An evaluation of the impact of introducing a new model for recognising and responding to early signs of deterioration in patients at the Rotherham NHS Foundation Trust

Project team

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Executive Summary

Background

Hospitalised patients are at risk of clinical deterioration at many points during their in-patient stay. A growing body of evidence suggests that deterioration is not recognised or acted upon by hospital staff (NPSA, 2007). This may result in adverse outcomes including delayed or avoidable admission to critical care and increased mortality.

A variety of systems are currently in use in English hospital settings to ensure timely recognition of deteriorating patients (Department of Health and NHS Modernisation Agency, 2003) most of which are aggregate scoring systems such as Early Warning Scoring System (EWS). These involve periodic observation of selected vital signs which are compared to a simple set of criteria with predefined thresholds. (McDonnell, Esmonde et al, 2007). Education and training has been identified as crucial in their successful use. NICE (2007) recommended that some form of physiological track and trigger system should be used to monitor all adult patients in acute hospital settings (NICE 2007). NICE further recommended that physiological observations should be monitored at least every 12 hours and that a graded response strategy which has three levels should be implemented.

In 2008, The Rotherham NHS Foundation Trust (Rotherham General Hospital site) in response to this NICE guidance moved from a system where only those patients who were at high risk of deterioration plus post-operative and trauma patients were monitored using a Patient at Risk (PAR) score which is an aggregate scoring system and where all patients monitored using PAR were automatically referred to the Critical Care Outreach Team for review.

The new system involved:

- modification of the algorithm accompanying the PAR score to include three levels of response (low, medium and high)
- modification of PAR to include new physiological parameters e.g. oxygen saturation and adjusted parameters in line with national recommendations and local audit
- introduction of a key to identify oxygen devices in use
- introduction of a key to standardise how nurses chart heart rate, temperature and blood pressure recording
- modification of PAR charts to include measurement of hourly urine output in mls per hour
- modification of the existing observation chart to include the scoring tool and graded response in line with national recommendations

Thus the hospital would be moving from a single scoring system to a two tier scoring system involving two different observation charts. This represents a major change in the model for recognising and responding to deteriorating patients.

Project aims

The aim of this project was to evaluate the impact of a new hospital wide model for recognising and responding to early signs of deterioration in patients at Rotherham Hospital - the Rotherham Two Tier Warning System (RTTWS).

Methods

This project was a mixed method study comprising the following 5 stages:

1. Stage 1: Before and after survey
2. Stage 2: Before and after qualitative consultation with nurses
3. Stage 3: Qualitative consultation with hospital patients
4. Stage 4: Audit of observation charts
5. Stage 5: A retrospective audit of the relationship between the quality of observations and patient outcomes

Full details of the methods can be found in the project report.

Following consultation with the NHS Research Ethics Committee and Trust Research Office, the project was classified service evaluation.

Findings

Positive impact

This evaluation had provided invaluable insight into the real world experience of using track and trigger warning scoring systems in a UK acute hospital context. In summary:

- The quantitative before and after survey gave a clear indication that the new model had a positive impact on the knowledge, skills and confidence of nursing staff to recognise and manage deteriorating patients

- The qualitative interviews confirmed these findings and provided more detail of how nursing staff felt the new system had improved practice

- Nurses reported in the interviews that the new charts helped them to pick up deteriorating patients earlier and there was a significant increase in their confidence to recognise deteriorating patients in the before and after study

- Nurses who were interviewed felt that having objective information in the form of scores might also help more junior medical staff prioritise their workload across the wards that they were covering.

- Staff who were interviewed described their positive experiences of working with the new system in terms of feeling more confident to seek

help from medical colleagues and being more able to articulate their reasons for concern. This is important in the light of the finding that asking for help from doctors and more senior staff was one of the major areas of concern to emerge from the survey. However the increase in confidence to 'ask senior staff to come' in the before and after survey was not statistically significant.

- The survey and the interviews showed that staff found charts easy to complete and did not cause them undue problems in terms of time. Interviews confirmed that the layout and structure of the charts was clear and the instructions about what to do if a patient triggered clear and unambiguous. They survey showed that confidence to report abnormal observations and confidence about who to contact and at what point all increased significantly following the training and the introduction of the charts. Coupled with the information from the Stage 4 audit of charts which showed that charts were being well completed overall this is a strong indication that the charts are helpful to staff and usable in ward settings.

- Nurses who were interviewed liked having fluid balance on the PAR chart and also valued the inclusion of information on oxygen administration and oxygen saturations. Nurses also liked the new parameters which had been introduced to score urine output and respiratory rate, but noted that the education and support from the Critical Care Outreach Team had been important to help them get to grips with these initially. The time taken complete a score for every set of patient observations was seen as time well spent.

- The training in the new system evaluated well in the staff interviews, as did the subsequent support provided by the Critical Care Outreach Team.

- No significant problems emerged relating to the use of a two tier system. With the exception of fluid balance (discussed below) there seemed to be a seamless transition between the two charts.

- Although no strong message emerged that having a two tier system was better than a single system, some staff commented that having a different chart for acutely ill patients did highlight those most at risk

Areas for improvement

The staff interviews did highlight some unresolved issues and areas for improvement which are summarised below:

- Some staff disliked the fact that when patients were 'stepped down' from the PAR chart, fluid balance was not included on the clinical observation chart.

- The Stage 2 staff interviews highlighted inconsistencies between wards in relation to the role of health care assistants (HCAs) in the recording of observations. On wards were HCAs were trained to do observations but in practice had little opportunity to do so, this raised concerns regarding their on-going competence and confidence.

- Although the confidence of nursing staff did increase after the introduction of the new system, findings from the survey and the staff interviews highlighted ongoing concerns about getting timely response from medical staff on some occasions, particularly at nights and weekends and when patients were 'outliers'.

- In some wards, the need for continued observation and PAR scoring for patients who were being actively treated but were not for resuscitation and not on the End of Life Care Pathway was causing problems when patients triggered on the PAR score.

- The Stage 4 audit of charts indicated that the recording of fluid balance and weight needs improving as does the recording of actions that are taken when a patient triggers on PAR score.

- While all eligible staff were invited to attend the training, not all staff were able to attend. This may suggest that there are practical difficulties in delivering a hospital wide intervention

Other issues for practice

- Staff in some areas were more confident than in others. The reasons for this are unclear.

- The charts themselves only represent part of a complex picture. The importance of having adequate time to deliver care, having experienced staff with time in the specialty, good clinical judgement, knowledge of their patients and knowledge of the clinical area where they worked were important parts of the jigsaw. For this reason working in an unfamiliar area where staff did not know the patients or working on wards with patient who were outliers were sources of concern.

Recommendations for local practice

- Focused support should be given to wards where staff appear to be less confident in the recognition and management of deteriorating patients

- The role of HCAs in the recording of observations should be reviewed across the hospital. Issues to be considered include the need for consistency across clinical areas and the need for mechanisms to ensure that competence is maintained

- Nursing staff need additional training in the recording of fluid balance and the way that temperature is charted

- Consideration should be given to where weight is recorded. If a record of weight is required on the observation chart and PAR chart then staff need additional training to reinforce this message

- Additional training is needed to encourage staff to complete the sections in the PAR chart which relate to the actions taken in response to a 'trigger'. Accurate information here would inform subsequent audits of response times

- A standardised approach to the completion of the PAR chart where details of the response to triggers are recorded should be adopted across the hospital

- Ongoing audits on the completeness of the observation charts should continue

- Audits should be carried out to assess the time taken for medical review after patients have triggered
- Audits should be carried out to assess the extent to which the frequency of observations complies with local protocols

- The hospital should consider whether they wish to make a recommendation that when patients are on the PAR chart (rather than the clinical observation chart) only qualified staff should perform observations

- The relationship between PAR scoring and patients who are not for resuscitation but who are not on the End of Life Care pathway should be clarified

- Follow up questionnaires and chart audits should be considered to assess whether improvements in confidence have been sustained and whether standards of documentation have changed.

Recommendations for all hospitals

- When changes are made in the models used to recognise and manage deteriorating patients face to face training which is delivered by staff with acknowledged expertise in this field should be considered

- However, careful thought needs to be given regarding the practicalities of how training is rolled out across hospitals. Delivery of all training by the Clinical Care Outreach Team worked well in a small single site hospital like Rotherham. However, even here 100% attendance was not possible. In order to ensure that training initiatives are rolled out to all staff, other models of delivery should be considered.

- Hospitals developing new observation charts might wish to seek out examples of charts which have evaluated well in terms of ease of use and acceptability to staff.

- The questionnaire used in this evaluation was well understood and easy to complete. Other hospitals wanting to measure the knowledge and confidence of their staff in the recognition and management of deteriorating patients should consider using this instrument.

- The before and after design used here worked well and could be adopted by others to assess impact of planned changes in practice

- Patients who are outliers present additional challenges for nursing staff. The implications of this in terms of the recognition and management of deteriorating patients should be carefully thought through in all acute settings.

- How nurses convey information to medical staff about deteriorating patients should be carefully considered. Hospitals should consider guidance to include information on what the triggers were, how the scores have changed over time and what is expected from medical staff in terms of response times

- Irrespective of the scoring system in place, the importance of more fundamental aspects of care provisions should not be forgotten. These include support for junior nursing staff and HCAs from more senior experienced colleagues, adequate staffing levels on acute wards and a ward based workforce that is experienced and familiar with the specialty.

- If patients are to become better informed about their observations and encouraged to pay more attention to this aspect of their care as suggested in one report from the NPSA, then they would need additional information about the purpose and meaning of their observations

- Where patients are clearly involved in self-management of their condition, this has implications for their management in hospital, particularly in relation to the monitoring of their observations

- If a patient ‘triggers' nurses should consider feeding this information back to the patient. However, consideration should be given to individual circumstances including whether the patient wishes to discuss this aspect of their care

Recommendations for further research

- Further research is needed to explore the impact of scoring systems on the confidence, attitudes and behaviours of medical staff of all grades
- Further research is needed to explore why some clinical areas are less confident than others in the recognition and management of deteriorating patients.

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1. Background and aims

Background

Hospitalised patients are at risk of clinical deterioration at many points during their in-patient stay. Catastrophic events such as cardiopulmonary arrest are often preceded by signs of deterioration. However, a growing body of evidence suggests that deterioration is not recognised or acted upon by hospital staff (NPSA, 2007). This may result in adverse outcomes including delayed or avoidable admission to critical care and increased mortality.

The use of physiological track and trigger systems seeks to ensure timely recognition of all patients with potential or established critical illness and to ensure timely attendance from appropriately skilled staff (Department of Health and NHS Modernisation Agency, 2003). A variety of systems are currently in use in English hospital settings, most of which are aggregate scoring systems - where weighted scores are assigned to physiological values which are compared to predefined trigger thresholds - such as Early Warning Scoring System (EWS) or single or multiple parameter systems – which involve periodic observation of selected vital signs which are compared to a simple set of criteria with predefined thresholds. (McDonnell, Esmonde et al, 2007).

Education and training has been identified as crucial if nurses are to utilise clinical observation monitoring systems to their full potential. However, there has been little evaluation of the impact of these tools on the knowledge and confidence of ward staff. In addition, evidence is lacking on the utility of these tools including ease of use and acceptability to patients and staff (Goa, McDonnell et al 2007).

In many clinical areas, routine observations are now delegated to support workers rather than being done by qualified nursing staff. Recent work by the National Patient Safety Agency (NPSA) indicates that observations may be seen as tasks with a low priority and suggests that in order for recording of observations to be given appropriate priority, patients need to be convinced of

its value (NPSA 2007). However, little work has been undertaken to explore patients' perceptions of the value of routine monitoring and observations, let alone the value of physiological track and trigger systems.

In 2007, clinical guidance from NICE recommended that some form of physiological track and trigger system should be used to monitor all adult patients in acute hospital settings (NICE 2007). NICE further recommended that physiological observations should be monitored at least every 12 hours and that a graded response strategy which has three levels should be implemented.

In 2008, in response to this NICE guidance, The Rotherham NHS Foundation Trust (Rotherham General Hospital site) moved from a system where only those patients who were at high risk of deterioration plus post-operative and trauma patients were monitored (using a Patient at Risk (PAR) score) and where all patients monitored using PAR were automatically referred to the Critical Care Outreach Team for review.

The changes which were planned are outlined below:

- modification of the algorithm accompanying the PAR score to include three levels of response (low, medium and high)
- modification of PAR to include new physiological parameters e.g. oxygen saturation and adjusted parameters in line with national recommendations and local audit
- introduction of a key to identify oxygen devices in use
- introduction of a key to standardise how nurses chart heart rate, temperature and blood pressure recording
- modification of PAR charts to include measurement of hourly urine output in mls per hour
- modification of the existing observation chart to include the scoring tool and graded response in line with national recommendations

Thus the hospital would be moving from a single scoring system to a two tier scoring system involving two different observation charts. This represents a

major change in the model for recognising and responding to deteriorating patients.

A decision was made to introduce these changes throughout the hospital alongside a rolling training programme for all grades of ward nursing staff. An evaluation of the impact of these changes was developed through a collaborative partnership between the Trust and Sheffield Hallam University.

Project aims

The aim of this project was to evaluate the impact of a new hospital wide model for recognising and responding to early signs of deterioration in patients at Rotherham Hospital - the Rotherham Two Tier Warning System (RTTWS).

More specifically, the objectives were:

- To evaluate the impact of the introduction of the RTTWS on the knowledge, attitudes and confidence of qualified and unqualified nursing staff in the recognition and management of acutely ill patients
- To gain an understanding of the reasons for any observed changes
- To explore the perceptions of qualified and unqualified nursing staff on the impact of the new system on their day to day practice
- To explore whether the introduction of a two tier scoring system has any drawbacks in practice
- To explore whether the introduction of a two tier scoring system offers added value over a single scoring system
- To investigate the utility of the RTTWS in terms of ease of use and acceptability to patients and staff
- To audit the completeness of data collection and accuracy of scoring using the RTTWS
- To explore possible links between the quality of the recording of observations and patient outcomes

This was a mixed methods service evaluation which had five stages. Sections 2 to 6 describe the methods and findings for each separate stage of the study. The findings for all stages are pulled together in Section 7 together with implications of the study and recommendations. Following consultation with the NHS Research Ethics Committee and Trust Research Office, the project was classified service evaluation.

2. Stage 1 Before and After survey

Aim:

- To evaluate the impact of the introduction of the RTTWS on the knowledge, attitudes and confidence of qualified and unqualified nursing staff in the recognition and management of acutely ill patients

Methods

Pilot survey

In order to refine the data collection methods and the questionnaire, a pilot study was carried out using staff from the hospital's ophthalmic ward who were subsequently excluded from the main study.

Developing the sampling frame

A list of all qualified and unqualified staff who were currently working on the ophthalmic ward was developed based on the 'off duty' rota. This included staff who worked on day and night duty. Staff on long term sick leave/maternity leave were excluded from the sample. Health Care Assistants (HCAs) who do not perform observations and therefore were not eligible to attend the training were excluded from the sample. HCAs who were trained to do observations and therefore eligible to attend the training were included.

Instrumentation

The design of the questionnaire was based on an existing instrument developed by Featherstone, Smith et al (2005) which was adapted for the purposes of this evaluation. The questionnaire comprised a series of questions asking respondents to rate their confidence, skills and knowledge relating to the recognition and management of deteriorating patients on a numerical scale. The questionnaire also included some closed and open questions and collected demographic information about respondents.

Respondents were asked to indicate how long it took them to complete the questionnaire and were invited to comment on any questions which were difficult to interpret or to answer.

Data collection prior to the intervention

Evidence based data collection strategies were used throughout in order to maximise the response rate (Edwards, Roberts et al 2002).

In October 2008, prior to attending a training session on the new scoring systems and observation charts, questionnaires were distributed to the staff. In some instances questionnaires were taken to the ward a few days prior to the training, in other cases questionnaires were distributed and collected in on the actual training day, before the training began. Questionnaires were printed on green paper with a personalised covering letter on headed paper including the Trust logo. The letter included a request that staff also complete a follow up questionnaire at a later date. An envelope was included for replies.

Intervention

In October 2008, over a 4 week period, the training session was delivered on eight occasions based on the availability of ward staff. The training was delivered by the Critical Care Outreach Clinical Nurse Specialist and lasted approximately 30 - 45 minutes. The content of the session included information on the recognition and response to patients who are deteriorating and an overview of the new clinical observation chart and PAR chart and the accompanying algorithms. In addition to highlighting the differences between the new model and the current system, the training allowed time for staff to ask questions and raise any concerns about the recognition and management of deteriorating patients.

Approximately two weeks after staff attended this training session, the new monitoring charts were introduced to the ward. Over the next 4 weeks daily visits were made by the Critical Care Outreach Team (CCOT) to the ward to

deal with any problems or queries relating to the use of the new charts in practice.

Data collection after the intervention

Approximately 5 weeks after the introduction of the charts, staff were re-surveyed to measure any changes in their self-assessed knowledge, attitudes and confidence in the recognition and response to deteriorating patients using the same questionnaire. The questionnaire was hand delivered to the wards and a box for completed questionnaires was left on the ward. Regular visits were made to the ward by the CCOT to encourage non-responders to complete the questionnaire.

Data analysis

Responses to closed questions were pre-coded for computation and questionnaires responses were entered on to SPSS (SPSS Windows version 16) where checks were carried out to expose possible errors in data entry or coding. Further analysis highlighted any questions which has posed problems for respondents and explored the time to complete the questionnaire.

Findings

The response rate to the 'before' survey was 15 out of 17 (88%).

Thirteen of the 15 'before' respondents sent an after questionnaire (87%). In addition, one member of staff returned an after ' questionnaire who had not completed a 'before' questionnaire.

The final number of paired responses (respondents who completed a 'before' *and* an 'after' questionnaire) was 13 out of 17 (76%).

A number of minor modifications were made to the wording and layout of the questionnaire to clarify areas of ambiguity or highlight instructions to respondents. The final questionnaire appears as Appendix 1.

Main survey

Following a sample size calculation, a decision was made to include 12 wards in the survey. Full details of the sample size calculation are given in Appendix 2.

Developing the sampling frame

The 12 wards included in the evaluation were all the in-patient areas in the hospital excluding day surgery, ophthalmic and the care of the elderly wards.

The same methods used in the pilot survey were used to develop the sampling frame of ward staff.

Data collection prior to the intervention

In order to maximise response rates, questionnaires were given to all staff and completed questionnaires collected in immediately before the start of each training session.

Data collection strategies reflected those used in the pilot study. The covering letter gave an estimate (based on pilot data) of how long the questionnaire should take to complete (5 to 10 minutes) and advised staff that as a gesture of appreciation, all staff who completed before *and* after questionnaires would be entered into a prize draw. Two members of staff would then be selected at random to receive high street shopping vouchers to the value of £25.

Intervention

The timetable for the delivery of the intervention during 2009 was driven by the operational requirements of the hospital. The 12 included wards were divided into three groups based on clinical specialty. Group 1 (n = 3) consisted of surgical and urology wards, Group 2 (n = 4) consisted of orthopaedics, haematology and gynaecology wards and Group 3 (n = 5) comprised the medical wards, the stroke unit the planned investigations unit

(PIU) and the acute admissions unit (AAU). The intervention described in the pilot study was rolled out to these three groups on a staged basis.

