An Online Survey of Health Professionals' Opinions Regarding Observation Charts

Report 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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Preface

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We also thank Kirsten Price for her comments on the survey items and John Manly for research assistance.

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Executive Summary

The current study was the second stage of a project funded by the Australian Commission for Quality and Safety in Health Care and Queensland Health to investigate the design and use of observation charts in recognising and managing patient deterioration, including the design and evaluation of a new adult observation chart that incorporated human factors principles.

Improving the recognition and management of patients who deteriorate whilst in hospital is a frequently cited goal for patient safety. Changes in physiological observations or 'vital signs' commonly precede serious adverse medical events. Paper-based observation charts are the chief means of recording and monitoring changes to patients' vital signs. One approach to improve the recognition and management of deteriorating patients is to improve the design of paper-based observation charts (note that the management of patient deterioration can potentially be affected by chart design if, for example, action plans are included on the chart).

There is considerable variation in the design of observation charts in current use in Australia and a lack of empirical research on the performance of observation charts in general. The aim of the current study was to gauge the opinions of the population who actually use observation charts.

We recruited a large sample of health professionals (N = 333) to answer general questions about the design of observation charts and specific questions about nine observation charts. The participants reported using observation charts daily, but only a minority reported having received any formal training in the use of such charts.

In our previously-reported heuristic analysis of observation charts (1), we found that the majority of charts included a large number of abbreviations. In this survey, participants were asked to nominate which term they first thought of when seeing a particular abbreviation. Most abbreviations were overwhelmingly assigned the same meaning. However, some abbreviations had groups of participants nominating different terms for the same abbreviation. Participants were also asked to nominate their preferred terms for nine vital signs that commonly appear on observation charts. For some vital signs, there was a high level of agreement as to which term was easiest to understand; however, for other vital signs, there was no clearly preferred term.

Participants were also asked about their chart design preferences both in terms of (a) recording observations and (b) detecting deterioration. In both instances, participants preferred the option to "*Plot the value on a graph with graded colouring, where the colours correspond to a scoring system or graded responses for abnormality*". Participants' preference was in line with what a human factors approach would recommend (i.e. charts with a colour-coded track and trigger system).

In the final sections of the survey, participants were first asked to respond to 13 statements regarding the design of their own institution's current observation chart, and then to respond to the same 13 statements for one of nine randomly-assigned observation charts. The nine observation charts included the new Adult Deterioration Detection System (ADDS) chart and eight charts of "good", "average", or "poor" design quality from the heuristic analysis.

Participants' mean aggregated rating across the 13 items for their institution's current observation chart was close to the scale's mid-point, 3 = *neutral.* For the assigned charts, there was a statistically significant effect of chart type on the aggregated rating. The *a priori* "poor" quality charts were each rated as having a significantly poorer design compared with each of the other charts (collectively, the *a priori* "average" and "good" quality charts). There was partial support for our hypothesis that health professionals would rate the "good" charts as having better design, compared to the "average" and "poor" charts.

In conclusion, the online survey served two main purposes. First, it collected quantitative data on health professionals' general preferences regarding aspects of the design of observation charts. This information informed the design of the ADDS chart and could also be used by other chart designers to produce more user-friendly hospital charts. Second, the online survey enabled health professionals to rate the design of the new ADDS chart as well as eight existing charts of varying quality. Overall, health professionals agreed with our human factors-based rating with regards to the "poor" quality charts. However, the health professionals did not differentiate between the "average" and "good" quality charts in their ratings.

1. Project Background

1.1 General background

Improving the recognition and management of patients who deteriorate whilst in hospital is a priority both at the national and state level. The Australian Commission on Safety and Quality in Health Care (ACSQHC) has launched a national program for 'Recognising and Responding to Clinical Deterioration' (2). In parallel, Queensland Health's Patient Safety Centre has released a strategy options paper discussing gaps in the recognition and management of the deteriorating patient (3).

Changes in physiological observations or 'vital signs' commonly precede serious adverse events such as cardiac or respiratory arrest, unplanned Intensive Care Unit (ICU) admission, or unexpected death (4-9). Several studies report that derangements in vital signs are observable up to 48 hours before the adverse event (4, 6, 7, 10). This suggests that if deterioration is recognised early and appropriately managed, then complications arising from delays could be reduced (e.g. morbidity, unexpected ICU admissions, extended length of stays in hospital), and some serious adverse events could potentially be avoided altogether (11-14).

Paper-based observation charts are the principal means of recording and monitoring changes to patients' vital signs. However, vital signs are not always correctly recorded or appropriately acted upon (4, 7, 10, 11, 15). The design of the observation charts themselves may contribute to failures in the ability of medical and nursing staff to record vital signs and recognise deterioration.

There is considerable variation in the design of observation charts in current use in Australia. They vary in both the number and selection of vital signs monitored. Observation charts also display diversity in the way in which information is presented. For instance, respiration rate may be displayed on one chart as a row containing boxes in which to write the number of breaths taken by a patient per minute at each time-point, while on another chart it may be plotted as a graph over time. Finally, observation charts also vary in the degree to which they incorporate track and trigger systems based on clinical criteria to help users recognise a deteriorating patient and respond appropriately.

There is presently a lack of empirical research on the design and use of observation charts. In Australia, observation charts tend to be designed at the local hospital or individual health service area level, resulting in a nationwide duplication of effort (11). Some observation charts appear to have been trialled in specific wards before full implementation or evaluated by means of a staff survey. Rigorous empirical evaluation is lacking in most cases.

There are indicative findings that efforts to improve the design of observation charts can produce benefits for patients, staff, and the hospital. In the United Kingdom, Chatterjee et al. carried out an empirical evaluation of five observation charts in use at a district general hospital (16). They reported that the design of the charts had a significant effect on the ability of staff to recognise patient deterioration (with a detection rate as low as 0% for one vital sign), and that no single

existing chart was best for all vital signs. As a result, they designed and implemented a new chart incorporating a track and trigger system. They found that there was a significant improvement in staff's ability to recognise deterioration (all detection rates over 90%), after the re-design and implementation of the new chart. Their new chart produced improvements in the detection of four forms of deterioration, hypoxia (45% increase in detection), tachypnoea (41% increase in detection), tachycardia (29% increase in detection), and fever (16% increase in detection). A recent Australian project to improve the early detection of patient deterioration, which included improvements to observation chart design (together with other interventions such as training), was found to produce statistically significant gains in the frequency of recording vital signs, as well as decreasing unplanned ICU admissions, decreasing the rate of cardiac arrests, and decreasing the rate of hospital deaths (17).

1.2 Background of the project

The current study was part of the second phase of a project funded by the Australian Commission for Quality and Safety in Health Care and Queensland Health to investigate the design and use of observation charts in recognising and managing patient deterioration, including the design and evaluation of a new adult observation chart that incorporated human factors principles. The initial phase of the project was a systematic usability evaluation of the quality and extent of design problems in 25 existing observation charts (1). A total of 1,189 usability problems were identified in the observation charts. Usability problems were identified as affecting the observation charts' page layout, information layout, recording of vital signs, integration of track and trigger systems, language and labelling, cognitive and memory load, use of fonts, use of colour, photocopying legibility, and night-time legibility. In compiling lists of the various usability problems present in the observation charts, we produced a de facto manual for producing a better designed observation chart. The next step in the project was to design a new user-friendly observation chart that adhered to good design principles whenever possible.

1.3 The Adult Deterioration Detection System (ADDS) chart

Using the information obtained from the heuristic analysis, a new chart was designed by combining what were considered to be the best design features of existing charts (see 18 for an overview). The chart was largely based on: (a) The Prince Charles Hospital chart (Brisbane, Queensland), which in turn was based on the Compass chart developed at The Canberra Hospital, ACT Health, and (b) the Children's Early Warning Tool (CEWT) paedriatric chart developed at Royal Children's Hospital (Brisbane, Queensland). The new chart was named the Adult Deterioration Detection System (ADDS) chart and incorporated the following features designed to minimize design problems that might lead to human error in both recording and interpreting patient data (see Appendix C to view the ADDS chart, labelled Chart 1). Note that the key function of the ADDS chart was to detect patient deterioration, rather than to act as a general observation chart.

- The ADDS chart featured both a single parameter and a multiple parameter colour-coded track and trigger system to facilitate the detection of deterioration. The single parameter

system (in which a medical emergency response was required when any single patient vital sign was outside a given range) had the advantage of simplicity of use. The multiple parameter system (in which vital signs were scored using a colour-coded key and scores were summed to give an overall indication of the patient's condition) was potentially more sensitive to deterioration and could lead to earlier detection of deterioration or fewer false alarms (see reference 18 for further details).

- Chart colours were chosen such that colour density correlated with the extent to which the patient's vital signs were outside the normal range (apart from being an intuitive progression, this strategy would aid colour-blind users).

- All information required for use (e.g. the colour key, the medical emergency criteria, and the actions to be taken when different levels of deterioration were detected) was provided on the same page as the vital signs data. This was in order to reduce cognitive load (e.g. to avoid the user having to turn the page to access more information).

- Only vital signs considered to be the most important for detecting deterioration were included on the chart. If additional information had been included, this less important information would potentially compete with the more important information for the user's attention.

- Each vital sign was presented as a separate graph. Many existing charts either displayed data numerically (making it difficult to see data trends and hence making deterioration harder to detect) or included graphs with multiple vital signs plotted on the same graph area (this increased visual clutter, which could make deterioration harder to detect).

- The most critical vital signs were placed towards the top of the page, as this is where users would look first. Most existing charts did not follow this practice.

- Scales were labelled on both the left and right of each graph and bold vertical lines were placed every 3 columns. These features were designed to minimize the chance of users reading from the wrong column or row.

- There was space to record modifications to vital sign thresholds. This information was placed so that it would be in view when a user first picked up the chart.

1.4 Rationale for the current study

Before formally trialling the new observation chart, it was considered important to seek the opinions of the population who actually use observation charts. The aim of the online survey was to recruit a sample of relevant health professionals to answer general questions about the design of observation charts and specific questions about nine observation charts. The nine observation charts in the online survey included the new observation chart and eight observation charts of "good", "average",

or "poor" design quality according to the usability evaluation. It was hypothesised that health professionals would rate the "good" charts as having better design, compared to the "average" and "poor" charts.

2. Method

2.1 Participants

Participants (N = 333) were recruited via an invitation email sent by the ACSQHC on behalf of the Research Team. The email was sent to approximately 250 health professionals who had previously indicated their interest in patient deterioration. These individuals were also encouraged to forward the invitation to any colleagues who might be interested in participating (snowball method). Participants were offered the chance to win an Apple iPhone (valued at $879) if they completed the online survey by 30 November 2009.

2.2 Online Survey

The online survey was run using Checkbox Survey Software version 4.6. The survey comprised 82 items. The survey began with questions about the participants' characteristics and their current use of observation charts. The second section of the survey assessed the comprehensibility of abbreviations commonly found in observation charts. For example, "What do you first think of when you see "P" on an Observation Chart?" (with the following response options: *patient*, *pain*, *pulse* or *other*). The third section of the survey asked participants to nominate their preferred terms for nine vital signs. For instance, "For temperature, which term do you think is the easiest for the average nurse to understand?" (with the response options being: *Temperature*, *Temp*, or *T*).

The next sections of the survey asked the same set of questions twice: once in relation to 'recording vital signs', and once in relation to 'detecting deterioration'. The first question asked which chart layout participants preferred (with options ranging from *writing the value in a box* to *plotting the value on a graph with graded colouring, where the colours correspond to a scoring system or graded responses for abnormality*). The second question asked whether participants preferred having blood pressure and pulse together on the same graph or on separate graphs. The third question asked if participants preferred having both systolic and diastolic blood pressure recorded on a chart, or systolic blood pressure alone.

The penultimate section of the survey required participants to use a Likert scale to indicate the extent to which they agreed with 13 statements about their institution's current observation chart. The statements addressed the chart's design, recording of vital signs, signaling of deterioration, response to deterioration, and support of staff's clinical decision making. The final section of the survey presented images of one of nine observation charts to each participant. The participants then indicated their agreement with the same 13 statements for the presented chart. A final question

checked that the presented chart's image was displayed on a participant's computer screen (in case of technical hitches).

The response format for the questions typically involved selecting one option from a list of likely responses, or a Likert scale. However, an "*other*" option (with an accompanying blank field for typing a unique answer) was included for many of the items. Furthermore, participants were given a number of opportunities to make open-ended comments throughout the survey.

To minimise the time it took to complete the online survey, we took advantage of the Checkbox software's 'conditions' function where appropriate. For example, if a participant answered *No* to the item, "Do you record information in Observation Charts as part of your current role?", a further question regarding the frequency the participant recorded information in charts was omitted. A copy of the full survey is available in Appendix A.

2.3 Design and Procedure

The study was approved by the Queensland Health Human Research Ethics Committee (Central Office). Potential participants were sent an invitation email on 23 October 2009 which included the study's URL. The website presented potential participants with information about the survey and stated that participation would be completely voluntary, confidential, and anonymous (see Appendix B for a copy of the information presented).

Most of the survey was designed as an observational study of health professionals' design preferences in relation to observation charts. However, each participant was also randomly assigned to evaluate one of nine existing charts at the end of the survey. The nine charts included the new ADDS chart designed to embody good chart design and eight charts of "good", "average", or "poor" quality from the usability evaluation (1). De-identified copies of the charts can be found in Appendix C. We chose to use a between-subjects design (rather than a within-subjects design where all participants would rate all nine charts) to minimise the amount of time participants would have to set aside to complete the survey.

2.4 Data Analysis

Data were exported from Checkbox on 7 December 2009. All analyses were conducted using SPSS Version 16.0.

3. Results

3.1 Participant characteristics

Three hundred and thirty-three participants completed the survey; their characteristics are listed in Table 1. The vast majority of the participants worked as nurses. The mean age of the current sample was comparable to that of the Australian nursing workforce (Australian *M* = 43.7 years) (19). However, males were over-represented in the current sample, compared with the general nursing workforce (Australia = 9.6%) (19).

The participants reported working in various geographical locations and in various areas within their institution. The survey used the Rural, Remote and Metropolitan Areas classification for participants' place of work, which is not strictly comparable with the Australian Standard Geographical Classification used to describe the Australian nursing workforce (19, 20). However, the rank order of sites from metropolitan to very remote was in line with that of the general workforce. About a third of the participants reported working on wards, other work areas reported are listed in Table 1.

As stated previously, the majority of participants were nurses. Table 2 shows the career levels of the nurses in the current sample. In comparison to the Australian nursing workforce, educators and managers were over-represented, while clinical nurses were under-represented (19). Ten doctors also participated in the survey: one was a registrar, one was a visiting medical officer, three were staff specialists, and five were senior staff specialists.

Table 1: Participant characteristics.

	Mean or Percentage	Standard deviation
Age in years	42.08	8.17
Gender	Female: 83.5% Male: 16.5%	
Occupation	Nurse: 91.3% Doctor: 3.0% Paramedic: 3.3% Other: 2.4%	
Years registered	19.31	8.61
Workplace's RRMA classification	M1: 55.9% M2: 22.5% R1: 11.4% R2: 5.7% R3: 3.3% Rem1: 0.9% Rem2: 0.3%	
Work area	Ward: 34.5% ICU: 15.6% Emergency: 12.3% Administration: 5.4% Education: 5.1% Multiple areas: 4.8% Theatre: 3.6% Outpatient clinic: 3.9% Pre-hospital: 1.8% Maternity: 1.2% Other: 11.7%	

Note. ICU = Intensive Care Unit; RRMA = Rural, Remote and Metropolitan Areas classification (20).

Table 2: Nurses' roles.

	Percentage
Student nurse	0.7%
Nursing assistant	0.3%
Registered nurse	17.2%
Clinical nurse	10.9%
Clinical nurse consultant	11.9%
Nurse unit manager	23.4%
Nurse educator	20.8%
Nursing director	2.3%
Nurse practitioner	3.0%
Other	9.6%

3.2 Use of observation charts

The vast majority of participants reported using observation charts as part of their current role (see Figure 1). Out of those who reported using charts, most used charts more than once a day (see Figure 2) and recorded information in the charts (see Figure 3). As shown in Figure 4, about 73% of those who recorded information in charts did so more than once a day. Given the importance of using the observation chart in detecting patient deterioration, it is worrying that almost 18% of participants reported having had no training in the use of such charts (see Figure 5).

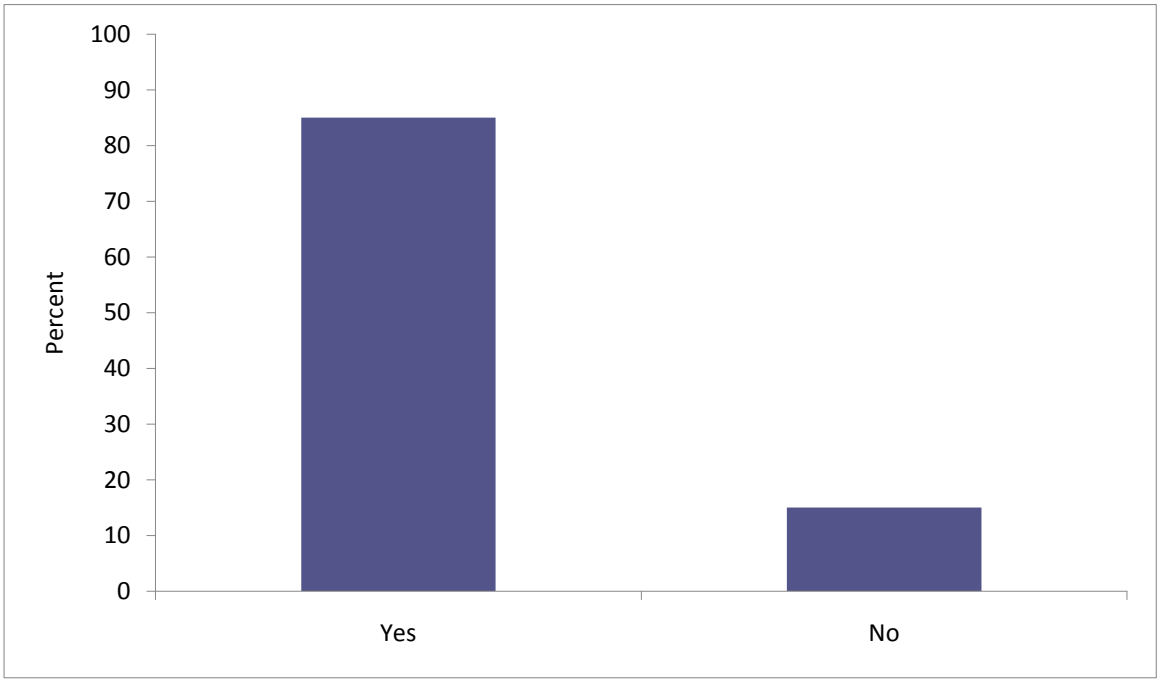

Figure 1: Percentage of participants who use observation charts.

