

## Recognition of the deteriorating patient

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### Abstract

Following Sir Bruce Keogh's review of 14 NHS Trusts, Buckinghamshire NHS Trust was found to have higher mortality rates than the England average. As part of a series of implementations and investigations to address this, a quality improvement project looking at clinical responses to the deteriorating patients was designed. Buckinghamshire NHS Trust utilises the National Early Warning Score (NEWS) metric for observations and escalation, and this was the standard used for the project. Episodes were eligible for inclusion if the NEWS score was increased to 5 or above. Data was collected by junior doctors from acute wards across the trust using notes and charts available. The initial cycle identified that in 57% of cases the high NEWS was escalated for review. Only half of cases were reviewed by a doctor; only a third were reviewed within an hour. In only 20% of cases were all criteria of the NEWS guidelines met. The first intervention was through education. After this, the project was completed on a monthly basis for 6 months with additional interventions introduced, including increased medical staff availability, grand round presentations, and increased outreach provision. Over this 6 month period, there was an increase to 87% of cases being reviewed by a doctor of appropriate seniority. Whilst this is a surrogate for reducing mortality and improving the clinical care given in the hospital, these results suggest successful interventions for improving clinical response to deteriorating patients across the trust. The project has recruited a new cohort of juniors to continue the quality improvement cycle.

### Problem

The National Early Warning Score (NEWS) was implemented in 2012 as part of a recommendation from the Royal College of Physician's working party group (Working Party Group). Previously each NHS Trusts in the UK used different systems with different charts to monitor patient observations. This was a particular issue with staff such as junior doctors rotating between hospitals and led to a lack of consistency in detecting and responding to acutely ill patients. At that time Professor Bryan Williams, Chair of the Royal College of Physicians NEWS Working Party, said, 'Many changes in health care are incremental but this new National Early Warning Score has the potential to transform patient safety in our hospitals and improve patient outcomes, it is hugely important' [1]. This was seconded by Janet Davies, Director of the Royal College of Nursing, who said, 'There is nothing nurses and doctors should prioritise more than patient safety, and this system if implemented across the board will be a great leap forward for patient care' [1]. Around the same time, a study of 1,000 adults dying in acute hospitals in England estimated that around 1 in 20 deaths (5.2%) in hospital were preventable and Professor Williams estimated that around 50% of these deaths (6000 in total) could have been prevented by implementing the National Early Warning Score correctly (BMJ Quality and Safety, 2012).

### Background

The NEWS is widely used as a tool particularly in A&E departments to better identify patients who may be at increased risk of deterioration, particularly from sepsis. A recent study carried highlighted that as the NEWS went up in septic patients there was a simultaneous increase in mortality rates [2]. Corfield et al. concluded that using NEWS in this way could better facilitate triage

and also allow for involvement of a senior clinician at an earlier stage in the treatment pathway. Indeed Smith et al. went further and proposed that NEWS had a far superior ability to discriminate between patients at risk of cardiac arrest, unanticipated ICU admission, and death than 33 other early warning scores currently in use [3]. In contrast to this another scoring system called THERM, a resuscitation management score, has apparently been shown to outperform NEWS for the purposes of predicting risk of death and ICU admission. Hence there is some debate in the literature surrounding claims that one scoring system is superior to another. One reason for this may be that different scoring systems may be more suited to predicting mortality in certain types of patient. Hence it may be difficult to generalise and use only one scoring system for all types of patients. This was particularly highlighted by Teasdale (Emeritus Professor of Neurosurgery) who had reservations about the suitability of NEWS in patients suffering from acute brain injury [4]. This was due to NEWS only offering very limited options pertaining to conscious level and therefore being less sensitive at detecting the more subtle changes which may indicate rapid deteriorating neurological function. A similar issue was raised by Eccles et al. 2014 who had concerns about the specificity of NEWS in patients with chronic hypoxaemia (eg COPD patients), who may frequently trigger highly on the NEWS despite being clinically stable and therefore could set off unnecessary clinical triggers [5]. The suitability of NEWS in identifying the sickest patient in this patient group was therefore questioned. A proposal was therefore made that a simple variant of NEWS known as 'Chronic Respiratory Early Warning Score (CREWS)' might better be suited to achieve this aim.

Following Sir Bruce Keogh's review of high mortality rates at 14 NHS Trusts, including Buckinghamshire NHS Trust, it was found that the mortality rates within the Trust were higher than the UK average. We therefore designed a study to review our response to

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the NEWS, as a marker of our response to the deteriorating patient. A concurrent audit was being run by ward nursing staff to analyse the calculation of the NEWS.

The aim of our quality improvement project was to see if the NEWS guidelines for high scores i.e. NEWS greater than 5 were being followed correctly. If they were not being followed, we would propose recommendations to allow the Trust to meet the national standards and re-audit to see if there was any improvement.

### Baseline measurement

The NEWS guideline was used as the standard to measure against (see attachment), with the target that all patients with NEWS five or greater should be seen by a doctor within 30 minutes, and observations taken at hourly intervals. For patients with a NEWS of seven or greater, a review should be carried out within thirty minutes by a doctor of grade ST3 or above and the patient should be monitored continuously.