The amount of time required to allow all eligible staff the opportunity to attend the training varied between the three groups due to seasonal pressures and workload affecting the availability of staff to attend with Group 1 wards taking the least time to train (4 weeks) and Group 3 wards taking the longest. In order to allow enough time for training of the Group 3 wards, the introduction of the charts was delayed by two weeks for four out of the five wards.

Full details of the timeframe for delivery of training are given in Appendix 3.

Data collection after the intervention

For all wards, six weeks following the introduction of the charts, 'after' questionnaires were sent to all staff. Covering letters and the frontsheet of the questionnaires included the deadline for return of completed questionnaires (two weeks). A box for the return of completed questionnaires was left on each ward.

Written reminders and another copy of the questionnaire were sent to non-responders after the two week deadline had passed. In some cases, ward managers delivered and collected in these questionnaires. The Nurse Consultant for Critical Care and the Research Assistant also visited each ward to encourage staff to complete their questionnaires.

Data analysis

Responses were entered on to SPSS (SPSS Windows version 16) and data checks carried out as described in the pilot study. Datasets for 'before' and 'after' responses were then merged and a new dataset created which included only the data for those respondents who had returned a 'before' and 'after' questionnaire (n = 213). Subsequent analyses are based on this paired data only.

Data were analysed descriptively in SPSS. Differences between 'before' and 'after' responses were then analysed using appropriate statistical tests.

Paired T tests were used for continuous data and, McNemar tests for categorical data.

To look at differences between groups, independent sample T tests (for groups of two) and 1 way ANOVA with Bonferroni tests to explore post-hoc differences (for groups of more than 2) were used.

Responses to open questions were content analysed for themes.

Results

The responses rates for each Group are given in Table 1.

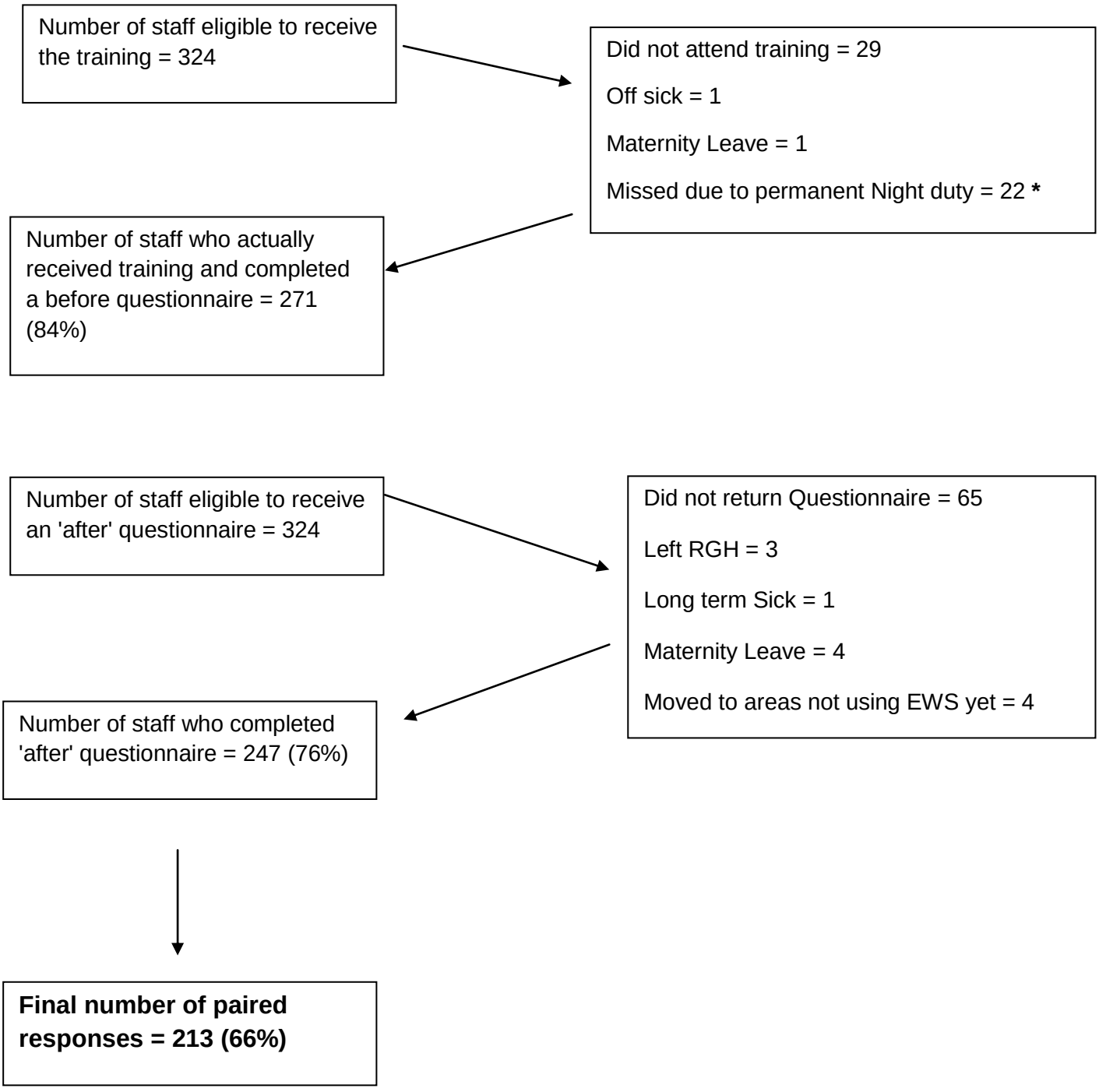
Table 1. Response rates by Group

Group	Eligible staff n (%)	Staff attending training n (%)	'Before' questionnaires returned n (%)	'After' questionnaires returned n (%)	Paired responses n (%)
1	73 (100)	64 (88)	64 (88)	66 (90)	60 (82)
2	112 (100)	97 (87)	97 (87)	88 (79)	78 (70)
3	139 (100)	110 (79)	110 (79)	93 (67)	75 (54)
Total	**324 (100)**	**271 (84)**	**271 (84)**	**247 (76)**	**213 (66)**

All staff who conducted observations were invited to attend the training and 271 (84%) of the 324 eligible staff did attend the training and completed 'before' questionnaires. While 247 staff completed the 'after' questionnaire, not all of these had attended the training and completed the 'before' questionnaire.

A breakdown of the response rates for all wards is given in Figure 1. Appendix 4 details the response rate by individual wards.

Figure 1. Summary of response rates to 'before' and 'after' questionnaires



* 23 staff on permanent nights were trained

Characteristics of respondents

Characteristics of the respondents are shown in Table 2 and indicate that the ward staff are relatively mature in terms of age and experienced in terms of years since registration, although the range for both is very wide.

Table 2. Characteristics of respondents

Gender n (%)	
Male	19 (8.9)
Female	194 (91.1)
Band n (%)	
2	69 (32.4)
3	2 (0.9)
5	100 (46.9)
6	30 (14.1)
7	11 (1)
8	1 (0.5)
Age (n = 211)	
Mean	41.2
SD	10.5
Range	19-64
Years since registration (n = 138)	
Mean	9.6
SD	6
Range	0 - 36

Appendix 5 gives the full details of the findings from the analysis of the 'before' and 'after' questionnaires. Key findings include the following:

- On average, prior to the intervention, staff rated their level of experience and knowledge as >7 on a 1 to 10 scale. Their confidence to manage deteriorating patients was also high, although their confidence to recognise deteriorating patients was lower (7.5) than their confidence for the other factors.
- The total number of concerns expressed by staff prior to the intervention was 4.3 out of a possible 10.

- After the intervention all scores went up apart from total number of concerns which went down to 3.7 out of a possible 10.
- When the difference in scores between the 'before' and 'after' data were explored to see whether the observed differences were statistically significant, all of the differences except the difference in scores for 'How confident are you in asking a more senior member of staff to come and assess a patient on your ward who is deteriorating clinically?' were statistically significant.
- Many of the differences are in the order of a change of 0.5 on a 10 point scale (i.e. about 5% of the scale). An important question to ask is 'Is this clinically meaningful?' Details of the methods used to make this judgement are given in Appendix 5 (Table C) and resulted in a judgement that three of the changes which were statistically significant constituted a moderate clinical effect size. These changes were in level of experience, level of knowledge and confidence to recognise a deteriorating patient.
- There were differences between the 'before' and 'after' responses to questions about whether a series of factors were a cause for concern when dealing with deteriorating patients. For all factors the number of staff who stated that these were a cause for concern was reduced following the intervention. These reductions were statistically significant for two of the ten factors.
- There were differences in the responses of qualified and unqualified staff. Before the intervention the qualified staff scored higher that the unqualified staff for all scales and the total number of concerns were less. For five of the scales, these differences were statistically significant with large effect sizes for three scales and moderate effect sizes for two scales.
- After the intervention, for all scales except confidence in who to contact, the qualified staff scored higher that the unqualified staff but the total number of concerns were the same. For six of the scales, these differences were statistically significant with large effect sizes for three scales and moderate effect sizes for two scales.
- For most scales the unqualified staff scores increased more than the scores for the unqualified staff - indicating that the improvement after the training was

greater in the unqualified staff. This was statistically significant for two scales where the effect size was moderate.

- Although there were some differences between medical and surgical/orthopaedic wards before the intervention, with surgical staff having higher scores for most scales and on average less concerns, these differences were small and not statistically significant.
- There were no statistically significant differences between medicine and surgery after the intervention
- The only change between before and after scores between medical and surgical staff was in confidence to ask a more senior member of staff to come and assess a patient which was greater in surgical staff with a moderate standardised effect size
- Two wards scored significantly lower than other wards for three scales after the intervention
- There were no significant inter-ward differences in the changes between before and after scores.

Staff were asked to estimate the time taken to complete the new observation charts. Table 3 reports these findings.

Table 3.Time to complete new charts

	Clinical obs chart **n (%)**	**PAR chart** **n (%)**
Less than 1 minute	49 (24.5)	25 (12.7)
Between 1 and 5 minutes	141 (70.5)	156 (79.2)
More than 5 minutes	10 (5.0)	16 (8.1)
Total	**200 (100)**	**197 (100)**

93 % (n = 86) of staff indicated that the introduction of the new charts had not resulted in any difficulties in their ward and Table 4 indicates that when measured on a 1 to 10 scale, the level of difficulty with completion of the new charts was low.

Table 4. Level of difficulty with completion of new charts

	Mean	SD	Minimum	Maximum
New observation chart (n = 206)	2.3	2.1	1	9
New PAR chart (n = 204)	2.4	2.2	1	10

Conclusions

Over 80% of nursing staff who conduct patient observations on the included wards received the training and completed the 'before' questionnaires. The final number of staff who completed 'before' and 'after' questionnaires (66%, n = 213) was a better response rate than anticipated and ensured that the study was adequately powered to detect differences in knowledge, attitudes and confidence in the recognition and management of acutely ill patients.

While the good response rate to the 'after' questionnaire was certainly helped by concerted efforts to follow up non-responders, it is also likely to reflect the fact that ward staff could see the relevance of the issues being explored. The good response ensured that views of the majority of staff on the included wards were represented, but it should be remembered that response rates varied considerably between wards (between 31% and 95%) with the best response rate for the Group 1 wards (surgery and urology) and the worst response rate for the Group 3 wards (medicine, stroke, PIU and AAU).

Scores for all the scales which measured the self-assessed knowledge and confidence of staff increased after staff received initial training and then ongoing support after the introduction of the new charts. Most of these increases were statistically significant and there was also a statistically significant reduction in number of concerns expressed by staff. Although the size of these changes were 'moderate' in most cases, this may be due to the fact that the scores were fairly high to start with, which may reflect the fact that overall this was an experienced workforce.

The number of staff who expressed concern about ten individual issues was reduced in the 'after' group for every issue. In some instances these reductions were statistically significant. This again indicates that the intervention had a positive impact.

For all scales the qualified staff scored higher than the unqualified staff before the intervention. Some of these differences were large - about 2 points on a 10 point scale and some of these differences were statistically significant. It is entirely expected that qualified staff would feel more knowledgeable and confident in this area and this finding attests to the validity of the questionnaire. Similarly, for most scales the qualified staff scored higher than the unqualified staff after the intervention and again some of these differences were statistically significant.

Interestingly, for most scales the unqualified staff scores increased more than the scores for the unqualified staff - indicating that the improvement after the intervention was greater in the unqualified staff. However, this may be because there was less scope for the qualified staff to improve as their scores were higher to start with.

There were some differences between medicine and surgery with surgical wards having higher scores for some scales but these changes were small and not statistically significant. These may be attributable to the fact that historically PAR scoring has been used more extensively on the surgical wards at the hospital.

When differences between individual wards were explored two of the wards consistently scored lower than others for some scales. However the reasons for this are unclear.

The findings indicate that the charts were not time consuming to complete and there was no evidence to indicate that the introduction of the new charts had caused problems for the wards.

In summary, the overwhelming picture to emerge from Stage 1 is that the intervention did have a positive impact on the self assessed knowledge, skills and confidence of all grades of staff in the recognition and management of deteriorating patients.

3. Stage 2 Before and after qualitative consultation to explore the perceptions of nursing staff on the impact of the RTTWS

Aims

- To explore the perceptions of qualified and unqualified nursing staff on the impact of the new system on their day to day practice
- To explore whether the introduction of a two tier scoring system has any drawbacks in practice
- To explore whether the introduction of a two tier scoring system offers added value over a single scoring system
- To investigate the utility of the RTTWS in terms of ease of use and acceptability to patients and staff

Methods

Prior to the introduction of the RTTWS, a sample of fifteen nursing staff was recruited for interview. Purposive sampling was used to ensure inclusion of a range of staff who received the intervention in terms of ward, grade and length of time since qualifying. Five staff from wards in each of the three staged intervention groups were interviewed. Ward managers from two surgical wards, one orthopaedic ward, one acute medical ward, and one other medical ward agreed that staff from their ward could be approached about the study. Registered nurses and health care assistants who were interested were sent the study information sheet, and followed up to see if they still wanted to be involved. All staff who were asked initially agreed to take part.

Table 5. Sample Characteristics

I.D	Speciality	Band	Length of Time as RGN or HCA (years)	Length of Time on Ward (years)	Training related to the Deteriorating Patient already undertaken
1	Surgery	7	>20	>10	ALERT, Sick Ward Patient
2	Surgery	6	5 - 10	5 - 10	ALERT, Sick Ward Patient
3	Surgery	5	< 1.0	< 1.0	
4	Surgery	5	1 - 5	1 - 5	ALERT, Sick Ward Patient
5	Surgery	2	1 - 5	1 - 5	NVQ clinical Observations
6	Orthopaedic	5	1 - 5	1 - 5	Sick ward patient
7	Orthopaedic	2	1 - 5	1 - 5	HCA study days clinical observations
8	Orthopaedic	6	5 – 10	5 – 10	ALERT, Sick Ward Patient, Sepsis Day
9	Orthopaedic	5	1 - 5	1 - 5	Sepsis Course
10	Orthopaedic	7	>20	1 - 5	
11	Acute Medicine	6	5 - 10	<1.0	Sick ward patient
12	Acute Medicine	5	1 - 5	1 - 5	Sick ward patient
13	Acute Medicine	2	1 - 5	<1. 0	NVQ clinical Observations
14	Medicine	5	>20	1 - 5	Sick ward patient Critical care experience
15	Medicine	5	1 – 5	1 – 5	Sick Ward Patient, ALERT, Sepsis Course

(***The Length of Time as RGN or HCA and Length of Time on the Ward has been clustered for anonymity)***

Interview Process

Participants were interviewed before the training and introduction of RTTWS and then again approximately 6 weeks after the introduction of the new charts to the ward. Interviews were arranged at a convenient time for the staff member, at their place of work, using a quiet room or office, and were approximately 15 - 20 minutes in length. All the interviews were audio taped with the participants' written consent, and an external independent company transcribed the taped interview. As seen in Table 5 the sample included qualified staff and health care assistants of varying grades, hospital ward and clinical speciality. Twelve women and three men took part. One follow up interview after the introduction of the RTTWS was missed as the staff member had left Rotherham hospital.

A schedule was used to guide the interview that explored the following areas pertinent to the project objectives:

Before the introduction of the RTTWS:

- The participants' perspectives on current management of deteriorating patients
- The utility of the current physiological track and trigger
- Perceptions of the benefits or drawbacks of changing from a one tier to a two tier scoring system

After the introduction of the RTTWS:

- The participants' perspectives on the utility and impact of this change on their practice
- The reasons for any changes in their knowledge, skills or attitudes in the recognition and management of acutely ill patients
- Perceptions of the benefits or drawbacks of utilising the two tier scoring system.

The staff interview schedules are included as Appendix 6.

Data analysis

The interview transcripts were checked against the original interview for accuracy, and transcripts were then reviewed and analysed by the evaluation team. Using a pragmatic approach of thematic framework analysis the data was sifted and charted to classify it into key issues and themes related to the introduction and use of the REWS and PAR chart (Ritchie and Spencer, 1994). Framework analysis allowed the integration of *a priori* issues into the emerging data analysis and provided a clearly defined analytical structure to ensure the transparency and validity of the results. Once themes had been identified and agreed by the evaluation team the data was analysed into thematic areas. The qualitative data analysis software NVIVO 7 was used to manage, store and search the data. A diagrammatic framework of themes from the data analysis is included in Appendix 7.

Following analysis of the interview data emerging findings were considered alongside the qualitative data generated in responses to the following "before" and "after" questionnaire items in Stage 1. The survey qualitative data was used to challenge and expand on the interview findings. Responses to the following survey questions were used:

> Question 3: Briefly describe how you would currently recognise that a patient on your ward is deteriorating clinically.
>
> Question 4: Briefly describe any worries or concerns you have about recognising a patient on your ward who is deteriorating clinically.

Qualitative data from the survey is presented in Appendix 8.

Table 6. Themes Identified in the Framework Analysis of Interviews

Before the introduction of RTTWS	**After the introduction of RTTWS**
Observation • Clinical observation • Observing the patient • Knowing the patient	Training

Experience
• Confidence
• Experience
  ○ Intuition
  ○ Clinical judgement
  ○ Length of time qualified
  ○ Exposure to speciality
	Experience of RTTWS
	• Impact on workload
	• Highlighting deterioration earlier
	• Clinical observations and parameters
	• Communicating with medical staff

Support and leadership	Support
Training • Deteriorating patient • RTTWS Training	Using the two tier system
Expectations of RTTWS • Worries and concerns • Positive expectations	Flexibility
Communicating with medical staff	Health Care Assistants Performing Observations
	End of life care

Discussion of the emergent themes

Before the introduction of RTTWS: Expectations and Experiences

Observation

Clinical observations

Nurses described how observing the patient and doing clinical observations were the primary ways in which they identified deteriorating patients on the ward.