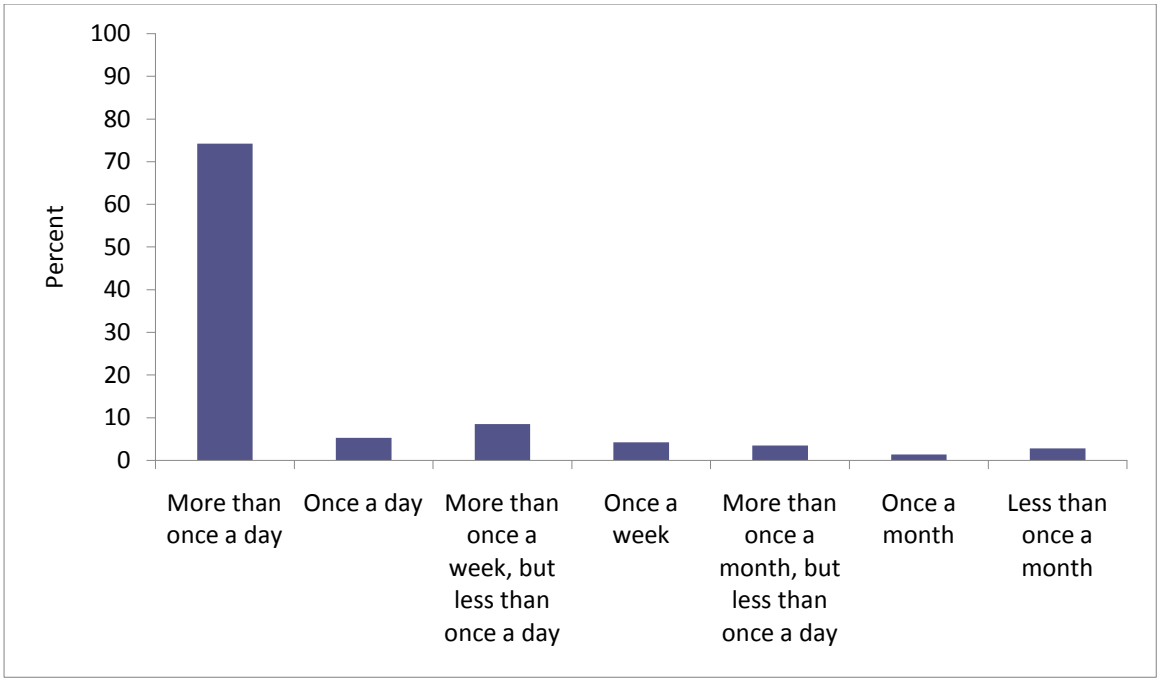

Figure 2: How frequently participants use observation charts, participants who reported not using observation charts (n = 50) were excluded.

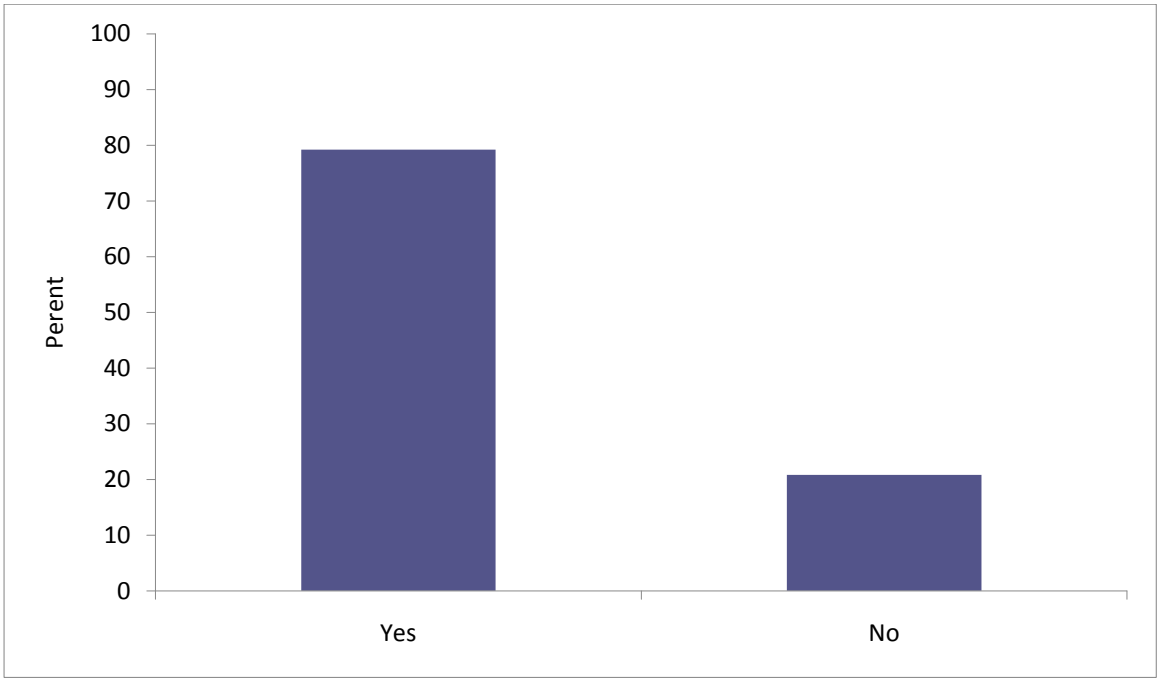

Figure 3: Percentage of participants who record information in observation charts, participants who reported not using observation charts (n = 50) were excluded.

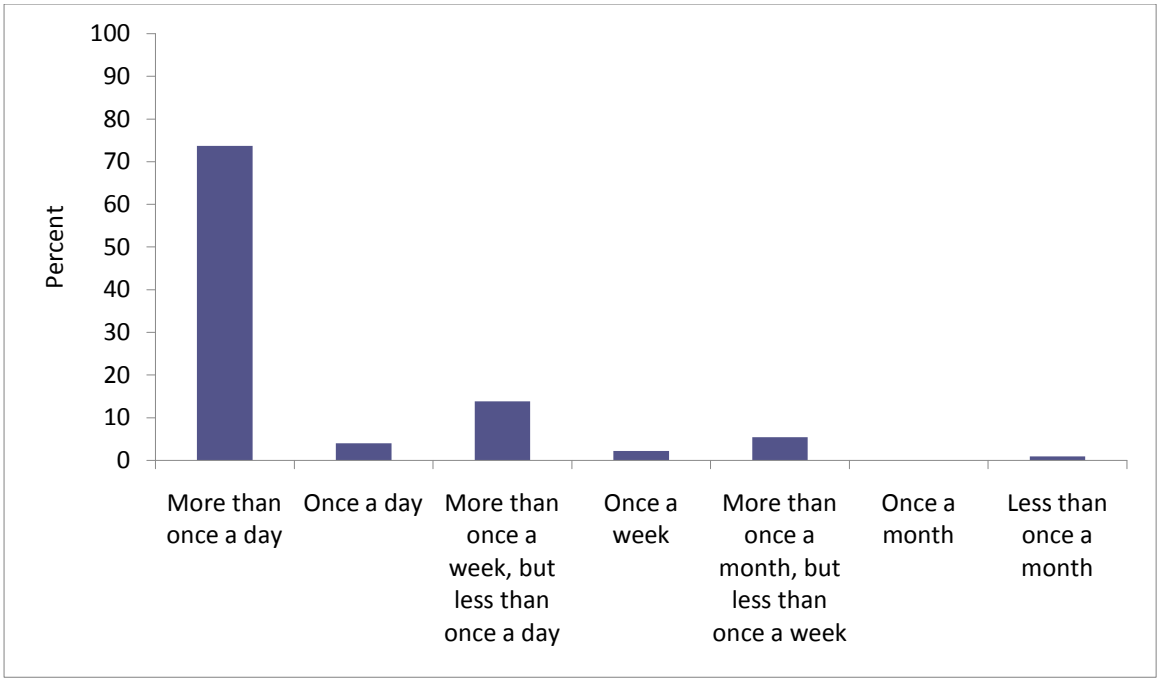

Figure 4: How frequently participants record information in observation charts, participants who reported not using or not recording information in observation charts (n = 109) were excluded.

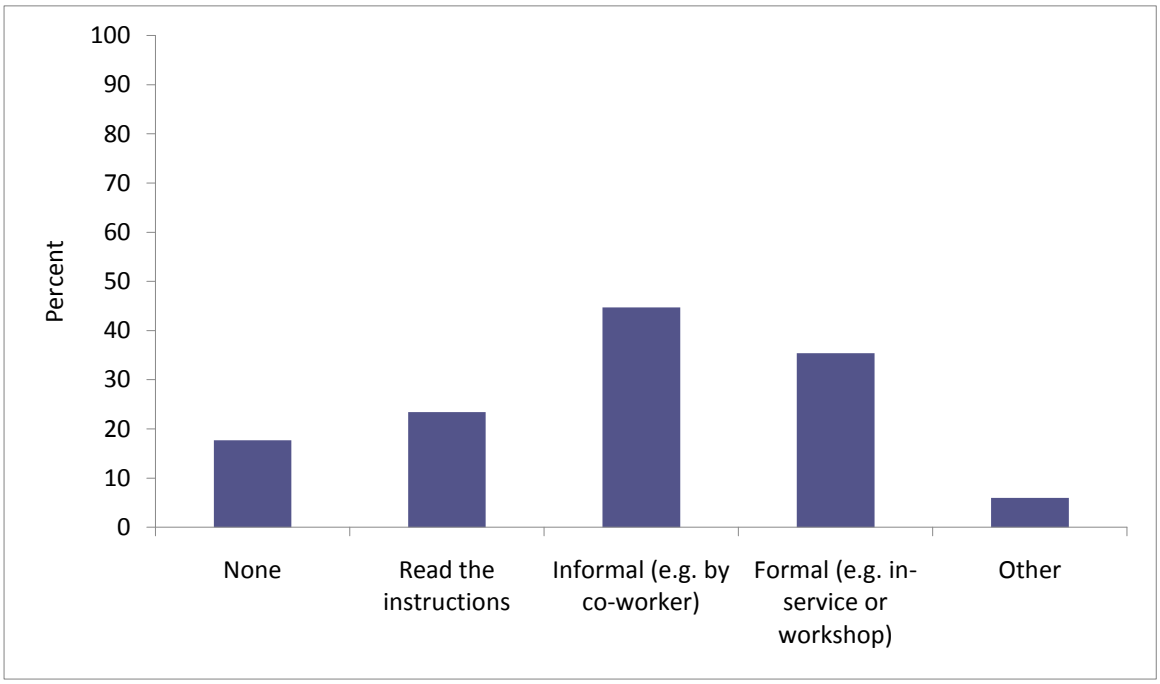

Figure 5: Percentage of participants reporting training in the use of observation charts.

3.3 Understanding of abbreviations on observation charts

Figures 6 to 16 present the results for items that asked participants to nominate which term they first thought of when seeing a particular abbreviation. Most abbreviations were almost uniformly assigned the same meaning, e.g. "BP" was seen as standing for blood pressure. However, "SBP" and "LOC" both had sizeable groups of participants nominating alternative terms.

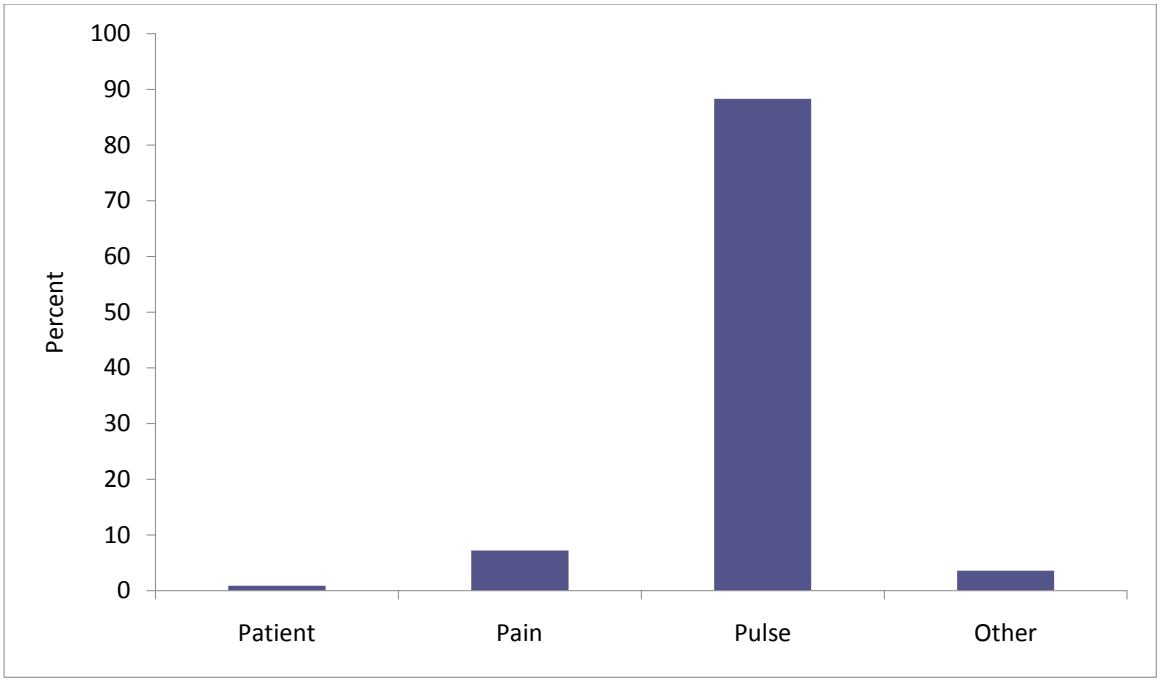

Figure 6: Participants' understanding of the abbreviation "P".

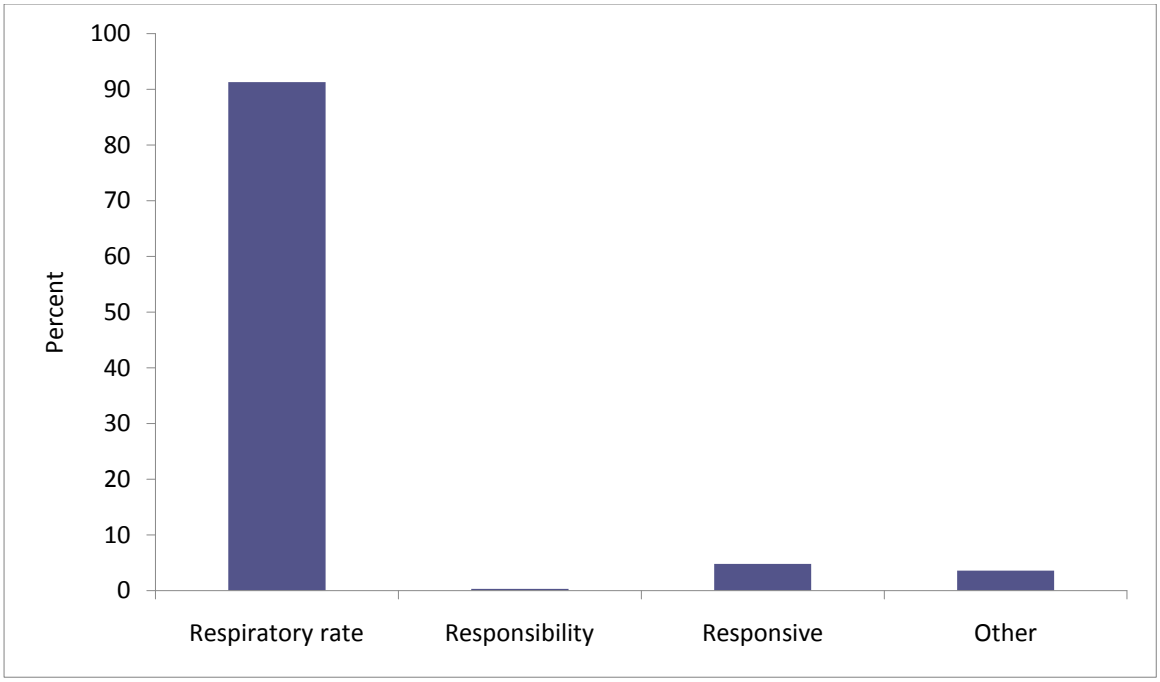

Figure 7: Participants' understanding of the abbreviation "R".

