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OBSERVATION AND RESPONSE CHARTS (ORC) PROJECT

Pilot Testing Report

AUSTRALIAN COMMISSION ON SAFETY AND QUALITY IN HEALTHCARE

recognising + responding TO CLINICAL DETERIORATION

Observation and Response Chart (ORC) Project

Pilot Testing Report

Preface

This report was prepared for the Australian Commission on Safety and Quality in Health Care's program for Recognising and Responding to Clinical Deterioration

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Definitions

ACSQHC; The Commission	Australian Commission on Safety and Quality in Health Care
EWS	Early Warning Score
MET	Medical Emergency Team
Modifications	Any changes made to ORC template; also used when discussing 'modifications section'
ORC	Observation and Response Charts
Response criteria	Physiological signs and parameters set by sites to align with escalation policies and trigger a response
RRS	Rapid Response System
Sets of vital signs / observations	Core physiological variables – respiratory rate; heart (pulse) rate; oxygen saturation; systolic blood pressure; temperature For the ORC templates, diastolic blood pressure, consciousness, urine output and pain are also documented (NB consciousness and urine output contribute to a response to clinical deterioration)
UTS	University of Technology, Sydney

Chart versions

ADDS +	Adult Deterioration Detection System with blood pressure table; multi-parameter trigger / four-response level, with calculation of score from Systolic Blood Pressure (SBP) value
ADDS –	Adult Deterioration Detection System without blood pressure table; multi-parameter scoring / four-response level – no scoring of SBP value
R1	Single response level with single-parameter trigger
R2	Two response level with single-parameter trigger
R4	Four response level with single-parameter trigger

Executive Summary

This report details the second of a two-phase project funded by the Australian Commission on Safety and Quality in Health Care through their 'Recognising and responding to clinical deterioration' Program.

Study description

A before-after design with a multi-method data collection approach was used to evaluate implementation, clinical utility and user acceptance. Three of the Commission's Observation and Response Chart (ORC) templates for use with adult general medical-surgical patients were implemented and evaluated in nine clinical sites. The two-level response ORC was selected in six, while the four-level response ORC and the Adult Deterioration Detection System (ADDS) version (without systolic blood pressure table) were selected in one site each. Participating sites spanned five jurisdictions, and both public and private hospitals, with different levels of service and size, ranging from small rural facilities, to metropolitan and tertiary-level hospitals.

Orientation, training and ongoing support for clinical staff on the introduction and use of the ORCs was provided by on-site project officers seconded from the local organisation's staff. An executive staff member was engaged as a 'champion' for chart implementation at each clinical site to enable optimal communication and engagement with all relevant clinical staff. ORC templates were modified for local site needs to reflect local rapid response system criteria and notification processes. Six sites executed an organisation-wide implementation of the ORC, while the remaining three trialed the charts in 3-4 of their wards.

Study findings

Across the sites, 1,058 patient records were audited during retrospective and prospective periods, including 9,920 sets of vital signs. Feedback on clinical utility from staff involved 218 participants in 44 focus groups. Site-based Project Officers performed 88 periods of observations when staff were using and documenting in the ORCs.

Findings for the five study objectives from the Commission are noted below. Rate of completion of the chart, in relation to vital signs documentation, noted that 75% of records had complete recordings. Improved compliance ranged from 4-14% across parameters when the ORC was in use. Compliance with graphing section requirements was generally high, ranging from 68-100%. Countering this was the use of written

numbers in the graphing section, contrary to human factors principles and ORC guidelines, in 60% of audited forms, increasing the risk of failure to detect patient deterioration. There was also sub-optimal use of the additional features of the chart (6-53%) designed to improve detection of deterioration, response actions and communication and lack of engagement and understanding by medical staff. The required frequency of observations was documented in 75% of cases, with the most common frequencies (four times per day and fourth hourly) accounting for two-thirds of the records. Actual frequency approximated three times per day based on audit findings.

Rate of recognition of abnormality in clinical observations was slightly higher when the ORC was in use - 8% versus 9% for blood pressure and 5% versus 8% for oxygen saturation respectively. Incidences of respiratory rate abnormalities were much lower – around 2% for both audit periods. Actions based on documented abnormal vital signs varied across the chart versions. Of note, for 'clinical review' in the R2 the frequencies of action for oxygen saturation were twice as high when the ORC was in use. For the R4 chart 'increased surveillance' for respiratory rate and systolic blood pressure were also twice as high when the ORC was in use. There were also significantly more 'increased surveillance' and 'senior nurse review' actions for heart rate with the ORC. No differences were evident with the ADDS- chart. These findings may indicate an important feature of the single-parameter ORCs, early identification with focused surveillance or review actions preceding further deterioration and an impending MET call.

Documentation of calling for assistance and response obtained were minimal, with an action documented in only 12% of case when an abnormal vital sign was identified. For a significant sign of clinical deterioration requiring a MET call, actual initiation occurred in only 33% of cases in the retrospective period. This improved to 41% when the ORC was in use. From the documentation it was noted that clinicians responded to abnormal vital signs by using the modifications section or documenting 'not for resuscitation' reactively not proactively; information in the progress notes did not match the identified abnormal vital signs on the ORC; and the decision to activate a MET call or request for clinical review was based on individual clinical judgement, not the ORC recommendations which reflected actual local rapid response system policy. Actual emergency call rates equated to 4.9 and 5.5 per 1,000 bed days respectively. Based

on the ORC guidelines, the required MET call rates could have been 14.8 and 13.6 per 1,000 bed days respectively.

A range of issues emerged from preferences and comments of clinical staff, providing some contextual understanding for the clinical utility of the ORCs, and the challenges encountered by nursing staff in particular when attempting to use these new charts in an existing practice culture. These included compliance, documentation practices, multidisciplinary communication, interdisciplinary practices, and tensions related to clinical decision-making, and ultimately uncovered a range of beliefs and views that hindered optimal use of the ORC framework. Of note particularly was the perceived and practical lack of precision when using ranges in the graphing section; and handling the A3 size, double sided format.

For patient outcomes, there were no differences in rapid response system call rates or outcomes with the introduction of the ORC, although there were limitations with the routinely collected data for a number of sites. There were 294 and 314 emergency calls per month for the retrospective and prospective periods respectively. No event rates could be calculated from the available data. Actual cardiac arrests were 3% of all emergency calls, with 15% of calls resulting in an unplanned ICU admission. Calls during out of hours occurred in 40% and 31% respectively.

Recommendations to the Commission

Our recommendations include: advising health care organisations on documenting the required frequency of patient observations; adding a required frequency of observations area to the ORC templates; revising the graphing section to improve the precision of ranges for vital sign parameters; consider the development of chart inserts to capture all relevant specialty observations in a single observation chart; development and dissemination of specific educational resources to enable optimal utility and adoption of the ORC framework and forms; promote these resources to all clinical disciplines in the health care sector; promote these resources to education and training providers; and explore opportunities for electronic versions of the ORC to link with developing clinical information systems and electronic health records.

Recommendations to health care organisations

Our recommendations are to: develop or revise vital sign and escalation policies, highlighting minimum standards of practice and required frequencies of vital signs observations; maintain the integrity of the ORC design characteristics, when local

modifications are inevitably implemented; continue to evaluate that escalation of care and appropriate responses are triggered when vital sign abnormalities are identified; review data collection and evaluation of local rapid response systems to reflect best practice; ensure full engagement, education and inter-disciplinary communication for all relevant disciplines when implementing an ORC practice framework and form to enable optimal and successful adoption; examine resource implications for using an A3 double-sided colours-specific observation chart which has high usage and handling; consider how to implement a complex practice change such as the ORC within their work cultures; provide initial and clinical training for all staff; provide additional training and support to improve the clinical utility of all sections of the ORC; include documentation of frequency of observations in routine practice audits; and audit the compliance of complete sets of vital signs.

Conclusions

This study demonstrated both positive findings and some limitations in relation to clinical utility and user acceptance of the ORC templates when trialed in adult general medical-surgical wards. The ORC forms were not used to their optimal functioning for a range of reasons including different design characteristics compared to existing charts, precision in charting vital signs values, tensions in clinical decision-making when an abnormal vital signs was identified, and lack of engagement by medical staff.

We believe this study report provides sufficient information to inform the effective implementation and evaluation of the adult general medical-surgical Observation and Response Chart into routine practice in a wide range of health care settings – public and private; rural to tertiary - across Australian jurisdictions.

Our recommendations involve modifications to the chart template for common sections of all versions; development and use of specific information and training packages; full engagement by all clinical staff. Based on our findings, implementation will require a change management approach to address influencing factors such as workplace culture(s); inter-disciplinary communication and co-practices; clinical decision-making; documentation practices; vital sign observation standards and practices; and understanding of and compliance with the human factors ORC design characteristics.

These recommendations to the Commission and health care organisations, listed below, will potentially improve the clinical utility and user acceptance of the charts as an important aid in clinical decision-making when managing adult medical surgical patients with identified abnormal vital signs that are at risk of clinical deterioration. Our recommendations for further research are to explore the cultural issues that influences practices in recognising and responding to the unmet identification of abnormal vital signs, and to examine the actual performance of vital signs measurements for accuracy and consistency.

Summary of Recommendations

Recommendations to the Commission

- Provide advice to organisations on a location(s) in the patient's documentation where the frequency of observation is to be recorded.
- Include the required frequency of observations as a section of the ORC templates.
- Revise the graphing section of the ORC to improve the precision in the ranges of the vital sign parameters. There is also an opportunity to document the actual abnormal parameter value in the 'interventions' section of the ORC, along with any clinical action.
- Develop form 'inserts' to enable all relevant specialty observations to be included on the one ORC, rather than the continuation of multiple observation forms. *(1: 'Measurement and documentation of observations')*
- Develop and disseminate explicit educational resources, based on the human factors principles of the chart design, to guide graphing practices (location of dots in the centre of the graphing area, use of lines to connect the dots, and use of arrows and connecting lines for blood pressure documentation). Information should also focus on eliminating or minimising the practice of writing numerical values in the graphing section of the chart. These resources should identify the human factors principles that guide these instructions, and provide a clear rationale from a patient safety and quality of care perspective.
- Promote and disseminate these resources to all clinical disciplines, specifically medicine at all levels in clinical departments and health care organisations, to enable optimal engagement and understanding. Appropriate engagement by medical clinicians would improve communication and team processes with their nurse colleagues.
- Promote these resources to education and training providers, so that students across all health disciplines have the background knowledge and understanding of safety science and human factors principles, the application of this knowledge in the form of the ORC templates, and the understanding and skills to promote recognition and rapid response systems processes in clinical practice. *(6: 'Education')*
- Consider opportunities for developing, implementing and evaluating electronic versions of the ORC. With the continued development of clinical information

systems and electronic health records, automated measurement devices in general ward areas,[1] and the future opportunities that handheld devices hold in clinical practice, automated measurement and documentation with auto-alerts to staff for abnormal vital signs are distinctly possible. *(8: 'Technological systems and solutions')*

Recommendations to Health care organisations

- Develop / revise local policies on vital sign observations and / or care escalation, highlighting minimum standards of practice and including frequencies required.
- Maintenance of the integrity of the ORC design characteristics will be important when modifying charts for local use, by adhering to chart developer guidelines and accessing human factors expertise. *(1: 'Measurement and documentation of observations')*
- Continue to evaluate whether appropriate responses were triggered according to the ORC recommendations (which were aligned to their local RRS policies), when a vital sign abnormality was identified. Given the findings presented here, it is clear that escalation of care does not always eventuate despite signs of clinical deterioration, sometimes on multiple occasions. *(2: 'Escalation of care')*
- Consider the data collection and evaluation processes of their local RRS system, given the variation in scope and quality of available data noted from study sites. *(3: 'Rapid response systems)*
- If implementing an ORC-type framework and form facility-wide, ensure full engagement by all relevant health disciplines. In particular, medical staff at all levels need to be informed about their role, and committed to their responsibilities and accountability for effective implementation of the ORC. Inter-disciplinary communication is essential for the ORC to be successfully adopted into practice. At the core of this communication is the professional and workplace culture(s) at all levels of the organisation. *(4: 'Clinical communication')*
- Account for increased costs associated with using an A3 double-sided colours-specific observation chart that has high usage and handling
- Consider how to implement the complex practice and cultural changes associated with the implementation of a clinical initiative such as the ORC, within the context of their local workplace culture(s). *(5: 'Organisational supports)*
- Provide relevant initial and continuing training for all clinical staff, based on resources available from the Commission, and tailored to meet their local needs

and context. Application of the ORC is essential to include in clinical deterioration education packages, including how the chart is implemented in routine practice, as well as in escalation of care.

- Additional training and support is required to improve the clinical utility of other sections of the ORC template ('Other Observation Chart in Use', 'Modifications', 'Interventions Associated with Abnormal Vital Signs', 'Clinical Review Requested', 'Additional Observations' sections). *(6: 'Education')*
- Include 'documentation of frequency of observations', and compare to actual frequency as part of routine clinical audits, with the aim of improving compliance to this recommendation by the Commission.
- Audit the compliance of complete sets of vital signs (minimum of respiratory rate, oxygen saturation, systolic blood pressure, heart rate, level of consciousness and temperature), as recommended by the Commission. *(7: Evaluation, audit and feedback)*

Introduction

This report describes the 'Pilot Phase' of a two-stage project commissioned by the Australian Commission on Safety and Quality in Health Care (ACSQHC; the 'Commission'). It is recommended that this report be read in conjunction with the Observation and Response Chart Usability Testing Report,[2] available from the Commission's website.

As a component of the Commission's program on 'Recognising and responding to clinical deterioration', a suite of observation and response charts (ORCs) were designed for use as general observation charts in adult medical / surgical wards of acute care facilities. Following usability testing of the five ORC templates, chart structure and design characteristics were reviewed by representatives from the ACSQHC, University of Technology Sydney (UTS), and the School of Psychology at the University of Queensland. After discussion of the study findings, revisions were made to the chart templates that incorporated clinical user feedback while maintaining key human factors principles.

A summary of the resulting human factors and user information / education issues are listed in Appendix A, and the revised ORC templates are illustrated in Appendix B.

For further information about the ORC project and current versions of revised templates visit: www.safetyandquality.gov.au

Background

In attempts to improve timeliness and effectiveness of responses, and reduce serious adverse events, systems for responding to clinical deterioration of patients in general wards of acute care hospitals have evolved from 'cardiac arrest' teams to 'medical emergency teams' (METs). In-hospital mortality rates approximate 80% for cardiac arrests, 25% for MET calls, and 15% for patients with abnormal vital signs.[3]

Paper-based observation charts remain the dominant approach for documenting clinical observations of adult patients in acute general wards of Australian hospitals. With failure to recognise and respond to signs of clinical deterioration evident,[4] development and evaluation of charts has become a focus of recent work.[e.g.5] Earlier projects in the Commission's program of work on clinical deterioration focused on chart design

characteristics including a survey of preferences from clinical staff,[6] and a simulated practice study.[7]

The online survey examined the preferences of 347 clinical staff (92% nurses; two-thirds in manager, educator or consultant roles) in relation to the design characteristics of nine observation charts.[6] Two-thirds of respondents used observation charts on a daily basis. The charts differed across a range of characteristics, including page size, graphical or numerical recording of physiological parameters, single or multiple parameter triggers, separate axes for each parameter, integration of colour coding to signal the level of abnormality and required response, and inclusion of a summed score.

No significant differences were evident between respondents' preferences for their current observation chart compared to the alternative chart they evaluated. Respondent preferences aligned with human factors principles for plotting values on graphs with graded colouring and links to a response system (43%). Chart versions with numerical recording were less favoured. Conversely, respondents preferred plotting heart rate and blood pressure on the same axis, despite recent evidence that overlapping plots increase error rates and response times. Separate axes are particularly required when a single-parameter response system is in use, to minimise the risk of failure to detect abnormality.[7] This lack of agreement may indicate that any implementation of a new chart and system requires a considered communication and training approach that also considers cultural practices.[6]

Results of the survey and best features of existing charts were then combined with human factors design knowledge to develop the Adult Deterioration Detection System (ADDS) chart for subsequent testing. In the related simulated-practice study, 45 clinicians and 46 volunteers examined correct interpretation and response times for six different designs of observation chart, including the newly developed ADDS chart.[7] Error rates for the 24 doctors and 21 nurses were similar and ranged from 13-38%, with the ADDS charts demonstrating the best performance. Single parameter ORCs were subsequently developed by the Commission using the human factors design principles that guided the development of the ADDS charts.

This project proceeded from the above recent work, to examine whether these specifically designed charts with ‘track and trigger’ response features have utility in actual clinical practice.

Study aim and objectives

The overall study aim was to collect original data in a clinical context, examining the implementation and performance of a site-selected ORC in adult general medical-surgical wards across a whole facility.

The specific study objectives of this phase were to examine the:

1. Rate of completion of the chart
2. Rate of recognition of abnormality (in clinical observations)
3. Rate of calling for assistance where indicated, and the response obtained
4. Preferences and comments of clinical staff
5. Patient outcomes.

Methods

Design

This before-after study used a mixed methods approach to optimise the quantity and quality of data collected. The implementation and performance of each site's chosen ORC was examined and explored using data from retrospective and prospective audits; user focus groups; observational field notes; and patient outcome data (routinely collected at each site).

Sample

Site selection

Invitations to participate in the Pilot Phase were sent to the ten sites involved in the Usability Testing Phase (UTP). Nine sites accepted, while one site declined involvement in favour of continuing with their current track and trigger chart that was developed and implemented in their State jurisdiction (not one of the ORC versions developed by the Commission).

ORC version selection

Each pilot site selected an ORC template that best aligned with their current rapid response system for managing clinical deterioration of adult acute-care patients. It was not an aim of this project to recommend a preferred ORC template for use in clinical practice. Sites were also not obliged to continue with the ORC version that they tested in the UTP. Selected charts are noted in Table 1 describes the selected chart type and the extent of implementation for each site.

Three of the five available ORC versions were selected across the nine sites:

- Seven sites selected the R2 version (single-parameter trigger / two-response level – 'clinical review' or 'emergency call')
- One site selected the R4 version (single-parameter trigger / four-response level – 'increased surveillance', 'senior nurse review', 'clinical review' or 'emergency call')
- One site selected the ADDS^{-} version (multi-parameter scoring / four-response level)

Table 1 Hospital type, selected ORC version and extent of implementation

Hospital Type	ORC version		
	R4	R2	ADDS -BP
Tertiary / Metropolitan		**Site D** (4 wards)	
		Site E (Hospital-wide)	
		Site F (AHS-wide)	
		Site H (4 wards)	
Regional		**Site I** (Hospital-wide)	
Rural		**Site B** (AHS-wide)	
Private	**Site C** (Hospital-wide)	**Site G** (Hospital-wide)	**Site A** (3 wards)

Notes: AHS Area Health Service

Of the nine sites, six conducted an organisation-wide implementation, while the remaining three trialed the ORCs in 3-4 wards. No sites selected the R1 (single-level response chart – 'Emergency call' only) or the ADDS+ (multi-parameter trigger with calculation of score from Systolic Blood Pressure value). See our Usability Testing report for further details of these chart versions.

Modification of ORC template

The *'Developer's guide for observation and response charts'* [8] was provided to all sites to enable identification of any *potentially harmless modifications* that could be applied to their selected ORC, to align with local systems and policies. Sites adjusted the calling criteria on each chart to match their existing escalation protocol. Appendix C illustrates the modifications made to the calling criteria and related parameter values in the graphing area for each site.

Extent of ORC implementation

Site executives provided a letter of support indicating the level of ORC implementation planned for their site. Any extra staff resources, beyond our site-based project officer funding, was determined by local site executives when charts were introduced to the entire organisation. The ORCs were implemented across two area or district health

services and hospital-wide in four sites. The remaining three implemented the charts in selected trial wards only. The six sites that implemented the charts across a whole hospital or service intended to continue to use the ORC in routine practice after completion of data collection (sites B, C, E, F, G, I; see Table 1).

Site-based Project Officer secondment

A Project Officer from each clinical site was seconded for the duration of site-based activities, as in the UTP. This allowed facilitation and successful implementation of the ORC into clinical practice at a site-level by an experienced Registered Nurse who was familiar with local policy, practices and nuances, and held an established rapport with key stakeholders and other hospital staff.

Project Officer responsibilities included:

- Leading and facilitating the implementation of the selected ORC according to the site plan
- Liaison and collaboration with ward staff, hospital executives, committees and other key stakeholders
- Provision of relevant information and education to all hospital staff and participating wards
- Collection and submission of data within required timelines to the UTS research team.

Project officer training

Five of the nine project officers recruited were previously seconded to the role in the UTP, while four were new to the project. A one-day preparatory workshop was sponsored by the Commission and facilitated by the ORC Project Director and Project Manager at UTS. The training day allowed extensive discussion of the UTP findings, introduction to the Project Officer role for the Pilot, and enabled practical application of data collection approaches using clinical scenarios. Ongoing support was provided by e-mail and telephone prior to commencing the pilot phase.

Clinical site preparation

A 26-page ‘Pilot Plan’ was distributed to all site-based project officers and site executives providing details of the different study stages, as well as guidelines, tools for data collection, participant information and consent form templates, and other resources for the site-based Project Officer.

Clinical staff preparation

The initial intent of the Commission was to introduce the ORCs with minimal training to explore the 'usability' of the ORCs for clinical staff. However, results from the participant user survey overwhelmingly indicated that 98% of respondents found education prior to the use of the ORC helpful. Based on these findings, educational resources such as posters and information sheets were developed for Project Officers to provide to clinical staff. These contained relevant information on 'how to use' the ORC (see Appendix D and E for examples). Separate posters and information sheets were developed for each version of ORC. A frequently asked questions (FAQ) sheet was also developed (see Appendix F).

Extensive in-service education sessions were provided by Project Officers prior to implementation of the ORC, as well as one to one support in clinical areas during the pilot phase. Nursing staff were predominantly involved in these educations sessions, as access to medical education time was not available at most sites. Education for doctors occurred primarily at the patient bedside, during ward round or in general ward discussions.

Implementation and Data Collection Timeline

Preparation for ORC implementation and data collection at each site included a range of activities, which are listed in Table 2 below.

Table 2 ORC implementation checklist

Activity	Comments	Date commenced	Date completed
Wards / department selection	• ORC project requires at least 3 wards for data collection • Decision to be made and supported by SEC if facility-wide roll out	__ / __ / __	__ / __ / __
Ethics approval	• Application made by UTS to local HREC with support of SEC and site-based PO	__ / __ / __	__ / __ / __
Forms Committee approval	• Process for medical record forms approval at site level with support of SEC and site-based PO (modified ORC templates to be provided in November)	__ / __ / __	__ / __ / __
Staff education	• Provided as required by the PO to prepare each of the pilot wards for implementation of ORC • If decision for facility-wide roll-out further resources provided by site	__ / __ / __	__ / __ / __
Implementation of ORC	• Project Officer to support roll-out of ORC into clinical practice	__ / __ / __	__ / __ / __
Data Collection	• As detailed in relevant sections of ORC Pilot Plan • All data to be submitted to UTS by 31st March 2012	__ / __ / __	__ / __ / __
Data quality checking	• PO to review 5% randomly selected audits – UTS will advise	__ / __ / __	__ / __ / __

Notes: SEC – Site Executive 'Champion'; PO – Project Officer

Of particular importance was approval of the ORC 'form' for use as an official document in the sites' medical records, and Human Research Ethics Committee (HREC) approval for the study.

The timeline and Project Officer activities related to ORC implementation and data collection are outlined in Table 3.

Table 3 Site activity timeline

Activity	PO Hours	2011												2012											
		October				November				December				January				February				March			
Implementation																									
Ward / department selection (1 day)	7.6																								
Ethics approval (1 day)	7.6																								
Forms Committee approval (1 day)	7.6																								
PO training workshop in Sydney (1 day)	15.2																								
Staff education (4 days) [a,c]	30.4																								
ORC implemented into trial wards (9 days)	68.4																								
Data collection [b]																									
Retrospective data collection (10 days)	76.0																								
Observational field notes (4 days)	30.4																								
Prospective data collection (10 days)	76.0																								
- 28-day patient outcome (1 day)	15.2																								
MET / response system outcome data (2 days)	15.2																								
User focus groups (3 days)	22.8																								
Data quality checking (2 days)	15.2																								
All data submitted to UTS team (1 day)	7.6																								

Notes:

[a] if decision for full facility-wide roll-out, then additional resources to be provided by site

[b] details on data collection activities described in Pilot Project Plan

[c] An extra day in January allocated for training of medical officers

Project Officers (POs) were seconded and funded for a total of 50 days over a period of four months to implement the charts and collect both retrospective and prospective data in at least three wards for data collection. In practice, some weeks required only 1-2 days, while the retrospective (November) and prospective (February) data collection periods required two weeks of full-time involvement.