'Clinical observation to start with, you can see obviously a patient's not well' (11)

'By the clinical observations; the blood pressure, pulse, their respiration rate, their temperature' (15)

''By the observations, and then if we're concerned about a patient we start them on PAR scoring and monitor them that way' (8)

These findings are supported by the responses to question 3 in the questionnaire. All RGN and most health care assistant (HCA) questionnaire respondents cited clinical observations as the method to identify deteriorating patients, supported by observing how the patient looked. HCA's also reported other clinical signs in identifying patients who were unwell, such as altered breathing patterns, and patients specifically not wanting to take diet and fluids or mobilise. HCA questionnaire responses therefore suggest they utilise other methods to understand when patients are potentially deteriorating. Examples given in the interviews include:

'We can tell by looking that something's not right and then inform the nurse who's looking after them' (5)

'For me it's feeding, if they've gone off their food, or if they're not passing urine enough, they are drowsy or sleepy' (7)

Health care assistants identified that they had not developed confidence in recognising abnormal observations due to the lack of practice taking patient observations:

‘ because it is such a busy ward I don’t get to do them as often as what I’d like, because the qualified nurses do them and we’ve just had a few of us that’s trained on this observations course, so we’re all like a little unconfident at the moment, but to do it, to get your confidence, you’ve got to do more, and I don’t think we do enough. Like I say I’m not as confident with that yet, but I’m sure the more I do it the better I’ll get’ (7)

‘Obviously more, doing it more would help me recognise, the more you do it, the more you’re bound to come across them people that are deteriorating and that, but if you don’t do it like I say, it’s very rare you come across anybody’ (13)

All the wards involved in the evaluation had some health care assistants who were trained to take clinical observations. Finding that HCA’s did not often have the opportunity to practice taking observations led the evaluation team to explore which wards provided more occasions for HCA’s to do this. This aspect is discussed later in the findings after the introduction of RTWWS.

Observing patients

Not being able to observe the patients adequately due to workload pressures were raised as a concern by some respondents;

‘*With demands on time and pressures on wards, you haven’t always got time just to look at a patient, even though you might have, like, I say you might have done their observations previously, even just having a glance at someone you can sort of get an indicator as to how they’re doing’ (9)*

This comment is supported by the replies to question 4 of the questionnaire. The problem of workload and lack of time to manage acutely ill patients was raised by 21 (33%) of questionnaire respondents before the introduction of RTTWS, and 30 (40%) after the introduction of RTTWS.

Knowing the Patient

Both qualified and non qualified staff described looking at and observing patients as an important factor in monitoring deterioration. Linked to observation of the patient, was knowing that patient, and perceived as essential to understanding if a patient

was deteriorating or not. This is supported by a few respondents to question 4 of the questionnaire on worries and concerns. Four respondents suggested medical patients who were ‘outlying’ from other wards caused concern, two replies raised concerns about the patient being unfamiliar and unknown to staff. These comments suggest that staff have concerns about not knowing the patient or caring for patients with conditions unfamiliar to them or the speciality they are working in.

Box 1. Knowing the Patient

- *'Our patients are quite long term, so.... obviously when you do your observations you notice deterioration in blood pressure, pulse and things like that, respiration rate recording and things. So it's mainly by sight and experience really' (14)*

- *'Patients that you've like looked after for a couple of days, you get to know them so you can tell ' (13)*

- *'Just getting to know your patient and sometimes just a sixth sense that they're just not quite right' (15)*

- *'given a little background history of patient, you're able to use that judgement and apply their history to their current admission' (9)*

- *'You can see colour, whether they're drowsy, whether they're awake, you know, what they're normally like. Especially if they've been in a while you get used to them. It's harder to tell somebody that's just come in. But it's just like the more you care for them the more you get used to them and know what they're like' (7)*

- *'If they don't know the patients that well, although we do know they've deteriorated and things, because sometimes their observations don't even tell you that they're poorly but you just know. Because you know that patient, you just know that they're not as well as they should be really' (14)*

Experience

<u>Confidence</u>

Experience, length of time qualified and exposure to acutely unwell patients were seen as essential in developing confidence to manage patients at risk of deterioration:

'I feel quite confident. I think it comes with experience of looking after patients that you can spot when a patient's not, is deteriorating' (8)

*'Confidence I think it's from experience, it's from seeing lots of different patients and having the experience of how they deteriorate and how fast they deteriorate. Yeah, from when you're first qualified, and confidence in looking at different things, and looking at the bigger picture' (*12)

Respondents also associated experience and knowledge with the confidence to use early warning scoring systems and communicate with medical staff:

'You know, you're confident enough to be able to relay that to doctors to tell them, you've got that confidence and you can say this is happening. I think anybody can add a PAR-scoring sheet up. You can ask a first year student to do a PAR-scoring sheet. But what you do with it at the end of the day is down to experience and how you relay what you've found to the doctors, you know, what you found on your PAR sheet, so it's how you relay to the doctors as well, and how confident you are to do that' (6)

Experience

Level and type of experience was referred to by all staff as an important factor in developing the ability to identify deteriorating patients. They described experience as a combination of intuition, clinical judgement, length of time qualified and exposure to a speciality. It emerges that all of these four characteristics of experience are inter woven at times. All these aspects assisted staff in recognising and managing the deteriorating patient (see Figure 2)

Staff described an interrelation between experience and ***intuition*** when caring for unwell and deteriorating patients:

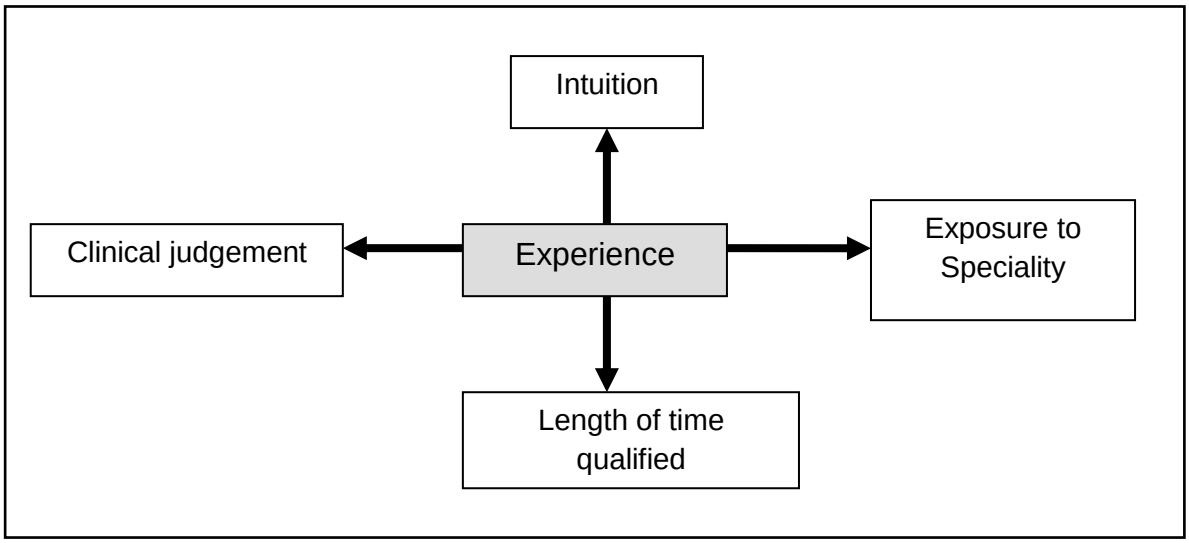
'There's something not quite right, and you just know that' (14).

'If you've seen it once you think.... intuition tells you that, your experience tells you that that patient, there's something wrong'(11)

'Just a general intuition as well comes into it a lot, so you just know that a patient's not right just by looking at them' (4)

‘Through your experience and your knowledge, your knowledge base, and again just back to that sixth sense that someone’s not quite right. You know, obviously patients on this ward we have for quite a while so you do get to know them as a person and if they are having an off day’ (15)

Figure 2. Characteristics that encompass experience



To rationalise their concerns about deteriorating patients, staff also described using their ***clinical judgement*** combined with intuition:

'But as soon as we take it (warming blanket) off within a few hours she's back down to more or less her normal temperature. But if you looked at her temp on a clinical basis, you'd think she was hypothermic, so it's that sort of clinical judgement again that you think well this is what's normal for her, due to the condition she's got' (11)

'Just by using your clinical judgement and looking at patterns in their observations or their general condition, you can determine if they are deteriorating' (9)

Nursing staff did also describe concerns about clinical judgement possibly being restricted when using an early warning scoring system, which is discussed later.

Length of time qualified was also seen to be important in developing skills to identify deteriorating patients. Junior staff participants were aware that they needed more exposure to clinical situations to develop their confidence in utilising clinical knowledge:

*'I think I could spot somebody who was deteriorating now better than I could probably six months ago, by observing them plus using the observations, vital signs' (*3)

'I've not got a great deal of experience, because I only qualified in May, an experienced nurse might see something that I haven't seen because they've seen it before……. I feel that I've got a little experience but nowhere near like an expert. I still feel a novice in some ways. Although I might have the theoretical knowledge, the practical side is actually going through experiencing things happening, so the more experienced nurses are often the ones I think who are more expert at spotting things' (3)

Other staff who had more clinical experience found that this exposure helped them in identifying and managing acutely ill patients:

'I feel quite experienced, normally just by going round looking at your patient, doing your assessments - that's how I learned through experience' (1)

Exposure to a clinical speciality. The experience in managing a particular patient group was described as important in managing patients at risk of deterioration by nursing staff. For example:

'I think it comes with experience of looking after certain patients that you can spot when a patient's is deteriorating' (8)

'working in this field, in the general surgical field, I think I know what, things to look for in patients, particularly patients that's had surgery, you can sort of pinpoint areas that aren't quite right' (1)

However concern was expressed that working in one speciality for some time can lead to anxiety if nurses were expected to nurse patients from another speciality:

'I think I'd be a bit stuck on medical wards and that. I mean I'm nursing surgical patients. Even though we're general trained I think you sort of specialise in your own area' (2)

Staff discussed experience in caring for and managing acutely ill patients in relation to the quantity of such patients. It was suggested that the amount of exposure nurses have to acutely ill does relate to the ability in managing such patients appropriately:

'a staff nurse that's been not on an acute ward, that's been on a maybe, an elderly ward, even though they ..... might have been qualified ten years, but because their experience is not in acute patients, they wouldn't be able to identify a potential problem as quickly as somebody that is used to it and dealing with it on a, you know, everyday, day in day out' (6)

The ***support, leadership***, and knowledge of senior ward staff were acknowledged as contributing to nursing staff confidence in managing patients who were deteriorating:

'*Like I say I do feel quite confident at the moment, and I think the fact that we've got good support on ward at moment also helps' (9*)

This was viewed as particularly important by less experienced nursing staff:

'My ward manager, a couple of weeks ago, we got a poorly patient, and I could tell they were deteriorating, I wouldn't have known exactly what was happening with the patient. I reported it to the doctor and ward manager, and ward manager just instantly said yeah, I think this is happening with this patient and we need to do this, this and this, and that really helped, it sped up the process, identifying and being able to act on what was happening with that patient' (9)

The importance of team work and support for the team was described by a health care assistant:

'I'm like fairly confident, more confident than when I first started, but if I'm in doubt at all I go straight to a qualified nurse to get their okay' (7)

Qualified nurses also valued the support and experience of non qualified staff in the total management of a patient who has the potential to deteriorate:

'The auxiliaries, I mean you can't fault them, they do, and they do pick up patients as well because they've been on there for a long time. So they've got good experience and they will relay that they feel someone's not well' (14)

Training

Deteriorating patient

Participants reported attending the ALERT course and the Sick Ward Patient course delivered by the critical care outreach team. These were described as very useful, particularly in improving confidence in managing deteriorating patients:

'I've done sick ward patient in-house training so I feel quite confident actually' (2)

'We all came back and I was just really fired up. but it just makes you feel a bit more confident, that ALERT course is fantastic, you just wanted to put it into practice because it made so much sense. …..I can still remember going through a checklist in my mind and I still do it now' (4)

Senior nursing staff were aware of the positive investment these courses brought back to the clinical areas, and the importance of staff applying this learning in practice:

'*The knowledge and skills that they've learned from the courses and bringing it back to the ward, because as I said to them when they go on, particularly Sick Ward, it's not about you just having four days off the ward, it's about you coming back to the ward and utilising those skills' (10)*

Non-registered nurses did not have access to the same courses for identifying deteriorating patients, other than the training for carrying out clinical observations. Some concern was expressed regarding this.

'Go on the courses for the acutely ill which the qualified go on, because at the end of the day we're all in the same boat with these patients (5)

REWS Training

Participants expected that the training provided before the implementation of RTTWS would include information on why the intervention was being introduced and how to manage the process:

'In the training we would expect scenarios and examples of how it is to be used, What are the Implications for not doing this, patient safety' (5).

There was also concern expressed around the evidence base of the proposed change:

'Why are we doing it, what is underpinning it, why are we bringing it in - I'd want to know why. And in the places where it has been done already what results they've kind of, we've seen, has it done what they said it were going to do' (6)

In general the needs of staff in training for the new RTTWS was summarised as:

'*Just training us on how to use the new sheets and about, I think just teaching us how to use the new sheets and how to spot deterioration in patients (8)*

REWS Expectations

Worries and Concerns

Staff expressed some worries and concerns about the introduction of the RTTWS. Concern was expressed by nurses about being able to utilise their own clinical judgement in conjunction with the proposed new early warning score:

'*Hopefully you will be able to incorporate your judgement into determining which aspects of it are not, or might not be entirely appropriate for that patient' (9)*

Participants highlighted the importance of being able to use clinical judgement when interpreting the EWS. Ability to do this would depend on the level of clinical experience, and ability to use intuition and knowledge of the patient:

'It's just making sure that we're not using it inappropriately, because obviously you're going to get newly qualified that probably need, are going to follow it rigidly, whereas obviously a more qualified nurse who's got a little bit more clinical experience and understands the patient, may use it a little bit more loosely if that's the word' (11)

'You've got to use your initiative and your common sense really And that's what, PAR is just a tool to allow you to do this. It's not really a black and white, this is what you do, this is what you do, you've got to use your own instincts and your own sense really' (4)

Staff did see the early warning score is a tool to assist in managing the process, and may help identify patients earlier:

'*Patients have always got the potential to deteriorate at any time so - I mean the PARS not going to prevent that; it might just highlight a little bit earlier' (6)*

Staff also expressed some concerns about the ease of using the new charts and the reasoning for using them:

'If it's difficult to use, I think it will sort of get sidelined and not used like it should. But I think if everybody understands what it's for and how it works, and it's proven that it will be beneficial, then I think it will be fine' (11)

<u>Positive expectations</u>

Nurses who had previous experience of the early warning scoring systems thought that it helped to develop nurses' clinical experience and anticipated that the new system would do likewise:

'I think that (EWS) has helped to give me a better insight into what can happen and what to look out for' (3)

'I think using tools such as PAR scoring helps develop that experience and understanding and that ability to identify patients that are more likely to be at risk' (9)

It was suggested that EWS would also assist in communication, with supportive evidence from clinical observations:

'I think it'll help enormously to pick up in communication and things like that, because we can pass over obviously that we're worried about somebody and know we've got some proof so to speak on what we're talking about' (14)

It was anticipated that having to calculate and quantify a score would improve the quality of observations, and enable nurses to consider the observations they have undertaken:

'It will make you think about the observations as you have to look at the values and apply a score, instead of just rushing about and doing obs to get them out of the way, as another task' (5).

The proposed EWS and it's accompanying algorithm was seen as supporting staff in making decisions when a patient has been identified as deteriorating:

'I think it'll get nurses thinking more, it'll give them a clear pathway as to what to do when a patient's scoring' (1)

Staff also talked about the possibility of improved care for the patient and a reduced workload for staff if deteriorating patients are identified earlier as summarised:

'*I think perhaps in the long term it could reduce the workload by patients not deteriorating because you're spotting it earlier on' (8)*

Communicating with medical staff

More than half of the respondents indicated on the pre questionnaire (Question 4) that they anticipated problems related to getting help from doctors about deteriorating patients who trigger using RTTWS. Staff felt that the medical staff often had workload pressures which made it difficult to attend in a timely manner, particularly at nights and weekends. Lack of experience in junior medical staff was a concern by more experienced and senior nurses as summarised below:

'It's possibly the medical cover that they do only see that orthopaedic problem. They won't see anything else and they're very quick to pass it on to a medical registrar, who is probably covering the whole of the hospital. Sometimes it's just very basic stuff that that patient needs, fluid, you know, a bit of fluid because they're dehydrated, but it's very quick, you know, because it's not orthopaedics let's pass it on' (10)

Experienced nurses recognised that staff did need to develop confidence in communicating and getting timely medical help. It was also felt that staff also needed the experience, confidence, as well as the objective information from the RTTWS to communicate the patient's needs to medical staff in an appropriate way:

'Depending on what you tell them on the phone determines how urgent they consider it to be. It's just having the experience to know what to do with it, (the EWS) and then following it through and getting somebody to actually look at this or come and review this patient' (4)

After the introduction of RTTWS: Expectations and Experiences

Training

All the respondents provided positive feedback on the training received prior to the new clinical observations and PAR chart being implemented. The training sessions were described as straightforward, understandable, comprehensive and informative, summarised as:

'It got the point across about what we needed to do and it was fine' (8)

Experience of RTTWS

Impact on Workload

All respondents were positive about the introduction of the new EWS system, they were clear that the new system had improved practice. There was positive feedback on the new structure and layout of the new charts:

'All the information is there, all on one chart' (1)

Other comments supported the presentation of the new charts and the structured way staff had to complete them, suggesting that the new charts led to conforming practice, and that staff are *'consistent in what we are doing'* (11). The new charts and the accompanying instructions on the back of the chart to escalate assistance were reported to be clear and unambiguous as summarised by:

'Everything's self-explanatory really, and if you look on the back it tells you what to do, and I think even a less-experienced nurse would know what she was doing and how to pick things up' (14)

Having to complete a score for every set of observations was seen as an improvement for patient care. This was because this ensured staff thought about the resulting score, what the patients' observations were, and if they needed to act on this. Some staff thought that whist this took a little longer, it was worthwhile:

'You're actually looking at what a patient's observations are and what scores would be given to them. So you know, if they are actually triggering on a specific observation or a number of observations then I'm finding I tend to pick up on it easier' (15).

'Those few more minutes can be really helpful in preventing somebody deteriorating way down the line' (3)

Highlighting Deterioration Earlier

All Staff were positive about the new charts and reported that they helped identify patient deterioration earlier (Box 2).