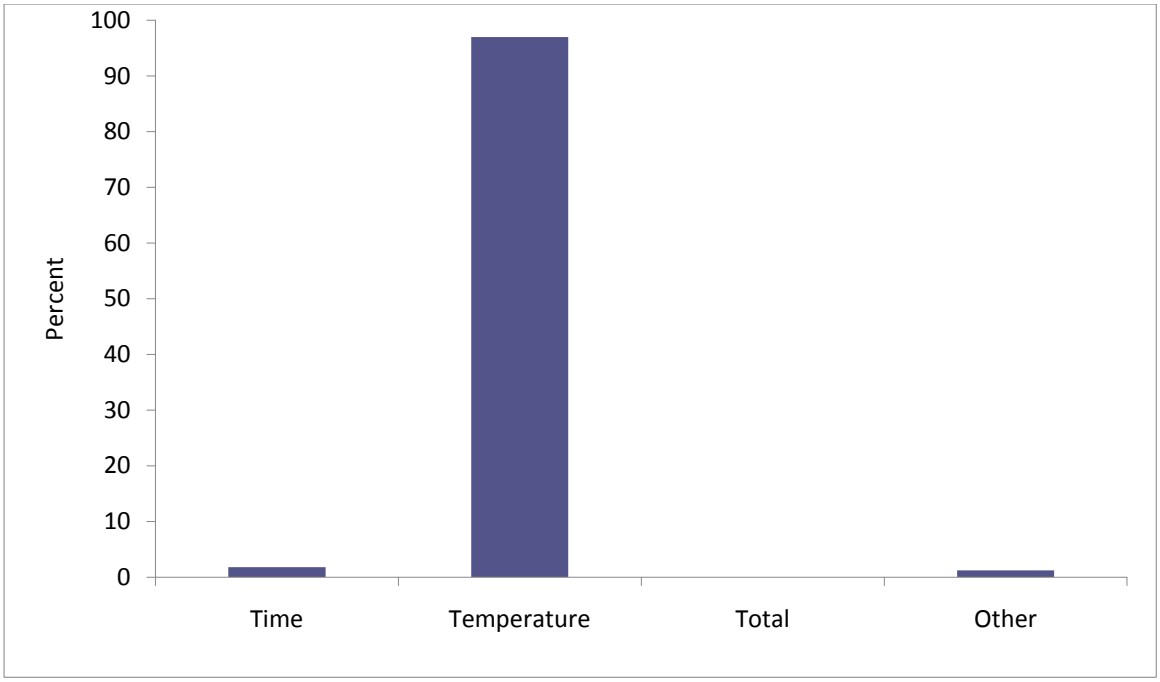

Figure 8: Participants' understanding of the abbreviation "T".

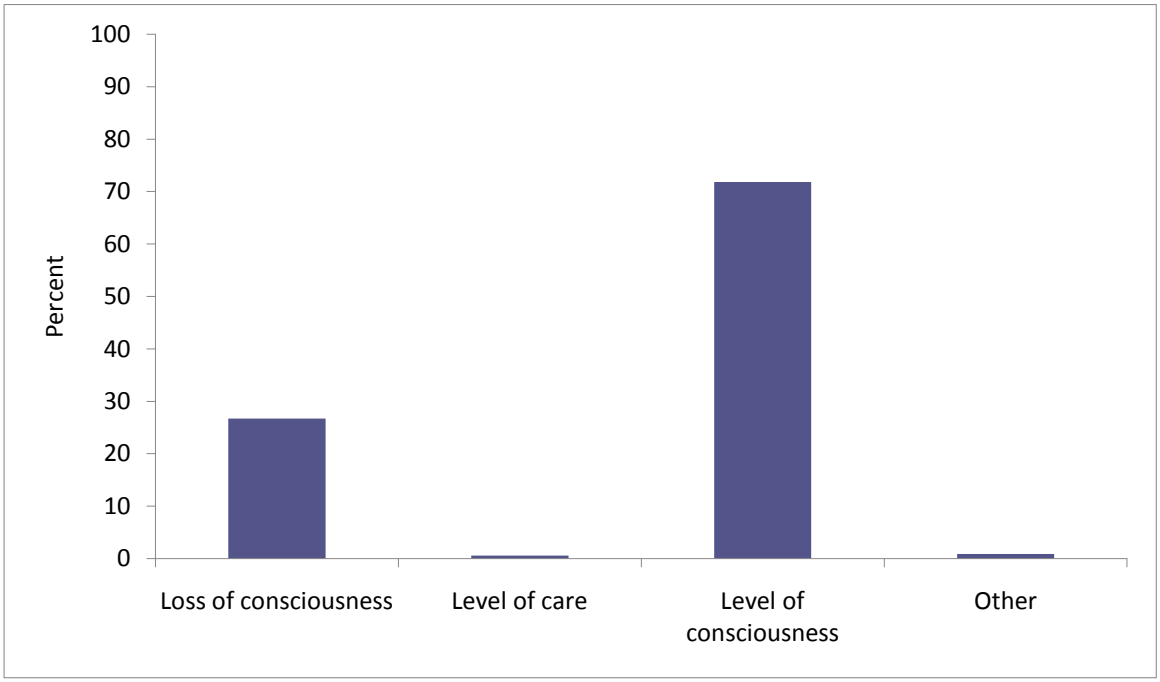

Figure 9: Participants understanding of the abbreviation "LOC".

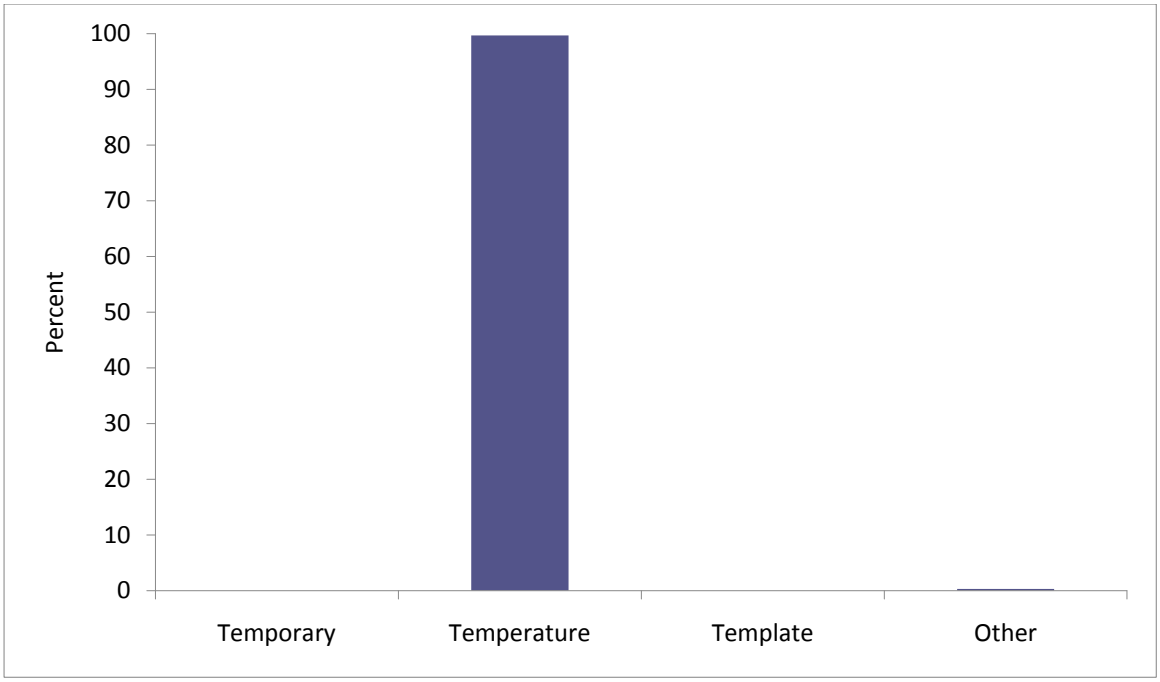

Figure 10: Participants' understanding of the abbreviation "Temp".

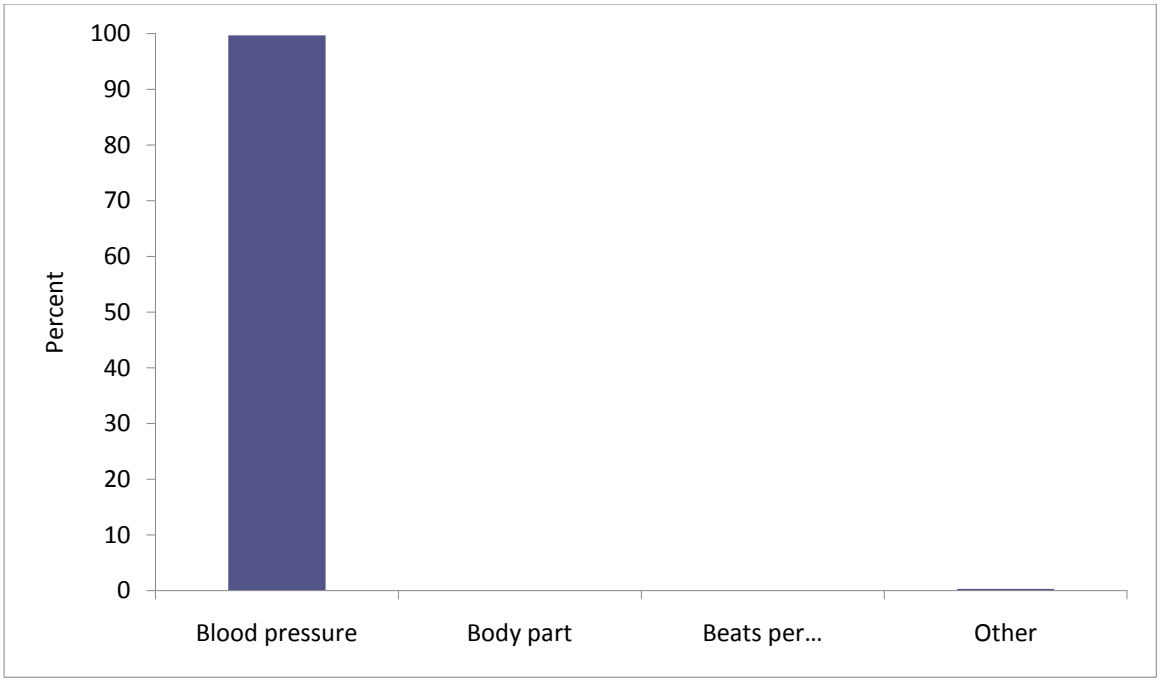

Figure 11: Participants' understanding of the abbreviation "BP".

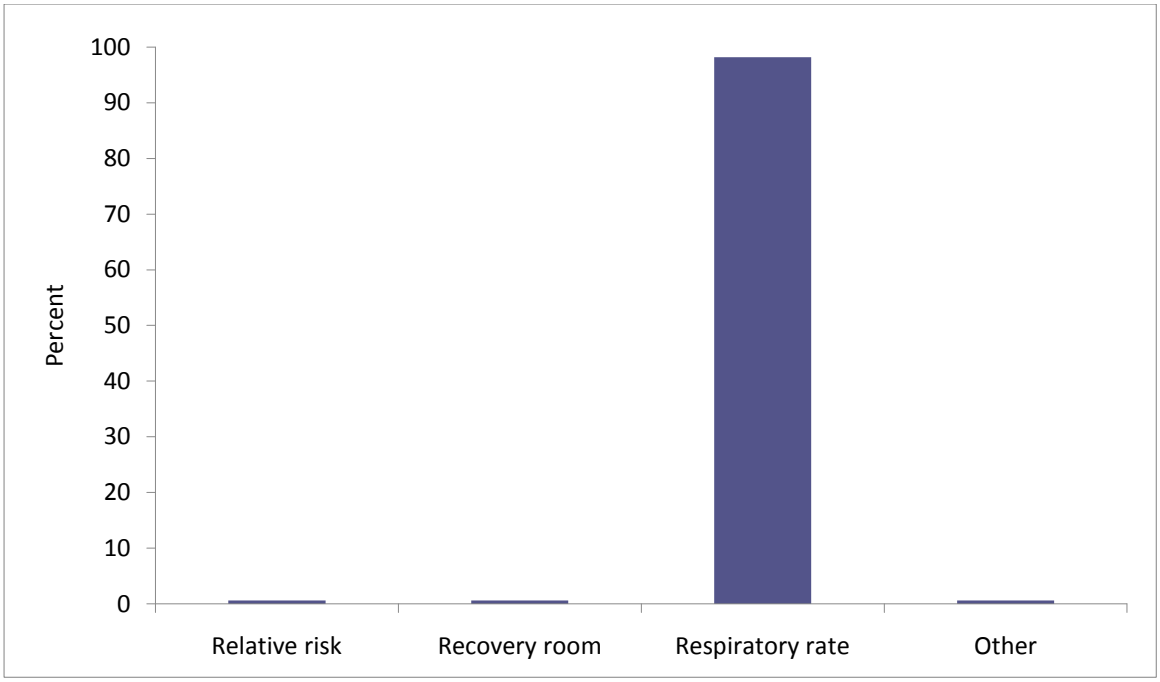

Figure 12: Participants' understanding of the abbreviation "RR".

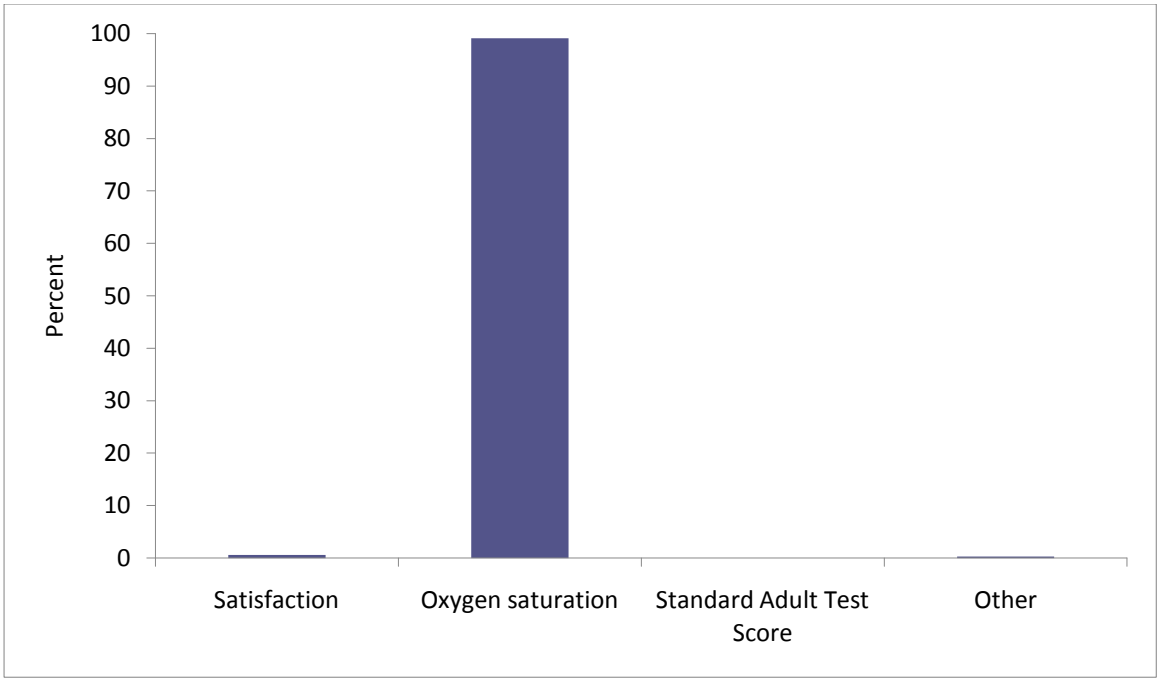

Figure 13: Participants' understanding of the abbreviation "Sats".

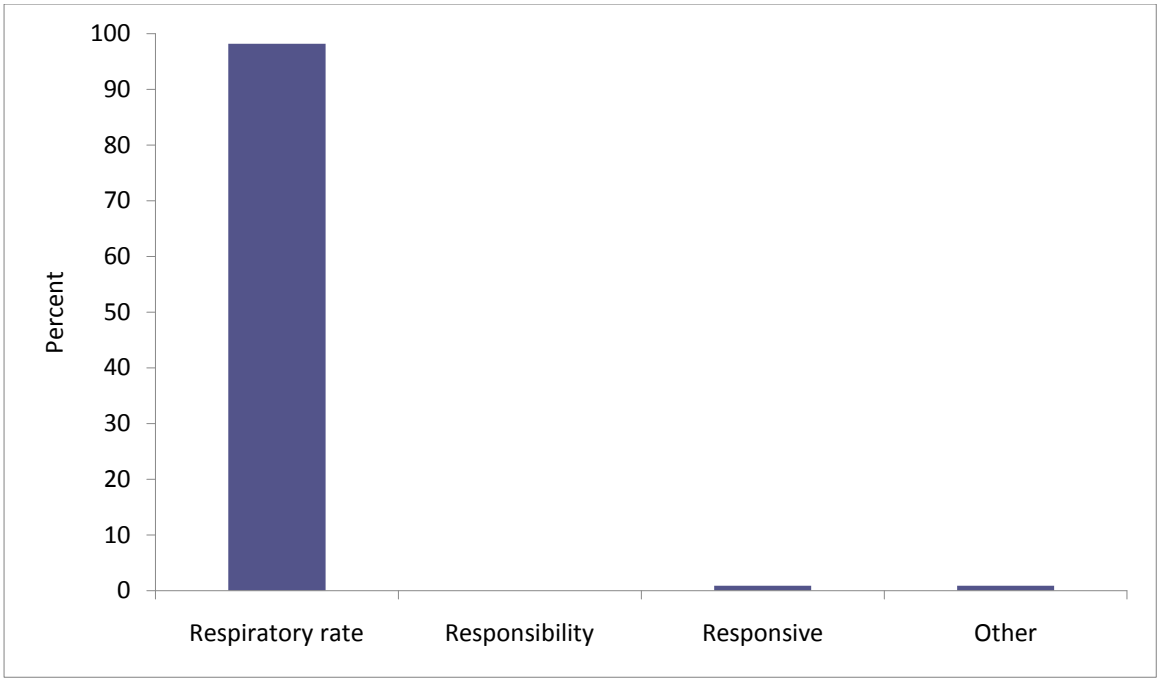

Figure 14: Participants' understanding of the abbreviation "Resp".