Data was collected from both Wycombe General Hospital and Stoke Mandeville Hospital sites, from both medical and surgical wards in order to have a representative sample across the Trust. The first data collection (pre-intervention) took place in January 2014 and was performed by junior doctors who had volunteered to assist with the project. The doctor was assigned to a particular ward and filled in a proforma for each individual patient with a NEWS 5 or greater, using patient notes and observation charts. Once 10 patients for that ward had been reached, the data collection was complete for that particular ward. Particular attention was paid to the time the observations were taken and at what time this was escalated, which grade of healthcare professional the high score was escalated to, how long that individual took to review the patient, and the actions of management, including the frequency of observations following the alert.

Completed proformas were sent to the Buckinghamshire Audit Department and results disseminated to the project group, and also to the wider Trust via email.

This initial data collection suggested that in 57% of cases the high National Early Warning Score was escalated for review. Only half of cases were reviewed by a doctor; only a third were reviewed within an hour. In only 20% of cases were all criteria of the NEWS guidelines met.

See supplementary file: ds4526.docx - "NEWS guideline"

### Design

The initial measurements suggest that several factors were at play, including an initial dependency on ward staff calculating the NEWS and contacting the appropriate doctor. This was already being analysed and addressed by a parallel project led by nursing colleagues.

The results were discussed within the project group of junior

doctors, Consultants and Intensive Care staff, and it was felt that a greater awareness of the NEWS guidelines was required. A summary of management according to NEWS, including the baseline measurements of the project, was emailed throughout the Trust (medical and surgical divisions). In addition, the project was presented at both the Medical Consultant meeting as this was attended by most medical staff including junior doctors, and the hospital Grand Round which was attended by other divisions including surgery. Both of these presentations were given at Stoke Mandeville hospital and video-linked to Wycombe hospital. This provided useful feedback, including the general consensus that the workload currently faced by staff, particularly out-of-hours, was too great to facilitate the timely reviews that had been suggested by the guideline.

In order to help alleviate some of the workload, in March 2014 the Night Nurse Practitioner role was extended from night shifts to also include evening shifts (5pm to 9.30pm) during weekdays. At the time of writing there are plans to extend this to the weekend day shifts (9am to 9.30pm), based on a review of times of peak workload. Funding has also been approved for an increase in Outreach Practitioners, senior Intensive Care trained nurses who are also available during the day to review acutely unwell patients. The timescale for this is dependent on recruitment and training but the expansion of the workforce should be sustainable if it can be shown to improve clinical response times to patients with a high NEWS score.

Thus the plan is to continue to collect data regarding the response to NEWS scores on a monthly basis and disseminate this to staff via email for education and motivational purposes. Ideally the data would be presented at regular points throughout the year, to allow for staff changeover.

### Strategy

In the initial PDSA cycle (January 2014), following the design of the proforma, it was trialled on 3 wards. It was found that a large proportion of high early warning scores were not reviewed by doctors, but it was not clear following the data collection whether the ward staff had not contacted the doctor, whether there was an attempted but failed contact or whether the doctor had responded but not reviewed the patient for a particular reason (and whether this reason was justified or not). The proforma was therefore amended so that data to help investigate this was collected.

A month later, in the second PDSA cycle (February 2014), a different set of 3 wards were visited, to check that the proforma was usable across the Trust. The amended proforma was used, which included options regarding whether a call to the appropriate clinician was documented and if so when. The Critical Care Outreach Team (CCOT) was also added as an option of escalation. A high proportion (40%) of cases were still not being escalated appropriately, but when the score was escalated, this was done so within 30 minutes. Performance was poor for patients being reviewed even when called, and for reviews being performed by an appropriately senior clinician. In light of this, a presentation was made at both the Medical Consultant meeting as this was attended

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by most medical staff including junior doctors, and the hospital Grand Round which was attended by other divisions including surgery. Both of these presentations were given at Stoke Mandeville hospital and video-linked to Wycombe hospital. This provided useful feedback, including the general consensus that the workload currently faced by staff, particularly out-of-hours, was too great to facilitate the timely reviews that had been suggested by the guideline.

In the third cycle in March, the educational intervention appeared to have helped. We acted on the feedback from the previous cycle, and with the assistance of the Medical Director, an extended role of the night nurse practitioner was introduced to try to re-distribute some the workload, in the hope that this would allow more timely reviews of patients.

In the fourth cycle in April, the initial escalation of a high NEWS was still not occurring in many cases. To help this, the escalation pathway, found on the backs of the observation charts, was drafted to act as an aide memoire. Also included in this was the inclusion of CCOT, to reflect the greater role played by the Outreach team in reviewing patients and so to improve the response time for senior reviews.

In the fifth cycle in May, the improved NEWS chart with accompanying escalation pathway were issued to every ward within the Trust. "SBAR" stickers (Situation, Background, Action, and Response) were made to also help with verbal discussion. There was an improvement in the number of triggering patients that were escalated to a clinician.