Box 2 : Highlighting Deterioration Earlier

- *'We now use it on every single patient that we have on the ward, and obviously they all get a score at the end of it, so I think it just rings more alarm bells if you like if a patient is unwell or is deteriorating, whereas just recording a patient's observations, you know, you might miss something' (15)*

- *'Advantage that it picks up patients earlier and so they are seen and sorted earlier. The new PAR identifies those at risk on the ward' (2)*

- *'I think it's working very, very well and, as I say, I think the benefit is that they've added extras like, I said before, about the oxygen level, and I think it's making it safer for the patient. We're picking things up earlier, so that can only benefit everybody, and staff are more aware and are picking things up sooner' (10)*

- *'It's telling you. Without asking it's telling you that, you know, it's out of the limits' (13)*

- *'It does highlight patients that are actually deteriorating quicker than you would if you'd just got a normal TPR chart' (6)*

- *I think it's vastly improved from the last PAR tool that we had because it's putting more information on, like the saturation level and the oxygen percentage that patients are on, and staff are more aware and are picking things up sooner (1)*

Staff reported that the new charts were an improvement on the previous one. The layout of the new clinical observation chart and the different colour of the new PAR helped indicate the patients' condition:

'Because they're a different colour as well, it's very quick to highlight the patients that are on the early warning scoring system' (10)

'When the doctors go on the rounds they can see straightaway on that day, yes they scored there' (5)

In nursing staff handover:

'you can quickly identify the patients that are, you know, sick because of this score, you know, the sheet at the end of the bed' (10)

Clinical Observations and parameters

Participants reported that some of the new physiological parameters on the new charts contributed to being able to identify patients who are at risk of deteriorating earlier. For example recording oxygen saturation levels and the percentage of oxygen patients made it safer for the patient, and staff more aware of a patients condition and staff *'picking things up sooner' (1)*

Considering the patient's oxygen saturation result along with the amount of oxygen the patient was receiving made staff more aware of a patient who may be starting to deteriorate. Some nurses did report that there had been some difficulty for some staff in assessing the amount of oxygen and the delivery method. However this was quickly overcome by education and support form the critical care outreach nurses.

Some participants thought that the new method of applying a score to urine output was much easier to use and understand. Staff felt that although the change for calculating urine output was more generalised it was better, and staff still had to use their:

'Clinical judgement to identify patients who might be at risk of having input and output problems' (9)

In the new charts wider parameters had been provided for respiratory rate. Those staff who had used the old PAR charts saw the change as an improvement. It was suggested that the previous parameters were narrow so that a patient could trigger the respiratory rate unnecessarily.

Communicating with medical staff

The new clinical observation chart and system for escalating care, were seen to contribute to patient care and safety because they enabled the clear delivery of objective information and precise evidence to medical staff:

'Nurses have something objective for talking to medical staff, and say this is what we do here for help i.e. the response algorithm' (2)

'You're telling the doctor over the phone all the information that they need, everything is there to tell them' (12)

Staff also felt they were better able to demonstrate they were not contacting medical staff unnecessarily. Having specific information made nurses more confident as they had a recognised formula and hospital protocol to work with:

'I felt more confident in phoning a doctor , purely because it is protocol to do that, I think it's reinforcing that security of knowing that it's the right thing to do at the right time' (9)

Having such specific objective information was seen to potentially help medical staff prioritise attending the deteriorating patients. Nurses reported that, if they had several patients to attend to at once, doctors would be able to understand that a patient having a higher score would possibly need attention before a patient with a lower score. Fewer staff indicated on the post questionnaire than the pre questionnaire that they had concerns related to doctor's response to staff concerns over deteriorating patients. Staff reported that there could still be potential problems related to weekend and night cover, and outlying patients. However having the ability to use the protocol and report an early warning score meant nurses had '*evidence to back up what you are saying' (15),* when getting help from medical staff.

Support

Senior nurses described how the new EWS supported inexperienced and junior staff by helping their confidence:

'I think it empowers the juniors because they've got a tool to say this is the guideline and this needs acting on. So I think it's given them the confidence to do that' (10)

Junior and inexperienced nurses described how use the protocol to escalate care, provided:

'that element of security of knowing there is some kind of formula to work to' (9)

The new system was also seen to be supportive for student nurses and health care assistants doing observations. These staff now had an objective way of assessing the patient and '*highlighting straightaway to them where the problems are' (12)*

Using the Two Tier System

Nurses thought that using the more detailed PAR chart for when a patient triggered the early warning score was very useful. It easily highlighted for all staff those patients on the ward at risk of deterioration. Including the patient's fluid balance on this one chart was regarded as very useful.

Nurses did not have any problems in starting a patient on a PAR chart once they had triggered, and then moving them back onto the clinical observation chart when they improved. The decision to take a patient off a PAR chart as they improved was often taken in conjunction with the medical staff. One problem identified by some nurses was that, although a patient may no longer need to be on the detailed PAR chart, they found it less efficient in no longer having fluid balance to be viewed easily with the observations;

'The only thing I find difficult is when they've come off PAR but we're still looking at the urine output so we've got a separate sheet for the urine output. I just think, well we might as well just stay on the PAR chart and then you can see it' (12).

Flexibility

Staff discussed the need to still use their own clinical judgement with the new EWS, because this was a tool to support clinical practice, and other factors had to be taken into consideration. They reported that the new system was not restrictive when it came to using clinical judgement about individual patients.

'Some one with COPD is not going to have a resp rate of 12 to 16, it's going to be more elevated generally, but that is normal for them. So it's inappropriate to be phoning doctors all the time with a COPD patient who might have a resp rate of 24 when that might be perfectly normal for them. Using your clinical judgement to

determine what is normal for that patient, and I think parameters that are set on PAR scoring system, as well as your own judgement, are enough to be able to identify patients that are at risk' (9)

Senior nurses suggested that *'as an experienced nurse I certainly would take in to account past medical history' (10).* Knowledge and experience was reported by nursing staff in the pre-evaluation interviews, as helping nursing staff to make judgements about a patients overall condition, and recurs afterwards as well:

'It comes into your own experience and knowledge, if someone's scoring but they've got a particular disease process happening they might score quite high, but that is quite normal for them' (15)

In the pre evaluation interviews nurses also reported using intuition and knowing the patient as important in assessing patients. This theme was described again after the new EWS had been introduced:

'they can also not score anything and still not be you know, there's something wrong and you can see that. And often like nurses who have experience their intuition us telling them that there's something wrong' (3)

Equally some staff emphasised the importance of considering the whole patient, their current problem and medical history, in association with the practitioners experience and clinical judgement.

Health Care Assistants Performing Observations

All health care assistants who were trained to take observations were invited to attend the EWS training sessions. Discussions in the post evaluation interviews with qualified nurses showed that the wards in Rotherham hospital had different approaches to health care assistants taking clinical observations. Some senior nurses suggested that qualified and student nurses should be doing observations particularly on patients who were seen to be at risk of deteriorating. For some wards student nurses undertook observations for their clinical practice, and therefore the HCA's had little opportunity to practice them as well as described:

'*you're taking that away from student nurses, you want to do it but then you're depriving them of doing them, what they are training for' (5)*

This had implications for the ongoing competence and confidence of HCA's in doing observations.

'I don't do them enough. I think I still need lots more practice, not that I can't do them, I just think you learn things the more you do them. The more confidence you've got, the more you question' (7)

This practice was partly due to the workload of different wards, in some wards HCA's carried out much of the patient hygiene, feeding and mobility. This subsequently meant that they did not have time in a shift to help with observations. At other times when HCA's needed to help with observations they felt it was very task orientated. In wards with a faster patient turnover the workload distribution meant that the HCA's build up practice and confidence:

'I'm doing them more, and I think the more you do the more aware you get of changes, because you're practising you become more aware of things' (13)

Following this finding all wards managers from the wards that took part in the RTTWS evaluation were asked what their approach to HCA's taking observations was. The results of this are detailed in Appendix 9. In all wards senior nursing staff reported that if a patient did trigger the EWS and was monitored on a PAR chart only qualified nurses took and monitored these observations as the patients were at risk of further deterioration.

End of Life Care

Patients who are noted to be deteriorating may subsequently be assessed by their team as not for resuscitation, but still for active treatment. This issue was raised by some of the nursing staff as problematic:

'in the event of cardiac arrest we're not going to resuscitate but we will follow active treatment' (11)

This raised practical and ethical problems for nursing staff as they needed to continue observations and PAR scoring to monitor if further treatment was required.

Some nurses reported that in their clinical area the process was clear. For other staff the process was much more ambiguous, however to continue with active treatment observations need to be taken to have a benchmark point to continually assess the patient from. Other staff discussed the difficulty in having a patient who was triggering the EWS and though not for resuscitation:

'medical staff don't want to start them on the end of life pathway and there's been a lot of difficulty on that area recently' (12)

Staff described these situations as 'difficult', and although the patient may be comfortable more decisive decisions should be made at this time.

Conclusions

Findings revealed the complex interaction of factors at work for nurses when detecting a deteriorating patient. An early warning scoring system like RTTWS was seen to be only part of the picture. The evaluation captured expectations and experiences of the RTTWS and the following issues were raised:

- The ability to observe and know your patient was as important as conducting clinical observations, when detecting if a patient was deteriorating.
- Experience was a multifaceted concept and was seen to comprise intuition, clinical judgement, time since qualifying and exposure to clinical speciality.
- A nurse's ability to detect patient deterioration was seen to be linked to the amount of experience and confidence acquired and developed over the years.
- Respondents' confidence and experience had been increased by training such as the "Sick Patient" and "Alert" courses.
- Many positive expectations of the RTTWS were realised and examples were given about how it could help nurses detect deterioration earlier
- The RTTWS did help nurses communicate their concern about a patient to medical staff
- Expectations of the RTTWS were met, with participants reporting they were pleased with the content and relevance.

- The new charts evaluated positively with staff reporting them to be clear and easy to complete. Whilst they took slightly longer to complete this was seen as time well spent.
- Nurses found the RTTWS flexible and they were able to integrate the use of clinical judgement and intuition.
- The clinical observations and parameters incorporated into the RTTWS were seen to be of help in detecting deterioration earlier, especially oxygen saturation and respiratory parameters
- Staff were able to move easily between the clinical observation and PAR charts – the two elements of the two tier system. However, respondents liked having urine input and output on the same chart as the observations chart, as in PAR. This was missed when patients stepped down from PAR to a clinical observations chart.
- Staff expressed concerns relating to some difficulties in contacting medical staff, and managing outlying patients they may be unfamiliar with.
- The evaluation highlighted that HCA did not always do the observations and so were at risk of not maintaining competency.
- Although there is literature suggesting that in many hospitals the recording of observations has been largely delegated to unqualified staff, this does not appear to be the case at Rotherham Hospital
- Issues were raised about the difficulty of using RTTWS with patients who were on the end of life pathway. Practical and ethical challenges were identified.

4. Stage 3 Qualitative consultation to explore the perceptions of hospital patients on the RTTWS

Aims

- To investigate the utility of the RTTWS in terms of acceptability to patients

Methods

In response to recent work by the NPSA (2007) indicating that patients need to be convinced of the value of observations, this evaluation incorporated a consultation to explore patient's' views on the role of observations within their care. Following the completion of the staff survey, a purposive sample of 11 patients from ward areas, which have changed to the new model of scoring, were selected. The sample consisted of a range of patients including:

- Patients who had experience of the of the new clinical observation chart incorporating the new early warning score, and

- Those who have utilised both the new clinical observation chart and the more detailed Patient At Risk (PAR) chart. This included some patients who had been 'stepped up' to PARS due to deterioration in their condition and some who have been routinely monitored using PARS following major surgery.

The sample was also chosen to reflect variation in terms of age, clinical area and diagnosis, six men and five women took part. Participants were interviewed using a schedule exploring patient's awareness of the scoring systems and routine observations as well as their perspectives of the purpose of the scoring systems and the extent to which they see these observations as an important part of their care. The interview schedule is included as Appendix 10. Some interviews were audio taped (n=6).to check for accuracy, some patients requested not to be taped and field notes were taken during the interviews (n=5). Sample characteristics of the patient's involved are shown in Table 7.

Table 7 . Sample Characteristics

I.D	Age	M/F	Diagnosis Category	Elective/ Emergency	Speciality	PAR Chart	Clinical Observation Chart
1	57	M	Lower Gastrointestinal	Emergency	Surgery	Yes	Yes
2	56	F	Lower Gastrointestinal	Elective	Surgery	Yes	Yes
3	45	F	Lower Gastrointestinal	Emergency	Surgery	Yes	Yes
4	40	F	Upper Gastrointestinal	Emergency	Surgery	Yes	Yes
5	39	F	Lower Gastrointestinal	Emergency	Surgery	No	Yes
6	71	M	Vascular	Emergency	Medicine	Yes	Yes
7	67	M	Orthopaedic	Emergency	Orthopaedic	Yes	Yes
8	81	F	Orthopaedic	Emergency	Orthopaedic	Yes	Yes
9	80	M	Orthopaedic	Emergency	Orthopaedic	Yes	Yes
10	27	M	Neurological	Emergency	Medicine	Yes	Yes
11	67	M	Respiratory	Emergency	Medicine	Yes	Yes

Data Analysis

Data was analysed using the Framework Analysis technique, as was used and described previously in the staff interviews.

Table 8. Themes identified in Framework analysis

Themes
Awareness of observations
Frequency of observations
Nursing staff and communication of observation results
Changes in clinical condition
Self management and clinical observations Ownership of information and charts
Worries and concerns

Discussion of emergent themes

Awareness of observations

All of the patients were aware that nursing staff monitored their condition by taking observations such as blood pressure, pulse, temperature. Some patients included oxygen saturation and heart rate. Only one patient mentioned that respiratory rate was measured, which was relevant to this patient who self managed his medical condition. Other patients commented that they were aware of staff monitoring their fluid intake and output.

Frequency of observations

All participants were aware that observations were taken during the day and sometimes at night, but could not describe the exact frequency. Some patients reported that at times during their admission the frequency of observations changed. Only one patient from the cohort was an elective admission, all others were emergency admissions. This meant their condition on admission required more intense monitoring:

'When I first came in and I had an operation it were done every hour' (3)

Patients assumed that this is normal practice, were satisfied with this and suggested that: '*It's good that they are keeping a check on you' (4)*

Patients commented that they noticed observations were taken more often when they were first admitted, or immediately after surgery. Patients reported that observations were done every day, and fairly regularly, the majority noticed that the frequency reduced as they improved:

'Since I started getting better and the pain was less they don't come in and take my blood pressure as much' (4)

All patients reported that if their clinical observations had not been taken for some time they would ask the nursing staff why this was so. When asked to suggest how long they would possibly wait before asking some patients were unsure, others suggesting no longer than 24 hours.

Nursing staff and communication of observation results

Patients reported that some nurses automatically told them of the results of their observations. At other times they had to ask as summarised:

'Depends on which nurse, some will tell you straightaway without asking and some don't you have to ask' (5)

Patients also reported that if staff did communicate with them, they were reassured. However, nurses did not always communicate specific results of observations, and patients also did not always ask for this:

'Only if I've said is my temperature okay, because I did have a very high temperature one time and I knew that and they've just sort of reassured me and said yeah, you know, it's coming down, you're fine sort of thing. But they never told me what the readings are. They never told me the readings. And I've never asked for the readings'. (2)

One patient reported that the nursing staff did tell him of his high temperature, and when it improved. Others suggested that if staff did not communicate about the results of taking observations everything must be: '*OK, and all is well' (9)*

Patients also felt that, even if they were told the results of their observations, they did not have the knowledge to understand their meaning:

'If I asked them I don't understand blood pressure anyway, so it won't really mean anything to me' (4)

However, for some, even if they did not understand what the observations meant they *'would like to know' (7)*

Changes in clinical condition

Some patients who had been unwell during their admission were aware that staff monitored and reported this change as medical staff subsequently saw them:

'He (the doctor) came to see me again later, and again, but I think I was getting worse' (4)

'Doctors saw me as my oxygen saturation was worse, nurses took this half hourly, and my observations were taken regularly that night (11)

One patient noticed that when monitoring her observations nursing staff did get help:

' It was the middle of the night a doctor came to see me to take some blood and I think oh my god my temperature was high' (3) '

For other patients when asked what happens if clinical observations are abnormal is summarised as: *'I presume they report it to the doctors' (6)*

Self management and clinical observations

Three patients described their interest in specific observations as they already monitored their condition at home*:*

'They tell me what the reading is, because I do my own blood pressure at home, so I know what it should be' (6)

Two patients monitored their blood pressure at home, and knew the clinical parameters that were normal for them. They reported that they did ask nursing staff what the results were, one patient reading his results directly from the dynamap.

One patient with a long-term respiratory disorder understood all the observations which were recorded on the clinical observations chart, had knowledge of the 'Patient at Risk Scoring', and the parameters which triggered each score. He measured his oxygen saturation and respiratory rate at home, knowing his normal limits, when his condition may be getting worse and so when to ask for help:

'I have to be interested so I can manage my condition' (11)

Other patients were interested in a specific part of their observations, because of their current condition. One patient described her need to know what her temperature was: '*If my temperatures up they'll keep doing that' (3).* If this patient felt unwell she asked the nursing staff to take her temperature *'I have always asked, and they'll do it for me, I like to know what they are, I always ask if every things fine' (3)*

Ownership of information and charts

Patients were aware that nursing staff documented observation results on the bedside charts; however the majority did not involve themselves with looking at the charts. One patient describes that he '*look at them but I never ask about me charts' (3).* In comparison to the patient who self-managed his condition most interviewees reported they did not understand what was written on their charts:

'I haven't got a medical background so I wouldn't know what to do with it' (1)

Patients suggested that they felt the clinical chart documentation did not belong to them but to the professional staff:

'I don't really want to read me chart. I think that's for them not me' (4)

'I'm not interested in seeing my charts, it's not my business' (7)

Another patient felt that they he did not have the authority to look at his observation charts described as*:*

'I don't really think I should look at them either so I don't look. I don't want to get into trouble' (4)

The lack of knowledge about the clinical observation and PAR chart, and beliefs that charts belonged to the hospital staff, were combined with a faith that the professional staff know how to care for patients:

'I mean I've not even looked at my charts. I've never even been concerned because I think they know what they're looking for, they're the professionals. I start looking at them and I think what does this mean, this looks different, this, that, obviously I'm going to start and get myself in and then I'm going to be questioning them all the time. So I just put myself in their hands and I trust that they're doing the right job' (2)

Worries and concerns

All patients reported that they were satisfied with the way their care had been managed with regard to clinical observations, and did not have any concerns to report.

Conclusions

- The majority of patients lack the knowledge and understanding of clinical observations and what the normal limits are
- Patients with long- term conditions are learning about clinical observations to manage their condition in community settings
- From patients recall it appears that observations are taken more frequently by nursing staff on admission and when patients are unwell
- Participants reported that the results of clinical observations are acted upon by contacting medical staff
- Some patients have a paternalist perception of healthcare and professional staff. They think they do not have the authority to look at bedside charts, and know their clinical results
- There are variations in the way nursing staff communicate to patients the results of clinical observations

5. Stage 4 Audit of observation charts

Aim

- To audit the completeness of data collection and accuracy of scoring using the new Clinical Observation chart and PAR chart

Methods

An audit of a sample of charts was carried out to determine the completeness of the recording of observations and the accuracy of calculations to determine the total score. This audit took place during November 2009. This was approximately 7 months after the introduction of the new charts to the Group 1 surgical wards and approximately 4 months after the introduction of the new charts to the Group 3 medical wards. A convenience sample was used. The final sample of charts was as follows:

- 25 clinical observation charts from 3 medical wards
- 25 PAR charts from 3 medical wards
- 25 clinical observation charts from 2 surgical wards
- 25 PAR charts from 2 surgical wards

Charts were audited using forms designed for the evaluation.

Results

Full results of the chart audit are presented in Appendix 11.