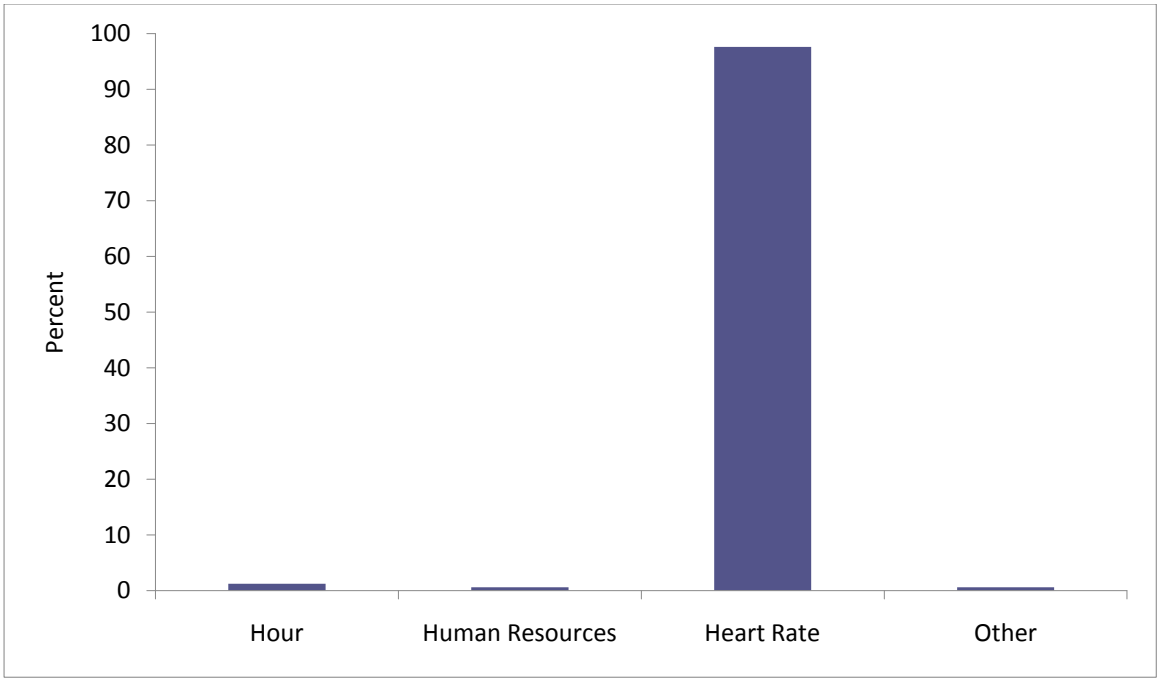

Figure 15: Participants' understanding of the abbreviation "HR".

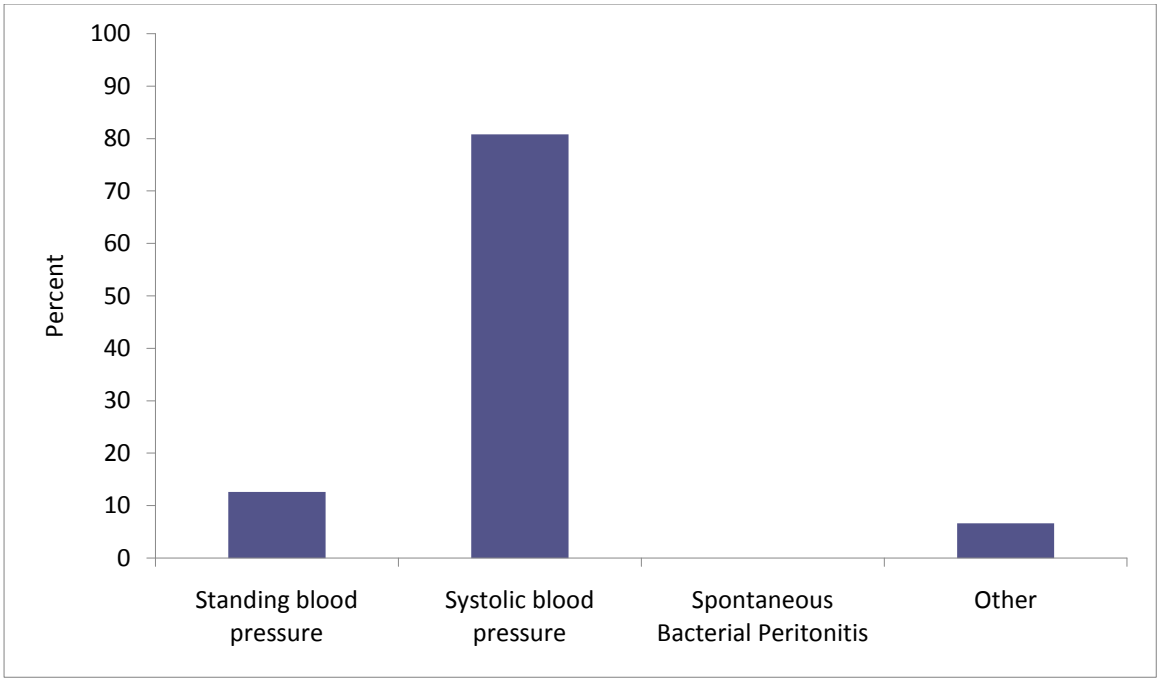

Figure 16: Participants' understanding of the abbreviation "SBP".

3.4 Which abbreviations are rated as easiest to understand on observation charts

Figures 17 to 25 present participants' preferred terms for 9 variables that commonly appear on observation charts. For some variables, there was a high level of agreement amongst the participants as to what they thought was easiest to understand, e.g. "BP" was most popular for blood pressure. For other variables, there was not a clearly preferred term, e.g. oxygen saturation.

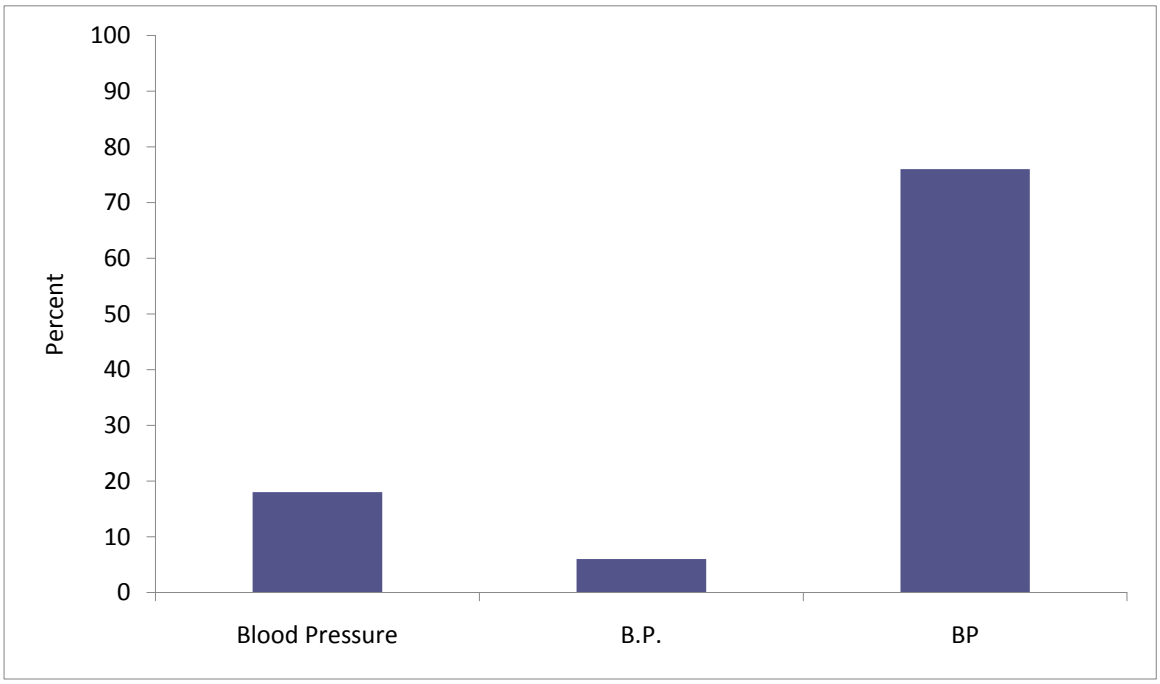

Figure 17: Participants' preferred term for blood pressure.

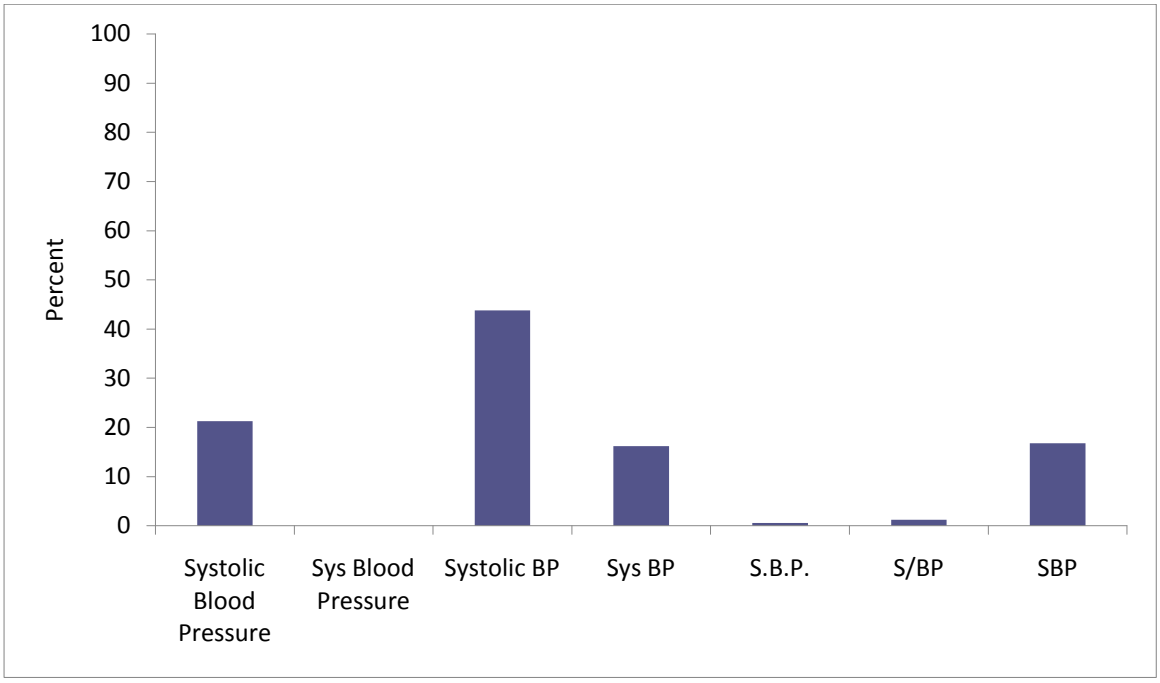

Figure 18: Participants' preferred term for systolic blood pressure.

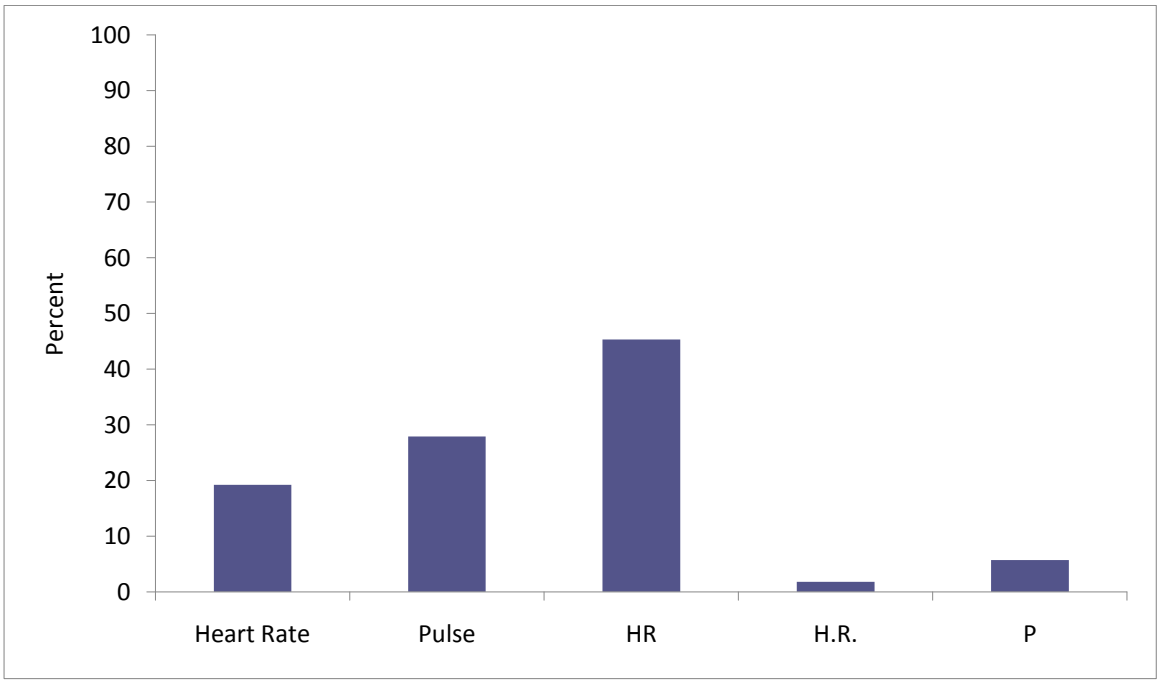

Figure 19: Participants' preferred term for pulse or heart rate.

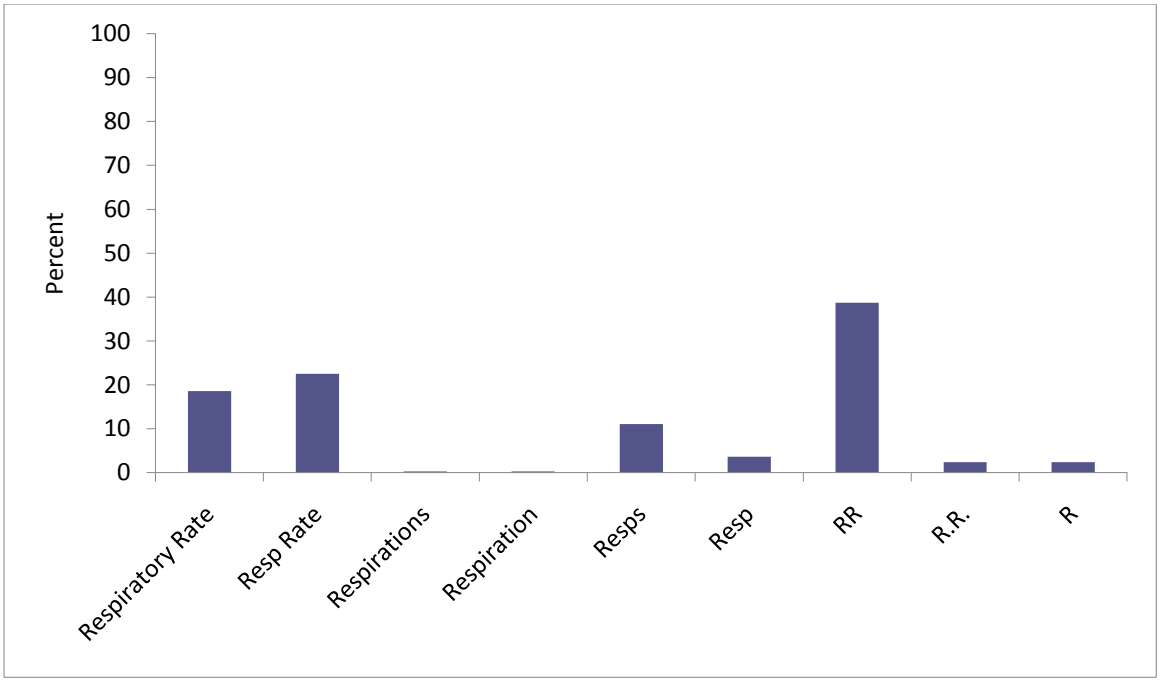

Figure 20: Participants' preferred term for respiratory rate.

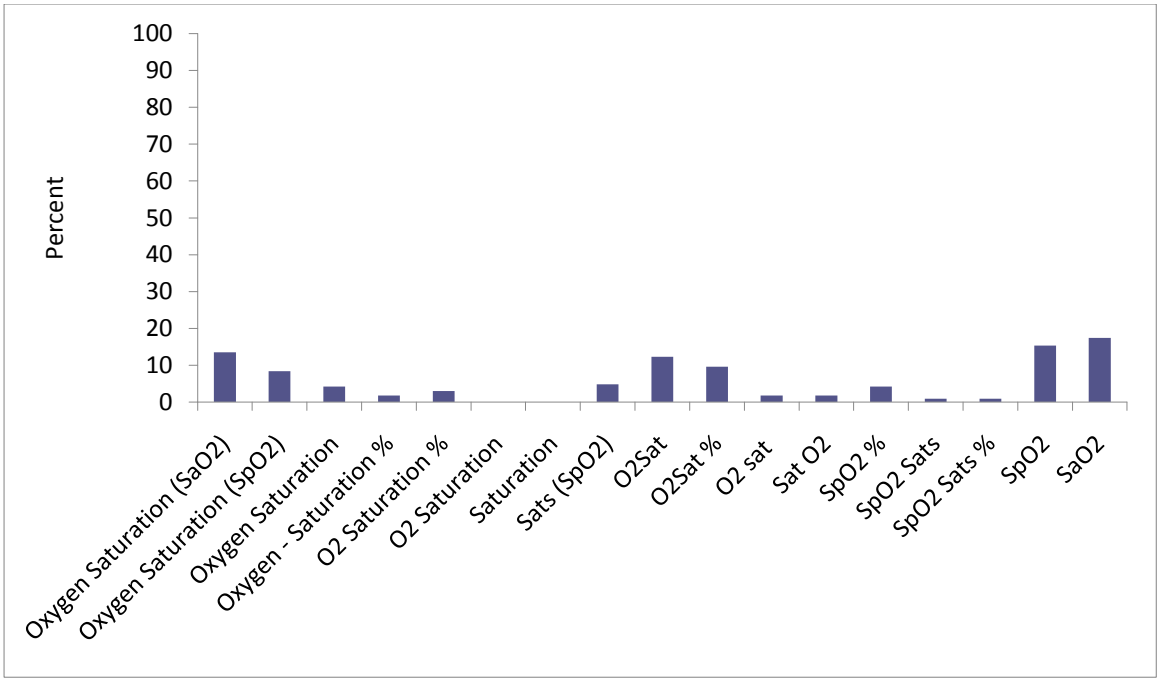

Figure 21: Participants' preferred term for oxygen saturation, note that the digit '2' in 'O2' above was presented as subscript (i.e. 'O_2') in the survey.