Data collection

A range of data collection techniques were used to address the study objectives:

- Retrospective audit of data from current hospital systems
- Prospective auditing of data following implementation of the selected ORC
- User focus groups
- Observational field notes
- Patient outcome data from routinely collected organisational data sources.

After education and implementation of the ORCs in each site, clinical staff used the charts routinely for observations for a minimum of three weeks, prior to data collection.

Retrospective and prospective audits

For the two audits, a 72-hour admission period was selected, in February 2011 (retrospective) and February 2012 (prospective). Sixty admission episodes were audited at each participating site. Sunday, Monday and Tuesday were chosen as the audit period to include data related to activity occurring 'out of hours.'

For the retrospective audit, observation charts in use prior to the implementation of the ORC were examined for rate of completion; rate of recognition of abnormal clinical parameters; and rate of triggered responses to a clinical deterioration. Abnormal clinical parameters were identified using triggers from the site-selected ORC. Data collection also included hospital length of stay, location of discharge or transfer at end of admission, resuscitation status, and admission outcome.

During the prospective audit, the recently implemented ORCs were audited for the same data as the retrospective audits, as well as extra items that allowed for comparison with UTP data of completion compliance according to the ORCs general instructions. An example of the prospective audit form is shown in Appendix G. The first page was the same for both retrospective and prospective audits and the second page was used only during the prospective audit.

Focus groups

After ORC implementation and a period of routine use, Project Officers conducted short semi-structured focus group interviews with clinical staff. Participant consent was

provided prior to data collection, and the focus groups were audio-recorded for transcription of de-identified verbatim comments. Focus groups were scheduled during shift overlap, staff development sessions, and education forums with the aim of capturing the views of as many staff comments as possible. Sample questions were provided to each site project officer (see Appendix H).

Observations of documentation practice

Field observations were conducted by the site-based project officers at negotiated times with each clinical area piloting the ORC for a recommended minimum of six observation sessions per selected ward over at least 1-2 hours duration during the prospective data collection period. Observation sessions ranged across different shifts on different days, to enable observation of activities related to use of the ORC in routine observation practices. Guidelines and a template for field notes supported project officers observation of practices (Appendix I).

Ward staff were informed that observations related to ORC usage would occur using normal communication processes and visible placement of ward posters (Appendix J). Individual staff members were able to refuse participation during the observation periods, by negotiation with the ward manager. Project officer interaction was possible with clinical staff during the observation period to either clarify or ask a question.

Patient outcome data

To minimise data collection burden, patient outcome data were collected from routinely collected organisation-wide data systems for adverse events such as MET/arrest calls, unexpected ICU admissions and deaths and length of stay. These data were collected for the months of the retrospective (February 2011) and prospective (February 2012) audit periods. An annual summary for 2011 was also obtained when available from sites.

Data management and analyses

All site data were sent to UTS for management and analyses. Audit data were entered into Microsoft Excel, then cleaned and coded for analysis in SPSS (version 19). Patient

outcome data were sent in original form from the sites, and then re-formatted and coded in Microsoft Excel. Focus groups were audio recorded and sounds files were sent to UTS for transcription. Project officer field notes were typed up as Microsoft Word documents and sent to UTS.

For quantitative data, frequencies were examined for distribution. Descriptive statistics were used to examine all data. For non-normal distributions of continuous data, medians and interquartile ranges (IQR) were used. Proportions and frequencies were used to present categorical data.

Qualitative data were entered into NVivo 9 and analysed for descriptive content and emerging themes.

Ethical considerations

A National Ethics Application Form (NEAF) was initially submitted to one selected lead site. Once HREC approval was confirmed, applications were submitted to the ethics committees all other participating sites as required by the relevant jurisdiction for each participating site.

Clinical staff participants provided informed consent for the focus groups, and observation periods by the project officer, using the provided Participant Information Sheet and Consent Form template (see Appendix K). Confidentially of participant identity was assured. All data were stored as per National Health and Medical Research Council guidelines.[9]

Results

This chapter reports collated findings from the nine clinical sites involved in pilot implementation and evaluation of the selected ORC. Demographic details are presented initially in relation to each of the data collection techniques: the retrospective and prospective audits; focus groups; observation and field notes; and patient outcome data.

Data are then combined to present findings for each study objective, examining the:

1. Rate of completion of the chart
2. Rate of recognition of abnormality (in clinical observations)
3. Rate of calling for assistance where indicated, and the response obtained
4. Preferences and comments of clinical staff
5. Patient outcomes (where available as routine data from sites).

Demographics

Audits - retrospective and prospective

The two audit periods were 13th February to 15th February 2011 (retrospective) and 14th February to 16th February 2012 (prospective). A total of 1058 records were audited – 522 and 536 for the two periods, respectively. This reflected 9920 sets of vital signs (4896 retrospective, 5024 prospective). Table 4 illustrates the number of charts audited for each of the three ORC versions. Note the differences in sample sizes across the versions, ranging from the ADDS- chart used in three wards in one site, through to six sites for the R2 chart (see Table 1 previously for further detail).

Table 4 Number of observation charts audited bychart type and audit period

Chart type	ADDS-	R4	R2	Total audits
Retrospective [a]	60	99	363	522
Prospective	60	116	360	536
Total charts	120	215	723	1058

Notes [a] site routine observation charts were audited according to their rapid response system and selected ORC version

Focus groups

Eight of the nine clinical sites participated with focus group feedback. Overall, data were available from 44 groups, involving 218 clinical nurse participants. Table 5 illustrates the number of groups and participants per site.

Table 5 Focus groups by clinical site

Site	ORC version	Number of focus groups	Number of participants	
			Total	Median (range)
A	ADDS-	9	26	2 (1-8)
B	R4	10 *	33	3 (1-6)
D	R2	5	35	7 (6-9)
E	R2	3	16	5 (4-7)
F	R2	4	22	5 (4-7)
G	R2	6	34	6 (4-7)
H	R2	8	38	4 (2-9)
I	R2	4	16	4 (4-4)

Notes: * 2 additional groups had poor sound quality and were not included

Observation and field notes

Across the nine sites, Project Officers performed 88 periods of field observations of practice, across all times of the day, including on the evening and night shifts. Periods of field observation ranged from 1-8 hours. Table 6 lists the number of observation periods per site. Sites with the smallest number of observation periods (e.g. F and G) conducted observation periods of 6-8 hours.

Table 6 Number of field observations of ORC documentation practices by clinical site

Site	A	B	C	D	E	F	G	H	I
Number of observation periods	6	18	6	12	18	4	3	8	13

Patient outcome data

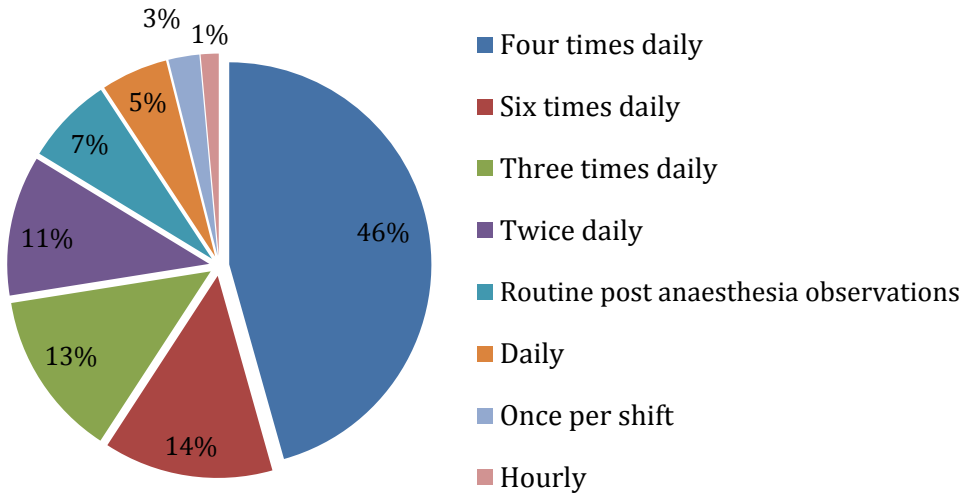
Where available, data routinely collected from each of the sites, recorded and used for their own local purposes was used to examine patient outcomes. Our aim was to examine the number of adverse events to detect any differences in the proportion of events including transfers to ICU during the 'before' and 'after' time periods. Collation and interpretation of these data was challenging, as individual sites collected information on MET and arrest calls in different ways, and with varying levels of detail.

Objective 1. Rate of completion of chart

The National Consensus Statement[10] recommends six core observations identified as essential for the recognition of clinical deterioration: respiratory rate, oxygen saturation, blood pressure, heart rate, temperature and level of consciousness. The Statement also recommends that the appropriate frequency of observations be documented for each patient (p. 29). Only one site provided any local policy on vital signs or care escalation on request; there was no description for minimum standards of vital sign monitoring practices within the policy.

Each admission episode was therefore audited for documentation of the patients required vital sign frequency. Over one-quarter (27%; n=291) of patient episodes did not have the required vital sign frequency documented in either a care plan or medical record. For the 73% (767) that did, Figure 1 illustrates that four times daily (q.i.d.) was the most commonly documented frequency for vital sign measurements in this sample of adult general medical-surgical patients. When combined with the 4th hourly frequency, this accounts for 60% of all observations of patient vital signs.

Figure 1 Documented frequency for measurement of patient vital signs



The location of this documentation varied between sites – 45% were in patient care plans (n = 479), with a small number (n = 18) dual-documented in the medical records or other location. Documentation on a clinical pathway was next most common (n = 234), followed by observations charts (n = 42), operation reports (n = 10), with the remaining in more than one location, on patient journey boards or 'other' locations.

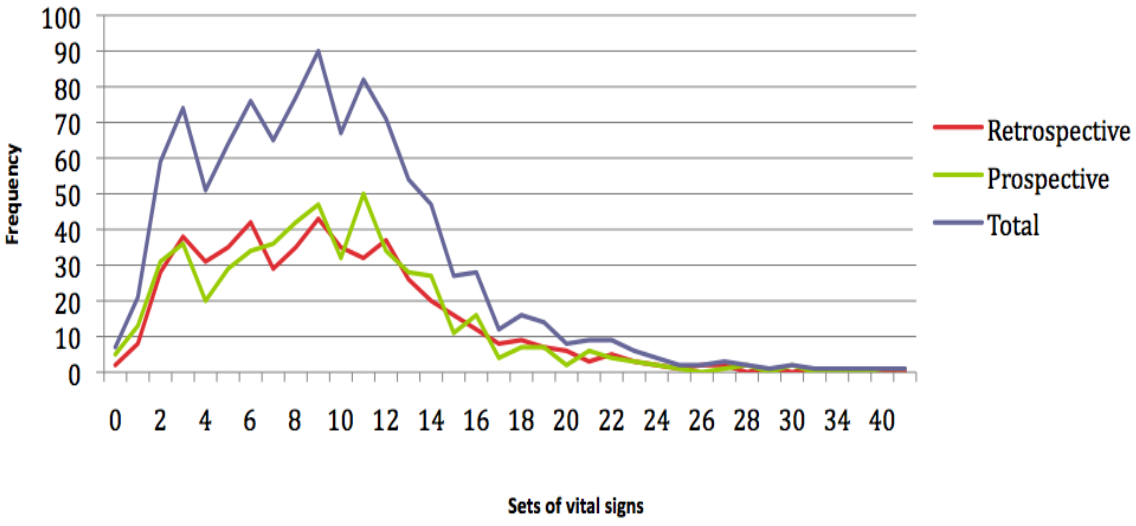
Of note, instruction to record the required frequency of vital signs measurement was not included on any of the ORC templates, although prior to implementation one site included an area on the front of the chart shown in Figure 2. Of the 60 ORCs audited at this site, frequency of observations was documented in 33% of records.

Figure 2 Additional section on the front of chart by one participating site

Frequency of Observations						
Date						
Signature						
Frequency						

Of the 9,920 sets of vital signs audited, 74% (n = 7334) were completed as per the National Consensus Statement,[10] with respiratory rate, oxygen saturation, systolic blood pressure, heart rate, temperature and level of consciousness documented (see Figure 3).

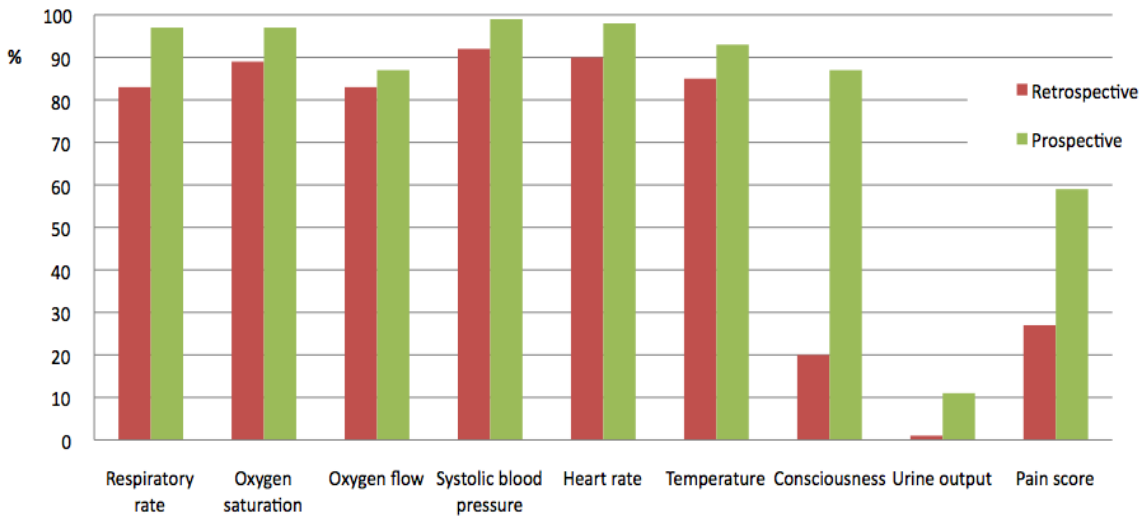
Figure 3 Total sets of vital signs recorded on each chart during the two 72-hour audit periods



The median frequency of observations recorded during the 72-hour audit period was 9 (IQR = 5-12, range 0-54), approximating three times a day (TDS). This was consistent across both retrospective and prospective audits. This actual frequency was less than the required frequency in patients' documentation. As noted earlier in Figure 1, 60% of patients were to have observations measured at least four times per day. Note that some patients may have been admitted and discharged during the 72-hour audit period so may not have had consistent vital signs recorded over this time.

There was an overall improvement in chart completion for each of the parameters in the prospective audit period (see Figure 4). Documentation for respiratory rate improved by 14%, oxygen saturation; heart rate and temperature by 8%; blood pressure by 7%; and oxygen flow by 4%. While there was also a notable increase in recording urine output, use of this section remained low.

Figure 4 Percentage of vital signs recorded by parameter



Despite education and support, staff may have been unclear how to record findings in this section, and may have been used to documenting urine output on a separate fluid balance chart. The significant increases noted for consciousness and pain score parameters were likely because previous observation charts did not include these two parameters. However, the high level of documentation for these parameters in the prospective audit (87% and 59% of cases respectively) reflects high clinical acceptance and utility for these features of the ORC, and promotes a safety culture approach to holistic patient assessment.

Table 7 illustrates a consistent improvement in documentation for each version of the charts tested.

Table 7 Percentage of vital signs recorded by parameter and chart

Parameter	ADDS-		R4		R2	
	Retro	**Pro**	**Retro**	**Pro**	**Retro**	**Pro**
Total sets (n)	(545)	(433)	(962)	(991)	(3389)	(3600)
Respiratory rate %	90	97	72	96	88	94
Oxygen saturation %	95	97	94	96	90	94
Oxygen flow %	86	90	74	70	88	89
Systolic blood pressure %	96	100	97	100	93	95
Heart rate %	96	99	94	97	91	94
Temperature %	97	92	86	95	86	89
Consciousness %		87	19	94	29	82
Urine output %	1	69	0	15	0	3
Pain score %	7	27	41	69	38	58

Compliance with ORC documentation guidelines

For the prospective audit, compliance was examined in relation to the ORC instructions for graphing vital signs (based on human factors principles) of:

- placing dots in the centre of the graphing area
- use of lines to connect dots
- use of arrows for blood pressure documentation
- use of connecting lines for blood pressure arrows

As noted in Table 8, compliance with use of dots was 70%, with the highest compliance related to respiratory rate (80%), and the lowest temperature (67%). Compliance with the use of lines connecting these dots was slightly lower than the use of dots (68%), and was frequently incomplete or consistently applied.

Graphing of systolic and diastolic blood pressure values with arrows was much higher (100%), with the use of lines connecting arrows less (92%), probably a reflection of current routine practice for graphical documentation of blood pressure.

Table 8 Compliance with graphing of vital signs in accordance with ORC instructions during the prospective audit

Graphing requirement	Median compliance (%)
Dots centre of square	**70**
Respiratory rate	80
Oxygen saturation	70
Heart rate	73
Temperature	67
Lines connecting dots	**68**
Complete compliance	7
Mixed compliance *	61
Arrows for BP graphing	**100**
Lines connecting arrows	**92**

Notes: * lines were used for some entries of vital signs, but this was not consistent or complete

Contrary to ORC guidelines, both graphed dots and written numbers were documented in 60% of audited ORC forms during the prospective period. In 30% of cases, only graphing was used, and in 3% only numerical values were documented.

When specific parameters were examined the highest percentages of written numbers were for temperature (33%) and oxygen saturation (31%). This may reflect that clinicians wanted to document these values more precisely than what the chart allowed. Other parameters had fewer but still frequent instances of written values documented; heart rate (22%), blood pressure (25%), and respiratory rate (10%).

Use of other sections on the ORC

The ‘Other Observation Chart in Use’ section was completed in only 28% of audited charts. The ‘Modifications’ section was used only once in 6% of audited charts and twice in only 1% of charts.

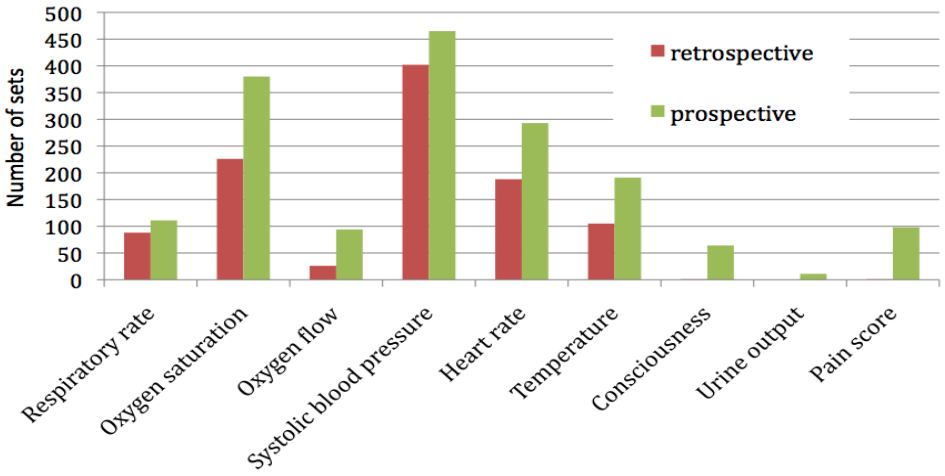
Similarly, the ‘Interventions Associated with Abnormal Vital Signs’ section was not used in 80% of cases. One entry was documented in 11% of forms, two entries in 4%, and three entries in 1% of forms. The ‘Clinical Review Requested’ section was also only used in a small number of cases; once in 3% of forms and twice in 1%.

The ‘Additional Observations’ section (blood glucose level, weight, bowels, urinalysis) was used more frequently; in 53% of audited forms. This higher level of use was probably because recording this information is common nursing practice and is similar to sections on routine observation charts.

Objective 2. Rate of recognition of abnormal clinical observations

The number of abnormal vital signs documented for each parameter over each of the two 72-hour audit periods is illustrated in Figure 5. As described earlier, a total of 9,920 sets of vital signs were audited from 1,058 observation charts. Note also that the retrospective audit was of each site's usual observation chart, which did not include the parameters consciousness, urine output and pain.

Figure 5 Total abnormal vital signs by parameter in 72 hours



Detection of abnormal vital signs

The most commonly documented vital sign abnormality detected on audit was systolic blood pressure, followed by oxygen saturation, heart rate, temperature and respiratory rate. For systolic blood pressure, the incidence of an abnormal value was 8.2% of all observations during the retrospective audit (402/4896), and 9.3% for the prospective audit (465/5024). For oxygen saturation, the incidence of an abnormal value was 4.6% during the retrospective audit (226/4896), and 7.6% for the prospective audit (380/5024). Interestingly for respiratory rate, the incidence of abnormality was much lower, only 1.8% during the retrospective audit (88/4896), and 2.2% for the prospective audit (111/5024). These findings indicate that abnormal values had a higher incidence during the prospective audit period when the ORC was in use.

When the first three sets of vital signs on each chart with one or more abnormal values were examined further, a consistent pattern was evident; systolic blood pressure and oxygen saturation were again the two most common parameters with abnormal values, regardless of which set of abnormal vital signs (1st, 2nd or 3rd instance of an abnormality;

see Table 9). As above, an abnormal respiratory rate had a lower incidence (4% and 3% respectively for the two audits) than the other parameters.

Table 9 Abnormal vital signs by parameter, set and audit period

Vital sign set	Audit period	1st		2nd		3rd	
		%	(n)	%	(n)	%	(n)
Systolic blood pressure	Retro	20	(103)	15	(77)	11	(56)
	Pro	21	(110)	15	(81)	12	(63)
Oxygen saturation	Retro	12	(63)	8	(42)	5	(25)
	Pro	17	(91)	13	(72)	9	(50)
Heart rate	Retro	9	(48)	4	(23)	3	(18)
	Pro	11	(58)	9	(46)	6	(34)
Temperature	Retro	9	(45)	4	(21)	2	(10)
	Pro	11	(59)	8	(42)	4	(23)
Respiratory rate	Retro	4	(19)	2	(11)	2	(9)
	Pro	3	(15)	2	(13)	2	(12)

Notes: Retro - retrospective audit period, Pro - prospective audit period

These findings indicate that a response was not triggered when the first instance of an abnormal vital sign was detected, and other instances of continuing abnormalities were then subsequently noted a second and third time within a contiguous period of observation of the patient.

The patterns of incidence for abnormal parameters across the audits varied in some respects, depending on the ORC version used (see Table 10).

Table 10 Abnormal vital signs by parameter, set, audit and chart type

Chart Type		ADDS-			R4			R2		
Vital sign set		1st	2nd	3rd	1st	2nd	3rd	1st	2nd	3rd
Systolic blood pressure % *(n)*	Retro	23 *(14)*	12 *(7)*	12 *(7)*	39 *(39)*	31 *(31)*	24 *(24)*	14 *(50)*	11 *(39)*	7 *(25)*
	Pro	17 *(10)*	10 *(6)*	3 *(2)*	39 *(45)*	30 *(35)*	26 *(30)*	15 *(55)*	11 *(40)*	9 *(31)*
Oxygen saturation % *(n)*	Retro	2 *(1)*	2 *(1)*	0	18 *(18)*	10 *(10)*	6 *(6)*	12 *(44)*	9 *(31)*	5 *(19)*
	Pro	2 *(1)*	2 *(1)*	0	19 *(21)*	15 *(17)*	6 *(7)*	19 *(69)*	15 *(54)*	12 *(43)*
Heart rate % *(n)*	Retro	12 *(7)*	2 *(1)*	3 *(2)*	1 *(1)*	1 *(1)*	1 *(1)*	11 *(40)*	6 *(21)*	4 *(15)*
	Pro	12 *(7)*	7 *(4)*	8 *(5)*	10 *(11)*	10 *(11)*	6 *(7)*	11 *(40)*	9 *(31)*	7 *(22)*
Temperature % *(n)*	Retro	17 *(10)*	10 *(6)*	3 *(2)*	3 *(3)*	1 *(1)*	0	9 *(32)*	4 *(14)*	2 *(8)*
	Pro	22 *(13)*	19 *(11)*	7 *(4)*	4 *(5)*	3 *(3)*	3 *(4)*	11 *(41)*	8 *(28)*	4 *(15)*
Respiratory rate % *(n)*	Retro	3 *(2)*	2 *(1)*	0	4 *(4)*	4 *(4)*	3 *(3)*	4 *(13)*	2 *(6)*	2 *(6)*
	Pro	0	0	0	10 *(12)*	9 *(10)*	8 *(9)*	1 *(3)*	1 *(3)*	1 *(3)*

While systolic blood pressure remained the most common parameter with abnormal values, for the ADDS- chart both heart rate and temperature abnormalities were more common than oxygen saturation. For the R4 and R2 versions, oxygen saturation abnormalities remained a common occurrence. The incidence of respiratory rate abnormalities was similar across the chart versions.