Conclusions

Overall, for both surgery and medicine, the clinical observation charts were completed well. Of the 24 items which related to completion of the charts, for 10 items all charts (n = 50) were fully completed. The lowest completion rate was 86% of charts (n = 43) for item 11 (temperature recorded correctly by joined black line). Overall, scoring was also accurate on the clinical observation charts. Of the nine

items which related to scoring, six were correct in all charts (n = 50) (including total REWS score) and three were correct in 94% (n = 47) of charts.

For the new PAR charts, for both surgery and medicine the 32 items which mirrored the items on the clinical observation charts was again completed well. Of the 24 items which related to completion of the charts, for 14 items all charts (n = 50) were fully completed. The lowest completion rate was 80% of charts (n = 40) for item 11 (temperature recorded correctly by joined black line). Overall, scoring was also accurate on the clinical observation charts. Of the nine items which related to scoring, eight were correct in all charts (n = 50) (including total REWS score) and one (urine output score) was correct in 90% (n = 45) of charts.

Information relating to the response to 'triggers' (items A to F) was not as well completed, with the lowest scores for items A and B - time of trigger and time of call to doctor which were 76% (n = 38) and 39% (n = 78) respectively.

Information relating to fluid balance and patients weight were less well completed. Only 16% (n = 8) of charts recording patients weight. However, the instruction on the chart asks for this to be recorded 'when required'. Although total input and output were recorded in >90% of cases, frequency of input and output were recorded in <40% of cases.

This audit relates to a convenience sample of only 100 charts and therefore no assumptions should be made that these finding can be generalised to all wards within the hospital at all times. Nonetheless, the results suggest that with the exception of fluid balance, charts seem to be being completed fully and scoring done accurately.

6. Stage 5 A retrospective audit of the relationship between the quality of observations and patient outcomes

Aim

- To explore possible links between the quality of the recording of observations and patient outcomes

Methods

An audit of a sample of patient casenotes was carried out to explore whether the quality of the recording of observations appeared to have contributed to adverse patient outcomes. The audit was focused on patients who were unplanned admissions from the study wards to either HDU or ITU. These patients by definition would have deteriorated while on the wards and may well have 'triggered' prior to transfer.

The sample comprised:

- 24 sets of casenotes before the new charts were introduced and
- 24 after the new charts were introduced.

This was a convenience sample and due to the limits of the hospitals information systems, it was not possible to match the 'before' and 'after' notes in any way e.g. for age, sex or diagnoses.

Charts were audited using forms designed for the evaluation. The final sample of notes was as follows:

Table 9. Breakdown of notes by Group

Group	**Number (%)**
Group 1 Before	12 (25)
Group 1 After	8 (17)
Group 2 Before	5 (10)
Group 2 After	8 (17)
Group 3 Before	7 (15)
Group 3 After	8 (17)
Total	**48 (100)**

Findings

All patients had had their observations recorded in the 12 hours prior to transfer to HDU/ITU.

The majority of patients on the old PAR chart and the new PAR chart had triggered (a score of 3 or more) in the 12 hour period prior to transfer (87%, n = 20 and 91%, n = 21 respectively. Only one patient on the old PAR chart would have triggered earlier on the new PAR chart. However, the doctors were already with this patient when they first triggered.

Table 10 summarises the findings on the actions taken after the patient triggered for the first time.

Table 10. Summary of responses to first trigger

% (n)	Old PAR % (n)	New PAR % (n)
Nurse informed	63 (10)	89 (16)*
Medical review requested	95 (19)	100 (18)
Medical review happened within 30 mins	65 (13)	81 (17)
Average time to review if over 30 mins	88 (SD 85.0) mins (range 45 to 240, 1 patient not reviewed at all)	80 mins (SD 34.6) (range 60 -120)

* one patient was already under medical review when they triggered

Seven patients (33%) were not commenced on the observations recommended on the new PAR chart after they first triggered and nine (43%) did not then have their observations continued as recommended on the new PAR chart.

In no cases did failure to follow the response algorithms on the PAR chart contribute to an adverse event.

Conclusions

This audit was done on a small sample of notes. As such it is just a small 'snapshot'. It is not a representative sample of the unplanned transfers from the study wards to HDU or ITU either before or after the new model was introduced. Nor were 'before' and 'after' notes matched in any way. In view of these limitations, the findings of this audit should be interpreted with caution.

There were indications that nurses did request medical review when patients triggered on the old and new PAR charts. However, the notes did not always indicate that the nurse in charge had been informed when patients triggered. Although medical review happened within 30 minutes in most cases, there are indications that at times the review took substantially longer than this.

There are also indications that nurses do not always follow the observation protocol on the new PAR chart after patients trigger.

There were no indications that the quality of the observations or the failure to follow exactly the algorithms on the observations contributed to adverse events in these patients.

Chapter 5. Discussion

This evaluation had provided invaluable insight into the real world experience of using track and trigger warning scoring systems in a UK acute hospital context. Previous work has explored the prevalence of different types of early warning systems in use (McDonnell, Esmonde et al 2007) and whether the tools are good predictors of patient outcomes (Goa, McDonnell et al 2007). There has also been some work which looks at whether the introduction of a track and trigger warning system improves patient outcomes (Esmonde, McDonnell at al 2006). The small amount of qualitative work published has indicated that staff may indeed value these tools (Baker-McClearn and Carmel 2008). This evaluation has used mixed methods to gain a detailed insight into the use of a two tier system and its impact in the real world of clinical practice.

Strengths and limitations of the evaluation

The major strength of this evaluation was its use of a mixed methods approach. The findings from each stage of the study reinforced and verified findings from other stages. This increases the confidence with which we can draw conclusions from the data.

However, the evaluation was conducted in a single hospital and due to time constraints did not include the care of the elderly wards. While the findings have implications and lessons which are likely to be useful to other acute hospitals, they should be interpreted in the light of the fact that the context of this evaluation may differ from that in other hospitals.

It should also be noted that the impact of these changes were assessed a relatively short period of time after they were introduced to the wards. Whether the positive effect we observed will be sustained over a longer period is not known.

Like all Foundation Trusts, Rotherham Hospital does not have a static climate, but is subject to constant change due to shifts in policy, the demands of the organisation and the changing needs of the population it serves. The changes evaluated in this study inevitably took place in a period when a number of other initiatives were taking place within the wards we studied. These including the Productive Ward initiative

and the introduction of Case Managers for patients with complex needs. However, the timing of these did not coincide closely with the introduction of the intervention evaluated here and it is therefore unlikely that the changes we found were attributable to any other single parallel initiative.

The implications and recommendations arising from the evaluation will be considered in the following sections.

Positive impact and the experience of nursing staff

- The quantitative before and after survey gave a clear indication that the new model had a positive impact on the knowledge, skills and confidence of nursing staff to recognise and manage deteriorating patients

- The qualitative interviews confirmed these findings and provided more detail of how nursing staff felt the new system had improved practice

- Nurses reported in the interviews that the new charts helped them to pick up deteriorating patients earlier and there was a significant increase in their confidence to recognise deteriorating patients in the before and after study

- Nurses who were interviewed felt that having objective information in the form of scores might also help more junior medical staff prioritise their workload across the wards that they were covering.

- Staff who were interviewed described their positive experiences of working with the new system in terms of feeling more confident to seek help from medical colleagues and being more able to articulate their reasons for concern. This is important in the light of the finding that asking for help from doctors and more senior staff was one of the major areas of concern to emerge from the survey. However the increase in confidence to 'ask senior staff to come' in the before and after survey was not statistically significant.

- The survey and the interviews showed that staff found charts easy to complete and did not cause them undue problems in terms of time. Interviews confirmed that the layout and structure of the charts was clear and the instructions about what to do if a patient triggered clear and unambiguous.

They survey showed that confidence to report abnormal observations and confidence about who to contact and at what point all increased significantly following the training and the introduction of the charts. Coupled with the information from the Stage 4 audit of charts which showed that charts were being well completed overall this is a strong indication that the charts are helpful to staff and usable in ward settings.

- Nurses who were interviewed liked having fluid balance on the PAR chart and also valued the inclusion of information on oxygen administration and oxygen saturations. Nurses also liked the new parameters which had been introduced to score urine output and respiratory rate, but noted that the education and support from the Critical Care Outreach Team had been important to help them get to grips with these initially. The time taken complete a score for every set of patient observations was seen as time well spent.

- The training in the new system evaluated well in the staff interviews, as did the subsequent support provided by the Critical Care Outreach Team.

- No significant problems emerged relating to the use of a two tier system. With the exception of fluid balance (discussed below) there seemed to be a seamless transition between the two charts.

- Although no strong message emerged that having a two tier system was better than a single system, some staff commented that having a different chart for acutely ill patients did highlight those most at risk

Areas for improvement

While an overwhelmingly positive picture of the new model emerged, the staff interviews did highlight some unresolved issues and areas for improvement which are summarised below:

- Some staff disliked the fact that when patients were ‘stepped down’ from the PAR chart, fluid balance was not included on the clinical observation chart.

- The Stage 2 staff interviews highlighted inconsistencies between wards in relation to the role of health care assistants (HCAs) in the recording of observations. On wards were HCAs were trained to do observations but in practice had little opportunity to do so, this raised concerns regarding their on-going competence and confidence.

- Although the confidence of nursing staff did increase after the introduction of the new system, findings from the survey and the staff interviews highlighted ongoing concerns about getting timely response from medical staff on some occasions, particularly at nights and weekends and when patients were 'outliers'.

- In some wards, the need for continued observation and PAR scoring for patients who were being actively treated but were not for resuscitation and not on the End of Life Care Pathway was causing problems when patients triggered on the PAR score.

- The Stage 4 audit of charts indicated that the recording of fluid balance and weight needs improving as does the recording of actions that are taken when a patient triggers on PAR score.

- While all eligible staff were invited to attend the training, not all staff were able to attend. This may suggest that there are practical difficulties in delivering a hospital wide intervention

Other issues for practice

- Findings from the before and after study and the staff interviews indicated that staff in some clinical areas were more confident than in others. The reasons for this are unclear. It is possible that confidence is influenced by the characteristics and case-mix of patients, the nature of the workload or the leadership style on the ward. However, we have little data to explain this.

- While the training and new charts did appear to have a very positive impact on nursing staff, the staff interviews showed that the charts themselves only represent part of a complex picture. The importance of having adequate time to deliver care, having experienced staff with time in the specialty, good

clinical judgement, knowledge of their patients and knowledge of the clinical area where they worked were important parts of the jigsaw. For this reason working in an unfamiliar area where staff did not know the patients or working on wards with patient who were outliers were sources of concern.

Recommendations for local practice

- Focused support should be given to wards where staff appear to be less confident in the recognition and management of deteriorating patients
- The role of HCAs in the recording of observations should be reviewed across the hospital. Issues to be considered include the need for consistency across clinical areas and the need for mechanisms to ensure that competence is maintained
- Nursing staff need additional training in the recording of fluid balance and the way that temperature is charted
- Consideration should be given to where weight is recorded. If a record of weight is required on the observation chart and PAR chart then staff need additional training to reinforce this message
- Additional training is needed to encourage staff to complete the sections in the PAR chart which relate to the actions taken in response to a 'trigger'. Accurate information here would inform subsequent audits of response times
- A standardised approach to the completion of the PAR chart where details of the response to triggers are recorded should be adopted across the hospital
- Ongoing audits on the completeness of the observation charts should continue
- Audits should be carried out to assess the time taken for medical review after patients have triggered
- Audits should be carried out to assess the extent to which the frequency of observations complies with local protocols

- The hospital should consider whether they wish to make a recommendation that when patients are on the PAR chart (rather than the clinical observation chart) only qualified staff should perform observations

- The relationship between PAR scoring and patients who are not for resuscitation but who are not on the End of Life Care pathway should be clarified

- Follow up questionnaires and chart audits should be considered to assess whether improvements in confidence have been sustained and whether standards of documentation have changed.

Recommendations for all hospitals

- When changes are made in the models used to recognise and manage deteriorating patients face to face training which is delivered by staff with acknowledged expertise in this field should be considered

- However, careful thought needs to be given regarding the practicalities of how training is rolled out across hospitals. Delivery of all training by the Clinical Care Outreach Team worked well in a small single site hospital like Rotherham. However, even here 100% attendance was not possible. In order to ensure that training initiatives are rolled out to all staff, other models of delivery should be considered.

- Hospitals developing new observation charts might wish to seek out examples of charts which have evaluated well in terms of ease of use and acceptability to staff.

- The questionnaire used in this evaluation was well understood and easy to complete. Other hospitals wanting to measure the knowledge and confidence of their staff in the recognition and management of deteriorating patients should consider using this instrument.

- The before and after design used here worked well and could be adopted by others to assess impact of planned changes in practice

- Patients who are outliers present additional challenges for nursing staff. The implications of this in terms of the recognition and management of deteriorating patients should be carefully thought through in all acute settings.

- How nurses convey information to medical staff about deteriorating patients should be carefully considered. Hospitals should consider guidance to include information on what the triggers were, how the scores have changed over time and what is expected from medical staff in terms of response times

- Irrespective of the scoring system in place, the importance of more fundamental aspects of care provisions should not be forgotten. These include support for junior nursing staff and HCAs from more senior experienced colleagues, adequate staffing levels on acute wards and a ward based workforce that is experienced and familiar with the specialty.

- If patients are to become better informed about their observations and encouraged to pay more attention to this aspect of their care as suggested in one report from the NPSA, then they would need additional information about the purpose and meaning of their observations

- Where patients are clearly involved in self-management of their condition, this has implications for their management in hospital, particularly in relation to the monitoring of their observations

- If a patient ‘triggers' nurses should consider feeding this information back to the patient. However, consideration should be given to individual circumstances including whether the patient wishes to discuss this aspect of their care

Recommendations for further research

- Further research is needed to explore the impact of scoring systems on the confidence, attitudes and behaviours of medical staff of all grades

- Further research is needed to explore why some clinical areas are less confident than others in the recognition and management of deteriorating patients

References

Baker-McClearn D and Carmel S (2008) Impact of critical care outreach services on the delivery and organisation of hospital care. Journal of Health Services Research and Policy 13 (3), 152-157

Cohen J (1988) Statistical power analysis for the behavioral sciences. 2nd edition. Hillsdale NJ: Lawrence Earbown

Department of Health and NHS Modernisation Agency (2003). The National Outreach Report. London, Department of Health.

Edwards P, Roberts I, Clarke M, DiGuiseppi C, Pratap S, Wentz R, Kwan I. (2002) Increasing response rates to postal questionnaires: systematic review. BMJ ;324:1183-5.

Esmonde L, McDonnell A, Ball C, Waskett C, Morgan R, Rashidian A, Bray K, Adam S, Harvey S. (2006) Investigating the effectiveness of Critical Care Outreach Services: A systematic review. Intensive Care Medicine. 32 (11), 1713-1721.

Featherstone B, Smith GB et al (2005). Impact of a one day inter-professional course (ALERT) on attitudes and confidence in managing critically ill adult patients. Resuscitation, 65: 329-336.

Gao H, McDonnell A, Harrison DA, Moore T, Adam S, Daly K, Esmonde L, Goldhill DR, Parry GJ, Rashidian A, Subbe CP, Harvey S. (2007) Systematic review and evaluation of physiological track and trigger warning systems for identifying at risk patients on the ward. Intensive Care Medicine; 33(4):667-79.

Institute for Healthcare Improvement (2008) IHI Global Trigger Tool for Measuring Adverse Events Cited on: http://www.ihi.org/IHI/Topics/PatientSafety/SafetyGeneral/Tools/IHIGlobalTriggerToolforMeasuringAEs.htm. Accessed on 29th July 2008.

McDonnell A, Esmonde L, Morgan R, Brown R, Bray K, Parry G, Adam S, Sinclair R, Harvey S, Mays N, Rowan K. (2007) The provision of critical care outreach services in England: findings from a national survey. Journal of Critical Care 22 (3) 212-218.

National Institute for Health and Clinical Excellence (2007) Acutely ill patients in hospital NICE Guideline 50. London, NICE.

National Patient Safety Agency (2007) recognising and responding appropriately to early signs of deterioration in hospitalised patients. London, NPSA.

National Research Ethics Service (2008) Defining research. London, NPSA.

Ritchie J & Spencer L (1994) Qualitative analysis for applied policy research. In A. Bryman and R. Burgess (eds) Analysing Qualitative Data. London, Routledge.

The Rotherham NHS
NHS Foundation Trust

A questionnaire on recognising and responding to deteriorating patients in hospital wards

Rotherham NHS Foundation Trust is currently working with researchers from Sheffield Hallam University to evaluate the impact of introducing a new model for recognising and responding to early signs of deterioration in patients on the hospital wards. This evaluation is being funded by the Yorkshire and Humber Strategic Health Authority.

As part of this study, a questionnaire on the recognition and response to deteriorating patients in hospital wards is being given to all staff on B4, B5 and Sitwell approximately 6 weeks after the new monitoring charts were introduced to the wards.

The questionnaire should take 5 to 10 minutes to complete.

It is very important that we receive your completed questionnaire even if you have already completed a similar questionnaire when you received your training on the new charts.

All replies will be treated as confidential and no individual will be identified in published reports.

We are aware of the many demands made on the time of busy ward staff and hope that you will be willing to support this evaluation.

As a gesture of our appreciation, we will enter all staff who complete both questionnaires into a prize draw. Two members of staff will be selected at random to receive high street shopping vouchers to the value of £25.

Please complete your questionnaire and post it in the box which has been left on the ward, using the envelope provided

by 6th April.

1. On a scale of 1 to 10, how would you describe your level of **experience** associated with recognising a patient on your ward who was deteriorating clinically.

1	2	3	4	5	6	7	8	9	10

No experience Considerable
experience

(please circle the appropriate response)

2. On a scale of 1 to 10, how would you describe your level of **knowledge** associated with recognising a patient on your ward who was deteriorating clinically.

1	2	3	4	5	6	7	8	9	10

Little knowledge Considerable
knowledge

(please circle the appropriate response)

3. Briefly describe how you would currently **recognise** that a patient on your ward is deteriorating clinically.

_____
_____
_____
_____

4. Briefly describe any **worries or concerns** you have about **recognising** a patient on your ward who is deteriorating clinically.

_____
_____
_____
_____

5. **On a scale of 1 to 10 how confident are you that you are able to:**

a) **recognise** a patient on your ward who is deteriorating clinically.

1 2 3 4 5 6 7 8 9 10

Little confidence Very confident

(please circle the appropriate response)

b) know **when** to contact a more senior member of staff about a patient on your ward who is deteriorating clinically.

1 2 3 4 5 6 7 8 9 10

Little confidence Very confident

(please circle the appropriate response)

c) know **who** to contact about a patient on your ward who is deteriorating clinically.

1 2 3 4 5 6 7 8 9 10

Little confidence Very confident

(please circle the appropriate response)

6. How confident are you about **reporting abnormal observations** relating to a deteriorating patient to a more senior member of staff?

1 2 3 4 5 6 7 8 9 10

Little confidence Very confident

(please circle the appropriate response)

7. How confident are you in asking a more senior member of staff to **come and assess** a patient on your ward who is deteriorating clinically?