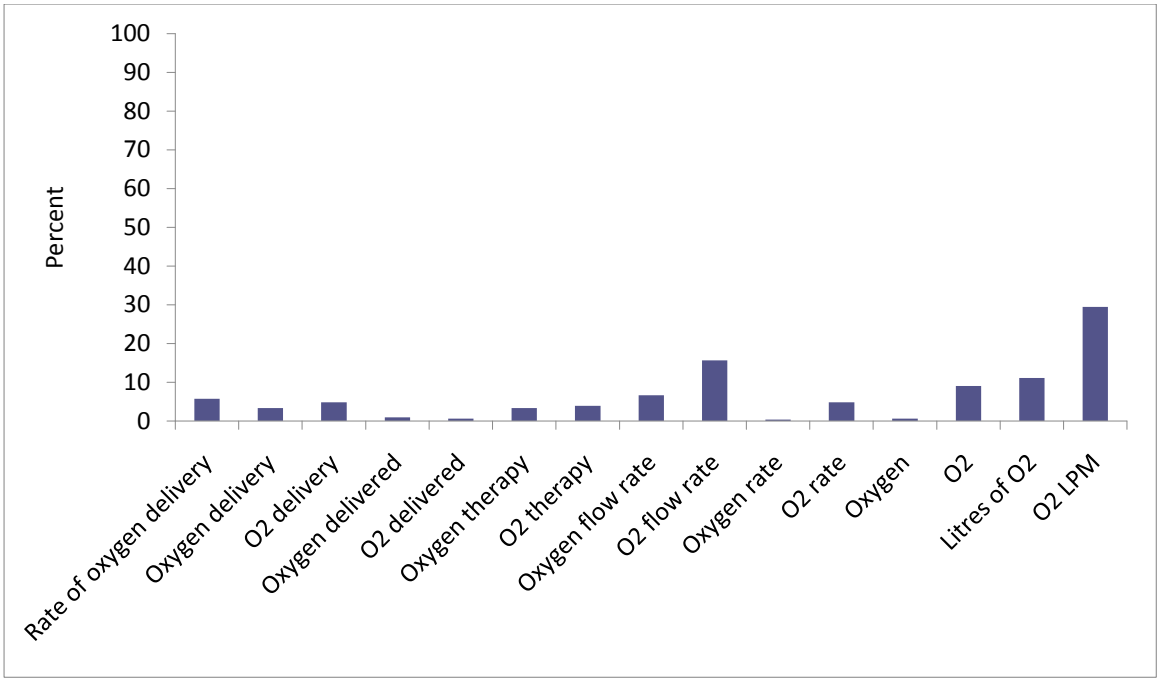

Figure 22: Participants' preferred term for oxygen delivery, note that the digit '2' in 'O2' above was presented as subscript (i.e. 'O_2') in the survey.

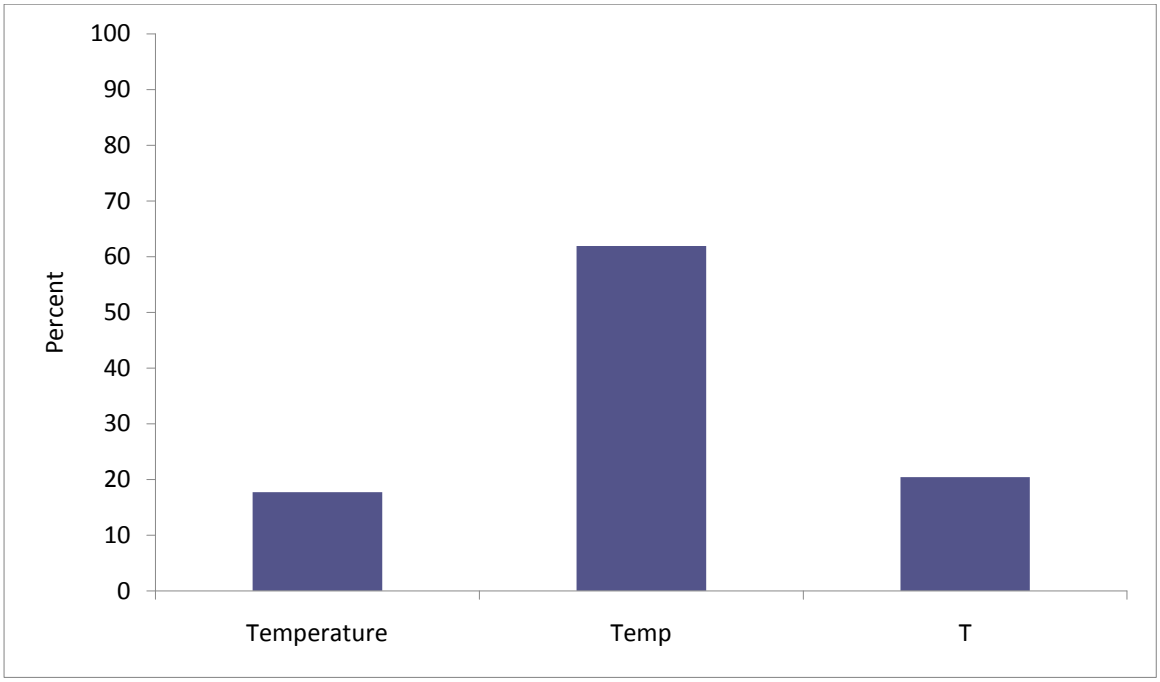

Figure 23: Participants' preferred term for temperature.

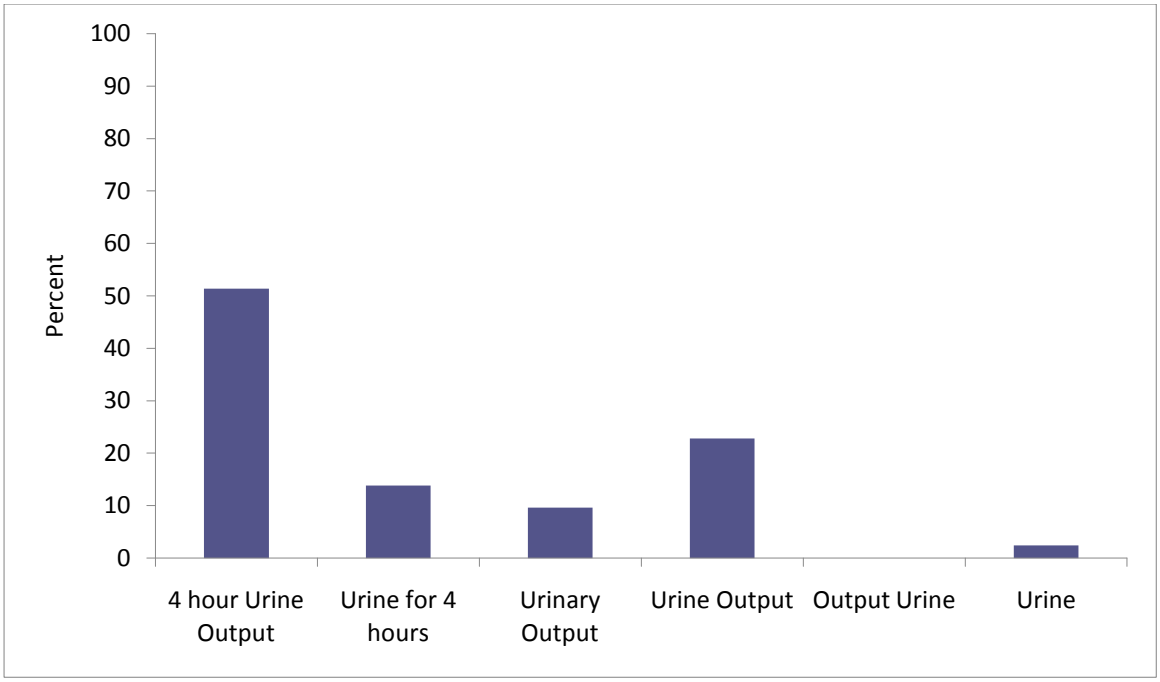

Figure 24: Participants' preferred term for urine output.

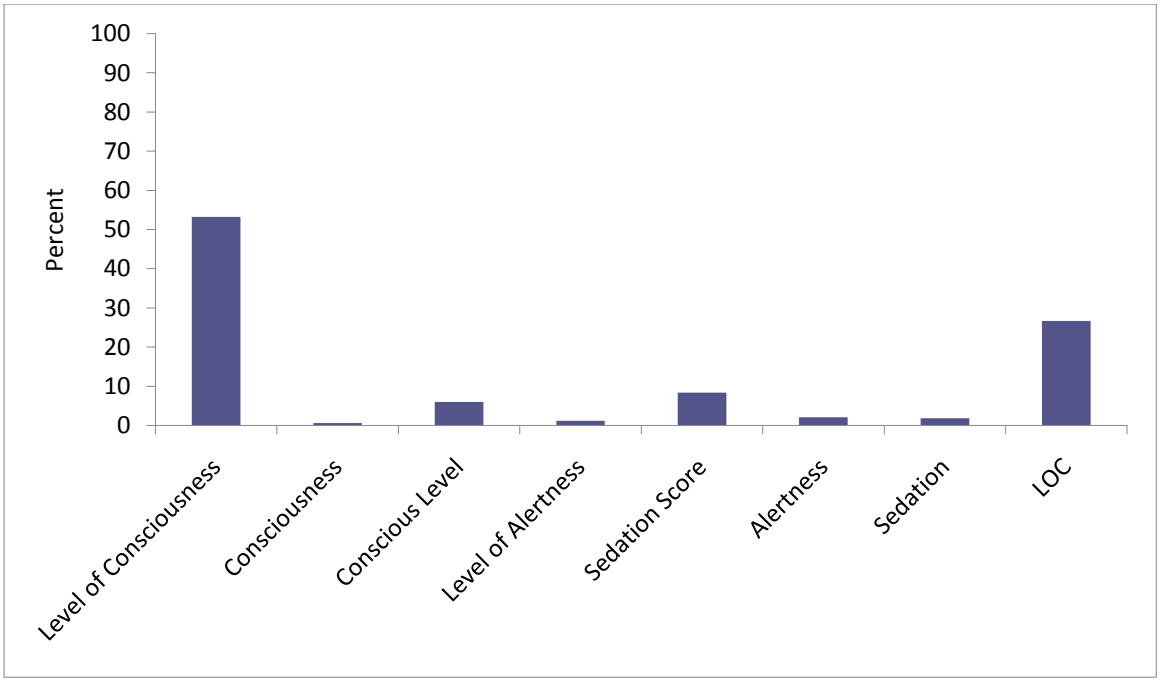

Figure 25: Participants' preferred term for level of consciousness.

3.5 Preferences regarding recording vital signs and detecting deterioration on observation charts

Participants had a strong preference for plotting blood pressure and pulse together on the same graph, as opposed to plotting the two variables on separate graphs (see Table 3). Similarly, participants preferred to record both systolic and diastolic blood pressure, rather than only systolic

blood pressure. Participants also expressed the same preferences with regards to detecting patient deterioration.

Table 3: Participants' responses to Likert scale items regarding recording vital signs and detecting deterioration.

Item	Mean	Standard Deviation
Recording vital signs		
I would prefer to plot blood pressure and pulse together on the same graph, rather than on separate graphs	4.18	1.32
I would prefer to record both systolic and diastolic blood pressure together, rather than only systolic blood pressure	4.49	1.12
Detecting deterioration		
I would find it easier to detect patient deterioration when blood pressure and pulse are together on the same graph, rather than on separate graphs	4.29	1.28
I would find it easier to detect patient deterioration when both systolic and diastolic blood pressure are recorded together, rather than only systolic blood pressure	4.53	1.05

Note. Response options were from 1 = *strongly disagree* to 5 = *strongly agree*, with a scale mid-point 3 = *neutral*.

Six formats for recording vital signs were presented to participants. As shown in Figure 26, participants preferred option 6 (*Plot the value on a graph with graded colouring, where the colours correspond to a scoring system or graded responses for abnormality*), but a substantial proportion also preferred option 4 = (*Plot the value on a graph that has line(s) indicating physiological abnormality*). Participants also expressed the same preferences with regards to detecting patient deterioration (see Figure 27).

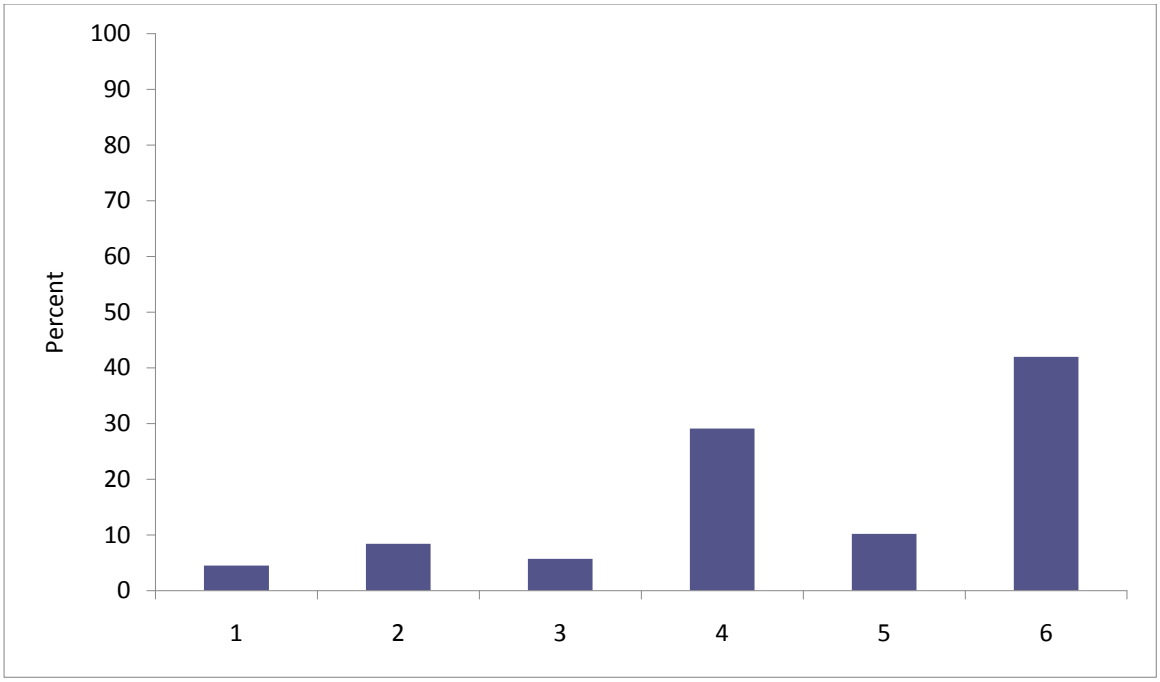

Figure 26: Participants' preferences for how to record vital signs, where 1 = *Write the value in a box*; 2 = *Plot the value on an otherwise 'blank' graph*; 3 = *Plot the value on a graph that has a line indicating physiological normality*; 4 = *Plot the value on a graph that has line(s) indicating physiological abnormality*; 5 = *Write the value in a box with graded colouring, where the colours correspond to a scoring system or graded responses for abnormality*; 6 = *Plot the value on a graph with graded colouring, where the colours correspond to a scoring system or graded responses for abnormality*.