Objective 3. Rate of calling for assistance and response obtained

The following data are based on the audit of 60 case notes per clinical site, totaling 540 records for each audit period. The following sub-sections describe required actions, based on the ORC recommendations; actual actions taken in response to an identified abnormal vital sign observation; and documentation related to the abnormal vital signs.

Required actions to abnormal vital signs

The instances where an action was required were reviewed for both audit periods based on the triggers for response on the ORC used in the prospective period (see Tables in Appendix L). Note that actual actions are described in the next sub-section.

For seven of the nine sites using the R2 version of the ORC, it was noted that the rates of required action were similar across each of the audit periods at the first instance of an abnormal sign. The exception was for oxygen saturation, where almost twice the number of required actions were identified when the ORC was in use, a potentially important benefit of the chart design and characteristics.

The instances of required actions identified when using the 4-tier ORC (from one site only; hospital-wide implementation), abnormal values for systolic blood pressure were most common overall. In this case, actions required were across all four levels of action, in both the retrospective and prospective datasets. Other abnormalities were evident again for oxygen saturations, then respiratory rate, heart rate and temperature. For 'increased surveillance', the prospective period demonstrated double the incidence for respiratory rate and systolic blood pressure, and significantly more for heart rate when compared to the retrospective period. For 'senior nurse review', abnormal heart rate again demonstrated significantly more actions during the prospective period. Other parameters were similar across the two audit periods for this action. As noted above, the actions for 'clinical review' and 'MET call' were mixed, with no patterns evident between the two periods.

For the ADDS- chart (from three wards in one clinical site), similar rates of action required were noted across the two audit periods, with systolic blood pressure, heart rate and temperature again the most common parameters identified for triggering an action.

What was also evident overall was that abnormal values did not necessarily trigger a response at the first instance. More importantly when values were also abnormal at second and third instances for the same patient, a response was also not necessarily

triggered. That is, an appropriate action was not always triggered at the first observation of an abnormal value, and abnormalities continued to be present with subsequent observations.

Actual actions in response to an identified abnormal vital sign observation

Audit findings demonstrated that documentation of actual responses when made, were mainly in the progress notes (medical records) for both audit periods (see Table 11). When the ORC was in use in the prospective period there were increased instances of documentation in both the progress notes and on the observation chart. This latter finding perhaps indicated greater opportunity for documenting actions in the bedside (ORC) charts. Some instances of dual documentation were also noted for the prospective period.

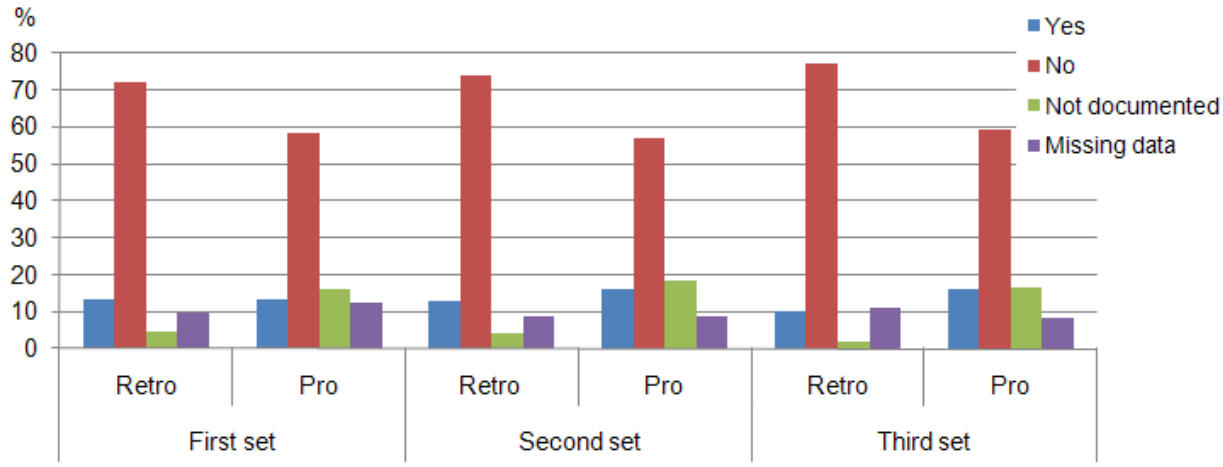
Of most significance however were the findings of 'no documentation' of actions for the vast majority of instances of abnormal vital signs. Note that these data include all levels of expected actions available across ORC versions – ranging from increased surveillance to MET calls.

Table 11 Location of documented comments relating to abnormal vital signs and rationale for action taken or not

		First set	Second set	Third set
		n	n	n
Medical record	Retro	25	29	20
	Pro	38	36	27
Observation chart	Retro	5	4	1
	Pro	10	10	9
Observation chart and medical record	Retro	3	1	1
	Pro	12	12	5
Not documented	Retro	145	95	60
	Pro	173	125	89

The lack of connection between documentation of, and response to, an abnormal vital sign is illustrated in Figure 6. The vast majority of instances of abnormal vital signs resulted in no documented response action being taken. The first three instances of a detected abnormal vital sign are presented. At the first set, only 12% of abnormal vital signs resulted in a specific action during the retrospective audit period. There was no improvement when the ORC was in use. Only slight increases in the rate of documented action were seen in the 2nd and 3rd instances of vital sign abnormality during the prospective period. Once again, these data include all levels of expected actions available across ORC versions.

Figure 6 Action taken according to ORC response criteria



Of particular interest are the findings in relation to MET calls. Table 12 indicates that there was initial evidence of clinical deterioration (1st set) that should have triggered a MET call in 24 and 22 cases for the two audit periods respectively. An actual MET call was initiated in only 33% of cases during the retrospective period, and in only 41% of cases when the ORC was in use during the prospective audit. Note that instances of missing data were evident from the documentation. Similar findings were noted for the 2nd instance of abnormal vital signs. There was approximately a 10% improvement in MET call initiation when the ORC was in use, though the numbers are too small to have any statistical significance.

Table 12 MET calls actioned according to ORC criteria in each audit period

Abnormal set	1st set n (%)		2nd set n (%)		3rd set n (%)	
	Retro	Pro	Retro	Pro	Retro	Pro
MET required according to ORC	24	22	10	19	6	15
Missing data	5	5	1	4	1	4
MET required - NOT called % (n)	11 (46)	8 (36)	6 (60)	7 (37)	2 (33)	7 (47)
MET Required – called % (n)	8 (33)	9 (41)	3 (30)	8 (42)	3 (50)	4 (27)

Issues related to documentation may give some insight into the potential reasons for these findings.

Documentation related to interventions for identified abnormal vital signs

A set of recurring issues for clinicians were uncovered through further content analysis of documentation of interventions related to identified abnormal vital signs, including:

- Use of 'modifications' section, only after an abnormal value was recorded
- Documentation of 'not for resuscitation' (NFR), only after clinical deterioration was identified
- Documentation in patient notes not reflecting identified abnormal observations from the ORC
- Documentation (or not) of interventions in the progress notes and / or on the ORC
- Activation (or not) of a MET call
- Request (or not) for a clinical review, based on clinical judgement, not necessarily the ORC recommendations

For the prospective audit, there was clear indication that the 'modifications' feature in the charts was being used in some instances to tailor the parameter values to the individual patient context – an actual benefit of the chart design. However, this was not always used prospectively, but rather reactively after an abnormal value was detected

when a clinician did not wish to initiate a response according to the ORC recommendations.

In a number of cases, this also prompted an NFR designation for the patient, after clinical deterioration was identified and a response was to be triggered according to the ORC.

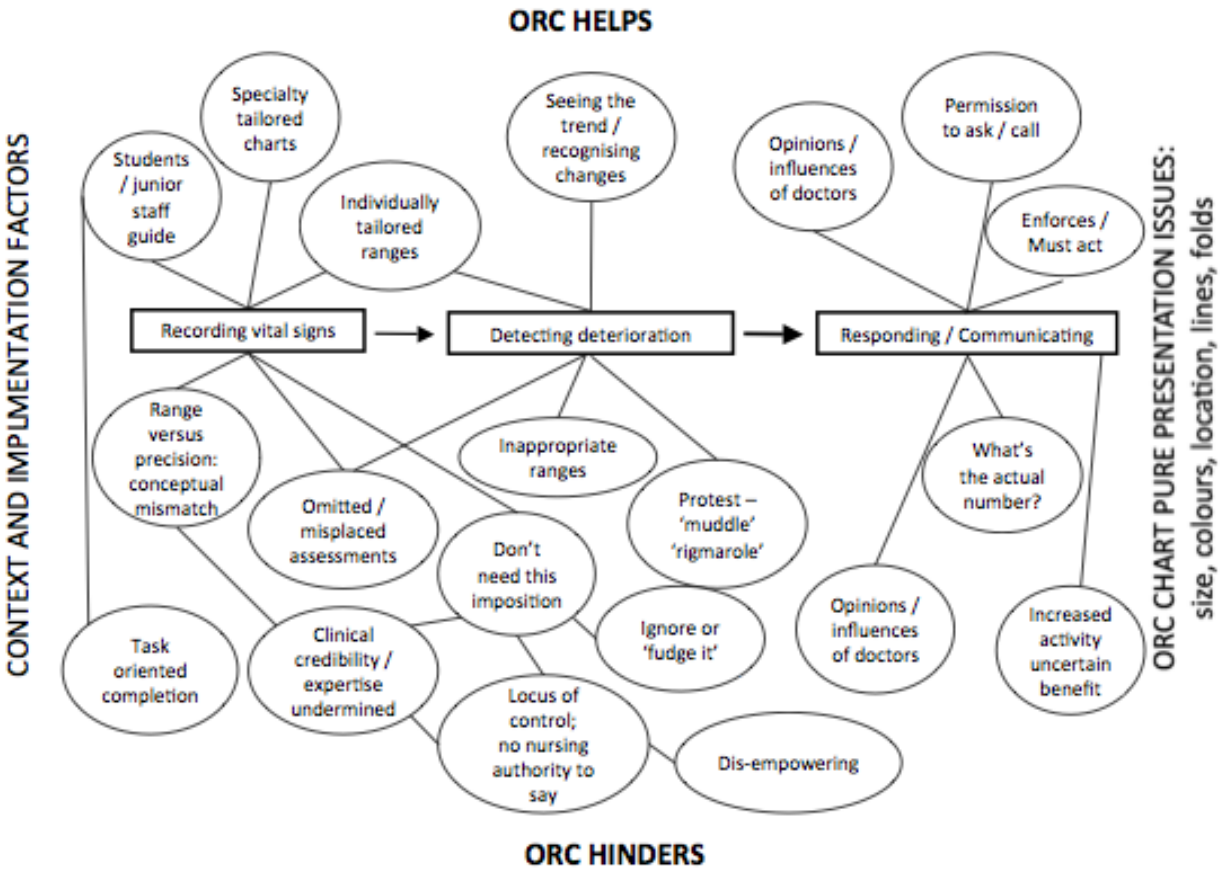
The justification behind these clinical decisions and responses are explored further when clinician views were examined in Objective 4 below.

Objective 4. Preferences and comments of clinical staff

Analysis of focus group transcriptions and field notes revealed a range of emergent themes, across a continuum from assessment, to recognition and subsequent response to clinical deterioration. A number of contextual issues also emerged that impacted on staff actions and behaviours.

Figure 7 illustrates the major themes and contextual factors. Themes grouped according to the temporal process of recognising and responding to abnormal vital signs – 'recording vital signs', 'detecting deterioration', 'responding / communicating', and aligned into positive ('ORC helps') and negative ('ORC hinders') vertical alignment.

Figure 7 Concept map of emergent themes from clinical staff preferences and comments



Themes within and between these temporal groups were often inter-related, and this is illustrated in some way with the inter-connecting lines between themes in the above Figure. The most common and instructive themes are discussed below for the purposes of this report, but not all elements will be elaborated here. The links between themes

and across temporal areas are reflected in the content when different quotes align with separate sub-themes.

Recording vital signs

The recording vital signs theme comprised four sub-themes evident within the data; ‘range versus precision’, ‘task orientated completion’, ‘clinical credibility’, and ‘don’t need this imposition.’ This range of issues spanned both positive and negative aspects that influenced clinician behaviour and acceptance with the ORCs. Nursing staff, particularly those with less experience and students, understood and appreciated the beneficial characteristics of the charts in principle, and could see that the ORC design and content was of value. The ability of the chart to be tailored to suit the needs of individual patients was also seen as a benefit.

Generally, staff did not find completion of the chart difficult once they became familiar with the design characteristics. For example *‘I think it's self-explanatory’,* although it was often considered burdensome and *‘needlessly complicated’* to identify deterioration.

As noted earlier in the findings from Objective 1, patient vital signs were measured and recorded on the ORC according to instructions with reasonable but not optimal compliance. Observational field notes made by project officers supported these results. Of note however were a variety of practices observed on occasions, where compliance did not occur. For example:

- Dots were placed in the correct square, but the numerical value was written in the lowest row of that parameter (N.B. recording of figures on the graphing area is not supported from a human factors perspective, as this increases visual clutter and leads to cognitive load, increasing the risk of not detecting vital sign abnormalities and clinical deterioration)
- Dots were not centred in the square, but placed on or near lines in an attempt to achieve more accuracy
- Crosses were used instead of dots
- Numbers alone were used instead of dots
- Lines were not used to join dots and BP arrows or were used intermittently
- Numbers were written above and below BP arrows.

On one occasion it was noted that a recorded heart rate triggered a clinical review, despite the abnormal value being present for a period of time: *'The low HR is not new, it is consistent since admission but the intervention section was not completed.'*

These findings supported earlier audit data indicating that the intervention section was completed inconsistently, even when 'abnormal' vital signs were viewed as 'normal' for that patient. This result highlights issues with poor documentation of interventions and low levels of compliance with required actions in response to abnormal vital sign triggers.

When vital signs triggered a review delays were also encountered as a result of general ward activities e.g. *'Not actioned as RN had to transport another patient to cardiac catheter lab.'*

Frequent comments were also made in the focus groups expressing the inconvenience of the intervention section and additional observation section being on the reverse of the double-sided chart. It was suggested that this may cause aspects of patient care not to be documented.

Range versus precision

One significant issue with correct completion of the chart related to current and accepted practice for documenting specific values, which was not supported by the use of ranges in the graphing area. This caused staff to graph as well as write numbers.

As noted earlier, the ORC templates did enable modification of the precision of parameter values to meet local clinical needs, although some trade-off was required to meet the human factors design imperative of a maximum number of rows in the graphing area. Examples of ranges applied by participating sites for the pilot phase are noted in Appendix B.

From a positive perspective, some clinician comments included:

> *… it is easier to … see a trend… on this chart, but … it's a different way than we've always been taught … not the actual … roughly this much … we've always been taught accuracy is better.*

While staff therefore understood the benefits and rationale of graphing to observe changes in trends, some embedded cultures and practices challenged this principle, mainly due to the lack of numerical precision for parameters with the ORCs. Recording a dot in the centre of a square was widely discussed in focus groups and often caused confusion, as illustrated in the following two quotes:

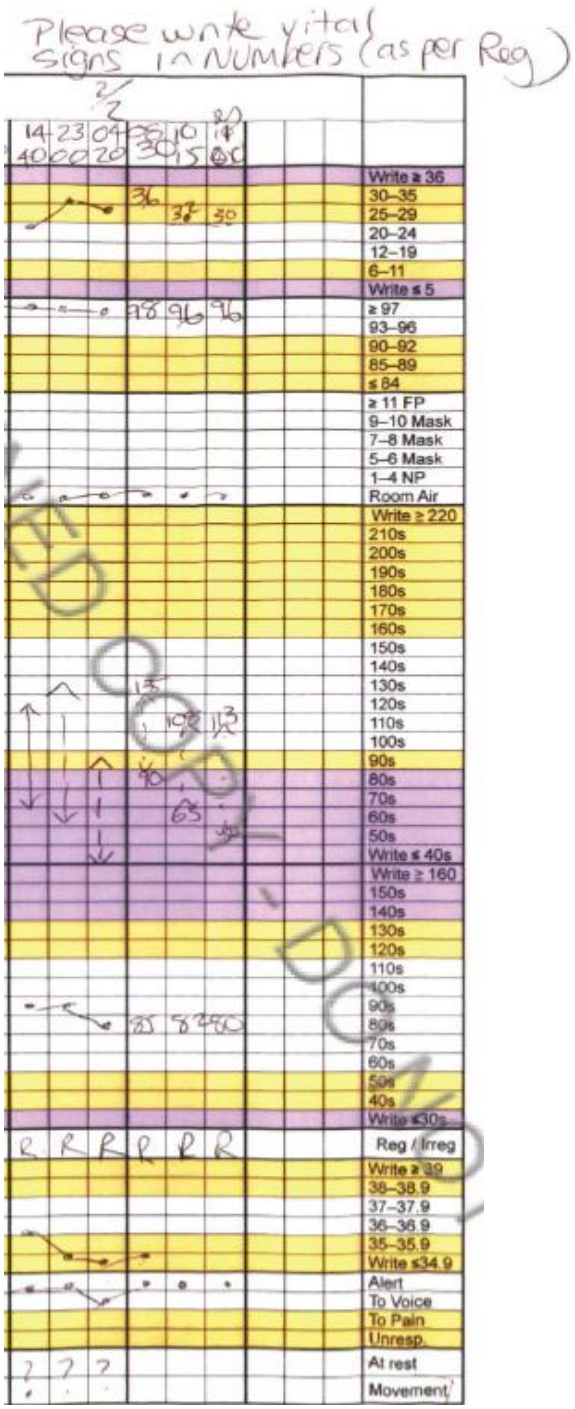
It's supposed to be just a dot … the idea being [to] graph so we can actually look at it at a glance and pick it up.

We don't know whether to put it (the dot) at the top of the square or the bottom of the square.

When reporting a patient's clinical condition to medical staff to escalate care, the nurses stated that they needed accurate numerical vital signs for clinical communication with medical staff or for senior nurse review. Nurses widely perceived that accuracy in the charting area and reporting of the values was imperative when escalating care to medical staff. Doctors were also generally not supportive with the use of ranges, and requested an accurate figure before they would attend to a nurse's request for review.

The tension between trend documentation and communication of accurate values to medical staff was therefore evident. Commonly within practice the need to achieve accuracy when recording vital signs meant that, '*a lot of people are still writing the numbers and that … it defeats the purpose of what the chart is there for in the first place.'* An example from practice of this issue is illustrated in Figure 8 – note annotations.

Figure 8 Sample of ORC – graphed and written values



An example of a completed chart where a patient began to display signs of deterioration.

Nursing staff were instructed by a registrar to record vital signs as numbers instead of using dots to graph (see handwritten notation).

Note this was an important issue for certain specialties, particularly for Infectious Diseases, where precise temperature values were required to guide evidence-based practice. While the intent of the ORC was for use in general medical-surgical patients, there are implications for certain specialties where modifications to charts may be necessary. This may also require modifications to scoring systems to then align with variations in parameter values and response ranges in the charts.

The ubiquitous use of automated measurement devices in general ward areas also means that digital values are provided for pulse rate, pulse oximetry, blood pressure and temperature, but when using the ORCs these precise values are lost when documenting in ranges.

A fundamental mismatch of the chart to clinical practice was therefore evident, as staff practices involved precision in documentation, but this was perceived as not possible with the parameter ranges available in the graphing area of the chart.

Task oriented completion

Completion of the chart quite often appeared task-oriented rather than considered as an essential aspect and useful tool for assessing and monitoring a patient's condition. An occasion was observed where the *'oxygen saturation and oxygen flow rate were not documented because the machine was not available'*, indicating a lack of reflection on practice. This behaviour and response is a cultural practice issue, which will not be altered by introduction of a new style of observation chart.

Clinical credibility / expertise undermined

Perceived benefits of the ORC depended on the level of experience for participants. As noted earlier, the charts were seen as an enabler for junior staff and had value for supporting them, including giving them permission and confidence to call and ask for help.

> *'I'm not frightened of calling the doctors but I've been nursing for a lot longer than some of the junior staff so it gives them a backup but, for me, I just ring if I'm looking after their patients'*

However some participants noted that, '*We should be educating junior staff to look for more than just educating them to use colours to identify clinical deterioration and being too reliant.'* Similarly, *'I think these charts are encouraging people to rely on them too much … my assessments is what I rely on more than anything. As a graduate I think that's what they should be encouraged to do ...'*

Don't need this imposition

The ORC design characteristics generated a series of comments in relation to the practice context, with a predominant view that the chart was an imposition for clinical staff.

The size and layout of the chart was viewed as cumbersome compared to previous charts. Of note, folding, the size and having to turn pages to record observations caused utility concerns, with charts falling out of folders from wear and tear because of the quality of paper. *'This chart is less easy to use and read, than our other chart. This chart makes comparisons between different vital signs difficult.'*

Lack of precision and clarity in the graphing area was a considerable barrier to chart acceptance in clinical practice and the consideration of including an area to record the actual figure was widely discussed in focus groups. *'I am not a fan of this chart. The oxygen flow rate, and oxygen saturations and temperature sections need to be redesigned, need to be able to write numbers. Also need a row for room air oxygen saturations. Also there is no FiO2, which makes documenting a patient on a Fisher and Paykel difficult.'*

When a patient is clinically deteriorating the frequency of observations will increase, and graphing issues for frequent observation patients was therefore a concern. While this concern was not supported in the audit, participants raised the potential issue of losing the benefit of a graphed trend when a new chart was commenced.

Having additional observations on separate pages of the ORC caused considerable frustration, with a resulting reluctance to use to the chart to its full potential. There was significant discussion around the location of additional observations such as bowels, blood glucose, urinalysis, and weight being on the 'back' of the chart. These observations carried significant importance to nurses performing their role in caring for the patient, not only from a clinical deterioration perspective, but also from an holistic care perspective.

Another participant noted that the practice of other charts in clinical use continued despite the introduction of the ORC, *'I just find that with this chart we've still got a lot of our old charts anyway.'*

An example of this dual-charting is illustrated in the following quote:

> *The front of the chart was to inform people that there are other charts in use. But I find that instead of writing your blood glucose on the back,*

people were actually getting another blood glucose chart and putting that in there. So it's getting doubled up because some people are writing on the base charts or just on one. Then you look at the charts and you think my goodness when was the last time the sugar was done.

This was also the case for pain and analgesia being recorded on multiple charts for pain score. This dual-documentation may lead to transcribing errors, and this needs be considered when reporting or requesting a patient review.

The complexity of patient care has led to the creation of a plethora of observation charts that is a significant cause of frustration and time consuming for nurses. This was an underlying reason for nurses requesting to have all observations in one chart rather than many.

Some staff participants did not perceive any benefits in detecting deteriorating from their previous observation chart and expressed a preference to use the old chart, for example:

I think it was easier to tell from the other charts whether someone was deteriorating ... (FG)

There's no difference in using the old chart to this chart in terms of graphing and seeing the change (FG)

… basically you knew before on your old observation chart, if it was out of whack you knew it was out of whack anyway…

As one participant concluded after using the ORC, *'It may look beautiful to people wearing suits in a boardroom but it doesn't work in day to day practice.'*

Detecting deterioration

Emerging from the detecting deterioration themes were sub-themes of 'seeing the trend', 'protests – muddle, rigmarole', 'ignore of fudge it', and 'disempowering.' The first three sub-themes highlighted positive aspects from the chart by supporting clinical decision-making, but the remaining three encompassed more negative aspects of clinician responses in practice.

Seeing the trend

As noted earlier in this section, many participants acknowledged the potential benefits of the observation chart, where the clear visibility of separate graphing areas made it possible to observe clinical deterioration more easily and visualise trends.

The visible recognition of deterioration within the chart reduced some of the 'wait and see' culture evident within practice. Instead the chart made visible the prompt and activation processes. As noted by one participant, *'Probably maybe in the past we might have sat on certain things because you just wanted to see how it goes, whereas this one it says, right do something about it.'* This reflection and behaviour was not however universal; some staff were observed to act according to the ORC recommendations, while others did not, as evident in the following sub-themes.