1 2 3 4 5 6 7 8 9 10

Little confidence Very confident

(please circle the appropriate response)

8. Do any of the following cause you concern when dealing with a patient on your ward who is deteriorating clinically? *(Please tick one box on each line):*

Lack of information about the patient	Yes ☐ No ☐
Lack of diagnosis	Yes ☐ No ☐
Rapid deterioration	Yes ☐ No ☐
Lack of prior specific experience	Yes ☐ No ☐
Keeping calm	Yes ☐ No ☐
Remembering to conduct all appropriate observations	Yes ☐ No ☐
Unable to get help when needed	Yes ☐ No ☐
Lack of knowledge	Yes ☐ No ☐
Not knowing who to contact	Yes ☐ No ☐
Getting a timely response from more senior staff	Yes ☐ No ☐

9. From the list above, please select the three items which give you the most concern when dealing with a patient on your ward who is deteriorating clinically.

1. ----------
2. ----------
3. ----------

10. On a scale of 1 to 10, how difficult do you find it to complete the **new Clinical Observation chart?**

1 2 3 4 5 6 7 8 9 10

Not difficult at all Very difficult

(please circle the appropriate response)

11. On a scale of 1 to 10, how difficult do you find it to complete the **new PAR chart?**

1 2 3 4 5 6 7 8 9 10

Not difficult at all Very difficult

(please circle the appropriate response)

12. On average, approximately how long does it take you to complete the **new Clinical Observation chart** for each patient? *(please tick one box only)*

Less than 1 minute ☐

Between 1 and 5 minutes ☐

More than 5 minutes ☐

13. On average, approximately how long does it take you to complete the **new PAR chart** for each patient? *(please tick one box only)*

Less than 1 minute ☐

Between 1 and 5 minutes ☐

More than 5 minutes ☐

14. Has the introduction of the new Clinical Observation chart and PAR chart resulted in any difficulties on your ward? *(Please tick one box only):*

Yes ☐ No ☐

If yes, please give details:

_____

_____

_____

15. In order to complete our evaluation we need to collect some demographic details. Please indicate:

Your age _____ *(years)*

Your gender *(please circle)* male/female

Your band *(please circle)* 2 3 4 5 6 7 8

16. If you are a registered nurse, please give the number of years since you gained your registration as a general nurse.

_____ *(years)*

17. Please add any comments you wish to make:

_____

_____

_____

_____

Many thanks for taking the time to complete this questionnaire.

Please place the questionnaire in the box that has been left on the ward, using the envelope provided.

Appendix 2. Stage 1 Sample size calculation

From the study by Featherstone, Smith et al (2005), confidence to recognise a critically ill patient was measured on a 1 to 10 scale with 1 = 'little confidence' and 10 = 'very confident'. The authors reported a mean (SD) score of 6.04 (1.80) pre-course and 7.71 (1.19) post-course. Based on a conservative estimate that the SD of the difference in scores is 2 and an assumption that a change of half a point in the scale is of clinical and practical importance, in order to have an 80% or larger change of detecting this at 5% significance level 128 paired observations were required i.e. 128 staff who complete the pre and post questionnaire. Assuming that 90% of eligible staff would complete 'before' questionnaires and assuming a 45% response rate to the 'after' questionnaire, a decision was made to include 12 wards (with approximately 320 staff) in the evaluation.

Appendix 3. Stage 1 Timeframe for delivery of training

Group	Training period and 'before' survey	Introduction of charts to wards
1 (n = 3 wards)	12th Jan - 8th Feb (4 weeks)	9th Feb
2 (n = 4 wards)	23rd Feb - 29th Mar (5 weeks)	30th Mar
3a (n = 1 ward)	4th May - 21st June (6 weeks)	22nd June
3b (n = 4 wards)	4th May - 8th July (9 weeks)	9th July

Appendix 4. Response rate by wards

Ward	Group	No of Staff	Trained and returned 'Before' Questionnaire n (%)	Returned 'After' Questionnaire	Number of paired responses n (%)	Staff who had left ward or on mat leave	Staff on permanent nights	Night staff trained n (%)
I	1	26	24 (92)	26	24 (92)	0	5	4 (80)
H	1	24	21 (88)	20	17 (71)	1	1	1 (100)
K	1	22	20 (91)	20	17 (77)	1	0	0 (0)
C	2	27	25 (93)	23	21 (78)	0	4	3 (75)
F	2	34	25 (74)	26	20(59)	3	11	7 (64)
G	2	33	27 (82)	22	20 (61)	2	8	4 (50)
E	2	19	19 (100)	18	18 (95)	0	0	0 (0)
L	3	38	32 (84)	28	24 (63)	2	8	3 (38)
D	3	40	32 (80)	27	25 (63)	1	0	0 (0)
A	3	26	19 (73)	14	8 (31)	2	2	0 (0)
B	3	27	20 (74)	22	15 (56)	0	6	1 (17)
J	3	8	7 (88)	4	4 (50)	0	0	0 (0)
Total		**324**	**271(84)**	**247**	**3 (66)**	**12**	**45**	**23 (51)**

Appendix 5. Findings of Stage 1 Before and After study

Table A. 'Before' scores for scales concerned with recognising and managing deteriorating patients

Before' scores' for Likert scales (n = 213)				
	Mean	SD	Minimum	Maximum
Level of experience	7.5	1.8	2	10
Level of knowledge	7.3	1.8	2	10
Confidence to recognise	7.5	1.8	3	10
Confidence when to contact	8.8	1.3	3	10
Confidence who to contact	8.9	1.3	4	10
Confidence to report	9.0	1.3	4	10
Confidence to ask to come	9.3	1.1	5	10
Total no of concerns	4.3	2.6	0	10

Table B shows the equivalent scores after the intervention had taken place, all of which have gone up, apart from total number of concerns which has gone down.

Table B. 'After' scores for scales concerned with recognising and managing deteriorating patients

After' scores' for Liker scales (n = 213)				
	Mean	SD	Minimum	Maximum
Level of experience	8.1	1.4	3	10
Level of knowledge	8.0	1.5	2	10
Confidence to recognise	8.2	1.4	3	10
Confidence when to contact	9.0	1.2	3	10
Confidence who to contact	9.2	1.1	4	10
Confidence to report	9.3	1.1	1	10
Confidence to ask to come	9.4	0.9	5	10
Total number of concerns after	3.7	2.3	0	10

Table C summarises the difference in scores between the 'before' and 'after' data and reports the results of the paired T tests to explore whether the observed differences were statistically significant. All of the differences except the difference in scores for ' How confident are you in asking a more senior member of staff to come and assess a patient on your ward who is deteriorating clinically?' were statistically significant. However, many of the differences are in the order of a change of 0.5 on a 10 point scale (i.e. about 5% of the scale). An important question to ask is 'Is this clinically meaningful?' Cohen (1988) suggests calculating the 'standardised effect size' by dividing the mean difference by the SD and then using the following rule to answer this question:

Standardised effect size:

- <0.3 - not important
- 0.3-0.5 - moderate
- >0.8 large

Applying this principle, resulted in a judgement that three of the changes which were statistically significant constituted a moderate effect size.

Table C. Summary of difference in scores between before and after data (n = 213)

	Before mean	Standard Deviation	After mean	Standard Deviation	Mean difference	Standard Deviation	Lower 95% CI	Upper 95% CI	p value	Standardised effect size
Level of experience	7.5	1.8	8.1	1.4	.59	1.298	.41	.77	.00*	0.45**
Level of knowledge	7.3	1.8	8.0	1.5	.71	1.440	.52	.91	.00*	0.49**
Confidence to recognise	7.5	1.8	8.2	1.4	.73	1.382	.55	.92	.00*	0.53**
Confidence when to contact	8.8	1.3	9.0	1.2	.24	1.315	.06	.42	.01*	0.18
Confidence who to contact	8.9	1.3	9.2	1.1	.30	1.164	.15	.46	.00*	0.26
Confidence to report	9.0	1.3	9.3	1.1	.27	1.123	.12	.43	.00*	0.24
Confidence to ask to come	9.3	1.1	9.4	0.9	.08	.883	-.03	.20	.16	0.10
Total no of concerns	4.3	2.6	3.7	2.3	-.58	2.38227	-.91	-.26	.00*	-0.25

* statistically significant at $p<0.05$ ** moderate effect size

Figure A summarises these changes graphically.

Figure A. Summary of mean changes in outcomes

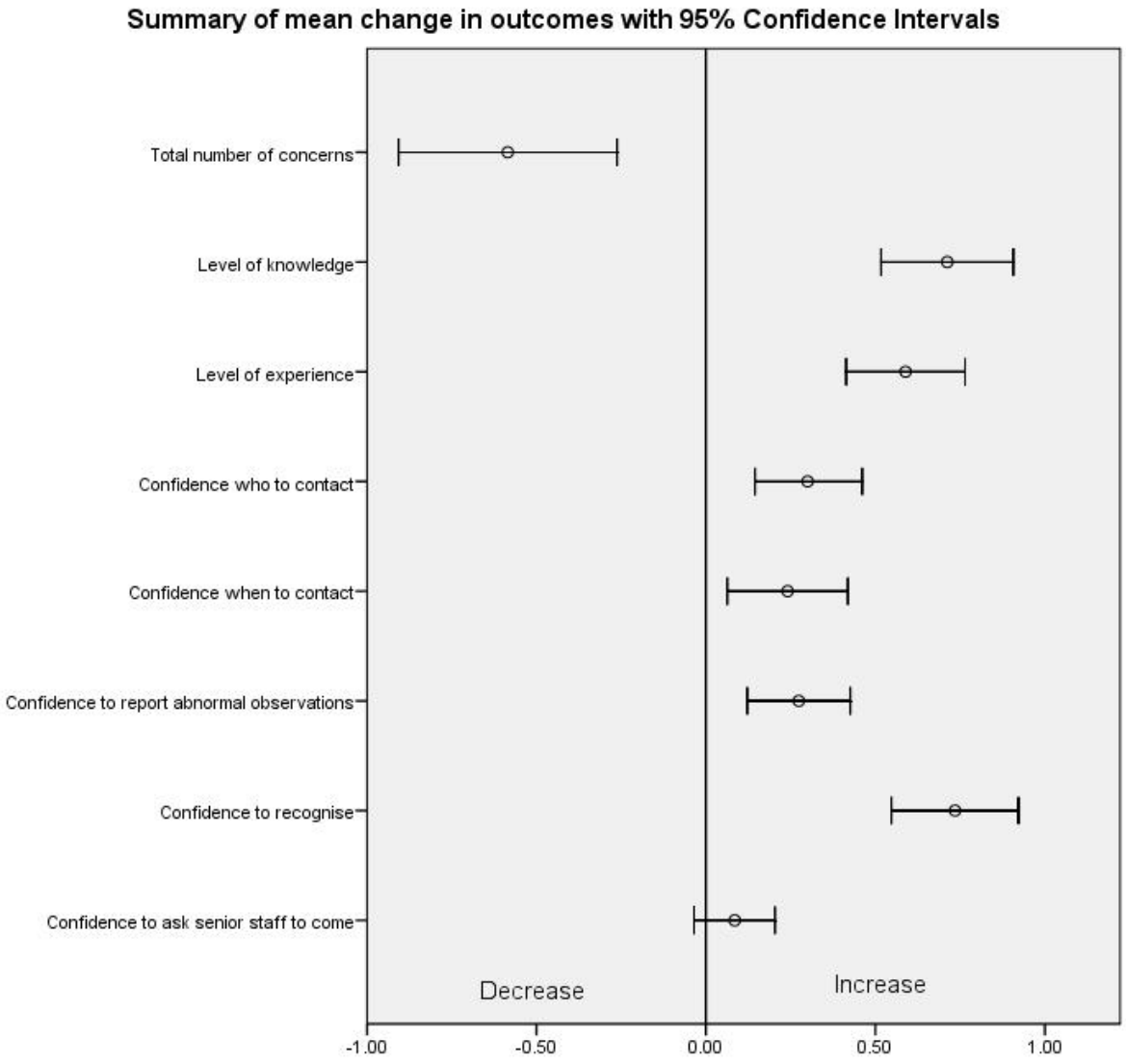


Table D shows the differences between the 'before' and 'after' responses to questions about whether a series of factors were a cause for concern when dealing with deteriorating patients. Also included are the results of the McNemar tests used to explore whether the observed differences were statistically significant.

Table D. Summary of differences in concerns between before and after data (n = 213)

	After			***p value***
Lack on information about the patient n (%)	*No*	*Yes*	*Total*	
Before				
No	57 (71.3)	23 (28.8)	80 (100)	
Yes	31 (23.8)	99 (76.2)	130 (100)	
Total	88 (41.9)	122 (58.1)	210 (100)	0.34
Lack of diagnosis				
Before				
No	58 (65.2)	31 (34.8)	89 (100)	
Yes	39 (33.6)	77 (66.4)	116 (100)	
Total	97 (47.3)	108 (52.7)	205 (100)	0.4
Rapid deterioration				
Before				
No	46 (65.7)	24 (34.3)	70 (100)	
Yes	39 (28.5)	98 (71.5)	137 (100)	
Total	85 (41.1)	122 (58.9)	207 (100)	0.08
Lack of prior specific experience				
Before				
No	87 (82.1)	19 (17.9)	106 (100)	
Yes	34 (35.8)	61 (64.2)	95 (100)	
Total	121 (60.2)	80 (39.8)	201 (100)	0.05*
Keeping calm				
Before				
No	165 (94.8)	9 (5.2)	174 (100)	
Yes	21 (65.6)	11 (34.4)	32 (100)	
Total	186 (90.3)	20 (9.7)	206 (100)	0.04*
Remembering to conduct all observations				
Before				
No	163 (94.2)	10 (5.8)	173 (100)	
Yes	21 (67.7)	10 (32.3)	31 (100)	
Total	184 (90.2)	20 99.8)	204 (100)	0.71
Unable to get help				
Before				

No	55 (62.5)	33 (37.5)	88 (100)	
Yes	40 (33.6)	79 (66.4)	119 (100)	
Total	95 (45.9)	112 (54.1)	207 (100)	0.49
Lack of knowledge				
Before				
No	95 (86.4)	15 (13.6)	110 (100)	
Yes	36 (40.9)	52 (59.1)	88 (100)	
Total	131 (66.2)	67 (33.8)	198 (100)	
Not knowing who to contact				
Before				
No	166 (93.8)	11 (6.2)	177 (100)	
Yes	22 (73.3)	8 (26.7)	30 (100)	
Total	188 (90.8)	19 (9.2)	207 (100)	0.08
Getting a timely response from senior staff				
Before				
No	70 (73.7)	25 (26.3)	95 (100)	
Yes	34 (30.1)	79 (69.9)	113 (100)	
Total	104 (50.0)	104 (50.0)	208 (100)	0.3

* statistically significant at $p<0.05$

For all factors the number of staff who stated that these were a cause for concern was reduced following the intervention. These reductions were statistically significant for two of the ten factors.

Table E summarises the difference in the 'before' scores for continuous data between qualified and unqualified staff and reports the results of the independent samples T tests to explore whether the observed differences were statistically significant.

Table E. 'Before' scores for qualified/unqualified staff

	Qualified			**Unqualified**						
	n	*mean*	*SD*	*n*	*mean*	*SD*	*mean diff*	*95% CI*	*p*	*Standardised effect size*
Level of experience	142	8.2.	1	71	6.2	1.8	2	2.4 - 1.5	0*	1.1***
Level of knowledge	142	8.0	1	71	5.9	1.7	2.1	2.6 - 1.6	0*	1.2***
Confidence to recognise	141	8.2	1	70	6	1.7	2.1	2.6 - 1.7	0*	1.2***
Confidence when to contact	141	9.0	1	71	8.4	1.6	0.6	1.0 - 0.2	0*	0.4**
Confidence who to contact	141	9.0	1	71	8.8	1.5	0.2	0.6 - -0.2	0.3	0.1
Confidence to report	141	9.3	1	71	8.5	1.7	0.8	1.2 - 0.4	0*	0.5**
Confidence to ask to come	141	9.4	1	71	9.2	1.1	0.2	0.5 - -0.1	0.3	0.2
Total no of concerns	142	4.2	2.6	71	4.3	2.7	-0.1	0.5 - -0.1	0.8	-0.03

* statistically significant at p<0.05

** moderate effect size

*** large effect size

For all scales the qualified staff scored higher that the unqualified staff before the intervention and the total number of concerns were less. For five of the scales, these differences were statistically significant with large effect sizes for three scales and moderate effect sizes for two scales.

Table F summarises the difference in the 'after' scores for continuous data between qualified and unqualified staff.

Table F. 'After' scores for qualified/unqualified staff

	Qualified			**Unqualified**						
	n	*mean*	*SD*	*n*	*mean*	*SD*	*mean diff*	*95% CI*	*p*	*Standardised effect size*
Level of experience	141	8.6	1.3	71	7.2	1.3	1.4	1.8-1.0	0*	1.1***
Level of knowledge	141	8.5	1.2	71	7.1	1.5	1.4	1.8 - 1.0	0*	0.9***
Confidence to recognise	142	8.6	1.1	71	7.2	1.5	1.4	1.8-1.0	0*	0.9***
Confidence when to contact	142	9.3	0.9	71	8.6	1.5	0.7	1.1 - 0.3	0*	0.5**
Confidence who to contact	141	9.2	1.0	71	9.2	1.2	0.1	0.4 - -0.3	0.7	0.1
Confidence to report	142	9.4	0.8	71	8.9	1.6	0.5	0.9 - 0.1	0*	0.3**
Confidence to ask to come	142	9.5	0.8	71	9.2	1.1	0.2	0.5 - 0.1	0.1*	0.2
Total no of concerns	142	3.7	2.3	70	3.7	2.3	0	0.7 - -0.7	1	0

* statistically significant at p<0.05

** moderate effect size

*** large effect size

For all scales except confidence in who to contact, the qualified staff scored higher that the unqualified staff after the intervention but the total number of concerns were the same. For six of the scales, these differences were statistically significant with large effect sizes for three scales and moderate effect sizes for two scales.

Table G summarises the difference in the changes between before and after scores between qualified and unqualified staff and the results of the independent samples T-Tests used to explore whether the observed differences were statistically significant.

Table G. Difference between 'before' and 'after' scores' for qualified/unqualified staff

	Qualified			**Unqualified**						
	n	*mean*	*SD*	*n*	*mean*	*SD*	*mean diff*	*95% CI*	*p*	*Standardised effect size*
DIff in level of experience	141	0.4	1.0	71	1	1.7	-0.6	-0.2 - -1.0	0*	-0.4**
Diff in level of knowledge	141	0.5	1.0	71	1.2	2	-0.7	-0.2 - -1.2	0*	-0.4**
Diff in confidence to recognise	141	0.5	0.9	70	1.2	1.9	-0.7	-0.2 - -1.2	0.1	-0.4**
Diff in confidence when to contact	141	0.3	1.1	71	0.2	1.7	0.1	0.5 - -0.3	0.6	0.1
Diff in confidence who to contact	140	0.3	1.0	71	0.4	1.5	-0.1	-0.3 - 0.5	0.5	-0.1
Diff in confidence to report	141	0.2	0.8	71	0.4	1.5	-0.2	0.1 - -0.6	0.2	-0.1
Diff in confidence to ask to come	141	0.1	0.8	71	0	1	0.1	0.4 - -0.2	0.5	0.1
Diff in total no of concerns	142	-0.5	2.0	70	-0.7	3	0.2	1.0 - -0.6	0.7	0.1

* statistically significant at p<0.05

** moderate effect size

For most scales the unqualified staff scores increased more than the scores for the unqualified staff - indicating that the improvement after the training was greater in the unqualified staff. This was statistically significant for two scales where the effect size was moderate.