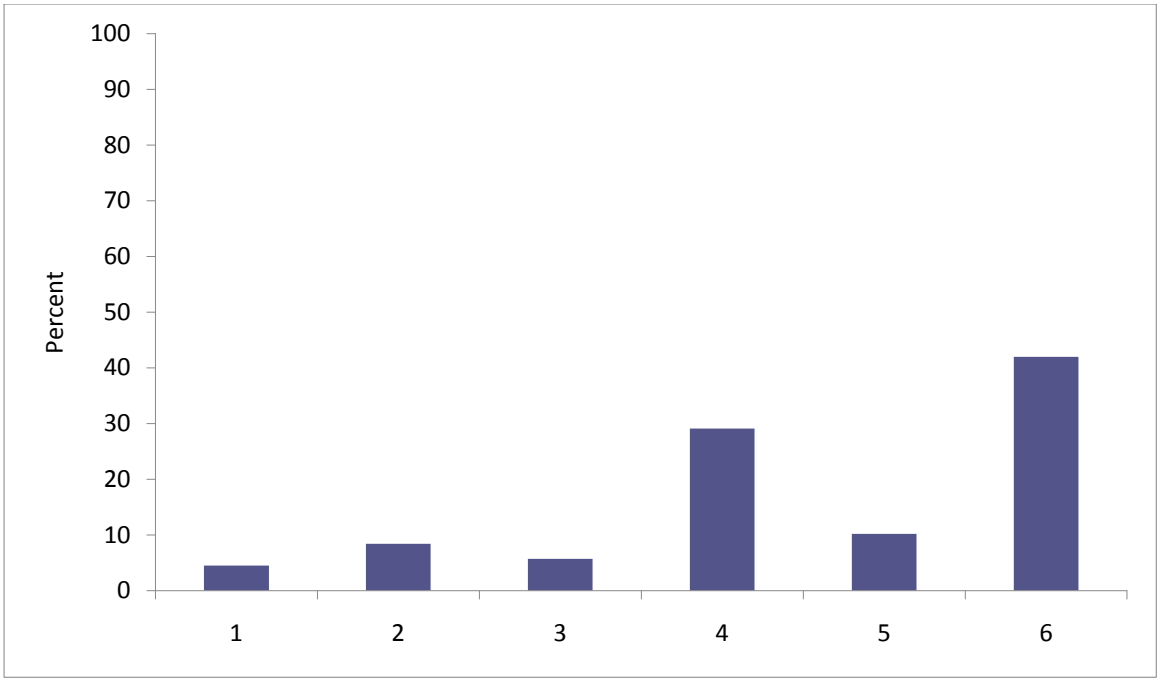

Figure 27: Participants' preferences for how to view vital signs to detect deterioration, where 1 = *Write the value in a box*; 2 = *Plot the value on an otherwise 'blank' graph*; 3 = *Plot the value on a graph that has a line indicating physiological normality*; 4 = *Plot the value on a graph that has line(s) indicating physiological abnormality*; 5 = *Write the value in a box with graded colouring, where the colours correspond to a scoring system or graded responses for abnormality*; 6 = *Plot the value on a graph with graded colouring, where the colours correspond to a scoring system or graded responses for abnormality*.

3.6 Participants' evaluation of their institution's current observation chart

Participants' responses to 13 statements regarding their institution's current observation chart are presented in Table 4. Together, the 13 items (with Items 3, 4, 6, 7, 9, and 10 reverse scored) formed a reliable scale (Cronbach's α = 0.90). Figure 27 shows the distribution of participants' aggregated responses to the 13 items. The mean of the aggregated rating was 3.03 (*SD* = 0.81). Across the items, charts received the highest rating for being "easy to record vital signs on", but received the worst rating for stating "how to respond when a patient's vital signs are deteriorating".

Table 4: Participants' responses to Likert scale items regarding their institution's current observation chart.

Item	Mean	Standard Deviation
1. The Observation Chart has a user-friendly design	3.51	1.10
2. The Observation Chart is easy to record vital signs on	3.70	1.01
3. Staff may make errors when recording vital signs on the Observation Chart	3.30	1.03
4. The design of the Observation Chart may cause errors when recording vital signs	2.88	1.11
5. The Observation Chart clearly signals when a patient's vital signs are deteriorating	3.05	1.46
6. Staff may make errors in detecting when a patient's vital signs are deteriorating	3.17	1.16
7. The design of the Observation Chart may cause errors in detecting when a patient's vital signs are deteriorating	2.88	1.20
8. The Observation Chart clearly states how to respond when a patient's vital signs are deteriorating	2.33	1.44
9. Staff may make errors when responding to a patient's vital signs deteriorating	3.24	1.09
10. The design of the Observation Chart may cause errors in responding to a patient's vital signs deteriorating	2.87	1.16
11. The design of the Observation Chart supports Staff's clinical decision making	2.92	1.32
12. I like the design of the Observation Chart	3.05	1.21
13. I like the Observation Chart as a whole	3.14	1.23

Note. Response options were from 1 = *strongly disagree* to 5 = *strongly agree*, with a scale mid-point 3 = *neutral*.

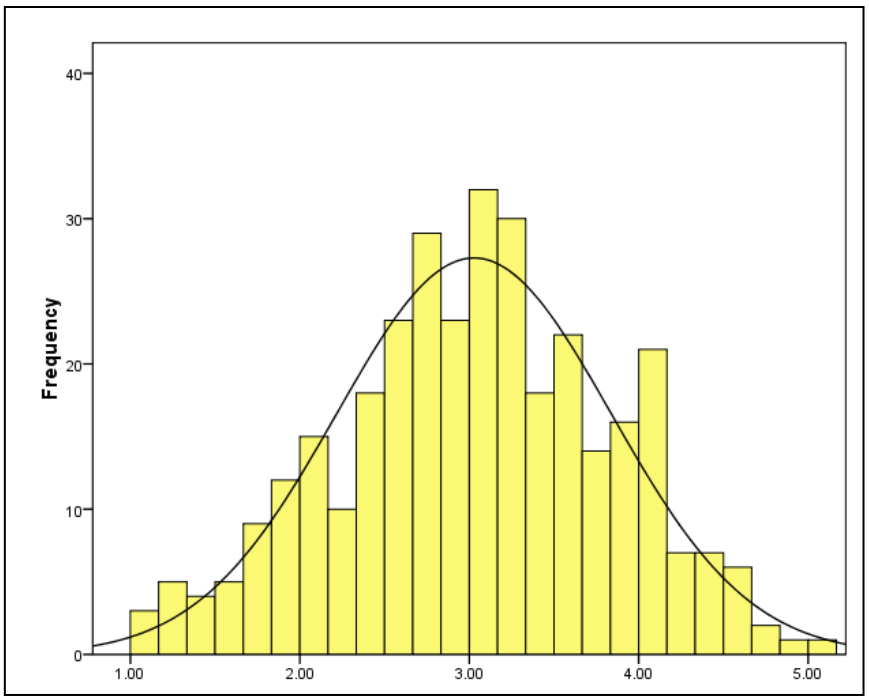

Figure 28: Distribution of participants' aggregated ratings of their institution's current observation chart (where 1 = strongly disagree, *3 =* neutral*, and 5 =* strongly agree).

3.7 Participants' evaluation of the 9 presented observation charts

Participants were randomly assigned to evaluate one of nine charts. The nine charts included charts of "good", "average", or "poor" quality. Charts 1, 2, and 3 were thought to be of "good" quality from a human factors perspective (*a priori*) (1). Charts 4, 5, and 6 were thought to be of "average" quality, that is, perhaps representative of the average observation chart used in Australia. Charts 7, 8, and 9 were thought to be of "poor" quality from a human factors perspective.

Participants' responses to 13 statements regarding their assigned chart are presented in Table 5. The 13 items (with Items 3, 4, 6, 7, 9, and 10 reverse scored) formed a reliable scale (Cronbach's α = 0.89). Table 6 shows participants' aggregated responses to the 13 items for each of the nine charts.

A between-subjects one-way analysis of variance was conducted with chart type as the independent variable and the aggregated rating as the dependent variable. Levene's test of homogeneity of variances indicated no significant differences in the variances of the nine groups, Levene's statistic(8,299) = 0.38, p =0.93.

There was a significant effect of chart type viewed on the aggregated rating, $F(8,299) = 20.53$, $p < 0.001$. Pairwise comparisons between charts were conducted using the Bonferroni method of correcting for multiple comparisons; results are listed in Table 7. The results of the pairwise comparisons show that Charts 7, 8, and 9 (collectively, the "poor" quality charts) were each rated as having a significantly poorer design compared to each of the other charts (collectively, the "average" and "good" quality charts). Therefore, there was partial support for our hypothesis that health professionals would rate the "good" charts as having better design, compared to the "average" and "poor" charts.

Table 5: Participants' responses to Likert scale items regarding the 9 presented observation charts.

Item	Chart 1 n = 32	Chart 2 n = 35	Chart 3 n = 34	Chart 4 n = 37	Chart 5 n = 35	Chart 6 n = 34	Chart 7 n = 36	Chart 8 n = 32	Chart 9 n = 33
1. The Observation Chart has a user-friendly design	3.03 (1.31)	3.37 (1.19)	3.65 (1.10)	3.46 (1.10)	3.26 (1.15)	3.32 (1.15)	3.17 (1.16)	2.34 (1.23)	2.09 (1.01)
2. The Observation Chart is easy to record vital signs on	3.53 (1.02)	3.83 (0.79)	3.71 (1.06)	3.73 (0.99)	3.77 (0.81)	3.50 (1.05)	3.58 (1.03)	3.25 (1.27)	2.36 (1.14)
3. Staff may make errors when recording vital signs on the Observation Chart	3.09 (0.93)	3.37 (0.91)	3.24 (0.86)	3.03 (0.96)	2.83 (0.79)	3.21 (0.95)	3.22 (1.02)	3.31 (1.18)	3.61 (1.17)
4. The design of the Observation Chart may cause errors when recording vital signs	2.91 (1.15)	3.09 (1.01)	3.18 (1.03)	2.97 (0.99)	2.83 (0.92)	2.94 (1.01)	2.97 (1.08)	3.22 (1.21)	3.82 (0.92)
5. The Observation Chart clearly signals when a patient's vital signs are deteriorating	3.75 (1.11)	3.97 (1.01)	3.97 (1.00)	3.89 (1.17)	2.80 (1.30)	3.18 (1.17)	2.03 (1.11)	1.62 (0.94)	2.24 (1.46)
6. Staff may make errors in detecting when a patient's vital signs are deteriorating	2.69 (1.15)	2.80 (0.99)	2.88 (0.98)	2.89 (1.10)	3.20 (0.96)	2.97 (0.94)	3.83 (1.16)	3.88 (1.13)	3.94 (1.14)
7. The design of the Observation Chart may cause errors in detecting when a patient's vital signs are deteriorating	2.62 (1.10)	2.91 (1.10)	2.56 (0.93)	2.78 (1.13)	3.00 (1.03)	2.97 (0.90)	3.67 (1.22)	3.50 (1.50)	3.97 (1.16)
8. The Observation Chart clearly states how to respond when a patient's vital signs are deteriorating	4.06 (0.76)	3.40 (1.40)	4.03 (0.94)	4.22 (0.95)	2.83 (1.34)	2.32 (0.98)	1.75 (1.00)	1.38 (0.71)	1.48 (0.94)
9. Staff may make errors when responding to a patient's vital signs deteriorating	2.88 (0.87)	3.11 (0.90)	2.85 (0.86)	3.24 (0.96)	3.17 (0.95)	3.24 (0.78)	3.81 (0.98)	3.78 (1.07)	3.97 (1.05)
10. The design of the Observation Chart may cause errors in responding to a patient's vital signs deteriorating	2.59 (1.13)	2.83 (1.01)	2.74 (0.96)	2.76 (1.04)	3.06 (1.03)	3.06 (0.81)	3.83 (1.13)	3.84 (1.25)	4.18 (0.88)
11. The design of the Observation Chart supports Staff's clinical decision making	3.69 (0.90)	3.60 (0.98)	3.88 (0.77)	3.68 (0.97)	2.94 (1.11)	3.41 (0.96)	2.39 (1.23)	1.78 (0.87)	2.12 (1.11)
12. I like the design of the Observation Chart	2.81 (1.33)	3.34 (1.31)	3.50 (1.24)	3.38 (1.16)	2.97 (1.22)	3.06 (1.13)	2.14 (1.07)	1.59 (0.80)	1.67 (1.02)
13. I like the Observation Chart as a whole	3.03 (1.28)	3.34 (1.26)	3.35 (1.10)	3.43 (1.17)	2.94 (1.21)	2.97 (1.11)	2.19 (1.12)	1.56 (0.76)	1.58 (0.83)

Note. Values are Mean (Standard deviation). Response options were from 1 = *strongly disagree* to 5 = *strongly agree*, with a scale mid-point 3 = *neutral*.

Table 6: Participants' aggregated responses to13 Likert scale items regarding the 9 presented observation charts.

Chart	Mean	Standard Deviation	N
Good			
Chart 1	3.31	0.68	32
Chart 2	3.26	0.62	35
Chart 3	3.43	0.60	34
Average			
Chart 4	3.38	0.66	37
Chart 5	3.03	0.71	35
Chart 6	3.05	0.70	34
Poor			
Chart 7	2.53	0.63	36
Chart 8	2.22	0.63	32
Chart 9	2.12	0.57	33

Note. Total *N* = 308 after excluding participants who reported that their assigned observation chart did not display on their computer. Response options were from 1 = *strongly disagree* to 5 = *strongly agree*, with a scale mid-point 3 = *neutral*.

Table 7: Pairwise comparisons between charts for aggregated ratings.

Comparison	Observed p	Comparison significant at 5% level?
Chart 1 vs. Chart 2	0.738	Not significant
Chart 1 vs. Chart 3	0.190	Not significant
Chart 1 vs. Chart 4	0.407	Not significant
Chart 1 vs. Chart 5	0.188	Not significant
Chart 1 vs. Chart 6	0.267	Not significant
Chart 1 vs. Chart 7	< 0.001	Significant
Chart 1 vs. Chart 8	< 0.001	Significant
Chart 1 vs. Chart 9	< 0.001	Significant
Chart 2 vs. Chart 3	0.319	Not significant
Chart 2 vs. Chart 4	0.615	Not significant
Chart 2 vs. Chart 5	0.091	Not significant
Chart 2 vs. Chart 6	0.141	Not significant
Chart 2 vs. Chart 7	< 0.001	Significant
Chart 2 vs. Chart 8	< 0.001	Significant
Chart 2 vs. Chart 9	< 0.001	Significant
Chart 3 vs. Chart 4	0.617	Not significant
Chart 3 vs. Chart 5	0.007	Not significant
Chart 3 vs. Chart 6	0.014	Not significant
Chart 3 vs. Chart 7	< 0.001	Significant
Chart 3 vs. Chart 8	< 0.001	Significant
Chart 3 vs. Chart 9	< 0.001	Significant
Chart 4 vs. Chart 5	0.027	Not significant
Chart 4 vs. Chart 6	0.048	Not significant
Chart 4 vs. Chart 7	< 0.001	Significant
Chart 4 vs. Chart 8	< 0.001	Significant
Chart 4 vs. Chart 9	< 0.001	Significant
Chart 5 vs. Chart 6	0.849	Not significant
Chart 5 vs. Chart 7	0.001	Significant
Chart 5 vs. Chart 8	< 0.001	Significant
Chart 5 vs. Chart 9	< 0.001	Significant
Chart 6 vs. Chart 7	< 0.001	Significant
Chart 6 vs. Chart 8	< 0.001	Significant
Chart 6 vs. Chart 9	< 0.001	Significant
Chart 7 vs. Chart 8	0.071	Not significant
Chart 7 vs. Chart 9	0.024	Not significant
Chart 8 vs. Chart 9	0.625	Not significant

Note. Critical p for significance at the 5% level with 36 comparisons = 0.0014.

4. Discussion

Improving the recognition and management of patients who deteriorate whilst in hospital is a frequently cited priority for improving patient safety (2, 11). One way to improve the recognition and management of deteriorating patients is to improve the design of paper-based adult observation charts. The aim of the current study was to gauge the opinions of the population who actually use observation charts.

We recruited a large sample of health professionals (the vast majority of whom were nurses) to answer general questions about the design of observation charts and specific questions about nine observation charts. We found that most of our sample reported using charts more than once a day and that the majority recorded information in the charts more than once a day. Despite the participants reporting using observation charts daily and the importance of using patients' vital signs to detect deterioration, only a minority (35%) reported receiving any formal training in the use of such charts.

In our initial heuristic analysis of observation charts, we found that the majority of charts included a large number of abbreviations (1). Futhermore, many charts included abbreviations that could potentially be misinterpreted (e.g. does "SBP" on a chart mean 'systolic blood pressure' or 'standing blood pressure'?). In designing a user-friendly chart, it is important to assess whether the terms and abbreviations used in the chart are actually understood by chart users. A section of the online survey asked participants to nominate which term they first thought of when seeing a particular abbreviation. Most abbreviations were overwhelmingly assigned the same meaning, e.g. 'blood pressure' for the abbreviation "BP". However, "SBP" and "LOC" both had substantial numbers of participants nominating different terms for the same abbreviation. Therefore, these two abbreviations should be avoided wherever possible in the design of observation charts.

Following on from gauging participants' understanding of commonly used abbreviations, we asked participants to nominate their preferred terms for nine observations that commonly appear on charts. A user-friendly chart should incorporate users' preferred terminology wherever possible (however, not when the preferred terminology is technically incorrect or potentially confusing). We found that there was a high level of agreement amongst the participants as to what they thought was easiest to understand for some variables, e.g. "BP" was most popular for blood pressure. For other variables, there was not a clearly preferred term, e.g. oxygen saturation.

Participants were also asked about their preferences for recording observations on charts. Interestingly, participants had a strong preference for plotting blood pressure and pulse together on the same graph (as opposed to plotting the two vital signs on separate graphs), and for plotting both systolic and diastolic blood pressure, rather than only systolic blood pressure. Participants also expressed the same preferences with regards to detecting patient deterioration. From a human factors point of view, plotting multiple vital signs (e.g. systolic blood pressure, diastolic blood pressure, and pulse) on the same graph is seen as potentially problematic, in that the display is likely to become cluttered, and patient deterioration on one vital sign could be obscured by observations for one or both of the other vital signs. The final item in this section of the survey presented six

formats for recording vital signs. For both recording observations and detecting patient deterioration, participants preferred option 6 (*Plot the value on a graph with graded colouring, where the colours correspond to a scoring system or graded responses for abnormality*). On this item, participants' preference was in line with what a human factors approach would recommend (i.e. a chart with a colour-coded track and trigger system).

In the final sections of the survey, participants were first asked to respond to 13 statements regarding their institution's current observation chart, and then to respond to the same 13 statements for one of nine observation charts. The nine observation charts included the new observation chart and eight observation charts of "good", "average", or "poor" design quality, according to the usability evaluation. It was hypothesised that health professionals would rate the "good" charts as having better design, compared to the "average" and "poor" charts.