A further data collection was performed a month after the introduction of the charts and stickers.

### Results

The post intervention data was collected in a similar manner to the initial data: junior doctors were assigned a ward and collected data from patients with a new high NEWS the first week of the month. One surgical ward at Stoke Mandeville hospital, one medical ward at Stoke Mandeville hospital, and one ward at Wycombe hospital were selected each month in a cyclical manner. 25 to 30 patients were included each month.

Several improvements were made to the proforma during the cycles including only using patients with NEWS of 5-6, expansion of who attended to include critical care outreach and clarification of whether a patient's NEWS took in to account a lower target saturations.

Interventions were decided upon following meetings with the senior clinical staff in the hospital. Funding and timescale played a factor in what could be achieved. The project was useful in monitoring success of interventions but also later iterations will be useful for planning second rounds of educational intervention.

From the initial baseline, an early intervention was nursing staff education about the relevance of NEWS scores. The result of this

was within 6 months of baseline, increase in appropriate monitoring and NEWS scores were being reassessed in 1 hour in 67% of cases. In 70% of the cases the nurse had informed the doctor (and documented this) whereas this had been as low as 39%. Notably, as the number of cases where a nurse called the doctor increased, there was a fall from 100% of calls made in 30 minutes to 91% of calls made in 30 minutes.

Along with the increase in nurse initiated reporting, there was an increase in the episodes when the doctor had attended within one hour to 85% of cases by June. The first PDSA cycle had produced levels of 33%. There has been a drop in the April cycle but this was reversed by future intervention.

The second intervention was to increase the hours in which there was Night Nurse Practitioner cover. These senior nurses can perform a number of tasks which often waylay a doctor from attending calls, notably cannulas, routine bloods, and death certification. By increasing their hours to include evenings and not just nights, the ward cover doctor for the evening was able to attend patients more readily. By April, 87% of patients with high NEWS scores were seen within one hour vs 33% in January.

In the January baseline audit, the attending doctor was only of the appropriate seniority in 40% of cases. From those doctors collecting data it was felt that this normally related to a patient with a NEWS of 7 or more where a registrar is supposed to attend and a team with critical care skills is to assess the patient. A presentation was made at the medical grand round in March which highlighted the NEWS system and drew attention to the escalation outlined by it. Following this there was significant increase in the appropriate grade of doctor attending to 87% by May.

Following the meeting, there was also an uptake in referrals to the critical care outreach team and for ITU review in line with protocol. By June referrals for ITU/HDU transfer or assessment had reached 50%. This was accompanied by an increase in reviews by critical care outreach.

The percentage of patients with new high NEWS scores receiving all appropriate care by the sixth cycle had improved from 3% to 12%.

One of the final interventions was to provide SBAR stickers to all the wards to aid communications. In addition to this a team of junior doctors was recruited to take over the monitoring of success for the coming year.

See supplementary file: ds4590.pptx - "Results Summary"

### Lessons and limitations

As the results above demonstrate, there were significant improvements in key indicators measuring the response of the clinical team to a deteriorating patient. Notable successes were an increase of clinician attending the patient within an hour of referral from 33% in the first month measured to 85% six months later. As importantly as the speed of response is the appropriateness of the

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attending clinician, hence again it was pleasing to see such large improvements in this (40%-87%). Such improvements can be accredited to the implementation strategies – namely educating colleagues, both Doctors and Nurses, open consultation encouraging feedback, and modifying clinical practice, and service provision accordingly.

This quality improvement project has several strengths. By using a ward rotation programme we captured a representative view of the hospitals performance reducing the risk of selection bias. Further, if the audit were to be continued, with several months data from each ward this would allow sub-stratification of adherence of each ward allowing for more tailored implementation approaches. The use of a medium sized data collection team also reduced the risk recording bias, whilst monthly cycles allowed for relatively quick feedback to guide further adjustments.

This project also has limitations. The sample size of thirty patients a month represents a small proportion of the patient population, however the ward rotation programme aimed at reducing the effect of this. Some of the initial low adherence rates were due to poor, or absence of documentation. This therefore may mean that the adherence rates were higher than those recorded, however documentation is an important part of the multi-disciplinary response to a deteriorating patient. Further still, some elements of the data collection such as 'appropriately acted upon' depends upon subjective interpretation of the data collector. We aimed to reduce this variation through the ward and data collector rotation programme. From our experience, we identified difficulties in the accuracy of data collection and refined the data collection proforma throughout the seven cycles, to improve the reliability of data capture. However, it is possible that some of the objective improvements in clinical practice may be related to these amendments. Finally, the NEWS score itself has inherent limitations, with inflexibility to account for a patients norm.

## Conclusion

This project demonstrates the value of short PDSA cycles allowing for real time feedback, and addressing of issues including implementation strategies, to achieve rapid and significant improvements in patient care. This further highlights the importance of a multi-disciplinary approach both in patient care, and the design and implementation of the services provided. Through continuation of the audit and the development of new implementation strategies, we hope to see continued and sustained improvements in clinical practice.

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## Declaration of interests

nothing to declare

## Acknowledgements

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