Protest – 'muddle', 'rigmarole'

There was some resistance to acceptance of the ORC as participants felt they were being forced to use something that did not align with their current practice. For example:

> *I'd like to think that it hasn't made any difference to me being able to detect my patient deteriorating.*

Many staff also highlighted that for them, detecting deterioration was not just about using a track and trigger system, and that there was more to look for:

> *It's more than just numbers and a graph to see if your patient is deteriorating, even if you haven't been nursing for long like me.*
>
> *I think there are a lot of other things that need to be looked at not just a colour-coded chart.*

For some clinicians the chart was viewed as inhibiting their ability to convey patient deterioration to medical staff; for example, *'I think if anything it can make it harder because you don't have the numbers there specifically to back up what you're trying to get across.'*

Ignore or 'fudge' it

On occasions when abnormal vital signs were recorded that were consistent with previously recorded abnormal vital signs, a staff member would consider it acceptable and action would not be taken or documented. A number of focus group participants agreed that '*people are going to fudge it because it's easier to fudge it than to do all that*

rigmarole.' This implies that some staff would rather avoid taking action and falsely document an abnormal vital sign in a normal 'uncoloured' graphing area, rather than record observations accurately, and then follow recommended actions or write an explanation as to why they did not.

Dis-empowering

Some staff, especially those with more experience and seniority, felt that the chart was disempowering and the documentation and colour trigger system undermined their professional capacity to care for patients. Participants who perceived that the chart purported to dictate how to care for their patient, and that their clinical competence was being questioned, noted:

> *This is basically almost a paint by numbers scenario.*
>
> *I went to nursing school for three years - we know when it's time to ring the doctor …*

To retain a level of autonomy for the care of their patient, one nurse stated, '*If I've got ... a score of three or four that tells me to do something about it, and I don't think I need to - I'm either going to be confident in my skills and write my intervention that I've chosen to do nothing or I'm going to write my results in the white.'*

Responding / Communicating

The responding / communicating temporal area uncovered similar practice and professional discipline issues to those previously reported, but with a focus on clinical decision-making and communication with medical staff, as noted in the following sub-themes.

Opinions / influences of doctors obtaining a review

One of the perceived benefits of the ORC was the direction provided for actions required, including obtaining a clinical review. The fixed parameters were however considered an imposition for nurses, as a doctor was required to complete the modifications section. Comments noted from focus group participants reflected that doctors commonly refused to complete the modification section, or did not review previous modifications within the stated 72 hour time-frame. Obtaining a modification or a review on the ORC was compounded by work practice. For example, *'That's the issue being on a surgical ward is the registrars are never here except first thing in the morning.'*

There were also reported instances where doctors refused to review a patient that met the clinical review criteria. These behaviours exaggerated the cultural 'them and us' divide between doctors and nurses, reinforcing the traditional hierarchy and the perceived professional autonomy of doctors to ignore the ORC required actions. This highlighted again a perception of nurses being 'dis-empowered', as described elsewhere in this report.

Enforces / must act

There was a perception that a nurse was expected to respond to the requirements of the chart, even when they felt capable of making that clinical judgement based on their expertise and knowledge. Autonomy was predominantly seen to operate only at the medical level.

Opposing this position however was a view from a focus group that perceived that introduction of the ORC was pushing their organisation to function in a particular way that challenged professional demarcation and the traditional hierarchy – a positive aspect.

Permission to ask / call

While participants positively viewed the ORC in supporting communication between nursing teams, including prompting action for a senior nurse review, this was counter-balanced by a perception of having to act as noted above, often against a nurse's clinical judgement.

What is the actual number?

Acceptance of the chart in practice was largely influenced by engagement with doctors, especially when they refused to respond to a nurse's request because of a parameter range being provided and not the actual numerical parameter. Requesting a medical review was therefore difficult using ranges. When a doctor reviewed a patient some time after observations had been recorded, nursing staff were unable to report an accurate figure because they had used dots in the parameter ranges to record the observations.

'It's hard to communicate deterioration to the doctors if it's - you know, you're in a rush and they don't know the charts and … you're trying to tell them what the blood pressure is, and you can't give them accurate information, and that's what they're wanting in a time like that.'

This was seen to contribute to an increased workload, as repeat observations were required to obtain the 'actual number' for the reviewing doctor.

Increased activity / uncertain benefit

The best location for documentation of actions and interventions was debated, with some participants not convinced about the use of the ORC for recording this information. One nurse stated:

'If people were really getting into the intervention thing and writing quite detailed notes there, then when they get to the end of the day and they write their normal [progress] notes, are they going to be still writing notes, or are they going to just say as per the chart, which means if a doctor wants to see, they're going to have to read one set of notes, and then they're going to have to read these notes, and it's not always in the one spot.'

The chart was therefore perceived to increase a nurse's workload, particularly as a result of lack of engagement and ownership of the chart by medical staff. The documentation of observation charts has not traditionally been part of the medical documentation. The ORC chart requires multidisciplinary entry and clear communication, and hence demands a cultural shift away from traditional medical documentation. In this study, nurses perceived that by default they had become the custodian of the form and therefore responsible for ensuring medical documentation occurs. As one participant noted, *'I think, and getting the doctors to fill in the modification thing I think is going to be a nightmare.'*

Objective 5. Patient outcomes

As noted in the Methods, only routinely reported data were requested from local sites to facilitate compliance for this objective and minimise the burden of data collection. As a consequence, available data varied across sites for the following fields (see Table 16). Note that only in-patient events are reported (not outpatient / visitor / staff events).

- **Number of MET / cardiac arrest (Code Blue) calls**: For the seven sites able to provide MET call frequency data, there were 266 and 289 calls for February 2011 and February 2012, respectively. In addition, there were 28 and 25 cardiac arrest ('code blue') calls, respectively.
- **Number of actual cardiac arrests**: Actual confirmed cardiac arrests were 9 for both audit periods, but as noted in the Table these data were not available from some sites.
- **Number of unplanned admissions to intensive care (ICU)**: Unplanned intensive care unit (ICU) admissions were 42 and 50, respectively, but note that these data were also incomplete for some sites.
- **Out of hours MET / cardiac arrest calls**: Overall, for the three sites able to provide time of event data, combined 'out of hours' calls were 40% (117 / 294) and 31% (97 / 314) of the total calls for February 2011 and 2012.
- **Number of unexpected deaths**: Based on available data from five sites, there were 9 and 5 unexpected deaths, respectively.

Table 13 Summary information on MET/arrest calls for the two audit periods

Site	MET calls		Arrest calls		Actual arrests		Unplanned ICU admissions		Out of hours MET calls [2]		Out of hours arrest calls		Unexpected deaths	
	2011	2012	2011	2012	2011	2012	2011	2012	2011	2012	2011	2012	2011	2012
A	19	31	1	2	1	2	5	7	9 (47%)	14 (45%)	1 (100%)	1 (50%)	1	2
B	- [3]	- [3]	- [3]	- [3]	- [3]	- [3]	4	1	- [3]	- [3]	- [3]	- [3]	- [3]	- [3]
C [1]	- [3]	- [3]	- [3]	- [3]	- [3]	- [3]	- [3]	- [3]	- [3]	- [3]	- [3]	- [3]	- [3]	- [3]
D	50	35	- [3]	- [3]	- [6]	3	5	- [6]	- [6]	- [6]	- [6]	- [6]	3	- [6]
E	62	69	4	0	0	0	11	9	- [3]	- [3]	- [3]	- [3]	4 [7]	3 [6, 7]
F	35	42	5	10	- [3]	2	- [3]	6	- [3]	- [6]	- [3]	- [6]	- [3]	- [3]
G	3 [4]	14	0	0	- [3]	- [3]	- [3]	- [2]	- [3]	- [3]	- [3]	- [3]	0	0
H	76	58	17	13	7	4	17	25	71 (93%)	46 (79%)	20 (87%)	21 (33%)	- [3]	- [3]
I	21	40	1	0	1	0	0	2	15 (81%)	15 (37%)	1 (100%)	0	1	0

Notes: ICU, Intensive Care Unit; MET, Medical Emergency Team

1 Site C unable to provide data

2 frequency and percentage based on total calls (no delineation for inpatients versus outpatients / visitors / staff)

3 data not available

4 local information system not working at time; accuracy of data not confirmed

5 data from 2 of 3 campus sites only

6 incomplete data

7 3 patients deemed not for resuscitation (NFR); documented by MET

Discussion

This section highlights and discusses the key study findings, the methodological strengths and limitations, recommendations to the Commission and health care organisations, implications for practice, and recommendations for further research.

Key findings

Findings are presented in relation to the Commission's requested research objectives:

1. Rate of completion of the chart
2. Rate of recognition of abnormality (in clinical observations)
3. Rate of calling for assistance where indicated, and the response obtained
4. Preferences and comments of clinical staff
5. Patient outcomes.

Rate of completion of chart

Planned frequency of observations

Over 1,000 patient records were examined across the two audit periods. The required frequency of patient observations was documented in three-quarters of the patient records audited, but importantly for the remaining quarter of patients, this information was not recorded as part of a management plan. While the Commission recommends documentation of the required frequency of observations,[10] there is no stipulation where this should be recorded, and of note the ORC templates do not currently have a section to specifically record the observation frequency. Locations for this documentation varied across and within sites, with almost one-half noted as being in 'patient care plans.' There was also some double-documentation noted in some sites. In the one site where a section was included in the ORC, completion was noted in only one-third of audited charts.

The most common frequencies documented were four times per day and 4th hourly, collectively accounting for almost two-thirds of the patient records. On audit, the actual frequencies approximated three times per day, indicating some lack of compliance, although the 72-hour audit periods and actual lengths of stay may have contributed to some of this discrepancy.

Compliance with documentation of vital signs

Three-quarters of the audited records had completed vital signs as recommended by the Commission,[10] noting the respiratory rate, oxygen saturation, systolic blood pressure, heart rate and temperature. Improved compliance was noted with use of the ORC templates (in the prospective audit), ranging from 4-14 % for the above parameters. Inclusion of additional parameters on the ORC (level of consciousness, urine output, pain score) appeared to be value-added features compared to sites' routine charts, with significantly higher improvements in compliance. Overall improvement in compliance was consistent across each of the ORC versions.

Compliance with graphing of vital signs (dots, BP arrows, connecting lines) was relatively high (at and above two-thirds), although further improvement is possible, with continued reinforcement of instructions and related rationale using educational resources, and local auditing. Importantly however, over half of the audited ORCs included some numerical values written in the graphing, potentially increasing the risk of failure to detect deterioration and contrary to the human factors principles of the chart design.

Use of other chart sections

Additional features of the charts ('Other Observation Chart in Use', 'Modifications', 'Interventions Associated with Abnormal Vital Signs', 'Clinical Review Requested', 'Additional Observations' sections) were not used optimally. While the latter section was used in over half of the audited forms, other sections had minimal use, with the 'Clinical Review Requested' section used in only 4% of cases.

Rate of documented recognition of abnormal clinical observations

Documented incidence of abnormal values was overtly higher during the prospective period, when the ORC was in clinical use. While a before-after design limits interpretation and inference of these results, it was evident that in this audit, the ORC detected abnormalities in systolic blood pressure in almost one in ten observations, while the rate was one in thirteen for oxygen saturation. Of note, rates of abnormality for respiratory rate were much lower – about 2% of all observations. Findings were consistent when the first three sets of vital signs included an abnormal value in one of the parameters. Systolic blood pressure and oxygen saturation were the most common signs to exhibit, while respiratory rate had the lowest incidence.

Poor rates of documenting respiratory rate have been reported,[11, 12] with the important practice issue being the low rate of documentation, not necessarily a low incidence of abnormality. As noted previously, parameter values to trigger a response were modifiable to reflect the local sites rapid response system criteria.

When the three ORC versions were compared, the ADDS- chart had a higher documented incidence of abnormal values for heart rate and temperature when compared to oxygen saturation. The reason for this result is not clear, and should be viewed with caution as the chart was used in only one site.

Actions based on documented abnormal vital signs varied across the chart versions. For the 'clinical review' in the R2, the frequencies of action for oxygen saturation were twice as high for the prospective period when the ORC was in use, while other parameters were similar between the two audit periods.

Of note for the R4 chart for triggers for action, 'increased surveillance' for respiratory rate and systolic blood pressure had double the incidence during the prospective period when compared to the retrospective audit. There were also significantly more 'increased surveillance' and 'senior nurse review' triggers for actions for heart rate during the prospective period. Other parameters were similar across the two audit periods for these actions, as well as for 'clinical review' and 'MET call.' Differences between the two audit periods were not evident with use of the ADDS- chart.

These findings may indicate an important feature of the single-parameter ORCs, notably early identification with focused surveillance or review actions preceding further deterioration and an impending MET call. Interestingly, the parameters varied across the chart versions, reinforcing the need for measuring the full suite of vital signs, particularly systolic blood pressure, respiratory rate, oxygen saturation, and heart rate. As noted previously, the parameter values selected by each site are listed in Appendix C.

Also of note is the continued evidence of abnormal vital signs persisting without an appropriate action being documented in response. This suggests that cultural and communication issues need to be addressed in conjunction with implementation of the charts.

There was some evidence that the 'modifications' section was used to tailor parameter values to an individual patient context, but in some cases this was reactively, after an actual abnormal value was detected. This appeared to occur when a clinician decided

not to initiate a response according to the ORC recommendations. This included initiation of a NFR designation for the patient, after actual clinical deterioration was identified. Although reactive, this action may have been a clinically appropriate response, and again highlights the need for appropriate inter-disciplinary communication and proactive discussion for advance care directives.[13]

When abnormal vital signs were documented clinical judgement frequently appeared to take precedence over the ORC required actions. Decisions not to initiate a clinical review or MET call were documented in the progress notes in some instances, but not always. Of equal concern was evidence that the documentation in the patient notes did not reflect identified and documented abnormal observations on the observation (ORC) charts.

Rate of calling for assistance and response obtained

Based on these audit findings documentation of responses to a clinical deterioration was minimal. There was evidence of an action in approximately only one in eight cases when an abnormal vital sign was detected. For a significantly abnormal vital sign that should have triggered a MET call as the response action, MET calls occurred in only one-third of cases in the retrospective period. This increased by almost 10% in the prospective period when the ORC was in use. The actual MET call rates equated to 4.9 and 5.5 per 1,000 bed days, for the retrospective and prospective audit periods respectively. If MET calls had been made every time an abnormal vital sign should have triggered one, call rates would have been 14.8 and 13.6 per 1,000 bed days, respectively.

Preferences and comments of clinical staff

Findings from the focus groups and field notes provided some contextual understanding for the clinical utility of the ORCs, and the challenges encountered by nursing staff in particular when attempting to use these new charts in an existing practice culture. Observed behaviours and staff comments reflected issues related to compliance, documentation practices, multidisciplinary communication, interdisciplinary practices, and tensions related to clinical decision-making, and ultimately uncovered a range of beliefs and views that hindered optimal use of the ORC framework. A number of important themes emerged from the data across the continuum of recording vital signs, detecting deterioration, and responding / communicating the abnormal vital sign/s.

Of note particularly, were issues of precision in documentation. The use of a range for a vital sign was problematic when communicating with others (mainly medical doctors) and initiating an appropriate response. This led to inter-disciplinary tensions, and uncovered a feeling of lack of autonomy for the nursing staff, along with the view that the medical staff did not have to comply with the ORC recommendations for documenting and responding.

As noted earlier, the ORC graphing area was designed using human factors principles to enable observation of a patient's clinical condition as a trend over time. Each vital sign is displayed as a separate graph using a range as a measure rather than actual numbers. Coloured zones in the graphing area provide an instant visual trigger to indicate if the vital signs are within acceptable ranges or if further action is required.

While simulated experiments using a human factors approach found detection of deterioration works better with graphing and ranges, [e.g. 6] in clinical practice there is a fundamental mismatch as staff training and practice focused on accurate documentation. Compliance with the related ORC documentation requirements was therefore often low, despite initial education and continued support by site project officers. It was clear the rationale for the chart design, according to safety science / human factors principles was not always understood or accepted by clinical staff.

Importantly, as vital signs became abnormal, more precision was required, but this often resulted in writing of actual figures in the graphing area. This led to visual clutter on the ORC, adding to cognitive load and generating a risk for failure to recognise further clinical deterioration.

Improving the available precision for documentation of parameter values in the graphing area may therefore improve multi-disciplinary clinical acceptance and compliance, enabling the ORC to truly act as a decision-support tool for timely inter-disciplinary communication and clinical responsiveness to identified patient deterioration. Note however that implementation of the charts was conducted in a condensed time frame, while culture change associated with successful recognition and response systems can take years to achieve.

Other chart characteristics and format also caused concern and sub-optimal use by clinical staff. The use of an A3 size, double-sided format, when staff were used to A4 observation charts, resulted in some section not being completed. This included the 'additional observations' section on the last or back page, when these parameters were on the same page as the vital signs in some previous observation charts.

Despite participant comments that the charting area did not allow enough observation sets to be documented, the audit indicated that the median frequency of observations was three times per day. With 18 charting columns, one chart will last up to six days for an average patient. This suggests there is little need to change the human factors-based design imperative that the graphing area should remain on the left side of the page and not extend beyond the centre-fold.

As noted in the methods section, preparation for implementation in local sites, included highlighting the human factors principles of chart characteristics and reference to the Commission's developers guide. Site staff were then able to modify parameters according to their local rapid response system parameters. Despite this preparation, clinical staff and project officers consistently requested additional changes that were not aligned with human factors principles; e.g. requesting more than nine variables in the graphing area; removal of essential sections such as review requested, to allow for further additional observations such as wounds or surgical drains. It is therefore clear that further education and information is required, so that the essential design principles and chart characteristics are retained, and the ORC is used optimally.

A second important point was related to clinical judgement, with some nurse participants viewing the ORC framework as undermining their professional thinking and decision-making. This resulted in a protest from some staff, including 'fudging' the documentation so that there was no need to respond, or ignoring the recommended ORC actions for an identified abnormal vital sign measurement. It is therefore necessary to change the perception that the escalation processes associated with an ORC are 'instead of' clinical judgement. Education programs should make it clear that the ORC is an adjunct and support for clinical judgement.

As noted earlier from the audit findings, documentation practices were commonly incomplete, missing or inaccurate. Implementation of the chart was predominantly a nursing responsibility although the autonomy and ability to modify vital sign parameters on with the chart was in the domain of the medical staff. Engaging medical staff was therefore challenging when the initiative was considered to be a nursing role. This perceived disparity between nursing and medical staff led to tensions, as nursing staff had no real capacity to achieve form completion from medical staff (e.g. 'modifications'), or when requesting a review if an abnormal 'range' for a vital sign was identified.

Multidisciplinary ownership of the form is therefore required before the full benefits of ORC implementation can be achieved.

Despite these concerns and limitations in practice, the ORC did on balance provide some nursing staff with the necessary information to contact medical staff when clinical deterioration was identified. This was however counter-balanced by a sense of increased workload, for an uncertain benefit. This reflects a culture of reactivity rather than proactivity, where there was no perception that the system and chart was a potential benefit for minimising preventable clinical deterioration. As noted previously, the focus groups were conducted after a minimum of three weeks of routine use. It is unclear whether time and continued clinical use will reduce the above criticisms.

Broader implementation of an ORC-type framework into routine clinical practice will therefore require more emphasis and education / information on the potential benefits of these systems. This defined preparation and implementation needs to be situated within the broader context of the professional workplace and culture(s), inter-disciplinary communication, professional autonomy and accountability, and multi-disciplinary teamwork. Only when all these issues are managed will there be optimal benefits from an ORC framework, with improved timely and appropriate responses for a patient at risk of clinical deterioration.

Patient outcomes

Complete data were not available from all sites for February 2011 and February 2012 regarding MET / arrest calls, related unplanned ICU admissions and unexpected deaths, and out of hours calls. From the available routinely collected information, there were 294 and 314 emergency calls for the two audit months, respectively. Event rates could not be calculated. Actual cardiac arrests were nine for each month, reflecting an approximately 3% rate for the total combined MET and arrest calls for each period. Approximately 15% of all calls resulted in an unplanned ICU admission for both audit periods, and unexpected deaths were nine and five, respectively.

Based on this information, and noting the methodological limitations, no differences in call rates or patient outcomes were apparent with the introduction of the ORC.

The occasions where abnormal vital signs were found to be in the MET calling criteria and action was not taken may be appropriate rather than concerning. Even though low numbers of MET calls were captured in the two audits the overall figures where MET

calls were not made with each abnormal set are consistent with some studies [e.g. 14] noting that 40% of initial abnormal observations did not lead to an actual adverse event.

Study Strengths and Limitations

This study used a before-after design with mixed methods data collection approaches to evaluate the implementation, clinical utility and user acceptance of an observation and response chart for use with adult general medical-surgical patients in nine clinical sites across five jurisdictions in Australia. The sites included both public and private hospitals, with different levels of service and size, ranging from small rural facilities, to metropolitan and tertiary-level hospitals.

Data were collected on three versions of the ORC, using retrospective and prospective audits of 1,058 cases (9,920 sets of vital signs); 44 user focus groups involving 218 participants; 88 sets of observations from nine project officers; and routinely collected patient outcome data related to clinical deterioration events.

Orientation, training and ongoing support for clinical staff on the introduction and use of the ORCs was provided by on-site project officers seconded from the local organisation's staff. An executive staff member was engaged to be a 'champion' for chart implementation at each clinical site to enable optimal communication and engagement with all relevant clinical staff.

Within the context of the chart design characteristics, modifications to parameter values and response levels were possible for alignment with local site needs, policies and practices. This process of 'flexible standardisation' enabled site input, but perhaps not from front line staff. Their engagement in setting of parameters may have improved acceptance and compliance. In practice, there were also some project time restrictions that impeded effective feedback for human factors review of locally requested modifications to the ORC templates prior to pilot testing.

The initial intent from the Commission was for this pilot to be an organisation-wide roll-out; this was specified in the invitation to participate for clinical sites. This was not however possible for some services to provide additional support beyond the funded project officer position for each site. Therefore, three sites were only able to trial the ORC on 3-4 wards.

Training and introduction of the chart was timed to coincide with the start of a new clinical term for resident medical officers. Clinical staff using the charts on a daily basis,

primarily nurses, had a minimum of three weeks experience with the ORC prior to data collection / evaluation.

Despite these activities, a range of issues were evident that resulted in sub-optimal use of the ORCs, including:

1. Compliance with graphing of observations, particularly in relation writing of numerical values
2. Minimal use of the additional features of the chart designed to improve detection of deterioration, response actions and communication ('Other Observation Chart in Use', 'Modifications', 'Interventions Associated with Abnormal Vital Signs', 'Clinical Review Requested', 'Additional Observations' sections)
3. Lack of engagement and understanding by medical staff, particularly those at more senior levels

Of note, industrial action by nurses in Victoria relating to workload and nurse:patient ratios occurred during implementation and evaluation of the chart in clinical areas in four of our nine clinical sites. This led to skepticism and mistrust as to the purpose of the chart by some staff (anecdotal reports from site project officers, prior to focus groups).

Clearly, the cultural context of an organisation has considerable influence on the acceptance of any new initiative such as the introduction of a new form of observation chart. The Commission's intent was to enable implementation of the ORC into clinical practice with 'minimal training.' This was reflected in the study, and while training on the completion of the chart was achieved, the underlying knowledge, values and beliefs of the clinical staff influenced both our findings and acceptance of the ORC into practice. As a consequence, the following recommendations highlight issues for both the Commission and health care organisations to consider, specifically in relation to education, communication and culture.

Implications for practice

This section provides an initial discussion of a number of general practice implications; local modification of ORC templates, resource implications for implementation of the ORC into routine practice, and use of technology in vital signs measurement. Specific recommendations for the Commission and health care organisations are then noted in the following sections.

The ORC design characteristics resulted from application of human factors principles to enable clear identification of potential patient deterioration and reduce cognitive load. [7] It is also clear that clinical chart design and modifications is a cottage industry in health care.[6] The Commission's attempt to standardise the layout and characteristics of an observation chart[8] (and others such as the National Inpatient Medication Chart; NIMC) to minimise risk and error will be impeded if local health services continually modify the ORC templates. If local modifications are absolutely necessary, then the above guidelines provided by the Commission should be adhered to. Access to human factors expertise is required to ensure that any modifications to chart design characteristics do not increase risks to patient safety.

There are specific resource implications if health services implement the ORC across their organisation. While a cost-benefit analysis was not undertaken as part of this project's brief, the printing costs for the A3, double-sided coloured ORC forms will be considerable compared to the costs of using current charts at some sites. The charts need to be printed, not photocopied, as there will be loss of definition and delineation in the specific ORC alert colours. This is particularly the case when using the R4 version. There may also be more usage of the ORCs; although there are 18 columns for observations, graphing of observations should only be on the inside left page of the chart, and there may be therefore less columns than some old forms. The weight and the quality of the paper is also a consideration. As an A3 size, the ORC is folded, opened and closed numerous times during their use. Based on this study's findings from field observations, some forms ripped or fell out of bedside folders when the filing holes were torn. On a related issue, the bedside folders for patient notes were usually of an A4 size, either with clips or ring-binders. Accommodation of the A3 ORC was therefore noted as problematic, particularly when the form was folded inside out or back to front in the folder. Health services will therefore need to consider the utility of the ORC in the current available folders, or whether an A3 clipboard would have improved utility (particularly as the NIMC is also an A3 size).