Participants' mean aggregated rating across the 13 items for their institution's current observation chart was close to the scale's mid-point, 3 = *neutral.* For the assigned charts, participants' mean aggregated rating varied from 3.43 (tending to agree with positive statements about the chart) for Chart 3 to 2.12 (tending to disagee with positive statements about the chart) for Chart 9. Indeed, we found that there was a statistically significant effect of chart type on the aggregated rating. Charts 7, 8, and 9 (collectively, the *a priori* "poor" quality charts) were each rated as having a significantly poorer design compared to each of the other charts (collectively, the *a priori* "average" and "good" quality charts). Therefore, there was partial support for our hypothesis that health professionals would rate the "good" charts as having better design, compared to the "average" and "poor" charts.

As a result of collecting data regarding the preferences of participants in the online survey, we made some changes to the terms used in new ADDS chart. We changed 'O_2 Delivery' to 'O_2 Flow Rate', as 'O_2 Flow Rate' was the second most popular term after 'O_2 LPM' for that observation (we did not include 'O_2 LPM' as this would introduce a new and unnecessary abbreviation into the chart). We changed 'Urine for 4 Hours' to '4 Hour Urine Output' as it was the most popular term for that vital sign. We also changed 'Pulse' to 'Heart Rate' as the combined preferences for 'Heart Rate', 'HR', and 'H.R.' eclipsed those for 'Pulse' and 'P' (we did not include the single most popular term, 'HR', as this would introduce an unnecessary abbreviation into the chart). We kept other terms unchanged on the ADDS chart as we generally preferenced using the full word over more popular abbreviations (i.e. 'Temperature', not 'Temp').

Responses to other sections of the online survey also suggested that we not modify the overall design of the ADDS chart at this stage. First, participants expressed a preference for "*plotting the value* [for a vital sign] *on a graph with graded colouring, where the colours correspond to a scoring system or graded responses for abnormality*" for both recording observations and detecting patient deterioration. All of the ADDS chart's vital signs are to be plotted in this manner (except blood pressure, for which users have to consult a look-up table). Second, participants' aggregated rating for the ADDS chart was no worse than that of any other chart (and significantly better than Charts 7, 8 and 9), even though the ADDS chart could be argued to be radically different from many existing observation charts that participants may be familiar with.

The online survey served two main purposes. First, it collected quantitative data on health professionals' general preferences regarding aspects of the design of observation charts. This information informed the design of the ADDS chart and could also be used by other chart designers to produce more user-friendly hospital charts. Second, the online survey enabled health professionals to rate the design of the ADDS chart as well as eight existing charts of varying quality. Overall, health professionals agreed with our human factors-based rating with regards to the "poor" quality charts. However, the health professionals did not differentiate between the "average" and "good" quality charts in their ratings.

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Appendix A: Online Survey Items

Questions about your background:

What is your occupation?

- Nurse
- Doctor
- Other health professional:

Which of the following best describes your nursing role?

- Enrolled Nurse
- Nursing Assistant
- Registered Nurse
- Clinical Nurse
- Nurse Unit Manager
- Nurse Educator
- Nursing Director
- Nurse Practitioner
- Other:

Which of the following best describes your medical role?

- Post-graduate year 1 (Intern)
- Post-graduate year 2 and not in an accredited training program
- Post-graduate year 3 and not in an accredited training program
- Post-graduate year 4+ and not in an accredited training program
- Post-graduate and in an accredited training program
- Hospitalist
- Career Medical Officer
- Senior Medical Officer
- Visiting Medical Officer
- Staff Specialist
- Senior Staff Specialist
- Other:

How many years have you been registered?

What is the postcode of your institution or place of work?

In what type of area is your institution located?Response options are modelled on the RRMA (Rural, Remote and Metropolitan Areas) classification

- Capital City
- Other Metropolitan Centres (urban centre population > 100,000)
- Large Rural Centres (urban centre population 25,000–99,999)
- Small Rural Centres (urban centre population 10,000–24,999)
- Other Rural Areas (urban centre population < 10,000)
- Remote Centres (urban centre population > 5,000)
- Other Remote Areas (urban centre population < 5,000)
- Do not know

At your institution, where do you spend the greatest proportion of your time working?

- Ward
- Emergency
- Intensive Care Unit
- Theatre
- Outpatient Clinic
- Other:

Your sex:

- Female
- Male

Your age in years:

Do you wear glasses or contact lenses in order to read?

- Yes
- No

Are you colour-blind?

- Yes
- No

What type of colour-blindness do you have (for example, red-green)?

Does your colour-blindness impact on your work?

- Yes
- No

The following questions are about the design and use of General Observation Charts. All responses are completely anonymous. Please answer the following questions as honestly and accurately as possible. There are no right or wrong answers.

The first few questions are about <u>your current use of General Observation Charts</u>.

Do you use Observation Charts as part of your current role?

- ○ Yes
- ○ No

What training have you received in the use of Observation Charts? Select all that apply:

- ☐ None
- ☐ Read the instructions
- ☐ Informal (for example, by co-worker)
- ☐ Formal (for example, in-service or workshop)
- ☐ Other: _____

How frequently do you <u>use</u> Observation Charts?

- ○ More than once a day
- ○ Once a day
- ○ More than once a week, but less than once a day
- ○ Once a week
- ○ More than once a month, but less than once a week
- ○ Once a month
- ○ Less than once a month

Do you record information in Observation Charts as part of your current role?

- Yes
- No

How frequently do you record information in Observation Charts?

- More than once a day
- Once a day
- More than once a week, but less than once a day
- Once a week
- More than once a month, but less than once a week
- Once a month
- Less than once a month

The next few questions are about abbreviations sometimes found on Observation Charts. These questions assess how easy to understand the abbreviations are, not your level of medical knowledge.

What do you first think of when you see "P" on an Observation Chart?

- Patient
- Pain
- Pulse
- Other:

What do you first think of when you see "R" on an Observation Chart?

- Respiratory Rate
- Responsibility
- Responsive
- Other:

What do you first think of when you see "T" on an Observation Chart?

- Time
- Temperature
- Total
- Other:

What do you first think of when you see "LOC" on an Observation Chart?

- Loss of consciousness
- Level of care
- Level of consciousness
- Other:

What do you first think of when you see "Temp" on an Observation Chart?

- Temporary
- Temperature
- Template
- Other:

What do you first think of when you see "BP" on an Observation Chart?

- Blood pressure
- Body part
- Beats per...
- Other:

What do you first think of when you see "RR" on an Observation Chart?

- Relative risk
- Recovery room
- Respiratory rate
- Other:

What do you first think of when you see "Sats" on an Observation Chart?

- Satisfaction
- Oxygen saturation
- Standard Adult Test Score
- Other:

What do you first think of when you see "Resp" on an Observation Chart?

- Respiratory rate
- Responsibility
- Responsive
- Other:

What do you first think of when you see "HR" on an Observation Chart?

- Hour
- Human Resources
- Heart Rate
- Other:

What do you first think of when you see "SBP" on an Observation Chart

- Standing Blood Pressure
- Systolic Blood Pressure
- Spontaneous Bacterial Peritonitis
- Other:

The next few questions are about which terms you think are the easiest for the average nurse to understand.

For blood pressure, which term do you think is the easiest for the average nurse to understand? Select one of the following:

- Blood Pressure
- B.P.
- BP

Please enter any comments you would like to make about the terms for blood pressure:

For systolic blood pressure, which term do you think is the easiest for the average nurse to understand? Select one of the following:

- Systolic Blood Pressure
- Sys Blood Pressure
- Systolic BP
- Sys BP
- S.B.P.
- S/BP
- SBP

Please enter any comments you would like to make about the terms for systolic blood pressure:

For pulse or heart rate (beats per minute), which term do you think is the easiest for the average nurse to understand? Select one of the following:

- Heart Rate
- Pulse
- HR
- H.R.
- P

Please enter any comments you would like to make about the terms for pulse or heart rate:

For respiratory rate (breaths per minute), which term do you think is the easiest for the average nurse to understand? Select one of the following:

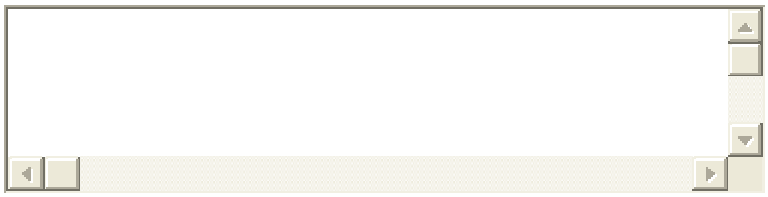
- Respiratory Rate
- Resp Rate
- Respirations
- Respiration
- Resps
- Resp
- RR
- R.R.
- R

Please enter any comments you would like to make about the terms for respiratory rate:

For oxygen saturation, which term do you think is the easiest for the average nurse to understand? Select one of the following:

- Oxygen Saturation (SaO_2)
- Oxygen Saturation (SpO_2)
- Oxygen Saturation
- Oxygen – Saturation %
- O_2 Saturation %
- O_2 Saturation
- Saturation
- Sats (SpO_2)
- O_2Sat
- O_2Sat %
- O_2 sat
- Sat O_2
- SpO_2 %
- SpO_2 Sats
- SpO_2 Sats %
- SpO_2
- SaO_2

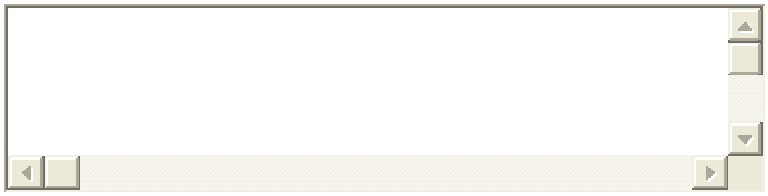
Please enter any comments you would like to make about the terms for oxygen saturation:



For the rate of oxygen delivery, which term do you think is the easiest for the average nurse to understand? Select one of the following:

- Rate of oxygen delivery
- Oxygen delivery
- O_2 delivery
- Oxygen delivered
- O_2 delivered
- Oxygen therapy
- O_2 therapy
- Oxygen flow rate
- O_2 flow rate
- Oxygen rate
- O_2 rate
- Oxygen
- O_2
- Litres of O_2
- O_2 LPM

Please enter any comments you would like to make about the terms for rate of oxygen delivery:



For temperature, which term do you think is the easiest for the average nurse to understand? Select one of the following:

- Temperature
- Temp
- T

Please enter any comments you would like to make about the terms for temperature:

For urine output (urine in millilitres per 4 hours), which term do you think is the easiest for the average nurse to understand? Select one of the following:

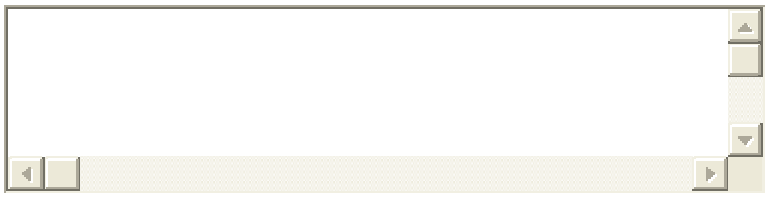
- 4 hour Urine Output
- Urine for 4 hours
- Urinary output
- Urine output
- Output urine
- Urine

Please enter any comments you would like to make about the terms for urine output:

For level of consciousness, which term do you think is the easiest for the average nurse to understand? Select one of the following:

- Level of Consciousness
- Consciousness
- Conscious Level
- Level of Alertness
- Sedation Score
- Alertness
- Sedation
- LOC

Please enter any comments you would like to make about the terms for level of consciousness:



Next, we are going to be asking you first about recording vital signs on Observation Charts (on this page) and we will then ask you the same questions about detecting patient deterioration using Observation Charts on the next page.

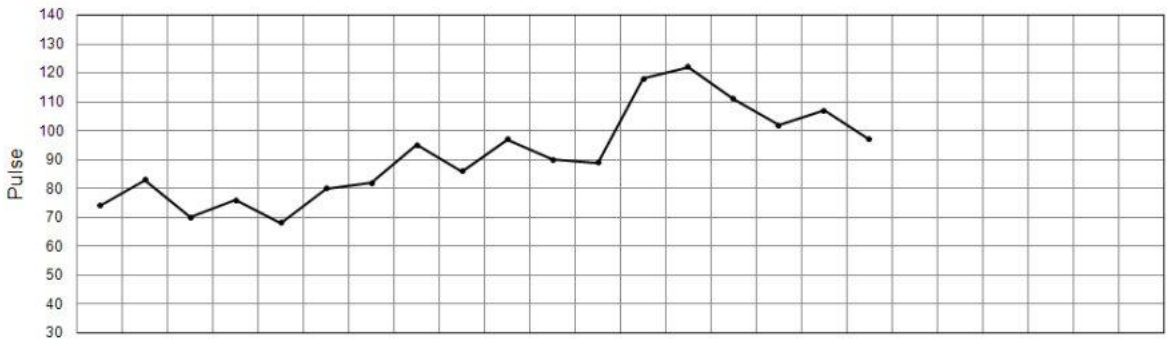
The questions on this page are about recording vital signs on Observation Charts.

When recording vital signs (e.g. pulse) I would prefer to:

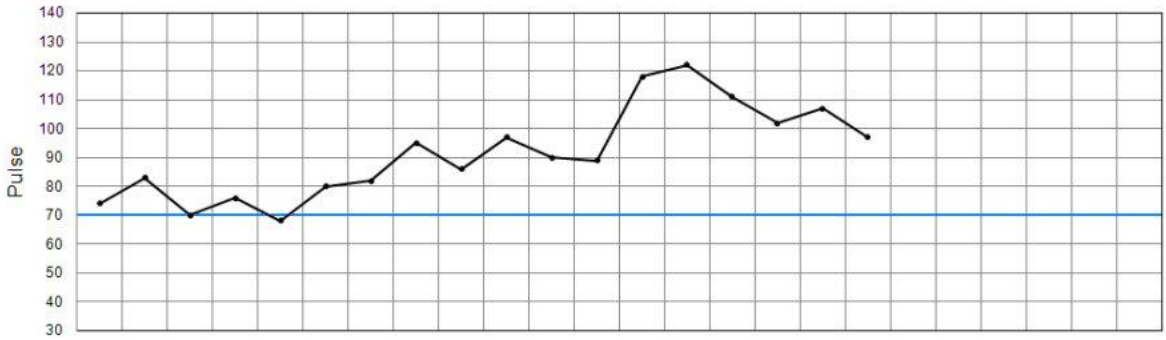
Write the value in a box

Pulse	74	83	70	76	68	80	82	95	86	97	90	89	118	122	111	102	107	97					

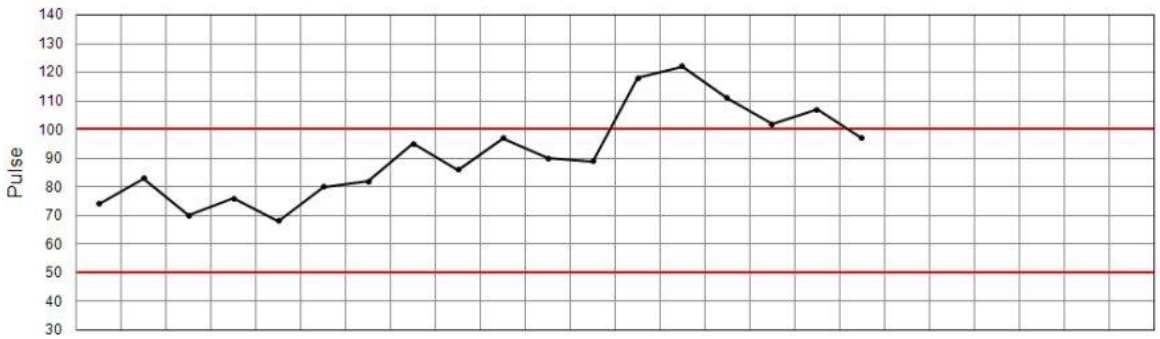
Plot the value on an otherwise 'blank' graph



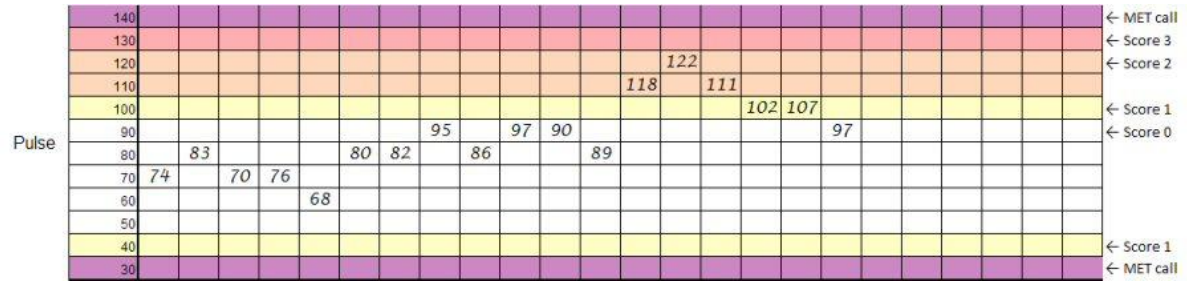
Plot the value on a graph that has a line indicating physiological normality