Further analyses explored the differences between medical and surgical/orthopaedic wards.

Table H summarises the difference in the 'before' scores for between medical and surgical ward staff and reports the results of the independent samples T tests to explore whether the observed differences were statistically significant. Although surgical staff had higher scores for most scales and on average has less concerns, these differences were small and not statistically significant.

Table H. 'Before' scores for medical/surgical staff

	Medicine			**Surgery**					
	n	*mean*	*SD*	*n*	*mean*	*SD*	*mean diff*	*95% CI*	*p*
Level of experience	80	7.4	1.7	89	7.5	1.9	-0.1	-0.6 - 0.5	0.7
Level of knowledge	80	7.1	1.7	89	7.4	1.7	-0.3	-0.8 - 0.3	0.3
Confidence to recognise	79	7.3	1.6	88	7.4	1.9	-0.2	-0.7 - 0.4	0.5
Confidence when to contact	80	8.9	1.1	88	8.8	1.4	0.0	-0.3 - 0.4	0.8
Confidence who to contact	80	9.0	1.0	88	9.0	1.3	0.0	-0.3 - 0.4	0.9
Confidence to report	80	9.0	1.3	88	9.1	1.2	-0.1	-0.5 - 0.3	0.5
Confidence to ask to come	80	9.3	0.8	88	9.4	1.1	-0.5	-0.3 - 0.2	0.7
Total no of concerns	80	4.4	2.6	89	4.3	2.5	0.1	-0.6 - 0.9	0.8

Table I summarises the difference in the 'after' scores for continuous data between medical and surgical ward staff and reports the results of the independent samples T tests to explore whether the observed differences were statistically significant. Again, no statistically significant differences were found.

Table J summarises the difference in the changes between before and after scores between medical and surgical staff. Only the difference in confidence to ask a more senior member of staff to come and assess a patient was statistically significant with a moderate standardised effect size of 0.4.

Table I. 'After' scores for medical/surgical staff

	Medicine			**Surgery**					
	n	*mean*	*SD*	*n*	*mean*	*SD*	*mean diff*	*95% CI*	*p*
Level of experience	79	8.0	1.4	89	8.1	1.4	-0.1	-0.5 - 0.3	0.7
Level of knowledge	79	8.0	1.6	89	8.1	1.4	-0.1	-0.6 - 0.3	0.6
Confidence to recognise	80	8.1	1.3	89	8.1	1.5	0.1	-0.4 - 0.5	0.8
Confidence when to contact	80	9.1	1.0	89	9.0	1.3	0.1	-0.2 - 0.5	0.4
Confidence who to contact	80	9.3	0.8	89	9.1	1.2	0.2	-0.1 - 0.5	0.2
Confidence to report	80	9.1	1.3	89	9.2	1.1	0.0	-0.4 - 0.4	0.9
Confidence to ask to come	80	9.5	0.7	89	9.3	1.0	0.2	-0.0 - 0.5	0.1
Total no of concerns	80	3.8	2.2	88	3.7	2.2	0.0	-0.6 - 0.7	0.9

Table J. Difference between 'before' and 'after' scores' for medical/surgical staff

	Medicine			**Surgery**					
	n	*mean*	*SD*	*n*	*mean*	*SD*	*mean diff*	*95% CI*	*p*
DIff in level of experience	79	0.6	1.2	89	0.6	1.4	-0.0	-0.4 - 0.4	0.9
Diff in level of knowledge	79	0.7	1.4	89	0.6	1.2	0.1	-0.3 - 0.6	0.5
Diff in confidence to recognise	79	0.9	1.3	88	0.7	1.3	0.2	-0.2 - 0.6	0.3
Diff in confidence when to contact	80	0.2	1.1	88	0.1	1.3	0.1	-0.3 - 0.5	0.7
Diff in confidence who to contact	80	0.3	1.0	88	0.1	1.3	0.2	-0.2 - 0.5	0.4
Diff in confidence to report	80	0.2	1.1	88	0.1	1.1	0.1	-0.3 - 0.4	0.7
Diff in confidence to ask to come	80	0.2	0.8	88	-0.1	0.8	0.3	0.01 - 0.5	0.04*
Diff in total no of concerns	80	0.6	2.3	88	-0.6	2.5	-0.0	-0.8 - 0.7	0.9

* statistically significant at $p<0.05$

Further analyses explored the differences between staff on individual wards. Table K summarises the difference in the 'before' scores for continuous data between staff on each ward and reports the results of the one-way Anova tests to explore whether the observed differences were statistically significant. Only the differences in level of knowledge and confidence to recognise deteriorating patients were statistically significant. When the Bonferroni correction was used to indicate which differences between wards were statistically significant, there were significant differences between wards G and F in confidence to recognise ($p = 0.05$, 95% CI 0.01 to 3.69) . However, although the overall difference in level of knowledge was significant, the differences between individual wards is small and when allowing for multiple hypothesis testing these differences are no longer significant at the $p = 0.05$ level.

Table K. 'Before' scores for all wards

		A	B	C	D	E	F	G	H	I	J	K	L	Group mean	p value
Level of experience	Mean	7.9	7.2	7.0	8.0	6.9	6.6	8.1	7.4	8.3	6.8	8.0	7.7	7.6	0.11
	SD	1.6	1.7	1.7	1.8	2.1	2.6	1.4	1.6	1.3	2.8	1.4	1.7	1.9	
	n	22	19	16	30	11	19	25	13	14	4	6	19	198	
Level of knowledge	Mean	7.4	7.0	6.8	7.9	6.6	6.5	8.1	7.1	7.9	5.5	7.8	7.5	7.3	0.02*
	SD	1.6	1.6	1.9	1.9	1.7	2.2	1.3	1.4	1.6	2.4	1.6	1.6	1.8	
	n	22	19	16	30	11	19	25	13	14	4	6	19	198	
Confidence to recognise	Mean	7.6	7.0	7.3	8.0	6.6	6.4	8.2	7.2	8.3	6.5	7.8	7.3	7.5	0.01*
	SD	1.3	1.6	1.7	2.0	1.8	2.4	1.5	1.4	1.6	2.1	1.2	1.7	1.8	
	n	22	19	16	30	11	18	25	13	14	4	6	18	196	
Confidence when to contact	Mean	8.9	8.9	8.8	8.8	8.3	8.5	9.0	8.5	9.8	9.2	8.8	9.0	8.9	0.31
	SD	1.0	1.2	0.7	1.7	1.8	1.4	1.2	1.3	0.6	1.0	1.2	1.5	1.3	
	n	22	19	16	30	11	18	25	13	14	4	6	19	197	
Confidence who to contact	Mean	8.5	9.3	8.9	8.9	8.9	8.7	9.0	8.8	9.4	9.0	9.5	9.4	9.0	0.40
	SD	1.3	0.7	0.9	1.6	1.3	1.5	1.2	1.1	1.4	1.4	0.5	0.8	1.2	
	n	22	19	16	30	11	18	25	13	14	4	6	19	197	
Confidence to report	Mean	8.9	9.0	8.9	9.2	8.7	8.9	9.2	8.7	9.6	9.3	9.2	9.0	9.0	0.83
	SD	1.2	1.3	1.2	1.3	1.6	1.2	1.1	1.5	1.1	1.0	0.8	1.6	1.3	
	n	22	19	16	30	11	18	25	13	14	4	6	19	197	
Confidence to ask to come	Mean	9.2	9.4	9.1	9.3	9.0	8.9	9.6	9.2	9.9	9.0	9.5	9.7	9.3	0.26
	SD	0.9	0.8	0.6	1.4	1.0	1.7	0.7	1.0	0.4	1.4	0.5	0.7	1.0	
	n	22	19	16	30	11	18	25	13	14	4	6	19	197	
Total no of concerns	Mean	5.0	4.1	3.2	3.5	4.6	4.7	4.0	4.5	3.9	6.0	4.0	4.7	4.2	0.42
	SD	2.6	2.6	2.1	2.8	3.2	2.5	2.3	2.3	3.0	4.9	2.4	2.2	2.6	
	n	22	19	16	30	11	19	25	13	14	4	6	19	198	

* statistically significant at $p<0.05$

Table L summarises the difference in the 'after' scores for continuous data between staff on each ward and reports the results of the one-way Anova tests to explore whether the observed differences were statistically significant. There were statistically significant differences in five of the scales. The results of applying the Bonferroni correction was used to indicate which differences between wards were statistically significant are shown in Table M. Wards F and E staff scores were significantly lower than other wards for three scales.

There were no significant inter-ward differences in the changes between before and after scores.

Table L. 'After' scores for all wards

Ward		A	B	C	D	E	F	G	H	I	J	K	L	Group mean	p value
Level of experience	Mean	8.1	7.8	8.1	8.7	7.0	7.5	8.6	7.9	9.1	7.5	8.3	8.2	8.2	0.005*
	SD	1.4	1.9	0.8	1.4	1.7	1.3	1.2	1.3	0.9	1.7	1.2	1.5	1.4	
	n	21	19	16	30	11	19	25	13	14	4	6	19	197	
Level of knowledge	Mean	8.0	7.6	7.9	8.7	6.7	7.3	8.6	7.9	8.9	7.8	7.7	7.8	8.0	0.001*
	SD	1.4	2.1	1.3	1.3	1.5	1.3	1.0	1.1	1.1	1.3	2.1	1.6	1.5	
	n	21	19	16	30	11	19	25	13	14	4	6	19	197	
Confidence to recognise	Mean	8.5	8.0	8.1	8.7	6.5	7.5	8.7	8.0	9.0	8.0	8.7	8.0	8.2	0.000*
	SD	1.0	1.4	1.2	1.4	2.0	1.4	1.0	1.1	1.2	0.8	1.5	1.8	1.4	
	n	22	19	16	30	11	19	25	13	14	4	6	19	198	
Confidence when to contactA	Mean	9.3	9.2	9.2	9.3	8.2	8.5	9.2	8.9	9.6	8.8	9.2	8.7	9.1	0.071
	SD	0.8	1.2	0.5	1.2	2.4	1.2	1.1	1.2	0.5	0.5	0.8	1.4	1.2	
	n	22	19	16	30	11	19	25	13	14	4	6	19	198	
Confidence who to contact	Mean	9.1	9.5	9.4	9.5	8.7	8.4	9.4	9.1	9.6	9.8	9.9	9.3	9.3	0.009*
	SD	1.0	0.8	0.7	0.9	1.6	1.7	0.9	1.0	0.5	0.5	0.4	0.7	1.0	
	n	22	19	16	29	11	19	25	13	14	4	6	19	197	
Confidence to report	Mean	9.4	9.4	8.8	9.6	8.9	8.6	9.4	9.3	9.6	8.5	9.5	9.2	9.3	0.089
	SD	0.8	1.2	2.2	0.6	1.6	1.4	0.9	0.8	0.6	1.3	0.8	0.9	1.2	
	n	22	19	16	30	11	19	25	13	14	4	6	19	198	
Confidence to ask to come	Mean	9.6	9.6	9.5	9.6	9.0	8.7	9.5	9.3	9.7	9.3	9.3	9.3	9.4	0.029*
	SD	0.5	0.8	0.7	0.7	1.4	1.3	0.8	0.9	0.5	1.0	0.5	0.7	0.9	
	n	22	19	16	30	11	19	25	13	14	4	6	19	198	
Total no of concerns	Mean	4.1	4.2	2.8	2.8	4.7	3.8	3.2	4.2	3.2	5.5	4.7	3.5	3.6	0.105
	SD	2.0	2.3	1.9	2.7	2.1	2.1	2.0	2.9	2.2	2.4	1.8	2.0	2.3	
	n	22	19	16	30	10	19	25	13	14	4	6	19	197	

* statistically significant at $p<0.05$

Table M. Bonferroni tests to explore the differences in the 'after' scores between individual wards

	Wards	Mean diff	p value	95% CI
Level of experience	D - E	1.7	0.05*	0.01 - 3.33
	I - E	2.1	0.02*	0.18 - 3.97
Level of knowledge	D - E	2.0	0.06*	0.3 - 3.72
	G - E	1.8	0.03*	0.08 - 3.59
	I - E	2.2	0.01*	0.25 - 4.16
	D - F	1.5	0.03*	0.05 - 2.89
Confidence to recognise	A - E	2.0	0.01*	0.29 - 3.71
	D - E	2.2	0.00*	0.61 - 3.88
	G - E	2.2	0.001*	0.55 - 3.90
	I - E	2.5	0.000	0.68 - 4.41
Confidence who to contact	B - F	1.1	0.05*	0.00 - 2.21
	D - F	1.1	0.02*	0.06 - 2.06
	I - F	1.2	0.04*	0.03 - 2.42

Confidence to ask to come	B - F	0.9	0.05*	0.01 - 1.89
	D - F	0.9	0.03*	0.03 - 1.73
	I - F	1.0	0.05*	0.01 - 2.05

* statistically significant at $p<0.05$

Appendix 6. Stage 2 Staff interview schedules

Before the introduction of RTTWS

Recognising a deteriorating patient.

1. Currently how do you recognise someone who is deteriorating on the ward?

Prompts: Documentation

Observations

Clinical assessment

2. How confident do you feel about identifying someone who is deteriorating on your ward?

Prompts: Reasons for high/low confidence

Lack of experience/knowledge

3. How experienced are you at recognising someone is deteriorating on your ward?

Prompts: What experience has been useful?

What experience do you need?

4. Do you have any worries or concerns about recognising someone is deteriorating on your ward or if someone is deteriorating?

Prompts: Lack of information about the patient

Uncertain or lack of diagnosis

Rapid deterioration

Lack of prior specific experience / knowledge

Keeping calm

Remembering to conduct all appropriate observations

Unable to get help when needed

Not knowing who to contact

Getting a timely response from more senior staff

5. What would help you to better recognise a deteriorating patient on your ward?

Prompts: Education, training

Support from nursing and medical colleagues

Early warning scores

Expectations of the REWs and training

6. What are you expecting from the training sessions to introduce the RTTWS?

Prompts: Background to why this is being introduced/change of practice

Use of new observation chart

Use of new escalation system to call

Knowledge of early warning scores for deteriorating patients

7. How do you think the proposed new early warning system of scoring all patients will help you in your daily practice?

Prompts: New charts time to complete

Aid to support nurses decision

Aid to getting further senior nursing and medical help

Two tier system to aid identification of acutely ill patients

8. Do you have any concerns or worries about the proposed new early warning system?

Prompts: Potential impact on day to day practice

Potential impact on workload

Access to necessary equipment: dynamaps

Access to medical staff when needed

Acceptability by all staff

Getting timely help from medical colleagues

9. Any other comments or questions?

After the introduction of RTTWS

1. What was your experience of the REWs training?

Prompts: Was it what you expected?

Did it meet your training needs?

How can it be improved?

What could be added?

2. What has been your experience of working with the new early warning scoring system?

Prompts: Has it been easy to understand and use?

Is the guidance on the charts easy to use?

What are the advantages/disadvantages of the new system/charts?

Two tier system to aid identification of acutely ill ward patient

How you move up to PAR on new system – easier/harder than before

How you move down from PAR on new system - easier/harder than before

Flexibility in interpretation of scoring – whether you call and who you call.

Any differences to old system?

Do you feel comfortable acting on the score - does it accurately reflect how ill aptients actually are. i.e triggering when not unwell and calling Drs more often/unnecessary, or not picking up patient is unwell

Are the individual parameters sensitive enough?

3. What has been the impact of the new REWS on your work on the ward?

Prompts: Impact on ward nurses (workload)

Ease of use

Access to advice – nursing and medical

Access to equipment

Empowerment for nursing staff to call for help

Access to medical staff - has this improved/speeded up access?

Access to medical teams of outliers any easier?