During field observations, project officers focused on clinicians' use and documentation practices with the ORCs. Actual practices during vital signs measurement were not directly observed. The accuracy of those measurements, or any recording or transcriptions errors cannot be verified. As noted in the literature, various factors can influence the precision of measurements for all vital signs, including operator error when using equipment such as automated devices. [e.g. 15] With the increasing ubiquitous use

and reliance on technology in general ward areas, [e.g. 1] clinicians need to consider equipment performance limitations and maintenance of core clinical assessment skills, particularly when monitoring a patient at risk of clinical deterioration.

Recommendations to the Commission

This section lists a range of suggestions for the Commission to consider, including aspects when liaising and supporting the broader implementation by health care organisations. The recommendations are aligned to the relevant consensus statement[10] elements:

- Measurement and documentation of observations
- Escalation of care
- Rapid response systems
- Clinical communication
- Organisational supports
- Education
- Evaluation, audit and feedback
- Technological systems and solutions

Essential element 1: Measurement and documentation of observations

1. The Commission consider providing advice to organisations on a location(s) in the patient's documentation where the frequency of observation is to be recorded.
2. The Commission consider including the required frequency of observations as a section of the ORC templates.
3. The Commission consider revising the graphing section of the ORC to improve the precision in the ranges of the vital sign parameters. There is also an opportunity to document the actual abnormal parameter value in the 'interventions' section of the ORC, along with any clinical action.
4. The Commission consider the development of form 'inserts' to enable all relevant specialty observations to be included on the one ORC, rather than the continuation of multiple observation forms.
5. Health care organisations develop or revise local policies on vital sign observations and / or care escalation, highlighting minimum standards of practice and including frequencies required.

6. Health care organisations maintain the integrity of the ORC design characteristics when modifying charts for local use, by adhering to chart developer guidelines and accessing human factors expertise.

Essential element 2: Escalation of care

7. Health care organisations continue to evaluate whether appropriate responses were triggered according to the ORC recommendations (which were aligned to their local RRS policies), when a vital sign abnormality was identified. Given the findings presented here, it is clear that escalation of care does not always eventuate despite signs of clinical deterioration, sometimes on multiple occasions.

Essential element 3: Rapid response systems

8. Health care organisations consider the data collection and evaluation processes of their local RRS system, given the variation in scope and quality of available data noted here from study sites.

Essential element 4: Clinical communication

9. Health care organisations that decide to implement an ORC-type framework and form across their facility need to consider how to ensure full engagement by all relevant health disciplines. In particular, medical staff at all levels need to be informed and committed to their role, responsibilities and accountability as participants in the effective implementation of the ORC. Inter-disciplinary communication is essential for the ORC to be successfully adopted into practice. At the core of this communication is the professional and workplace culture(s) at all levels of the organisation (see below).

Essential element 5: Organisational supports

10. Account for increased costs associated with using an A3 double-sided colours-specific observation chart that has high usage and handling
11. Health care organisations consider how to implement the complex practice and cultural changes associated with the implementation of a clinical initiative such as the ORC, within the context of their local workplace culture(s).

Essential element 6: Education

12. The Commission consider development and dissemination of explicit educational resources, based on the human factors principles of the chart design, to guide

graphing practices (location of dots in the centre of the graphing area, use of lines to connect the dots, and use of arrows and connecting lines for blood pressure documentation).

The information should also focus on eliminating or minimising the practice of writing numerical values in the graphing section of the chart. These resources should identify the human factors principles that guide these instructions, and provide a clear rationale from a patient safety and quality of care perspective.

13. The Commission should promote and disseminate these resources to all clinical disciplines, specifically medicine at all levels in clinical departments and health care organisations, to enable optimal engagement and understanding. Appropriate engagement by medical clinicians would improve communication and team processes with their nurse colleagues.
14. The Commission should also promote these resources to education and training providers, so that students across all health disciplines have the background knowledge and understanding of safety science and human factors principles, the application of this knowledge in the form of the ORC templates, and the understanding and skills to promote recognition and rapid response systems processes in clinical practice
15. Health care organisations provide relevant initial and continuing training for all clinical staff, based on resources available from the Commission, and tailored to meet their local needs and context. Application of the ORC is essential to include in clinical deterioration education packages, including how the chart is implemented in routine practice, as well as in escalation of care
16. Additional training and support is required to improve the clinical utility of other sections of the ORC template (‘Other Observation Chart in Use’, ‘Modifications’, ‘Interventions Associated with Abnormal Vital Signs’, ‘Clinical Review Requested’, ‘Additional Observations’ sections).

Essential element 7: Evaluation, audit and feedback

17. Health care organisations include ‘documentation of frequency of observations’, and compare to actual frequency as part of routine clinical audits, with the aim of improving compliance to this recommendation from the Commission.
18. Health care organisations to audit the compliance of complete sets of vital signs (minimum of respiratory rate, oxygen saturation, systolic blood pressure, heart rate, level of consciousness and temperature), as recommended by the Commission.

Essential element 8: Technological systems and solutions

19. The Commission consider the opportunities for developing, implementing and evaluating electronic versions of the ORC. With the continued development of clinical information systems and electronic health records, automated measurement devices in general ward areas,[1] and the future opportunities that handheld devices hold in clinical practice, automated measurement and documentation with auto-alerts to staff for abnormal vital signs are distinctly possible.

Recommendations for further research

The findings from this study highlighted a number of areas for further potential research.

Given the identified issues of clinical acceptance and compliance, further exploration of cultural issues that influence practices of recognising and responding to the unmet needs of a deteriorating patient within local escalation systems is warranted.

While not a focus of this study, during field observations a range of issues were identified related to the actual performance of vital signs measurement. In particular, the practices for measuring vital signs without use of electronic equipment, currently such as respiratory rate, can be explored for accuracy and consistency. In this study and others, [e.g. 16,17] respiratory rate did not appear to be physiologically important for triggering a response to clinical deterioration when compared to other parameters. It is not clear if this is related to practice issues around the accuracy of measurement and documentation of respiratory rate or to the study population.

Conclusion

This study demonstrated both positive findings and some limitations in relation to clinical utility and user acceptance of the ORC templates when trialed in adult general medical-surgical wards. The ORC forms were not used to their optimal functioning for a range of reasons including different design characteristics compared to existing charts, precision in charting vital signs values, tensions in clinical decision-making when an abnormal vital signs was identified, and lack of engagement by medical staff.

We believe this study report provides sufficient information to inform the effective implementation and evaluation of the adult general medical-surgical Observation and Response Chart into routine practice in a wide range of health care settings – public and private; rural to tertiary - across Australian jurisdictions.

Our recommendations involve modifications to the chart template for common sections of all versions; development and use of specific information and training packages; full engagement by all clinical staff. Based on our findings, implementation will require a change management approach to address influencing factors such as workplace culture(s); inter-disciplinary communication and co-practices; clinical decision-making; documentation practices; vital sign observation standards and practices; and understanding of and compliance with the human factors ORC design characteristics.

With optimal use of the ORC sections and compliance with the local rapid response system calling criteria, we believe implementation of the Commission standards together with a revised version of the ORC templates will improve both the identification and response to abnormal vital signs and the trigger when clinical deterioration is determined and a rapid response system is called.

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Appendices

Appendix A Discussion points for ORC template revision post UTP

	I = Issue / D = Discussion	Human Factors Action	Education Action
Charting areas			
1.	*I - Remove vertical bold lines or move to 4 / 6 columns?* D - Bold vertical lines minimise 'column-shift' error when documenting observations. Three (3) columns between the bold lines is optimal for accuracy with documenting. Changing the number of columns between the bold line, or removing bold lines will increase the risk of recording observations in the wrong column.	Bold lines to remain in charting area	Highlight justification for use of bold lines Emphasise that the bold lines do not relate to the frequency of observations required for an individual patient
2.	*I - Delete rows above first emergency call line to create more space to narrow parameters?* D - Rows can be deleted from sections in graphing area to add to others, which will allow for increased precision in parameter values. The graphing area allows for a maximum of nine (9) observation parameters.	Advise on optimal 'minimum row height' and therefore related 'maximum numbers of rows' available in graphing area	n/a
3.	*I - Increase the precision for each parameter by using faint horizontal lines (i.e. at 5 bpm / mmHg)?* D - Additional horizontal lines through each row on graphing area will clutter the space and increase the risk of incorrect recording of vital signs.	n/a	Focus on 'patterns' of observations, and 'rounding-down / rounding up' in documentation [a]
4.	*I - Remove 'modifications in use' tick box and locate one next to each parameter?* D - Modifications in use box rarely ticked in usability trial. Space limited in charting area; not enough space in boxes next to parameters without causing clutter in the charting area	Remove modifications in use tick box from ORC	Highlight completion of actual 'modification in use' section of chart

	I = Issue / D = Discussion	Human Factors Action	Education Action
5.	*I - Parameter value ranges need to be narrower so trend is clearly seen when changes occur, especially respiratory rate, O_2 saturations, O_2 flow, temperature.* D - See discussion Point 2; 'maximum numbers of rows' to be confirmed, to enable increased precision of values	As for discussion Point 2	Information to sites on managing the parameter values within the context of the maximum number of rows in the charting area
Other charts in use			
6.	*I - Add O_2 delivery method?* D - Can be included in the O_2 Flow rate section, with modifications of parameters (noting the maximum number of parameters as 9), or could be noted in 'interventions' section	Not to be a core component of the ORC, but can be added by individual sites	Documenting the type of device in the interventions section
7.	*I - Relocate charting area to right side (if binder in centre)?* D - Binder to remain on left of chart (see Point 23)	Binding margin to remain in current left of chart position	Use of left margin for binding; chart layout with 'writing' and 'information' pages
Response criteria & actions required			
8.	*I - Move section to back page?* D - Response criteria and actions required are next to the charting area as it is important for staff to identify deterioration and take relevant action promptly. Right side of page designed for information only when leaf open; not for writing / documentation	Response criteria and actions required' section to remain in current place	Highlight 'writing' and 'information' sections of the chart design; 'importance' not 'frequency' guide location of section; 'right-facing' page a non-writing section
9.	*I - Clear guidelines that should NOT repeat what is already in graphing area to action?* D - Cognitive overload an important consideration. Documentation in these sections should remain clear, concise and not repeat what the graphing area already	n/a	FAQ sheet to be developed, to include this information

	I = Issue / D = Discussion	Human Factors Action	Education Action
	actions. Developers guide provides further information		
10.	*I - Delete 'other charts in use' section – issues around keeping up to date, already on inpatient medication chart.* D - Considering usefulness comments from usability testing and the importance of the ORC as a tool, suggestion was made that listed charts with tick boxes are changed to forms that are most frequently used	Other charts in use' section to remain	Highlight value of identifying other observation-type charts in use
Modifications			
11.	*I - Separate each box so that modified parameters are documented individually, as all vital signs won't necessarily be modified at the same time* D - Feedback on modifications section was positive overall; some concern about completion by medical staff and how to use if more than one modification required	Re-design the section to allow up to 3 modifications for each vital sign	Highlight chart revisions
12.	D - 1 line including parameter, 2 boxes for ranges acceptable from-to, date, time, sig, valid for xx hours / days	As for # 11	Highlight chart revisions
13.	*I - Develop specific training information for 'modifications' section*		Education for medical staff to be included in ORC training package
Interventions			
14.	*I - Relocate 'interventions' section to charting area/page* D - Due to graphing area and binding margin requirements, it is impractical to move the interventions section next to graphing area because the right inside cannot be written on when opened out	Interventions section to remain in existing location	As for # 7

	I = Issue / D = Discussion	Human Factors Action	Education Action
15.	*I - Add date, time, signature/initials for each comment* D - Date and time correlates with relevant set of vitals signs and staff sign at the end of each comment	No change to section design	Highlight process and link of intervention code to time on charting area
16.	*I - Provide guidelines on how and what to document i.e. actions taken relevant to vital signs* Guidelines to be provided in section i.e. document intervention(s) associated with deranged vital signs D - Numbers cannot replace letters because of scoring with ADDS chart	Add comment, 'document intervention(s) associated with deranged vital signs' to intervention section Replace upper case letters (e.g. 'A') with lower case in brackets (e.g. '(a)') for coding interventions	Highlight chart revisions
17.	*I - Additional rows to be added to 'intervention' sections* D - This is possible with above planned modifications to section	Add further rows if space available following modifications	Highlight chart revisions
Urine Output			
18.	*I - Remove urine output section?* D - A number of issues discussed about use of urine output section; noted as an important sign to monitor for recognition of clinical deterioration. The urine output section does not replace the need for a FBC for other clinical reasons	To remain on chart templates until further trial, use and recommendations occur	Highlight optimal use and documentation, including purpose from a clinical deterioration perspective
19.	*I - Change to fluid balance chart (FBC) trigger?* D - See point 18	As for # 18	As for # 18
20.	*I - Does patient require FBC as well?* D - The patient may or may not require a fluid balance chart.	As for # 18	As for # 18

	I = Issue / D = Discussion	Human Factors Action	Education Action
	The urine output section does not replace the FBC		
21.	*I - Need to be able to document HNPU, PUIT, IDC ...* D - It is acceptable for staff to note the above, if this complies with local policies.	As for # 18	As for # 18
22.	*I - Add fluid balance summary to front or back of chart* D - As noted in points above, if summaries required, then FBC is needed to appropriately document patient fluid balance		
General Layout			
23.	*I - Move fold / binding to centre of ORC (similar to National Inpatient Medication Chart)?* D - Possible, but would mean losing 3 columns in the charting area due to space limitation with binding in the centre	Binding margins to remain on left of chart	As for # 7
24.	*I - Add page numbers* D - Agreed labelling of pages would be helpful. 'Numbers' however may not be always clear as there maybe be more than one chart	To label pages as 'inside left', 'inside right', 'outside left', 'outside right'	As for # 7
25.	*I - Move binder / filing margin to centre?* D - See # 23	As for # 23	As for # 23
26.	*I - Move instructions to back at bottom of chart* D - Instructions are placed in areas on the R1 and R2 because this side of the page has space that cannot be written on	All charts to be reviewed so that instructions are moved to the back page if modifications allow	Highlight chart revisions

	I = Issue / D = Discussion	Human Factors Action	Education Action
Clinical Review			
27.	*I - Remove review undertaken section - Drs will not complete, as required to write in medical records* D - A number of issues discussed with completion of this section	Remove 'clinical review' section, with doctors to continue to record in patient notes	Highlight chart revisions
28.	*I - Add extra 'review requested' sections so that nurse can document when request made* D - Agreed with suggestion	Revise section to be amended to allow recording of more than one request	Highlight chart revisions
Additional Observations			
29.	*I - Move blood glucose level to charting area* D - Blood glucose level is not a vital sign that requires monitoring for all patients	p.r.n. blood glucose to remain in additional observation section	Specific BSL chart to be used if patient requires frequent monitoring
30.	D- Keep weight & bowels documentation sections	These components to remain in chart	n/a
Other issues			
31.	*I - Add sections for additional observations* D - Significant requests for extra sections / observations to be added to chart. It is however important that the ORC is kept as 'clutter free' as possible and adding extra information should be avoided because of risk of cognitive	n/a	Highlight risk of cognitive overload; staff to continue to use specific charts for specialized observations
32.	*I - Develop educational tools* – how to use ORC	n/a	Develop FAQ and other information resources for pilot phase roll-out

	I = Issue / D = Discussion	Human Factors Action	Education Action
33.	*I - Generate consensus on the required precision for documentation for observation values* [b] D - Outside scope of ORC Project	n/a	n/a
34.	*I - Standardise values for response system triggers* [b] D - Outside scope of ORC Project	n/a	n/a
35.	*I - Consider development of additional standard charts that complement the ORC and lead to a harmonised suite of national observation charts* [b] D - Outside scope of ORC Project	n/a	n/a
36.	*I - Use of term 'heart rate' in charts, when actual observational parameter is most commonly measurement of 'pulse rate'* [b] D - This issue was not identified from the usability testing data, but was raised by a member of the UTS research team. This was discussed, and it was agreed that 'pulse rate' was the more correct term	n/a	n/a

Notes:

[a] ACSQHC to examine the optimal precision for parameter values, in relation to the minimal important clinical difference (MID), where treatment will change; this will require a cultural change in practice settings, involving pre-registration education, and post-registration training (item 3)

[b] For discussion at the Deteriorating Patient Advisory Committee (items 35-36)

Appendix B Revised templates for pilot phase

Date
Time

Respiratory Rate (breaths / min): ≥ 37; 36; 31–35; 21–30; 9–20; 5–8; ≤ 4

O₂ Saturation (%): ≥ 93; 90–92; 85–89; ≤ 84

O₂ Flow Rate (L / min): ≥ 5; 1–5; < 1

Blood Pressure (mmHg): Write ≥ 200; 190s; 180s; 170s; 160s; 150s; 140s; 130s; 120s; 110s; 100s; 90s; 80s; 70s; 60s; 50s; 40s

Score systolic BP

If systolic BP ≥ 200, write value in box

Heart Rate (beats / min): Write ≥ 140; 130s; 120s; 110s; 100s; 90s; 80s; 70s; 60s; 50s; 40s; 30s

If heart rate ≥ 140, write value in box

Temperature (C): ≥ 38.6; 38.0–38.5; 36.1–37.9; 35.1–36.0; 34.1–35.0; ≤ 34.0

Consciousness — If necessary, wake patient before scoring: Alert; To Voice; To Pain; Unresp.

4 Hour Urine Output (mL): ≥ 800; 120–799; 80–119; ≤ 79

Pain Score None (0) – Worst (10): Write

ADDS Scores: Respiratory Rate; O₂ Saturation; O₂ Flow Rate; Systolic BP; Heart Rate; Temperature; Consciousness; 4 Hour Urine Output; TOTAL ADDS

Intervention E.g. 'a'

<INSERT SITE LOGO>

UR Number:
Family name:
Given names:
Date of birth: / / Sex: ☐M ☐F
(Affix patient identification label here)

DRAFT

Adult Deterioration Detection System (ADDS)

If any observation is in a shaded area, add up the Total ADDS Score and take the action required for that score.

- Score 0
- Score 1
- Score 2
- Score 3
- Emergency call

Actions Required

Total ADDS Score 1–3
- Record observations at least once every 4 hours
- Carry out appropriate interventions as prescribed
- Manage fever, pain or distress
- Review O₂ delivery
- Consider informing Team Leader

Total ADDS Score 4–5
- Ward doctor to review patient within 30 minutes
- Request review, and note on the back of this form
- Notify Team Leader
- Record observations at least once every 30 minutes
- If patient must leave ward area, Nurse must accompany patient

Total ADDS Score 6–7
- Registrar to review patient within 30 minutes
- Request review, and note on the back of this form
- Registrar to ensure consultant is notified
- Ward doctor to attend
- If patient must leave ward area, Intern and Nurse must accompany patient

Total ADDS Score ≥ 8
- Consider Emergency call
- Registrar to review patient within 10 minutes
- Request review, and note on the back of this form
- Registrar to ensure Consultant is notified
- If patient must leave ward area, Registrar and Nurse must accompany patient

Emergency call if:
- Any observation is in a purple area
- Airway threat
- Respiratory or cardiac arrest
- New drop in O₂ saturation < 90%
- Sudden fall in level of consciousness
- Seizure
- You are seriously worried about the patient but they do not fit the above criteria

<INSERT SITE LOGO>

Adult Deterioration Detection System (ADDS) Chart

UR Number:
Family name:
Given names:
Date of birth: / / Sex: ☐M ☐F
(Affix patient identification label here)

Other Observation Charts In Use

☐ Alcohol Withdrawal ☐ Insulin Infusion ☐ Pain/Epidural/Patient Controlled Analgesia
☐ Anticoagulant ☐ Neurology ☐
☐ Fluid Balance ☐ Neurovascular ☐

General Instructions

- You must record appropriate observations:
  - On admission
  - At a frequency appropriate for the patient's clinical state.
- You must calculate a Total ADDS Score:
  - If the patient is deteriorating or an observation is in a shaded area
  - Whenever you are concerned about the patient.
- When graphing observations, place a dot (•) in the centre of the box which includes the current observation in its range of values and connect it to the previous dot with a straight line. For blood pressure, use the symbols indicated on the chart.
- Whenever an observation falls within a shaded area, you must enter the ADDS Score for that vital sign in the appropriate row of the ADDS Scores table, unless a modification has been made (see below).

Modifications

- If abnormal observations are to be tolerated for the patient's clinical condition, write the acceptable ranges below (where the ADDS Score will be 0).
- Modifications must be reviewed at least every 72 hours.
- If any vital sign needs further modifying, draw two diagonal lines through the entire Modification record in use and write the new acceptable ranges in the next Modification record.

	Modification 1	Modification 2	Modification 3	Modification 4
Respiratory Rate	- breaths / min	- breaths / min	- breaths / min	- breaths / min
O₂ Saturation	- %	- %	- %	- %
O₂ Flow Rate	- L / min	- L / min	- L / min	- L / min
Systolic BP	- mmHg	- mmHg	- mmHg	- mmHg
Heart Rate	- beats / min	- beats / min	- beats / min	- beats / min
Temperature	- C	- C	- C	- C
Consciousness	-	-	-	-
4 Hour Urine Output	- mL	- mL	- mL	- mL
Doctor's name				
Signature				
Date	/ /	/ /	/ /	/ /
Time	:	:	:	:

ADDS CHART

DRAFT

DRAFT

UR Number:
Family name:
Given names:
Date of birth: / / Sex: ☐M ☐F
(Affix patient identification label here)

Interventions Associated With Abnormal Vital Signs

	Reference Letter	Intervention (initial if required)
If you administer an intervention, record here and note letter in Intervention row over page in appropriate time column.	a	
	b	
	c	
	d	
	e	
	f	
	g	
	h	

Clinical Review Requests

Review requested Date / / Time : ☐Ward doctor ☐Registrar ☐Emergency
Reason ☐ADDS ☐Other Specify:

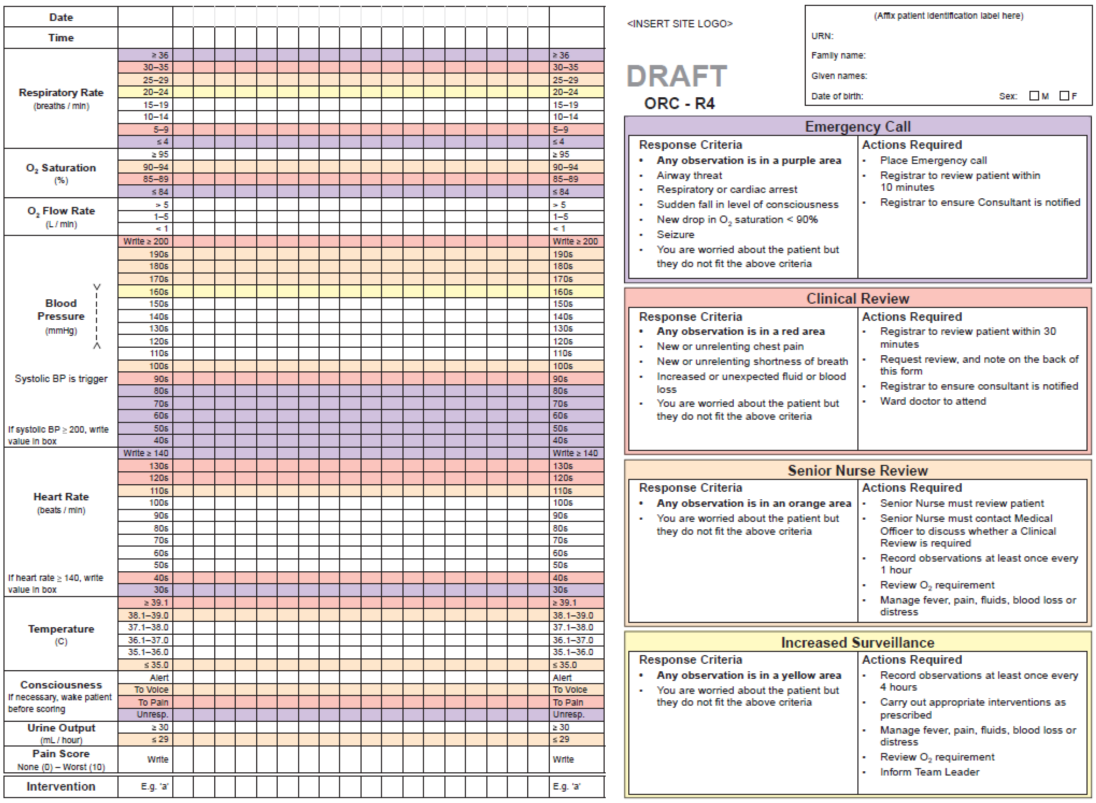
Review requested Date / / Time : ☐Ward doctor ☐Registrar ☐Emergency
Reason ☐ADDS ☐Other Specify:

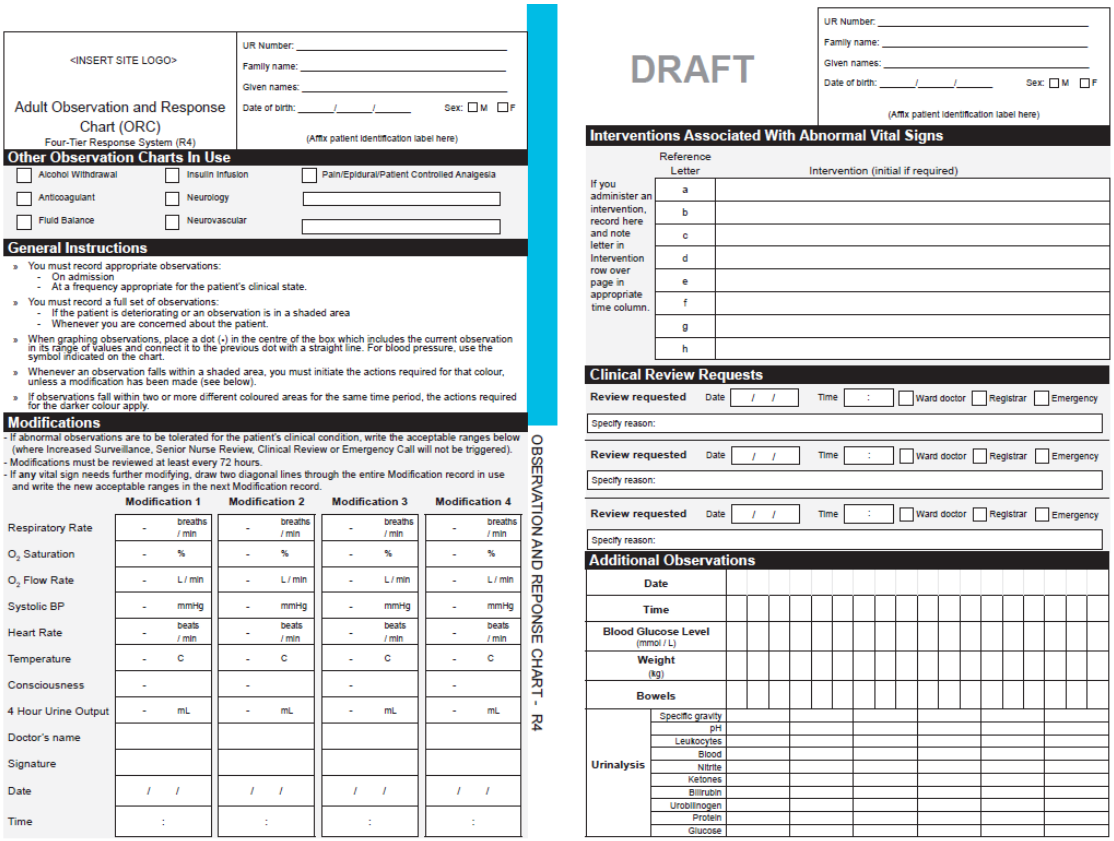
Review requested Date / / Time : ☐Ward doctor ☐Registrar ☐Emergency
Reason ☐ADDS ☐Other Specify:

Additional Observations

Date
Time
Blood Glucose Level (mmol / L)
Weight (kg)
Bowels
Urinalysis: Specific gravity; pH; Leukocytes; Blood; Nitrite; Ketones; Bilirubin; Urobilinogen; Protein; Glucose

N.B. The ADDS chart with blood pressure table had the same modifications applied. No changes were made to the graphing area.





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Adult Observation and Response Chart (ORC)
Four-Tier Response System (R4)

UR Number:
Family name:
Given names:
Date of birth: / / Sex: M F
(Affix patient identification label here)

DRAFT

OBSERVATION AND REPONSE CHART - R4

Other Observation Charts In Use

Alcohol Withdrawal | Insulin Infusion | Pain/Epidural/Patient Controlled Analgesia
Anticoagulant | Neurology
Fluid Balance | Neurovascular

General Instructions

- You must record appropriate observations:
  - On admission
  - At a frequency appropriate for the patient's clinical state.
- You must record a full set of observations:
  - If the patient is deteriorating or an observation is in a shaded area
  - Whenever you are concerned about the patient.
- When graphing observations, place a dot (•) in the centre of the box which includes the current observation in its range of values and connect it to the previous dot with a straight line. For blood pressure, use the symbol indicated on the chart.
- Whenever an observation falls within a shaded area, you must initiate the actions required for that colour, unless a modification has been made (see below).
- If observations fall within two or more different coloured areas for the same time period, the actions required for the darker colour apply.

Modifications

- If abnormal observations are to be tolerated for the patient's clinical condition, write the acceptable ranges below (where Increased Surveillance, Senior Nurse Review, Clinical Review or Emergency Call will not be triggered).
- Modifications must be reviewed at least every 72 hours.
- If any vital sign needs further modifying, draw two diagonal lines through the entire Modification record in use and write the new acceptable ranges in the next Modification record.

	Modification 1	Modification 2	Modification 3	Modification 4
Respiratory Rate	- breaths / min	- breaths / min	- breaths / min	- breaths / min
O_2 Saturation	- %	- %	- %	- %
O_2 Flow Rate	- L / min	- L / min	- L / min	- L / min
Systolic BP	- mmHg	- mmHg	- mmHg	- mmHg
Heart Rate	- beats / min	- beats / min	- beats / min	- beats / min
Temperature	- C	- C	- C	- C
Consciousness	-	-	-	-
4 Hour Urine Output	- mL	- mL	- mL	- mL
Doctor's name				
Signature				
Date	/ /	/ /	/ /	/ /
Time	:	:	:	:

Interventions Associated With Abnormal Vital Signs

If you administer an intervention, record here and note letter in Intervention row over page in appropriate time column.

Reference Letter	Intervention (initial if required)
a	
b	
c	
d	
e	
f	
g	
h	

Clinical Review Requests

Review requested Date / / Time : Ward doctor Registrar Emergency
Specify reason:

Review requested Date / / Time : Ward doctor Registrar Emergency
Specify reason:

Review requested Date / / Time : Ward doctor Registrar Emergency
Specify reason:

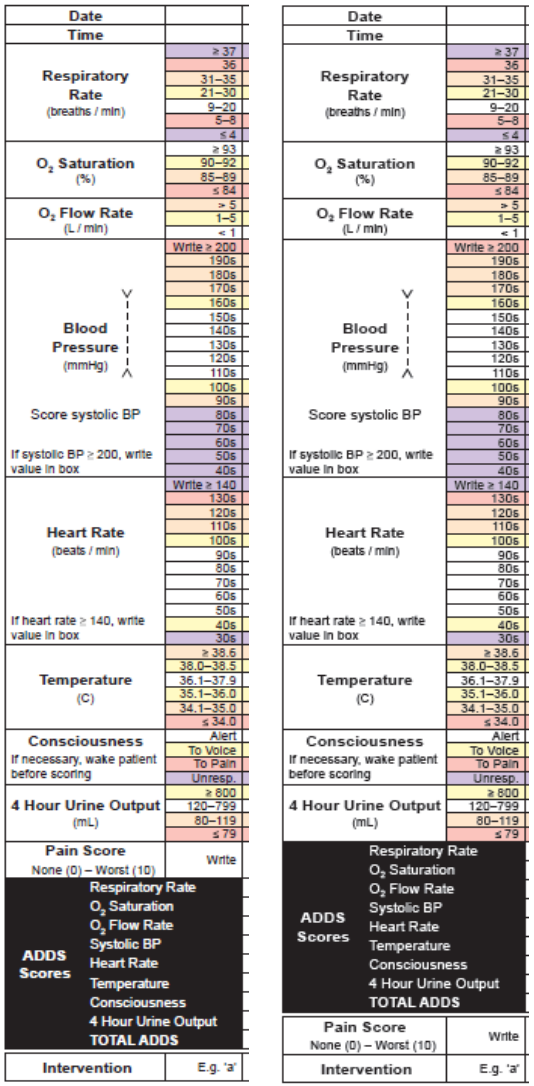
Additional Observations

Date	
Time	
Blood Glucose Level (mmol / L)	
Weight (kg)	
Bowels	
Urinalysis	Specific gravity
	pH
	Leukocytes
	Blood
	Nitrite
	Ketones
	Bilirubin
	Urobilinogen
	Protein
	Glucose

N.B. The R1 and R2 had the same modifications applied. No changes were made to the graphing area.

Appendix C Comparison of ORC graphing areas by chart and site

Template ADDS- Site A

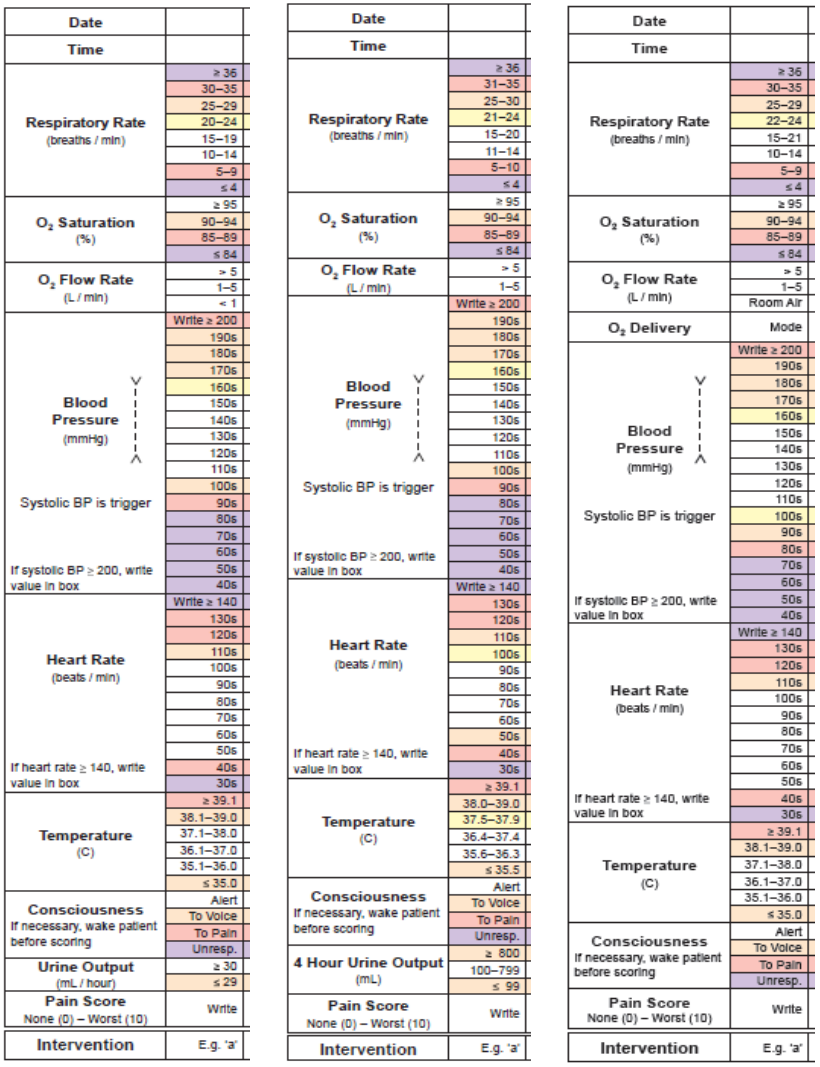


Date	
Time	
Respiratory Rate (breaths / min)	≥ 37
	36
	31–35
	21–30
	9–20
	5–8
	≤ 4
O_2 Saturation (%)	≥ 93
	90–92
	85–89
	≤ 84
O_2 Flow Rate (L / min)	> 5
	1–5
	< 1
Blood Pressure (mmHg)	Write ≥ 200
	190s
	180s
	170s
	160s
	150s
	140s
	130s
	120s
	110s
	100s
	90s
Score systolic BP	80s
	70s
	60s
If systolic BP ≥ 200, write value in box	50s
	40s
Heart Rate (beats / min)	Write ≥ 140
	130s
	120s
	110s
	100s
	90s
	80s
	70s
	60s
	50s
If heart rate ≥ 140, write value in box	40s
	30s
Temperature (C)	≥ 38.6
	38.0–38.5
	36.1–37.9
	35.1–36.0
	34.1–35.0
	≤ 34.0
Consciousness If necessary, wake patient before scoring	Alert
	To Voice
	To Pain
	Unresp.
4 Hour Urine Output (mL)	≥ 800
	120–799
	80–119
	≤ 79
Pain Score None (0) – Worst (10)	Write
ADDS Scores	Respiratory Rate
	O_2 Saturation
	O_2 Flow Rate
	Systolic BP
	Heart Rate
	Temperature
	Consciousness
	4 Hour Urine Output
	TOTAL ADDS
Intervention	E.g. 'a'

Site A

Date	
Time	
Respiratory Rate (breaths / min)	≥ 37
	36
	31–35
	21–30
	9–20
	5–8
	≤ 4
O_2 Saturation (%)	≥ 93
	90–92
	85–89
	≤ 84
O_2 Flow Rate (L / min)	> 5
	1–5
	< 1
Blood Pressure (mmHg)	Write ≥ 200
	190s
	180s
	170s
	160s
	150s
	140s
	130s
	120s
	110s
	100s
	90s
Score systolic BP	80s
	70s
	60s
If systolic BP ≥ 200, write value in box	50s
	40s
Heart Rate (beats / min)	Write ≥ 140
	130s
	120s
	110s
	100s
	90s
	80s
	70s
	60s
	50s
If heart rate ≥ 140, write value in box	40s
	30s
Temperature (C)	≥ 38.6
	38.0–38.5
	36.1–37.9
	35.1–36.0
	34.1–35.0
	≤ 34.0
Consciousness If necessary, wake patient before scoring	Alert
	To Voice
	To Pain
	Unresp.
4 Hour Urine Output (mL)	≥ 800
	120–799
	80–119
	≤ 79
ADDS Scores	Respiratory Rate
	O_2 Saturation
	O_2 Flow Rate
	Systolic BP
	Heart Rate
	Temperature
	Consciousness
	4 Hour Urine Output
	TOTAL ADDS
Pain Score None (0) – Worst (10)	Write
Intervention	E.g. 'a'

Template R4 Site B Site C



Date			
Time			
Respiratory Rate (breaths / min)	≥ 36	≥ 36	≥ 36
	30–35	31–35	30–35
	25–29	25–30	25–29
	20–24	21–24	22–24
	15–19	15–20	15–21
	10–14	11–14	10–14
	5–9	5–10	5–9
	≤ 4	≤ 4	≤ 4
O_2 Saturation (%)	≥ 95	≥ 95	≥ 95
	90–94	90–94	90–94
	85–89	85–89	85–89
	≤ 84	≤ 84	≤ 84
O_2 Flow Rate (L / min)	> 5	> 5	> 5
	1–5	1–5	1–5
	< 1		Room Air
O_2 Delivery			Mode
Blood Pressure (mmHg)	Write ≥ 200	Write ≥ 200	Write ≥ 200
	190s	190s	190s
	180s	180s	180s
	170s	170s	170s
	160s	160s	160s
	150s	150s	150s
	140s	140s	140s
	130s	130s	130s
	120s	120s	120s
	110s	110s	110s
	100s	100s	100s
Systolic BP is trigger	90s	90s	90s
	80s	80s	80s
	70s	70s	70s
	60s	60s	60s
If systolic BP ≥ 200, write value in box	50s	50s	50s
	40s	40s	40s
Heart Rate (beats / min)	Write ≥ 140	Write ≥ 140	Write ≥ 140
	130s	130s	130s
	120s	120s	120s
	110s	110s	110s
	100s	100s	100s
	90s	90s	90s
	80s	80s	80s
	70s	70s	70s
	60s	60s	60s
	50s	50s	50s
If heart rate ≥ 140, write value in box	40s	40s	40s
	30s	30s	30s
Temperature (C)	≥ 39.1	≥ 39.1	≥ 39.1
	38.1–39.0	38.0–39.0	38.1–39.0
	37.1–38.0	37.5–37.9	37.1–38.0
	36.1–37.0	36.4–37.4	36.1–37.0
	35.1–36.0	35.6–36.3	35.1–36.0
	≤ 35.0	≤ 35.5	≤ 35.0
Consciousness If necessary, wake patient before scoring	Alert	Alert	Alert
	To Voice	To Voice	To Voice
	To Pain	To Pain	To Pain
	Unresp.	Unresp.	Unresp.
Urine Output (mL / hour)	≥ 30		
	≤ 29		
4 Hour Urine Output (mL)		≥ 800	
		100–799	
		≤ 99	
Pain Score None (0) – Worst (10)	Write	Write	Write
Intervention	E.g. 'a'	E.g. 'a'	E.g. 'a'

Template R2

Date	
Time	
Respiratory Rate (breaths / min)	≥ 31
	25–30
	21–24
	15–20
	11–14
	5–10
	≤ 4
O_2 Saturation (%)	≥ 96
	90–95
	≤ 89
O_2 Flow Rate (L / min)	> 5
	1–5
	< 1
Blood Pressure (mmHg)	Write ≥ 240
	230s
	220s
	210s
	200s
	190s
	180s
	170s
	160s
	150s
	140s
	130s
	120s
	110s
Systolic BP is trigger	100s
	90s
	80s
	70s
	60s
If systolic BP ≥ 240, write value in box	50s
	40s
Heart Rate (beats / min)	Write ≥ 180
	170s
	160s
	150s
	140s
	130s
	120s
	110s
	100s
	90s
	80s
	70s
	60s
	50s
If heart rate ≥ 180, write value in box	40s
	30s
Temperature (C)	≥ 38.6
	37.6–38.5
	36.6–37.5
	35.5–36.5
	≤ 35.4
Consciousness If necessary, wake patient before scoring	Alert
	To Voice
	To Pain
	Unresp.
4 Hour Urine Output (mL)	≥ 800
	100–799
	≤ 99
Pain Score None (0) – Worst (10)	Write
Intervention	E.g. 'a'

Site D

Date	
Time	
Respiratory Rate (breaths / min)	≥ 31
	25–30
	21–24
	15–20
	11–14
	6–10
	≤ 5
O_2 Saturation (%)	≥ 96
	90–95
	≤ 89
O_2 Flow Rate (L / min)	> 5
	1–5
	< 1
Blood Pressure (mmHg)	Write ≥ 240
	230s
	220s
	210s
	200s
	190s
	180s
	170s
	160s
	150s
	140s
	130s
	120s
	110s
Systolic BP is trigger	100s
	90s
	80s
	70s
	60s
If systolic BP ≥ 240, write value in box	50s
	40s
Heart Rate (beats / min)	Write ≥ 180
	170s
	160s
	150s
	140s
	130s
	120s
	110s
	100s
	90s
	80s
	70s
	60s
	50s
If heart rate ≥ 180, write value in box	40s
	30s
Temperature (C)	≥ 38.6
	37.6–38.5
	36.6–37.5
	35.5–36.5
	≤ 35.4
Consciousness If necessary, wake patient before scoring	Alert
	To Voice
	To Pain
	Unresp.
4 Hour Urine Output (mL)	≥ 800
	100–799
	≤ 99
Pain Score None (0) – Worst (10)	Write
Intervention	E.g. 'a' See over

Site E

Date	
Time	
Respiratory Rate (breaths / min)	≥ 30
	25–29
	21–24
	15–20
	11–14
	7–10
	≤ 6
O_2 Saturation (%)	≥ 96
	89–95
	≤ 90
O_2 Flow Rate (L / min)	> 5
	1–5
	O_2 Delivery
Blood Pressure (mmHg)	Write ≥ 240
	230s
	220s
	210s
	200s
	190s
	180s
	170s
	160s
	150s
	140s
	130s
	120s
	110s
Systolic BP is trigger	100s
	90s
	80s
	70s
	60s
If systolic BP ≥ 240, write value in box	50s
	40s
	30s
Heart Rate (beats / min)	Write ≥ 180
	170s
	160s
	150s
	140s
	130s
	120s
	110s
	100s
	90s
	80s
	70s
	60s
	50s
If heart rate ≥ 180, write value in box	40s
	30s
Temperature (C)	≥ 38.6
	37.6–38.5
	36.6–37.5
	35.5–36.5
	≤ 35.4
Consciousness If necessary, wake patient before scoring	Alert
	To Voice
	To Pain
	Unresp.
4 Hour Urine Output (mL)	≥ 800
	100–799
	≤ 99
Pain Score None (0) – Worst (10)	Write
Intervention	E.g. 'a'

Site F

Date	
Time	
Respiratory Rate (breaths / min)	Write > 30
	26–30
	21–25
	16–20
	11–15
	8–10
	Write < 8
O_2 Saturation (%)	96–100
	92–95
	90–91
	Write ≤ 89
O_2 Flow Rate (L / min)	Write ≥ 10
	7–9
	5–6
	3–4
	1–2
	Room Air
O_2 Delivery	Mode
Blood Pressure (mmHg)	Write ≥ 200
	190s
	180s
	170s
	160s
	150s
	140s
	130s
	120s
	110s
	100s
Systolic BP is trigger	90s
	80s
	70s
	60s
	50s
If systolic BP ≥ 200 or ≤ 30, write value in box	40s
	Write ≤ 30
Heart Rate (beats / min)	Write ≥ 150
	140s
	130s
	120s
	110s
	100s
	90s
	80s
	70s
	60s
	50s
If heart rate ≥ 150 or ≤ 30, write value in box	40s
	Write ≤ 30
Temperature (C)	Write ≥ 38.5
	38–38.4
	37.5–37.9
	37–37.4
	36.5–36.9
	35.6–36.4
	Write ≤ 35.5
Consciousness If necessary, wake patient before scoring	Alert
	To Voice
	To Pain
	Unresp.
Looks Unwell	Yes
	No
Intervention Reference letter	E.g. 'a'

Site G

Date	
Time	
Respiratory Rate (breaths / min)	≥ 36
	31–35
	26–30
	21–25
	15–20
	7–14
	≤ 6
O_2 Saturation (%)	≥ 96
	93–95
	90–92
	≤ 89
O_2 Flow Rate	L / min
	Mode
Blood Pressure (mmHg)	Write ≥ 240
	230s
	220s
	210s
	200s
	190s
	180s
	170s
	160s
	150s
	140s
	130s
	120s
	110s
Systolic BP is trigger	100s
	90s
	80s
	70s
	60s
If systolic BP ≥ 240, write value in box	50s
	40s
Heart Rate (beats / min)	Write ≥ 160
	150s
	140s
	130s
	120s
	110s
	100s
	90s
	80s
	70s
	60s
	50s
	40s
If heart rate ≥ 180, write value in box	30s
Temperature (C)	Write ≥39.1
	38.6–39.0
	38.1–38.5
	37.6–38.0
	37.1–37.5
	35.6–37.0
	≤ 35.5
Consciousness If necessary, wake patient before scoring	Alert
	Drowsy
	To Pain
	Unresp.
Pain Score None (0) – Worst (10)	Write
Weight (kgs)	kgs
Intervention	E.g. 'a'
Signature	Initals

