituted by the Outreach Nurse.

Some particular patient profiles in the ward setting, e.g. tuberculosis of the abdomen, result in patients being treated conservatively; however, this is not necessarily communicated through the various categories of nursing staff, resulting in patients triggering the referral algorithm unnecessarily. This may have an adverse outcome, as doctors may fail to respond to genuine cases in need of active intervention. At the same time lack of available resources limits the ability to respond appropriately and may be detrimental, as a 'why bother' attitude may result in patients not receiving the care they require.

As indicated previously, accurate assessment is vital in identifying the deteriorating patient, yet student nurses appear to lack the necessary clinical skills, possibly owing to the use of automated blood pressure monitors. Students use these devices, against hospital policy, to measure heart rates as well as blood pressure, which may result in inaccurate readings, especially in a patient with significant tachycardia. Such lack of skills is highlighted by students' inability to palpate the pulse accurately when asked to reassess a patient whose heart rate was charted as 'normal'.

- Oxygen therapy
- Fluids
- Paracetamol
- Nebulisations
- Bloods
- Management of artificial airways
- Advice regarding monitoring of urine

Fig. 5. Common Outreach interventions.

Despite these problems, response to the MEWS has been positive. Student nurses have said that the scoring system assists them in identifying patient deterioration and reporting it to the registered nurse on duty. There is, however, a lack of awareness of the use of the scoring system and algorithm among the medical staff that needs to be addressed.

Discussion

The introduction of MEWS into the general wards in public hospitals in South Africa is potentially viable but requires ongoing evaluation. The Outreach Nurse responsible has other responsibilities that impinge on the time available to dedicate to such a project. A positive spin-off has been the collegial development of relationships between the medical and nursing staff in the ward setting.

Conclusion

Beauman[23] acknowledges that patience and persistence are necessary when introducing change and that its introduction can take weeks or months. She goes on to say that 'team members must be convinced that there is a reason to change and that the new system will be better than the current system'. The introduction of MEWS and Outreach may therefore create a unique opportunity to improve the quality of care rendered to the patient in the general wards through relationship building and the sharing of ICU knowledge and skills through education and training.

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