4. How has it helped in the management of deteriorating patients in the wards?

Prompts: Empowerment for nursing staff to call for help

Easier/quicker access to medical staff

Ownership

Improved patient care, better outcomes

5. Do you think the RTTWS is an improvement on previous practice?

Prompts: Why/why not

Elements of observations difficult to assess and document

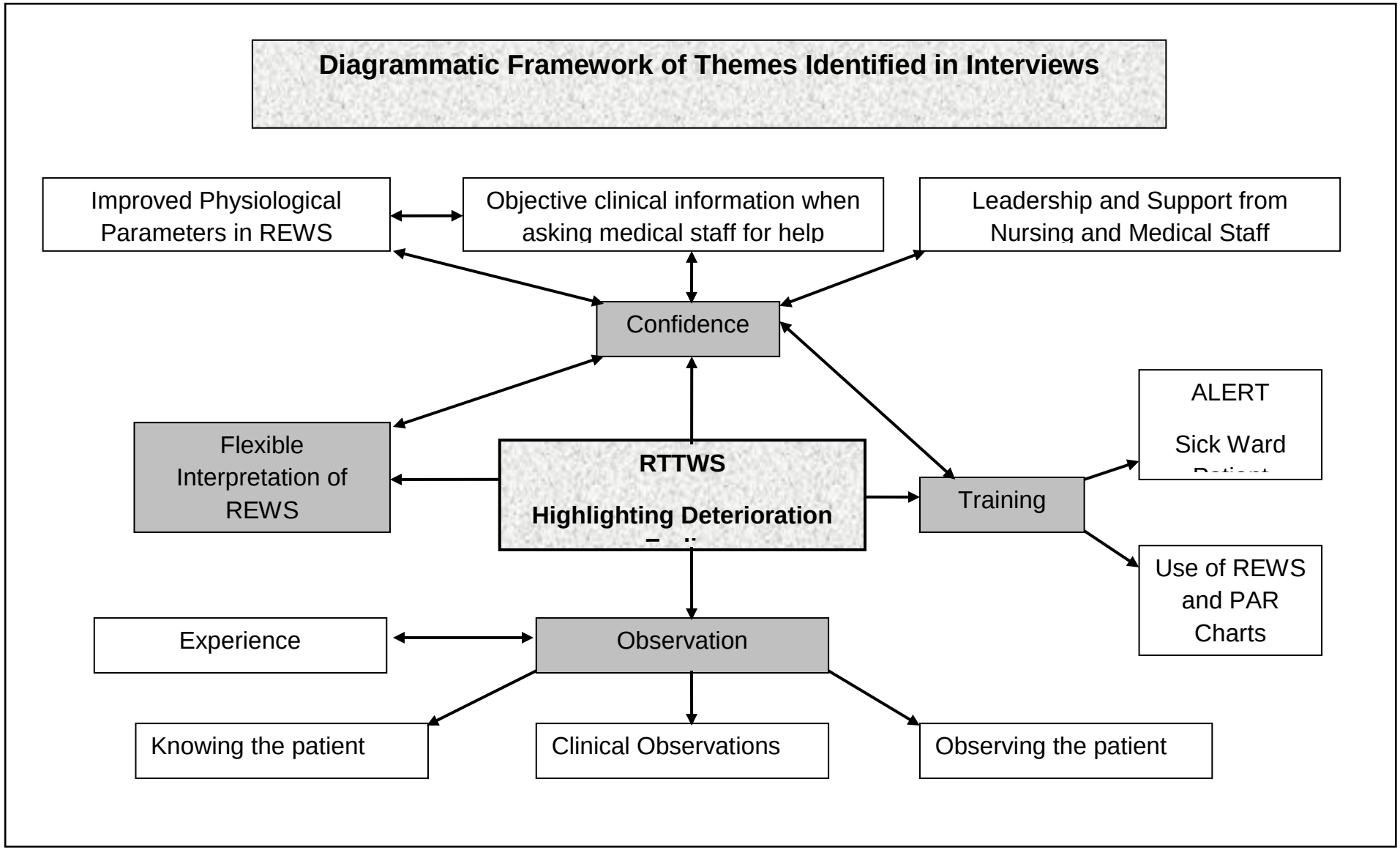
E.g. urine output, oxygen saturations

Time taken for documentation

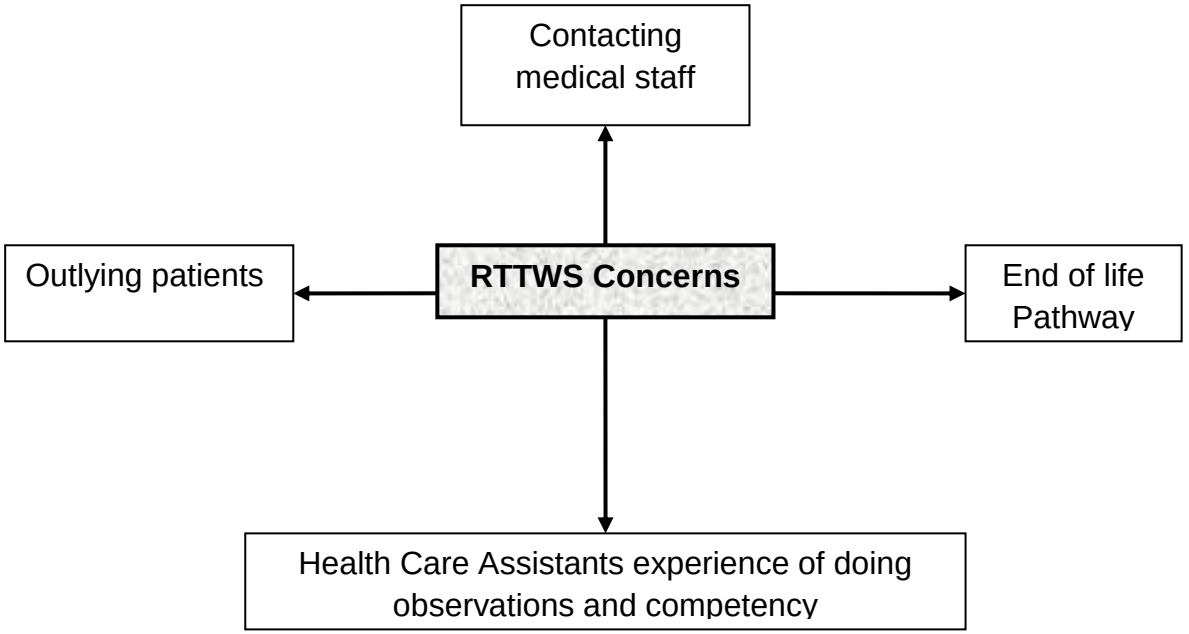
Two tier system to aid identification of acutely ill ward patient

Does the documentation need improving/ changing

Appendix 7. Diagrammatic framework of themes identified in staff interviews


Diagrammatic Framework of Themes Identified in Interviews
Improved Physiological Parameters in REWS
Objective clinical information when asking medical staff for help
Leadership and Support from Nursing and Medical Staff
Confidence
Flexible Interpretation of REWS
RTTWS
Highlighting Deterioration
Training
ALERT
Sick Ward
Use of REWS and PAR Charts
Experience
Observation
Knowing the patient
Clinical Observations
Observing the patient

Issues of Concern for Future Consideration



Appendix 8. Stage 1 Questionnaire responses to open- ended questions

Question 3: How would you recognise a deteriorating patient?

Responses from Registered Nurses

	Pre Questionnaire Number of Responses	Post Questionnaire Number of Responses
How the patient looks/observing e.g. colour	68	75
Intuition/instinct	5	2
Communication/confusion /response from patient	50	37
Observations	129	125
Patient clammy	5	7
PAR score	22	29
Blood results/saturations	39	34
Asking the patient	9	4
Total Number of respondents commenting	138	140

Summary of key issues:

- How patient looks e.g. colour very important
- Observations cited much more often than how patient looks
- More staff cited observations than using PAR scoring, however this increased in the Post Questionnaire
- Some staff also use oxygen saturations and blood tests to monitor deterioration
- Asking or talking to the patient to monitor deterioration seen as useful by fewer staff
- Very few mentioned intuition - seems to be more about recognising from patients appearance - specifically colour and clammy
- Patient becoming confused, not able to respond also important indicator of deterioration

Responses from Health Care Assistants

	Pre Questionnaire Number of Responses	Post Questionnaire Number of Responses
How the patient looks/observing e.g. colour	33	27
Intuition/instinct	2	2
Communication/confusion /response from patient	26	29
Observations	50	40
Altered breathing pattern	20	17
Patient clammy	10	2
PAR score	1	6
Patient not wanting diet and fluids	8	14
Unable to mobilise	3	1
Total number of respondents commenting	68	69

Summary of key issues:

- Responses from the HCA's are to the RGN's, except only one HCA mentioned PAR
- Non qualified are aware of other subtle clues e.g. patient not wanting diet and fluids, and unable to mobilise
- HCA's indicate that altered breathing patterns indicate deterioration more than other vital signs
- Larger proportion stated they had no worries than qualified
- Contact with doctors is less of an issue for HCA's
- More are worried about their own ability to notice or respond to deterioration
- Most rely on informing senior nurses and them then acting

Question 4: Briefly describe any worries and concerns you have about recognising a patient who is deteriorating on your ward?

Responses from Registered Nurses

	Pre Questionnaire Number of Responses	Post Questionnaire Number of Responses
Recognising deterioration early enough	6	5
Doctors/response time/availability/not listening to nursing staff/inexperience	36	26
Pt unfamiliar not known to staff	2	4
Medical Outliers	4	1
Lack of experience	6	5
Not enough information	3	3
Not escalating	2	2
Lack of time and staffing/workload	21	30
Getting Patient to HDU	1	0
No Concerns (one positive comment for REWS)	11	26
Total Number of Respondents Commenting	102	95

Summary of key issues:

- Lack of time and problems of response times and communicating with doctors biggest worries
- Few mentioned medical outlying patients
- Only about 10% of staff stated they had no worries

Question 4: Briefly describe any worries and concerns you have about recognising a patient who is deteriorating on your ward?

Responses from Health Care Assistants

	Pre Questionnaire Number of Responses	Post Questionnaire Number of Responses
Recognising deterioration early enough/getting help quickly enough	11	9
Doctors response time	3	3
Patient condition (e.g how patient looks, breathing deterioration)	7	3
Would inform senior/staff nurse (so not worried) *	21	7
Lack of information (e.g about the patient)	3	2
Not escalating		
Lack of time and staffing/workload	4	2
Lack of training	1	2
No Concerns	7	9
Missing responses	23	29
Total Number of respondents commenting	45	36

***One response worried inexperienced staff may not act quickly enough**

Summary of key issues:

- Larger proportion stated they had no worries than qualified
- Contact and communicating with doctors is less of an issue for HCA's
- More worried about own ability to notice or respond to deterioration
- Most rely on informing senior nurses and them then acting

Before Questionnaire Question 12: Any other comments?

RGN's	Number of Comments	HCA's	Number of Comments
Further training e.g. ALERT improves knowledge and confidence	2	Would always inform senior staff	1
Training for night staff so all staff get trained	1	Still Learning	2
Positive towards PAR scoring	4	Would like more training	1
Getting doctors to attend patient can be difficult	3	Trying to learn more through courses	1
Outlying patients and getting doctors to attend	1	HCA not always listened to	1
Lack of experience	1		
Workload and busy ward	1		
Good support from senior staff	3		

After Questionnaire Question 17: Any other comments?

RGN's	Number of Comments	HCA's	Number of Comments
Issues with medical staff attendance/outliers	6	New observation chart and PAR chart has increased awareness and knowledge of observations	1
Increased confidence	3	New charts are easier to use	1
Charts and system better	6	Not relying on observations alone, need to look at how the patient is	1
Training important	1	Lack of opportunity to do obs and use charts since introduction	1
Forces people to act	1		
ALERT course helped	2		

After Questionnaire - Question 14:

Has the introduction of the new clinical observation chart and PAR chart resulted in any difficulties on your ward?

RGN's	Number of Comments	HCA's	Number of Comments
Urine misleading	3	Saturation, oxygen delivery and masks had caused confusion	2
Not filed in properly if patient has a catheter ? not a catheter	2	Not had training on new charts or PAR	1
Need to bleep SHO more	1	Staff debates on how to complete the chart	1
Students taking more notice of oxygen saturation and delivery	1		
Robust early training overcame teething problems	1		
Staff quicker and more confident	1		

Appendix 9. Summary of HCA practice by ward

Ward	Number HCA's Trained to do obs	Number on permanent Nights	Can Do PAR Score	Does HCA do observations, and how often?	Can HCA do PAR Score, if so how often?
A	3	0	Yes	Yes at least weekly	Occasionally, if ward busy and more than 1 patient unwell would need to help under supervision
B	14	2	No	Fewer RGN's on this ward so HCA's do observations more often	No RGN only
C	9	3	No	HCA's do observations on all shifts	No RGN only
D	14	0	No	Rarely will HCA's do obsefvations, RGN's and student nurses do them, would probably only do observations on nights	No RGN only

E	10	0	Yes	Yes would do observations frequently on most shifts supervised by RGN's	Yes, can do set of observations with RGN checking and applying a score. HCA's work closely with RGN on this ward
F	9	5	No	Not very often, RGN and Student nurses always do observations, HCA would only do if very busy, mostly on nights	No RGN only
G	10	4	Yes	Not very often, RGN and Student nurses always do observations first, HCA would only do if very busy, mostly happens on nights	Only would do PAR if ward very busy, and RGN needed help
H	10	1	No	Not very often, RGN and Student nurses always do observations, HCA would only do if very busy, mostly on nights	No RGN only, might help RGN if very busy, e.g. put dynamap on, but RGN will always check
I	9	3	Yes	Not very often, RGN and Student nurses always do observations, HCA would only do if very busy, mostly on nights, possibly weekly	Can do PAR score if RGN busy and needs help, will probably happen mostly on nights
J				Yes at all times due to fewer RGN's on duty	Yes, as usually fewer RGN on duty, HCA may occasionally have to help

	4	0	Yes		if patient on PAR
K	8	0	No	RGN and Student nurses do observations first, HCA might do them weekly, depends on how busy ward is and workload	No RGN only
L	14	5	Yes	RGN and Student nurses do observations first, HCA might do them weekly, depends on workload and how busy ward is, will do observations intermittently usually on nights	Infrequently, would only do if very busy and absolutely necessary
Total	**114**	**23**			

Appendix 10. Stage 3 Patient interview schedules

Introduction

Summary of the project:

This evaluation study is examining how patients are being assessed and monitored by nurses on the wards. We are interested in knowing more about how nurses can tell if a patient is getting better or worse.

We want to talk to some patients to find out their views and experiences about being assessed and monitored on the ward. We want to know how this feels from your point of view. We would like to ask you how you think your health is assessed, what you know and understand about this and what you think is important?

Confidentiality - Taping interview, transcripts, anonymity etc

Consent

Are you happy to continue?

1. Do you know how nurses assess or monitor your condition / health on the ward?

Prompts: How do they know your health is getting better or worse?

BP/Pulse/Temperature/other?

2. When they undertake these measurements then what do they do?

Prompts: Does anyone tell you what the results of these observations are?

Are they written down?

What notes are taken and where are they kept?

Are they reported to anyone else?

3. Do you know what is written on your charts (say where they are kept)?

4. Do you think it is important that you know what is written on your charts?

Why?

5. Have the type or frequency of these assessments ever changed?

Prompts: If yes then in what way……

How did you know this (try to check if just worked this out or if this was preceded or accompanied by an explanation)

6. If assessments weren't done would you be aware/notice?

7. If you thought an assessment should have been done but wasn't, would you say something?

Prompts: If yes, who to?

If no why not?

8. Do you have any worries or concerns about how your health has been monitored or assessed since you have been on this ward?

Prompts: yes / no – why is this?

9. How could the way your health has been monitored and assessed on the ward be improved?

10. Are you aware of the critical care outreach team?

If yes check understanding of critical care outreach

Any other comments?

Thank you for talking to me and taking part.

Appendix 11. Findings of Stage 4 chart audit

Summary of clinical observation chart audit for surgery and medicine (n = 50)

		SURGERY		MEDICINE		Total correct n (%)
		YES	N/A	YES	N/A	
1.	Patient has REWS assessment chart within records of care	25	0	25	0	50 (100)
2.	Patients name in patients name space	25	0	24	0	49 (98)
3.	Current ward name in ward name space	23	0	23	0	49 (98)
4.	Individual hospital number in unit number space	22	0	24	0	49 (98)
5.	Consultant in consultant space	23	0	22	0	45 (90)
6.	Date commenced in date space including year	25	0	25	0	50 (100)
7.	Month in month space	24	0	25	0	49 (98)
8.	Date in date space	25	0	25	0	50 (100)
9.	Time in time space	25	0	25	0	50 (100)
10.	Temperature recorded in space below date & time	25	0	25	0	50 (100)
11.	Temperature recorded correctly by joined black line	22	0	21	0	43 (86)
12.	Systolic and diastolic BP recorded in space below date & time	25	0	25	0	50 (100)
13.	BP recorded in correct way on chart	25	0	25	0	50 (100)
14.	Pulse rate recorded in space below date & time	25	0	25	0	50 (100)
15.	Pulse rate recorded correctly in red joined line	23	0	25	0	48 (96)
16.	Respiratory rate recorded in space below date & time	25	0	25	0	50 (100)
17.	% oxygen administered recorded correctly in box for %O2	25	0	23	2	48 (96)
18.	SpO2% recorded as a number in Spo2 box	25	0	23	2	48 (96)

19.	O2 device recorded correctly according to key on back of chart	25	0	23	2	48 (96)
20.	Individual PAR score or symbol entered in all observation boxes	24	0	24	0	48 (96)
21.	Systolic BP score correct	25	0	25	0	50 (100)
22.	Pulse score correct	25	0	25	0	
23.	Temperature score correct	25	0	25	0	50 (100)
24.	Conscious level score correct	25	0	25	0	50 (100)
25.	Respiratory rate score correct	25	0	25	0	50 (100)
26.	Urine output score correct	24	0	23	0	47 (94)
27.	% of oxygen score correct	22	3	25	0	47 (94)
28.	O2 saturations score correct	22	3	25	0	47 (94)
29.	Total REWS score recorded in box next to total score	24	0	24	0	48 (96)
30.	Total REWS score recorded is correct	25	0	25	0	50 (100)
31.	Recorded observation has practitioner initials in initials box	24	0	25	0	49 (98)
32.	All recorded observation have practitioner initials in initials box	25	0	25	0	50 (100)

Summary of PAR chart audit for surgery and medicine (n = 50)

		SURGERY	MEDICINE	TOTAL N (%)
A	TIME OF TRIGGER RECORDED correct	21	17	38 (76)
B	TIME OF CALL TO DR RECORDED correct	22	17	39 (78)
C	TIME DR REVIEWED RECORDED correct	21	22	43 (86)
D	GRADE OF DR RECORDED correct	18	22	40 (80)
E	INTERVENTION/TREATMENT/REFERAL RECORDED correct	23	22	45 (90)
F	SIGNATURE RECORDED	23	20	43 (86)
G	SEX IN SEX SPACE RECORDED	24	22	46 (92)
H	DOB IN DOB SPACE RECORDED	25	23	48 (96)

		SURGERY		MEDICINE		**TOTAL N (%)**
		YES	N/A	YES	N/A	
1.	Patient has PAR assessment chart within records of care	25	0	25	0	50 (100)
2.	Patients name in patients name space	25	0	25	0	50 (100)
3.	Current ward name in ward name space	24	0	21	0	45 (90)
4.	Individual hospital number in unit number space	24	0	24	0	48 (96)
5.	Consultant in consultant space	23	0	22	0	45 (90)
6.	Date commenced in date space including year	25	0	25	0	50 (100)
7.	Month in month space	25	0	25	0	50 (100)
8.	Date in date space	25	0	25	0	50 (100)
9.	Time in time space	25	0	25	0	50 (100)
10.	Temperature recorded in space below date & time	25	0	25	0	50 (100)
11.	Temperature recorded correctly by joined black line	19	0	21	0	40 (80)
12.	Systolic and diastolic BP recorded in space below date & time	25	0	25	0	50 (100)
13.	BP recorded in correct way on chart	25	0	25	0	50 (100)
14.	Pulse rate recorded in space below date & time	25	0	25	0	50 (100)
15.	Pulse rate recorded correctly in red joined line	25	0	23	0	48 (96)
16.	Respiratory rate recorded in space below date & time	25	0	25	0	50 (100)
17.	% oxygen administered recorded correctly in box for %O2	21	2	23	2	44 (88)
18.	SpO2% recorded as a number in SpO2 box	21	2	21	0	42 (84)
19.	O2 device recorded correctly according to key on back of chart	22	1	23	2	45 (90) with 3 (6) NA
20.	Individual PAR score or symbol entered in all observation boxes	25	0	24	0	49 (98)

21.	Systolic BP score correct	25	0	25	0	50 (100)
22.	Pulse score correct	25	0	25	0	50 (100)
23.	Temperature score correct	25	0	25	0	50 (100)
24.	Conscious level score correct	25	0	25	0	50 (100)
25.	Respiratory rate score correct	25	0	25	0	50 (100)
26.	Urine output score correct	22	0	23	0	45 (90)
27.	% of oxygen score correct	25	0	24	1	49 (98) with 1 (2) NA
28.	O2 saturations score correct	25	0	24	1	49 (98) with 1 (2) NA
29.	Total REWS score recorded in box next to total score	25	0	25	0	50 (100)
30.	Total REWS score recorded is correct	25	0	25	0	50 (100)
31.	Recorded observation has practitioner initials in initials box	25	0	25	0	50 (100)
32.	All recorded observation have practitioner initials in initials box	25	0	25	0	50 (100)

FLUID BALANCE CHART PAR

		SURGERY	MEDICINE	TOTAL n (%)
33.	Frequency of Input recorded	9	8	18 (36)
34.	Frequency of Output recorded	10	9	19 (38)
35.	INPUT RECORDED	25	22	47 (94)
36.	12 HRLY SUBTOTAL RECORDED (INPUT)	18	17	35 (70)
37.	TOTAL INPUT RECORDED	25	23	48 (96)
38.	OUTPUT RECORDED	24	22	46 (92)
39.	12HRLY SUBTOTAL RECORDED (OUTPUT)	20	17	37 (74)
40.	BALANCE RECORDED	23	18	41 (82)
41.	PATIENTS WEIGHT RECORDED	6	2	8 (16)