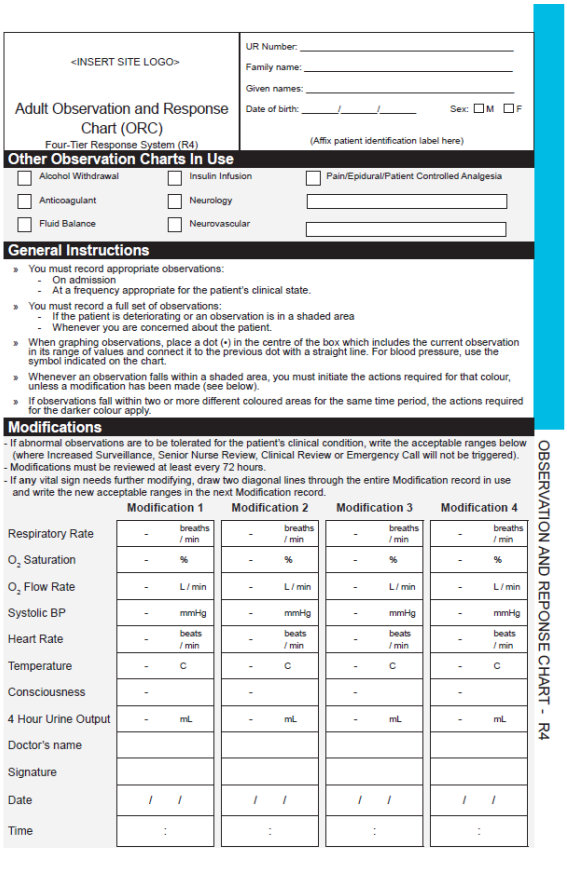
Site H

Date	
Time	
Respiratory Rate (breaths / min)	Write ≥ 36
	30–35
	25–29
	20–24
	12–19
If resp rate ≤ 5 or ≥ 36 write value in box	6–11
	Write ≤ 5
O_2 Saturation (%)	≥ 97
	93–96
	90–92
	85–89
	≤ 84
O_2 Flow Rate (L / min)	≥ 11 FP
	9–10 Mask
	7–8 Mask
NP = Nasal Prongs	5–6 Mask
FP = Fisher and Paykel	1–4 NP
	Room Air
Blood Pressure (mmHg)	Write ≥ 220
	210s
	200s
	190s
	180s
	170s
	160s
	150s
	140s
	130s
	120s
	110s
	100s
Systolic BP is trigger	90s
	80s
	70s
	60s
If systolic BP ≤ 40 or ≥ 220 write value in box	50s
	Write ≤ 40s
	Write ≥ 160
Heart Rate (beats / min)	150s
	140s
	130s
	120s
	110s
	100s
	90s
	80s
	70s
	60s
	50s
If heart rate ≤ 30 or ≥ 160 write value in box	40s
	Write ≤ 30s
Rhythm / Pulse	Reg / Irreg
Temperature (C)	Write ≥ 39
	38–38.9
	37–37.9
	36–36.9
If temperature ≤34.9 or ≥ 39 write value in box	35–35.9
	Write ≤34.9
Consciousness If necessary, wake patient before scoring	Alert
	To Voice
	To Pain
	Unresp.
Pain Score None (0) – Worst (10)	At rest
	Movement
Intervention	E.g. 'a'

Site I

Date	
Time	
Respiratory Rate (breaths / min)	≥ 31
	25–30
	21–24
	15–20
	11–14
	5–10
	≤ 4
O_2 Saturation (%)	≥ 96
	90–95
	≤ 89
O_2 Flow Rate (L / min)	Write ≥ 5
	1–5
	< 1
Blood Pressure (mmHg)	Write ≥ 240
	230s
	220s
	210s
	200s
	190s
	180s
	170s
	160s
	150s
	140s
	130s
	120s
	110s
Score systolic BP	100s
	90s
	80s
	70s
	60s
If systolic BP ≥ 240, write value in box	50s
	40s
Heart Rate (beats / min)	Write ≥ 180
	170s
	160s
	150s
	140s
	130s
	120s
	110s
	100s
	90s
	80s
	70s
	60s
	50s
If heart rate ≥ 180, write value in box	40s
	30s
Temperature (C)	≥ 38.6
	37.6–38.5
	36.6–37.5
	35.5–36.5
	≤ 35.4
Consciousness If necessary, wake patient before scoring	Alert
	To Voice
	To Pain
	Unresp.
4 Hour Urine Output (mL)	≥ 800
	100–799
	≤ 99
Pain Score None (0) – Worst (10)	Write
Intervention	E.g. 'a'

Appendix D How to use an ORC information sheet



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Adult Observation and Response Chart (ORC)
Four-Tier Response System (R4)

UR Number: _____
Family name: _____
Given names: _____
Date of birth: _____/_____/_____ Sex: ☐M ☐F
(Affix patient identification label here)

Other Observation Charts In Use

☐ Alcohol Withdrawal ☐ Insulin Infusion ☐ Pain/Epidural/Patient Controlled Analgesia
☐ Anticoagulant ☐ Neurology
☐ Fluid Balance ☐ Neurovascular

General Instructions

» You must record appropriate observations:
- On admission
- At a frequency appropriate for the patient's clinical state.

» You must record a full set of observations:
- If the patient is deteriorating or an observation is in a shaded area
- Whenever you are concerned about the patient.

» When graphing observations, place a dot (•) in the centre of the box which includes the current observation in its range of values and connect it to the previous dot with a straight line. For blood pressure, use the symbol indicated on the chart.

» Whenever an observation falls within a shaded area, you must initiate the actions required for that colour, unless a modification has been made (see below).

» If observations fall within two or more different coloured areas for the same time period, the actions required for the darker colour apply.

Modifications

- If abnormal observations are to be tolerated for the patient's clinical condition, write the acceptable ranges below (where Increased Surveillance, Senior Nurse Review, Clinical Review or Emergency Call will not be triggered).
- Modifications must be reviewed at least every 72 hours.
- If any vital sign needs further modifying, draw two diagonal lines through the entire Modification record in use and write the new acceptable ranges in the next Modification record.

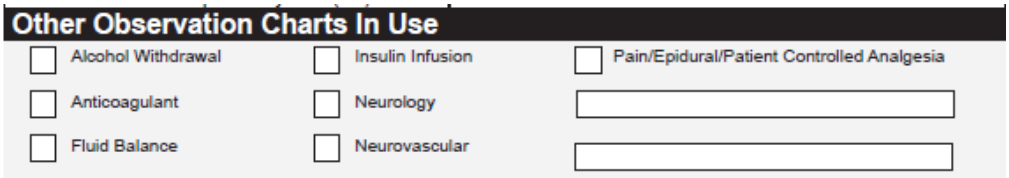
	Modification 1	Modification 2	Modification 3	Modification 4
Respiratory Rate	- breaths / min	- breaths / min	- breaths / min	- breaths / min
O_2 Saturation	- %	- %	- %	- %
O_2 Flow Rate	- L / min	- L / min	- L / min	- L / min
Systolic BP	- mmHg	- mmHg	- mmHg	- mmHg
Heart Rate	- beats / min	- beats / min	- beats / min	- beats / min
Temperature	- C	- C	- C	- C
Consciousness	-	-	-	-
4 Hour Urine Output	- mL	- mL	- mL	- mL
Doctor's name				
Signature				
Date	/ /	/ /	/ /	/ /
Time	:	:	:	:

OBSERVATION AND RESPONSE CHART - R4

1 'Other Observation Charts in Use' Section

This first section on the outside of the ORC *(when folded)* highlights other observation charts relevant for monitoring a patient's clinical condition

Check this section each time before you measure and document a set of observations



Other Observation Charts In Use

☐ Alcohol Withdrawal ☐ Insulin Infusion ☐ Pain/Epidural/Patient Controlled Analgesia
☐ Anticoagulant ☐ Neurology
☐ Fluid Balance ☐ Neurovascular

2 'Modifications' section

Refer to this second section on the outside of the ORC *(when folded)* prior to documenting and responding to any abnormal observations – any observation / vital sign that falls within a coloured zone or acquires an ADDS score

If abnormal observations are accepted for a patient's clinical condition they are recorded in this section and any Action(s) Required according to the relevant coloured / scoring section do not apply *(see No.4)*

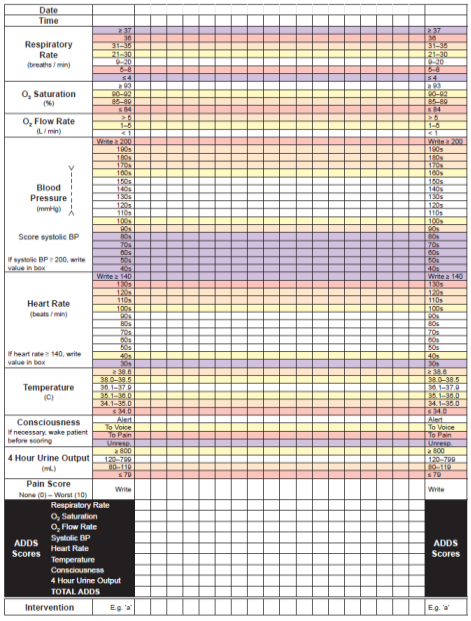
Each modification MUST be completed in full by the treating doctor, as a medico-legal order

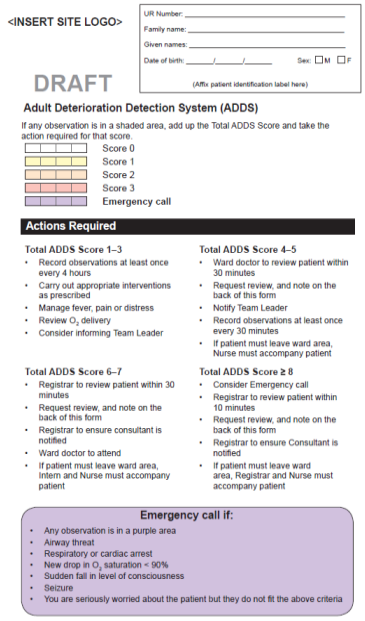
Up to four modifications are allowed for each chart - if further modifications are required, commence a new ORC

Modifications

- If abnormal observations are to be tolerated for the patient's clinical condition, write the acceptable ranges below (where Increased Surveillance, Senior Nurse Review, Clinical Review or Emergency Call will not be triggered).
- Modifications must be reviewed at least every 72 hours.
- If any vital sign needs further modifying, draw two diagonal lines through the entire Modification record in use and write the new acceptable ranges in the next Modification record.

	Modification 1	Modification 2	Modification 3	Modification 4
Respiratory Rate	- breaths / min	- breaths / min	- breaths / min	- breaths / min
O_2 Saturation	- %	- %	- %	- %
O_2 Flow Rate	- L / min	- L / min	- L / min	- L / min
Systolic BP	- mmHg	- mmHg	- mmHg	- mmHg
Heart Rate	- beats / min	- beats / min	- beats / min	- beats / min
Temperature	- C	- C	- C	- C
Consciousness	-	-	-	-
4 Hour Urine Output	- mL	- mL	- mL	- mL
Doctor's name				
Signature				
Date	/ /	/ /	/ /	/ /
Time	:	:	:	:





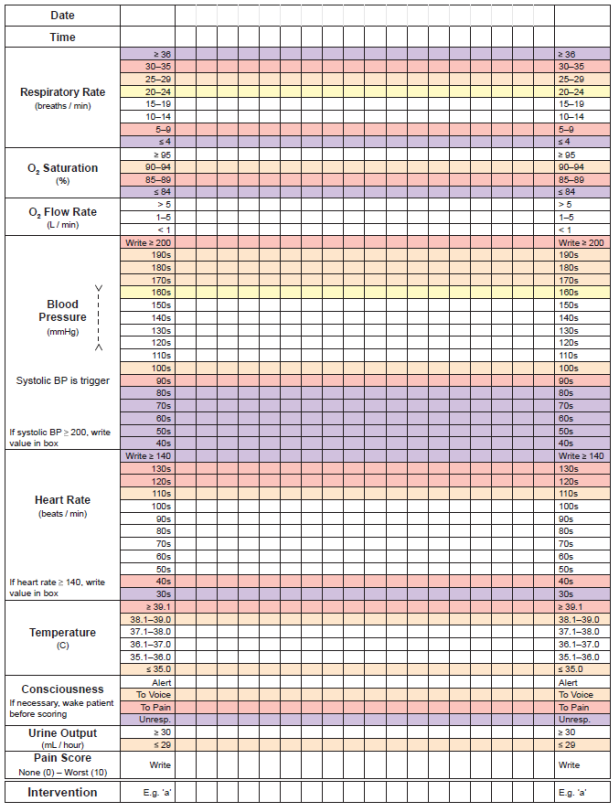
3 ‘Graphing’ section

This third section on the inside of the ORC *(when open)* is for documentation of important observations

For ALL observations EXCEPT blood pressure record a dot in the centre of the square and join it to the previous dot *(connecting the dots enables faster recognition of clinical deterioration)*

For blood pressure use arrows as indicated in the box to the left of the graphing area, and connect the arrows with a dashed line (*connecting the arrows enables faster recognition of clinical deterioration*)

DO NOT use numbers (*unless indicated*) as they impede the ability to observe and recognise clinical deterioration



4 ‘Response Criteria and Actions Required’ Section

This fourth section on the inside of the ORC *(when open)* provides you with essential information when abnormal observations are identified for a patient

Familiarise yourself with this information as extra Response Criteria may be provided that do not fit within the coloured or ADDS scoring zones

Make sure you are aware of any documented modifications before responding to abnormal observations *(see No. 2)*

If any action is taken for abnormal observations OR is not deemed appropriate it should be documented in the Interventions Associated with Abnormal Vital Signs section *(see No.6)*

When one or more observations are documented in any of the coloured zones use the darkest colour, or total ADDS score, to identify any action(s) that must be taken

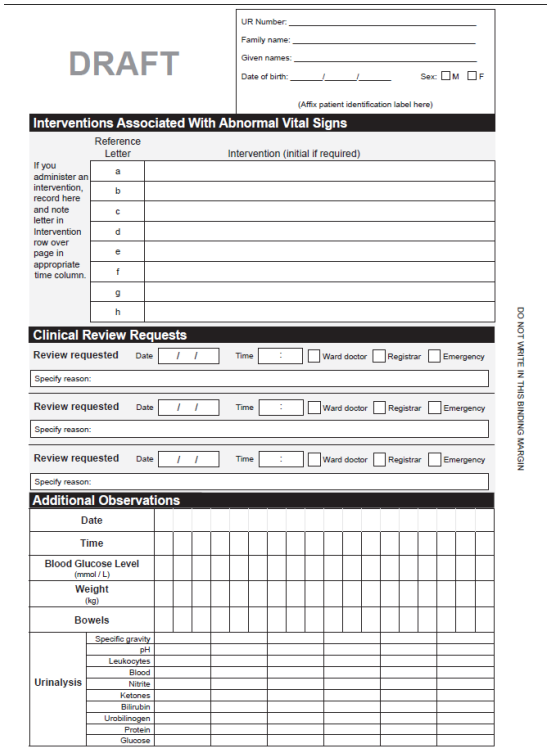
If a clinical review is requested, document in the Clinical Review Requests section *(see No. 7).*

Emergency Call	
Response Criteria	**Actions Required**
• **Any observation is in a purple area** • Airway threat • Respiratory or cardiac arrest • Sudden fall in level of consciousness • New drop in O_2 saturation < 90% • Seizure • You are worried about the patient but they do not fit the above criteria	• Place Emergency call • Registrar to review patient within 10 minutes • Registrar to ensure Consultant is notified

Clinical Review	
Response Criteria	**Actions Required**
• **Any observation is in a red area** • New or unrelenting chest pain • New or unrelenting shortness of breath • Increased or unexpected fluid or blood loss • You are worried about the patient but they do not fit the above criteria	• Registrar to review patient within 30 minutes • Request review, and note on the back of this form • Registrar to ensure consultant is notified • Ward doctor to attend

Total ADDS Score 1–3

- Record observations at least once every 4 hours
- Carry out appropriate interventions as prescribed
- Manage fever, pain or distress
- Review O_2 delivery
- Consider informing Team Leader



DRAFT

UR Number: _____
Family name: _____
Given names: _____
Date of birth: ____/____/____ Sex: ☐M ☐F
(Affix patient identification label here)

Interventions Associated With Abnormal Vital Signs

If you administer an intervention, record here and note letter in Intervention row over page in appropriate time column.	Reference Letter	Intervention (initial if required)
	a	
	b	
	c	
	d	
	e	
	f	
	g	
	h	

Clinical Review Requests

Review requested Date / / Time : ☐ Ward doctor ☐ Registrar ☐ Emergency
Specify reason:

Review requested Date / / Time : ☐ Ward doctor ☐ Registrar ☐ Emergency
Specify reason:

Review requested Date / / Time : ☐ Ward doctor ☐ Registrar ☐ Emergency
Specify reason:

Additional Observations

Date							
Time							
Blood Glucose Level (mmol / L)							
Weight (kg)							
Bowels							
Urinalysis	Specific gravity						
	pH						
	Leukocytes						
	Blood						
	Nitrite						
	Ketones						
	Bilirubin						
	Urobilinogen						
	Protein						
	Glucose						

DO NOT WRITE IN THIS BINDING MARGIN

5 ‘Interventions Associated with Abnormal Vital Signs’ section

This fifth section on the outside of the ORC *(when closed)* is where you document any actions taken OR not taken in response to abnormal observations

When you have written comments in a row, document the corresponding letter at the bottom of the column in the charting area, with the abnormal observations

The corresponding letter is written in lower case to avoid any confusion with abbreviations or acronyms

Interventions Associated With Abnormal Vital Signs

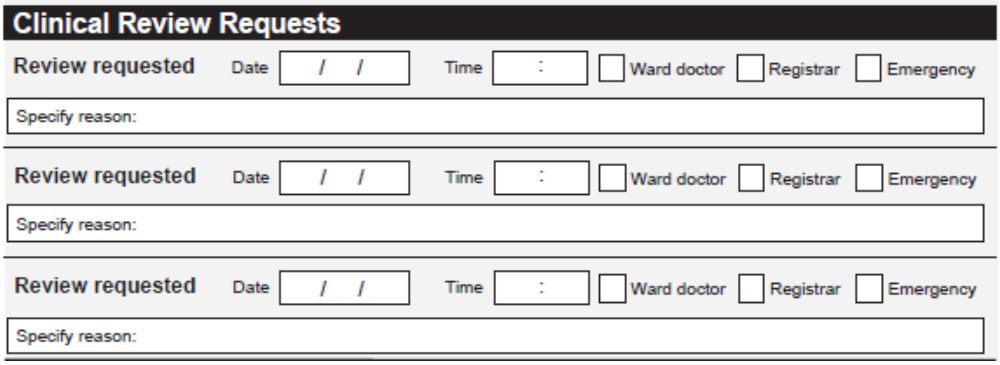
If you administer an intervention, record here and note letter in Intervention row over page in appropriate time column.	Reference Letter	Intervention (initial if required)
	a	
	b	
	c	
	d	
	e	
	f	
	g	
	h	

6 ‘Clinical Review Requests’ section

This is the sixth section on the ORC *(when closed)* where you document that a request for

a clinical review has been made

Up to three clinical review requests can be recorded in this section – if further clinical review requests are required, commence a new chart

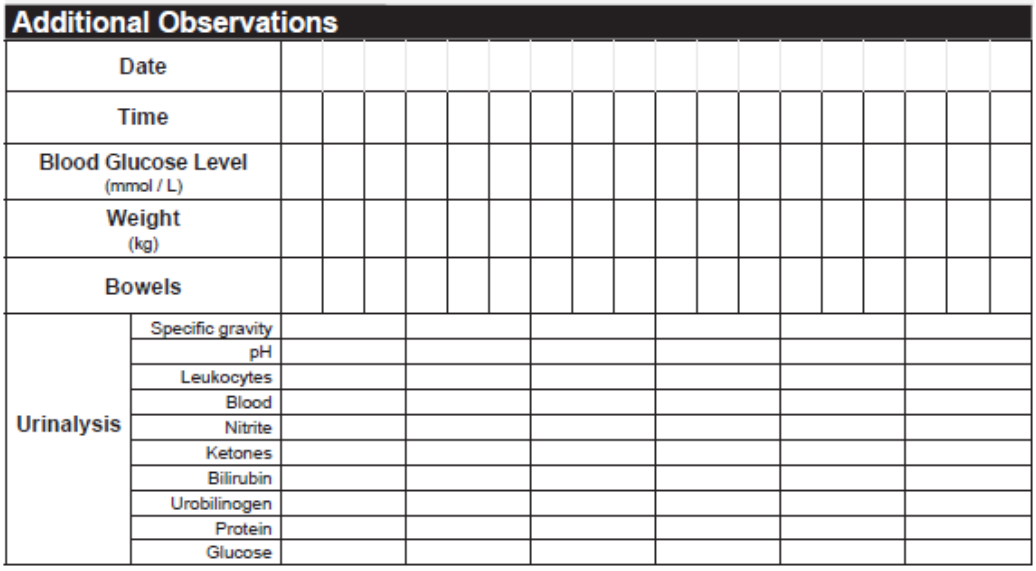


Clinical Review Requests							
Review requested	Date / /	Time :	☐ Ward doctor	☐ Registrar	☐ Emergency		
Specify reason:							
Review requested	Date / /	Time :	☐ Ward doctor	☐ Registrar	☐ Emergency		
Specify reason:							
Review requested	Date / /	Time :	☐ Ward doctor	☐ Registrar	☐ Emergency		
Specify reason:							

7 ‘Additional Observations’ section

This is the final section on the ORC *(when closed)* where you can document other observations being monitored for a patient’s clinical condition

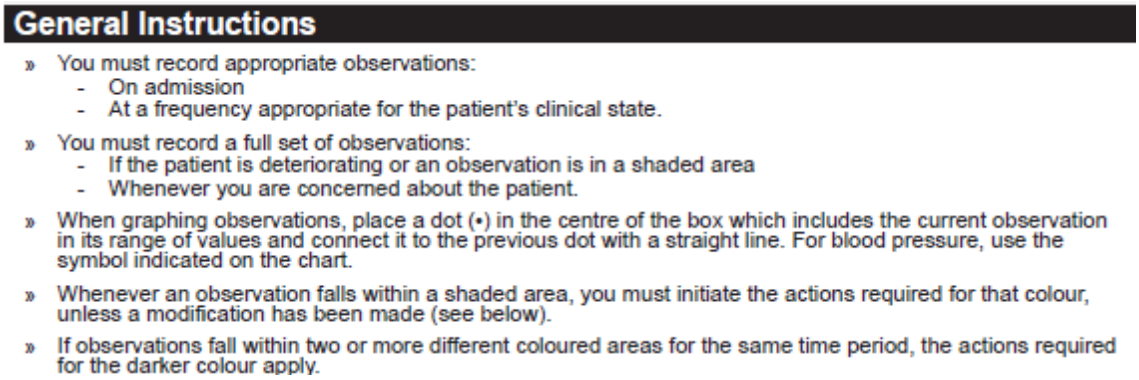
You do not have to document in all of the sections unless it is important to monitor for a patient’s clinical condition



Additional Observations																		
Date																		
Time																		
Blood Glucose Level (mmol / L)																		
Weight (kg)																		
Bowels																		
Urinalysis	Specific gravity																	
	pH																	
	Leukocytes																	
	Blood																	
	Nitrite																	
	Ketones																	
	Bilirubin																	
	Urobilinogen																	
	Protein																	
	Glucose																	

8 ‘General Instructions’ section

This section provides instruction for staff who are unfamiliar with the ORC and remains an integral feature of the chart

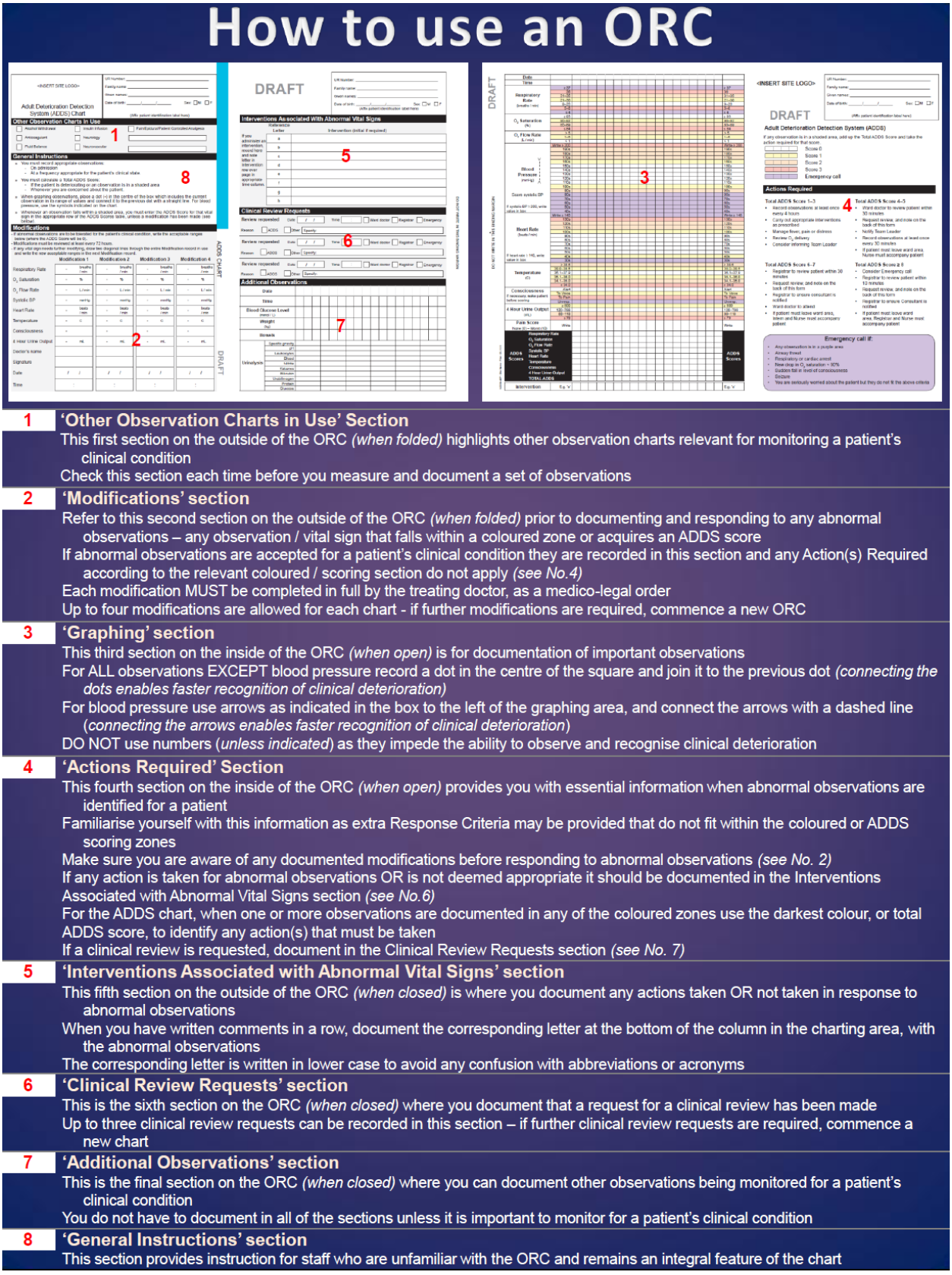


General Instructions

- You must record appropriate observations:
  - On admission
  - At a frequency appropriate for the patient's clinical state.
- You must record a full set of observations:
  - If the patient is deteriorating or an observation is in a shaded area
  - Whenever you are concerned about the patient.
- When graphing observations, place a dot (•) in the centre of the box which includes the current observation in its range of values and connect it to the previous dot with a straight line. For blood pressure, use the symbol indicated on the chart.
- Whenever an observation falls within a shaded area, you must initiate the actions required for that colour, unless a modification has been made (see below).
- If observations fall within two or more different coloured areas for the same time period, the actions required for the darker colour apply.

N.B. This 'how to use an ORC' document is to be read in conjunction with the FAQs sheet

Appendix E How to use an ORC poster



Appendix F Frequently asked questions (FAQ) sheet

1. What is Human Factors?

Human factors (HF) incorporates knowledge from a range of multidisciplinary field incorporating knowledge from psychology and design, to inform complex processes, and minimize risk of human error

2. Why do HF principles need to be applied to ORCs?

Applying HF minimises risk of error occurring and reduces 'cognitive load'

Cognitive load is related to a person's working memory, problem-solving and other aspects of high-level functioning

3. Why is the ORC designed in this format?

This format minimises cognitive load and processing, reducing the risk of errors being made when recording and interpreting patient's vital signs

4. Why is the ORC A3 size and not A4 like other charts we use?

The A3 size improves usability and interpretation by minimising clutter

The ORC has a left binding margin and an off centre fold to allow enough space for the graphing area. The graphing area MUST NOT extend beyond the fold of the page

5. I want to be accurate when I'm recording patient observations. Why do I have to use dots and ranges in the graphing area instead of numbers?

Empirical HF research has found that clinical deterioration is recognised much faster with the use of dots instead of numbers; With the use of separate graphing areas instead of overlapping, and using colour coding instead of tables / legends

It is also important to consider the accuracy of automated machines and if a patient's vital sign is abnormal it MUST be check manually

6. I've always been taught to look for the 'seagull sign' as an indicator of clinical deterioration. How am I supposed to apply this principle with the separate graphing area?

Empirical HF research has found the 'seagull sign' to be potentially harmful when indentifying clinical deterioration because overlapping of the graphing area 'impedes recognition of clinical deterioration'

7. Why can't I add more variables to the graphing area?

The maximum of 9 variables prevents the charting area from becoming 'cluttered' with too much information, causing cognitive overload

Adding more than 9 variables increases cognitive load, risk of error, and distracts from the most significant variables reducing the likelihood of identifying clinical deterioration

The core variables include respiration rate, oxygen saturation, systolic blood pressure, heart rate and temperature

8. Can the order of variables in the graphing area be changed?

The order of the variables on the charting area should not be changed because they are in order of significance to clinical deterioration

9. Why is there a bold line every 3rd column when it doesn't align with 4 hourly or QID observations?

The bold line every 3rd column prevents 'column shift' or error of recording observations in the wrong column

10. Can more rows be added to the graphing area to narrow the ranges in each variable?

Yes, extra rows can be inserted for variables but other rows must be deleted to keep the overall graphing area the same size

The minimum height for each row must not be less than 3.6mm

These restrictions prevent too much 'clutter' in the graphing area and enables faster recognition of clinical deterioration

11. Why can't we add other observation sections such as wound management, surgical drains, cannula changes etc?

The additional observations section is not an essential element of monitoring clinica deterioration

Different observations can be placed in this section, however the area should NOT be increased at the cost of other sections on the ORC that are important for the recognition of clinical deterioration

Adding further 'additional observations' would increase cognitive load with extra information and reduce the likelihood of identifying clinical deterioration

12. I work on a neuro ward and the Glasgow Coma Scale is really important to monitor alongside other vital signs. Why can't this be included on the ORC?

This is a 'general' adult observation chart that has been designed to monitor the core physiological vital signs of all adult patients (see ACSQHC standards/consensus)

Any additional specialty observations should be monitored on a separate chart

N.B. This FAQ document should be read in conjunction with the ORC Developers Guide available from the Australian Commission on Safety and Quality in Health Care website www.safetyandquality.gov.au

Appendix G Audit form

UNIVERSITY OF TECHNOLOGY SYDNEY

72 hour PROspective Audit

AUSTRALIAN COMMISSION ON SAFETY AND QUALITY IN HEALTH CARE

Audit Period: 12th February 2012 *00:00am to* 14th February 2012 *23:59pm* **Audit No.**_____/60

MRN_____ **Pt Initials**_____ **Age**_____ **Gender** M / F **Ward Type**_____

Box 1

- Was the expected observation frequency documented during the audit period? Y / N
- If yes, what was it?
- Where is the frequency documented? Care plan ☐ Med records ☐ Other (please write)

- **Total number (#) of observation sets** recorded on chart/s during 72-hr audit period_____
- **# *complete* sets** (inc. RR,O_2S, SBP, HR, T) recorded on chart/s during 72-hr audit period_____
- **# *incomplete* sets** recorded on chart/s during 72-hr audit period_____

Box 2

Vital sign (during 72hr audit period)	# obs documented in each vital sign	# obs NOT documented in each vital sign	# of **abnormal** obs in each vital sign
Resp Rate			
O_2 Sats			
O_2 Flow Rate			
Systolic BP			
Heart Rate			
Temperature			
Consciousness			
Urine Output			
Pain Score			

N.B. Abnormal = according to response criteria on pilot phase ORC

Box 3

	1st set abnormal obs	2nd set abnormal obs	3rd set abnormal obs
Time set of obs taken (use 24hr clock)			
# minutes since previous set of obs			
# minutes until next set of obs			
# normal obs sets between previous abnormal obs set			
Write no. of colour next to corresponding vital sign(s) below…. 1 2 3 4			
RR	RR	RR	RR
O_2 S	O_2 S	O_2 S	O_2 S
SBP	SBP	SBP	SBP
HR	HR	HR	HR
T	T	T	T
Total **ADDS**	Total **ADDS**	Total **ADDS**	Total **ADDS**
ADDS correct Y / N	ADDS correct Y / N	ADDS correct Y / N	ADDS correct Y / N
What action was required according to the ORC?			
Intervention ☐	Intervention ☐	Intervention ☐	
Nurse review ☐	Nurse review ☐	Nurse review ☐	
Clinical review ☐	Clinical review ☐	Clinical review ☐	
MET call ☐	MET call ☐	MET call ☐	
Arrest call ☐	Arrest call ☐	Arrest call ☐	
Was action taken? *(provide details in Comments)*			
Yes Time:_____ ☐	Yes Time:_____ ☐	Yes Time:_____ ☐	
No ☐	No ☐	No ☐	
Unknown ☐	Unknown ☐	Unknown ☐	
Where was action documented?			
No document ☐	No document ☐	No document ☐	
ORC ☐	ORC ☐	ORC ☐	
Med record ☐	Med record ☐	Med record ☐	
ORC + med record ☐	ORC + med record ☐	ORC + med record ☐	
Other_____ ☐	Other_____ ☐	Other_____ ☐	

Box 4

Patient outcome

Date admitted to ward:	/ /
Date discharged from ward:	/ /
Discharged / transferred to:	_____
NFR	Y / N
Hospital admission outcome	D / A

Comments:
Note any responses or events relating to this audit episode e.g. details of interventions, were they nurse initiated (NI) or doctor initiated (DI)

_____
_____
_____
_____
_____
_____
_____
_____
_____
_____

P.T.O

UNIVERSITY OF TECHNOLOGY SYDNEY

72 hour PROspective Audit

AUSTRALIAN COMMISSION ON SAFETY AND QUALITY IN HEALTH CARE

* Answer these questions for the 72-hour audit period only

Observation Graphing Area (inside page)

- How many sets of observations have a DOT 'CENTRE OF SQUARE' in each of the following parameters: (exclude dots on the line or where another marker has been used)

Resp Rate	O2 Sat	Heart Rate	Systolic BP	Diastolic BP	Temp

- If dots have been used are they CONNECTED BY A STRAIGHT LINE? (tick one of the following)

☐ Yes - all ☐ No - all ☐ Mixed – some are /some aren't ☐ Lines have not been used at all

- How many sets of observations have CORRECT BLOOD PRESSURE ARROWS?_____ (either ▲or▼ - exclude anything other than an arrow)

- How many sets of observations have STRAIGHT LINES CONNECTING THE ARROWS?_____

- Have actual numbers been recorded in the vital signs graphing area? (tick 1 option below)
  - ☐ Yes, numbers and graphing
  - ☐ Yes, numbers only
  - ☐ No, graphing only

If yes, please note number of times figures written in each parameter below during 72 hour audit period:

Resp Rate	O2 Sat	Heart Rate	Systolic BP	Diastolic BP	Temp

Chart Information Side (front and back page)

- Has the 'Other Observation Charts in Use' section been used? Y / N

- How many times has the 'Modifications' section been used?
  0 / 1 / 2 / 3 / 4

- How many times has the 'Interventions Associated With Abnormal Vital Signs' section been used?
  0 / 1 / 2 / 3 / 4 / 5 / 6 / 7 / 8 / 9 / 10

- How many times has the 'Clinical Review Requests' section been used?
  0 / 1 / 2 / 3

- Has the 'Additional Observations' section been used? Y / N

  Please list which sections_____

Appendix H Focus group questions for project officers

1. How did you find using the new charts? (What did you like about them? What didn't you like?)
2. Are there any particular sections, which you particularly liked or disliked on the ORC? (Please explain answer)
3. Did you encounter any difficulties while using the ORC? If so, what were they? Can you suggest any ways to resolve this?
4. How do you find graphing using ranges rather than writing the actual number?
5. How does the ORC compare to the ones you usually use? (Easier / harder to fill in or read? If so, in what way? What makes them easier / harder to use?).
6. Does the chart make any difference to your ability to detect/ pick up changes in a patient's condition? (If yes, what is it about the chart that makes the difference?)
7. Does the chart make any difference to your ability to make decisions about patient care? (If so, in what way?)
8. Do you think the chart influences your ability to communicate clinical deterioration to the patient's team? (If so, in what way?)
9. Is there anything else about these charts that you would like to tell me about?

Appendix I Observation and field note guidelines and template

Preparing for Observations

The ***focus of the observation period*** is to record dialogue / practice that is specifically relevant to the use of the ORC in the clinical environment in which it is being trialed.

Identify ***times for observation*** periods when increased activity with observations charts occurs on the ward, such as routine observation rounds or medical /multidisciplinary ward rounds.

During the Observations

Think about where you can ***position*** yourself without being 'in the way.' It is fine if you need to reposition yourself or even shadow a member of staff with their permission.

Make notes during the observation periods of dialogue and practices that have any relevance to the use of the ORC. Notes can be made using the template provided in this package or something similar. Try to capture as much data as possible and make sure your notes are clear and legible so that when you review them you will be able to understand what you were observing at the time.

Questions to Consider During Observations

When ***making field notes*** you might like to consider:

- *Where are the observation charts (current & trial) kept? E.g. by the bed, at the end of the bed, at the nurses' station, in an office.*
- *Who is completing the ORC?*
- *Which section of the ORC are they completing?*
- *Where is it being completed? By the bed or at the nurses' station, or somewhere else?*
- *How many people are involved? For example, is there an RN and AIN and/or others?*
- *Note level of ease for completion - is there confusion / is clarification required?*
- *Is there any informal education occurring between staff members and what roles are they in?*
- *How long does it take to complete the observation chart section or any of the other sections?*
- *Note comments made directly or indirectly / out loud about the ORC.*
- *How are the observations being recorded, e.g. straight to chart or on piece of paper*

then to chart; do they get taken and charted one by one or all together?

- *Where are the observations being taken such as oral, tympanic or underarm temperature & where/how is this being documented if it is?*
- *Is the participant taking the necessary vital signs or are they missing something / following previous? For example, if the patient is tachypnoeic has their respiratory rate been taken and documented?*
- *Did the observations fall within 'acceptable' parameters? If not, was the appropriate action taken and was it immediate or did they complete other tasks first? Was this documented, and if so how?*

After the Observations

Before leaving the clinical area make sure you have ***asked any questions*** that you noted during the observation period and may have been unable to clarify at the time.

Review your notes as soon as possible after completing the observation period and add any observer comments or questions in the relevant column alongside your notes.

Once you have completed your observational notes ***transcribe*** them into a word document and email them to the Project Manager at UTS Emily.Allen@uts.edu.au

Observation and Field Notes Template

Hospital: Ward / Clinical Area:		Date: Clinical Specialty:
Time	Observation / Field Notes	Observer Comments / Questions

Appendix J Ward poster

AUSTRALIAN COMMISSION ON SAFETY AND QUALITY IN HEALTHCARE

UNIVERSITY OF TECHNOLOGY SYDNEY

Observation and Response Chart Pilot

Purpose

To perform pilot testing of an evidence-based Observation and Response Chart to examine:

- The rate of completion ,
- The recognition of abnormal clinical observations,
- The rate of calling for assistance where indicated, and the response obtained,
- Preferences and comments of clinical staff and,
- Patient outcomes, where available.

What is happening?

An Observation and Response Chart is being introduced to your ward and notes will be made by a Project Officer of activities relating to the use of the chart.

The observation period will occur from:

___am / pm on _____ 2012

to

___am / pm on _____ 2012

Personal identifying information will NOT be recorded.

Would you like to be involved?

If you would like to participate please inform your Project Officer / Nurse Unit Manager to roster you on duty during the observation period.

You are also invited to participate in a user Focus Group. Details of date, time and venue will be provided by your Project Officer

What do you have to do?

Document patients' vital signs as usual on the new Observation and Response Chart. Dual documentation is NOT required.

You will also be invited to participate in a Focus Group to discuss the new chart, which will be audio recorded and sent to the University of Technology project team for transcription. Any personal identifying details will NOT be transcribed.

recognising + responding TO CLINICAL DETERIORATION

Do you have to participate?

Participation is voluntary. It is up to you to decide; it will not affect your position now or in the future if you don't.

You can withdraw from the Observation / Focus Group at any time without having to give a reason.

If you do not wish to be rostered during the Observation / Focus Group period please inform your Project Officer / Nurse Unit Manager.

Contact details of the Project Team

Your Project Officer

Emily Allen
ORC Project Manager
University of Technology, Sydney
Contact details
Tel: 61 (02) 9514 4843

Doug Elliott
Professor of Nursing
ORC Project Director
University of Technology, Sydney
Contact details
Tel: 61 (02) 9514 4832

Nicola Dunbar
ORC Project Lead
Program Manager - Recognising and Responding to Clinical Deterioration, Australian Commission for Safety and Quality In Health Care
Contact details
Tel: 61 (02) 9126 3638

Appendix K Participant Information Sheet and Consent Form

Participant Information Sheet & Consent Form

NB: For ethics applications you will be required to submit the PICF on your site letterhead. The Project Manager will provide you with a Master Template prior to submitting your application to your local HREC.

Full Project Title: Observation and Response Chart (ORC) Project _ PILOT

Principal Researcher: [insert site investigator]

Introduction

You are invited to take part in this research project because you are a member of staff at [insert hospital] who uses a general adult observation chart in your area of clinical practice to monitor your patients' clinical condition. This research project aims to assess the implementation and outcome of the previously tested 'Observation and Response Chart' (ORC) in your clinical area.

Participation in aspects of this research is voluntary. If you don't wish to take part, you don't have to.

If you decide you want to take part in the research project, you will be asked to sign the consent section. By signing it you are telling us that you:

- understand what you have read;
- consent to take part in the research project;
- consent to be involved in the procedures described;

You will be given a copy of this Participant Information and Consent Form to keep.

What is the purpose of the Observation and Response Chart (ORC) Project?

Improving recognition and system responses to the clinical deterioration of patients is an important goal for the Australian Commission for Safety and Quality in Health Care (ACSQHC). This project aims to assess the effectiveness of the ORC by:

a) Examining the suitability for clinical monitoring of patients where general adult observation charts are used and its ability to prompt a response when there is clinical deterioration and;

b) Obtain users opinions on use of the ORC via observing and holding focus groups;

c) Compare before and after ORC data to assess the effectiveness of the new chart on patient outcomes.

The University of Technology Sydney (UTS) is conducting this project on behalf of ACSQHC. [Insert hospital name] is involved in this project because of our interest in improving recognition and system responses to clinical deterioration of patients.
A Project Officer will provide several planned education sessions to your clinical area prior to implementing the ORC and will be available for any questions you may have.

The Project Officer will also be available to support your clinical area during the roll out period of the ORC, which is planned for January 2012. Reading information will be made available and posters will be displayed in your clinical areas during the roll-out phase.

What does participation in this research project involve?

[Insert hospital name] has chosen an ORC that fits with the hospital medical response system and this chart is going to replace your current observation chart if the results from this pilot project are favourable.

There are two data collection processes for you to participate in which include:

- **Staff observation** – your hospital Project Officer will observe practices and make notes relating to the use of the trial chart. During this time you can make comments about the ORC whilst being observed and the Project Officer may ask you questions regarding the use of the ORC. The observation period will be 1-2 hours long and will occur at least 6 times on your ward during different shifts, on different days, to observe a broad range of practices relating to the ORC and its use. They are most likely to be carried out during regular patient observation rounds. A poster will be displayed in your clinical area advising you when the observation periods are scheduled.
- **Staff focus groups** – your Project Officer will provide the opportunity for you to participate in a focus group to discuss the ORC and give feedback on its use. The focus group, with a maximum of 8 staff, will be approximately 30 minutes in duration and involve audio recording for ease of review and transcription by the University of Technology Sydney project team. No personal or identifying information will be kept or linked to the transcription.

These data collection methods enable the gathering of important information on how well this chart works for identification of deteriorating patients.

The site project officer will co-ordinate and support all data collection on your ward.

What are the possible risks?

There are no foreseeable risks to your participation. However, there may be some inconvenience due to time required to participate in the focus group.

The observation periods will be carried out by the site-based Project Officer who is a member of staff at your hospital. **What if I want to withdraw from this project?**

If you decide you do not want to participate in the project but have already been observed or audio recorded in the focus group, the researchers are unable to remove your input, but you will not be able to be identified from the transcripts. All the information collected via observations and the focus group will help make sure that the results of the research can be measured properly. If you do not want them to do this, you must tell them before you join the research project.

Do I have to take part in this research project?

You do not have to participate in this research project. If you do not want to participate please inform the Project Officer / NUM so that you are not rostered on during the

scheduled days for observation and focus groups. Not participating will not influence your employment or working relationships.

Is this research project approved?

The University of Technology Sydney is conducting this national research project on behalf of The Australian Commission on Safety and Quality in Health Care (ACSQHC) with participation from ten hospital/networks around Australia.

The ethical aspects of this project have been approved by each site HREC including the Human Research Ethics Committee of [insert hospital name]

This project will be conducted in accordance with ethical principles described in the National Statement on Ethical Conduct in Human Research 2007.

What information is collected about me?

There is no identifiable information being collected about you for this project.

What will happen to information about me?

All the information collected from you for the study will be de-identified so that there will be no personally identifiable information in the data. All data will be treated confidentially, and only the researchers will have access to it. The study results may be presented at a conference or in a scientific publication using only de-identified data. All data collected will be securely stored for a period of 7 years.

Can I access research information kept about me?

As the research information is unidentifiable you will not be able to access information about yourself. All participants will be able to access research reports when published.

How will I be informed of the final results of this research project?

The results from this study will be written as a report to the Australian Commission for Safety and Quality in Healthcare. This report will be made available via the Commissions website and will provide combined data of all sites involved in the project, and specific results grouped by individual ORCs. A breakdown of site-specific data will be reported in the appendices. The results will also be published in peer reviewed medical journals with no individual identifiable information present.

Who can I contact?

For questions about this project please contact:

[insert site project officer], ORC site project officer
Phone Number / Email

Emily Allen, ORC project manager
02 9514 4843 / Emily.Allen@uts.edu.au

For any complaints about this project please contact:

Ethics Chair
Phone Number / Email

Consent

I, _____ (print name) agree to participate in the **Observation and Response Chart (ORC) Project: Pilot.**

I acknowledge that I have read this document and I understand the purposes, procedures and risks of this research project as described within it.

I have had an opportunity to ask questions and I am satisfied with the answers I have received.

I freely agree to participate in this research project, as described.

I agree that research gathered from the results of this project may be published, provided that I cannot be identified.

I agree to audio recording of the Focus Group and understand once I have been recorded I cannot revoke my consent for use of this information.

I understand that I will be given a signed copy of this document to keep.

I understand that if I have any complaints about any aspects of the project, the way it is being conducted or any questions about being a research participant in general I can contact the above.

Participant's name (printed) _____

Signature _____ Date _____

Declaration by researcher*: I have given a verbal explanation of the research project, its procedures and risks and I believe that the participant has understood that explanation.

Researcher's name (printed) _____

Signature _____ Date _____

Appendix L Tables illustrating required actions to abnormal vital signs for each ORC version

Table L1 Action required according to abnormal vital signs on the RE ORC

R2		Respiratory rate			Oxygen saturation			Systolic blood pressure			Heart rate			Temperature		
		n			n			n			n			n		
	Set	1st	2nd	3rd	1st	2nd	3rd	1st	2nd	3rd	1st	2nd	3rd	1st	2nd	3rd
Clinical review	Retro	9	4	6	31	27	16	46	36	24	38	18	15	32	14	8
	Pro	3	3	3	60	49	37	50	35	27	39	30	20	41	27	15
MET call	Retro	4	2		13	4	3	4	3	1	2	3				
	Pro				9	6	6	5	5	4	1	1	2			

MET - Medical emergency team

Table L2 Action required according to abnormal vital signs on the R4 ORC

R4		Respiratory rate			Oxygen saturation			Systolic blood pressure			Heart rate			Temperature		
		n			n			n			n			n		
	Set	1st	2nd	3rd	1st	2nd	3rd	1st	2nd	3rd	1st	2nd	3rd	1st	2nd	3rd
Increased surveillance	Retro	4	3	3	2	1		14	10	10				2	1	
	Pro	10	9	8				25	13	15	6	3	4	2	3	2
Senior nurse review	Retro		1		14	7	5	19	16	10	1			1		
	Pro		1	1	21	16	7	17	16	10	5	6	2	3		2
Clinical review	Retro				2	1	1	5	3	4		1				
	Pro	1				1		3	5	4			1			
MET call	Retro					1		1	2				1			
	Pro								1	1		1				

Table L3 Action required according to abnormal vital signs on the ADDS- ORC

ADDS chart		Respiratory rate			Oxygen saturation			Systolic blood pressure			Heart rate			Temperature		
		n			n			n			n			n		
	Set	1st	2nd	3rd	1st	2nd	3rd	1st	2nd	3rd	1st	2nd	3rd	1st	2nd	3rd
Score 1	Retro	1			1	1		8	4	6	5		2	9	4	2
	Pro							9	6	1	5	3	3	12	10	4
Score 2	Retro							4	2		2	1		1	2	
	Pro				1			1		1	1		1	1	1	
Score 3	Retro	1	1													
	Pro					1										
MET call	Retro							2	1	1						
	Pro										1	1	1			

MET - Medical emergency team