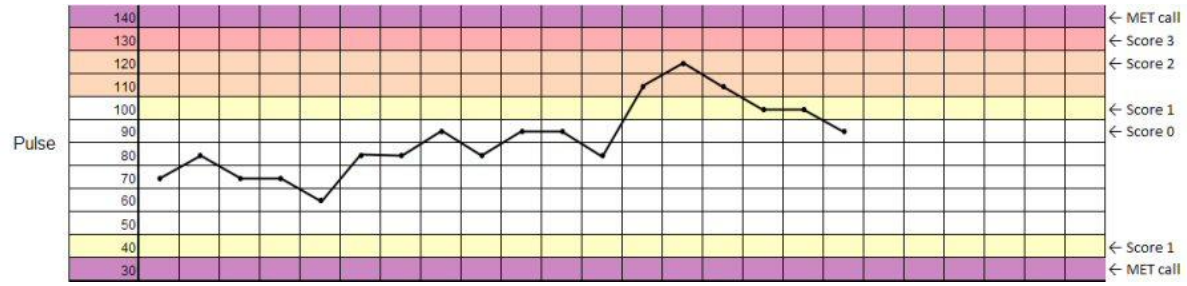
Plot the value on a graph that has line(s) indicating physiological abnormality



Write the value in a box with graded colouring, where the colours correspond to a scoring system or graded responses for physiological abnormality



Plot the value on a graph with graded colouring, where the colours correspond to a scoring system or graded responses for physiological abnormality



I would prefer to plot blood pressure and pulse together on the same graph (for example, Image 1 below), rather than on separate graphs (for example, Image 2 below). Please indicate your level of agreement with this statement:

Strongly disagree		Neutral		Strongly agree
○	○	○	○	○
1	2	3	4	5

Image 1: An example of blood pressure and pulse plotted together on the same graph

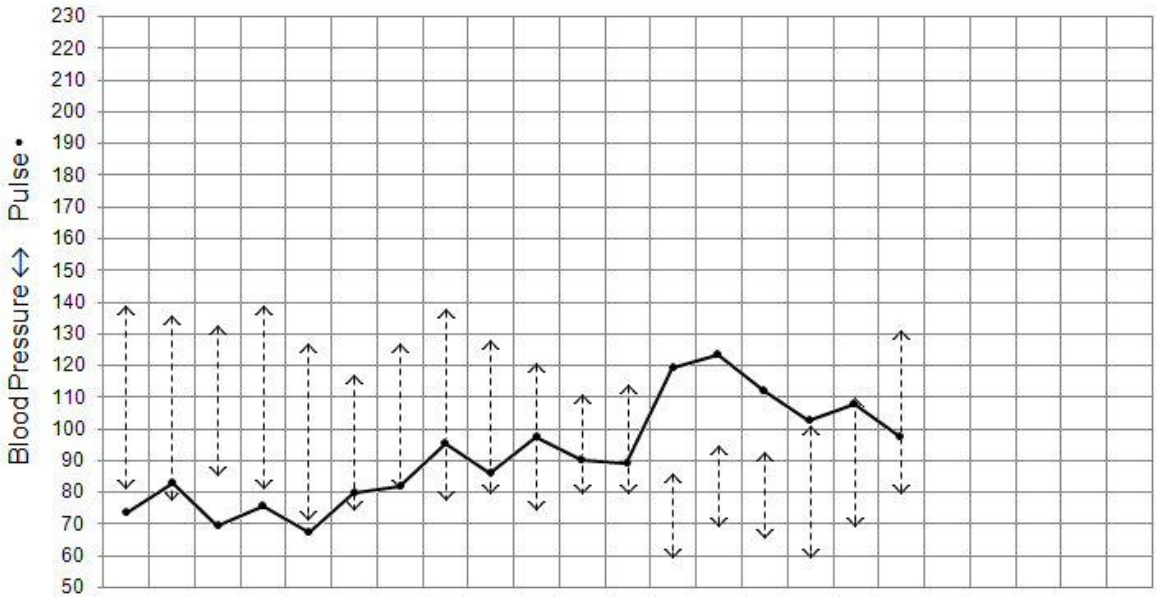
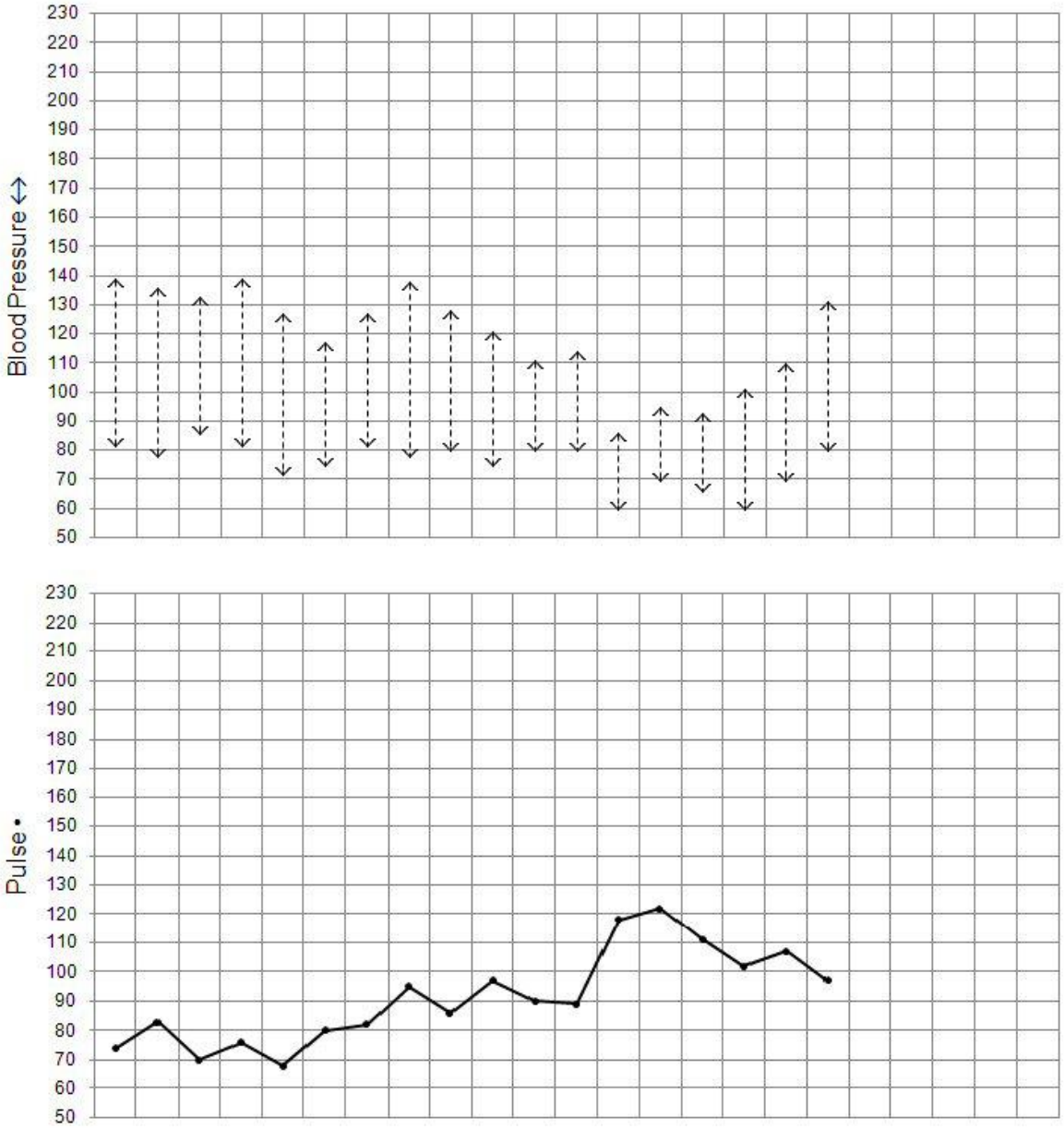


Image 2: An example of blood pressure and pulse plotted on separate graphs



I would prefer to record both systolic and diastolic blood pressure together (for example, Image 3 below), rather than only systolic blood pressure (for example, Image 4 below). Please indicate your level of agreement with this statement:

Strongly disagree		Neutral		Strongly agree
○	○	○	○	○
1	2	3	4	5

Image 3: An example of recording both systolic and diastolic blood pressure

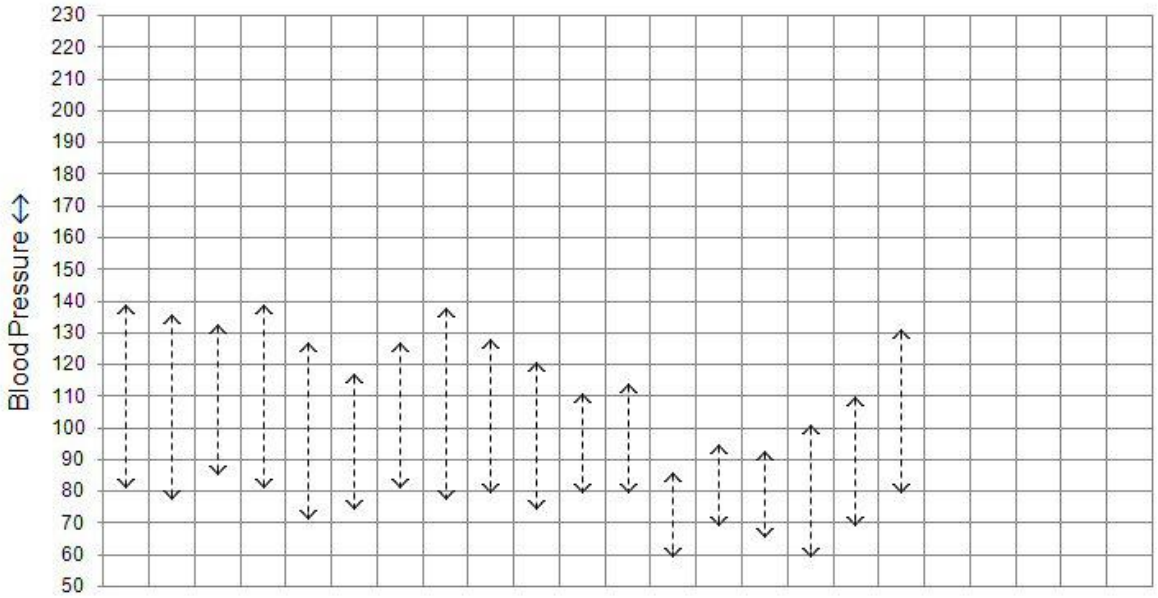
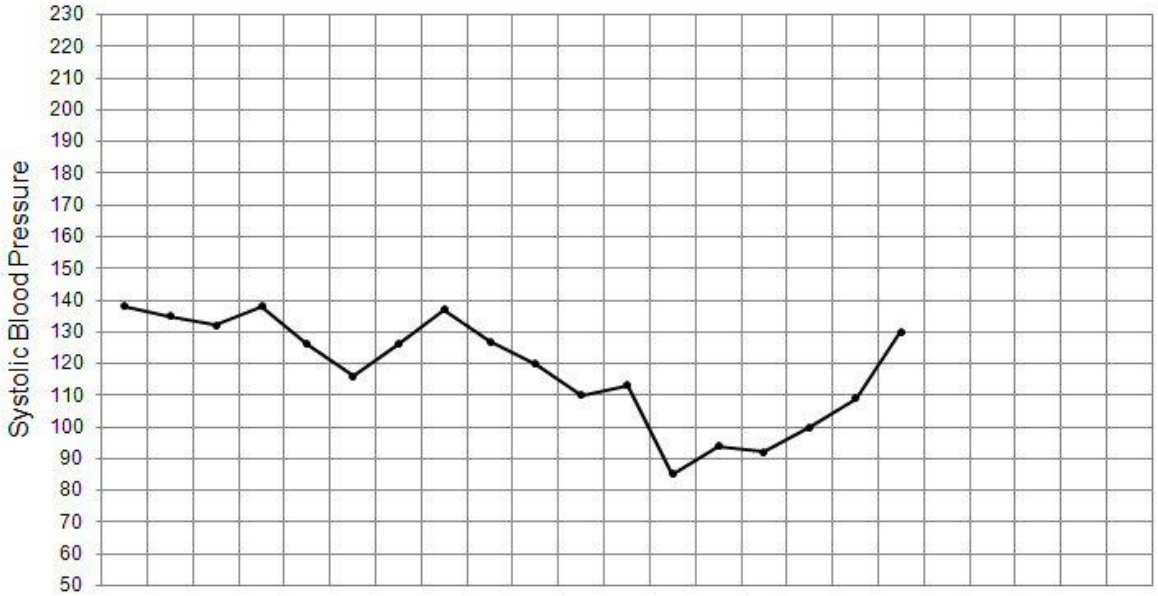


Image 4: An example of recording only systolic blood pressure



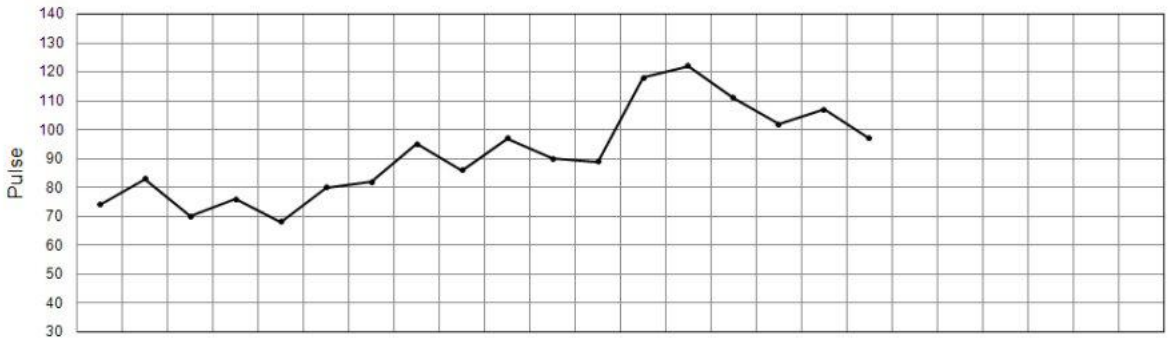
The questions on this page are about detecting patient deterioration using Observation Charts.

I would find it easier to detect patient deterioration when vital signs (e.g. pulse) are presented as:

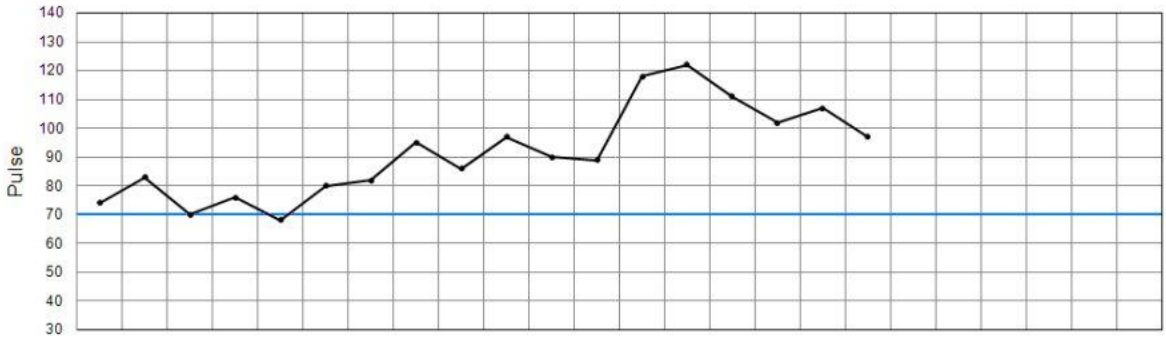
- Write the value in a box

Pulse	74	83	70	76	68	80	82	95	86	97	90	89	118	122	111	102	107	97

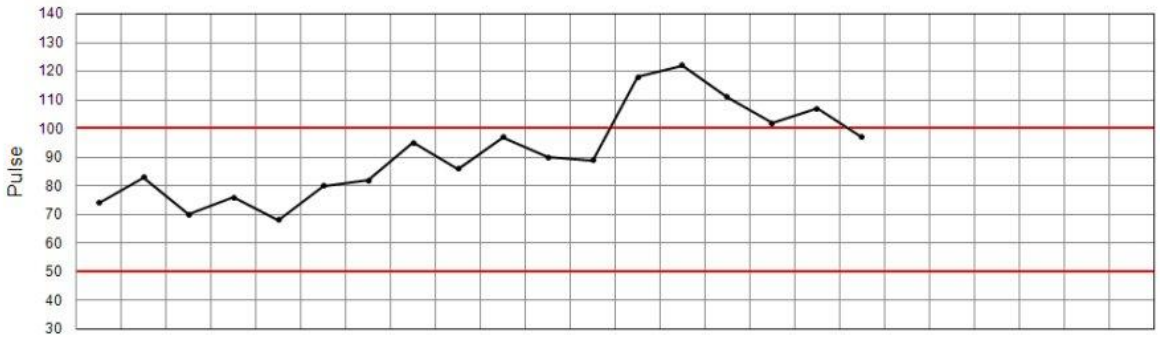
- Plot the value on an otherwise 'blank' graph



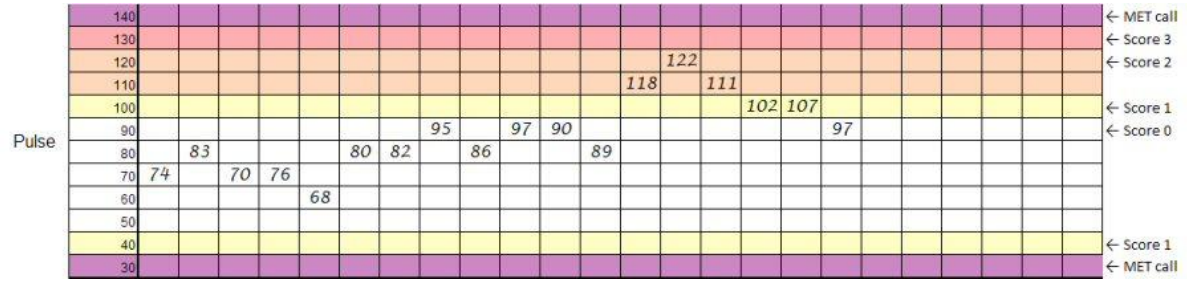
- Plot the value on a graph that has a line indicating physiological normality



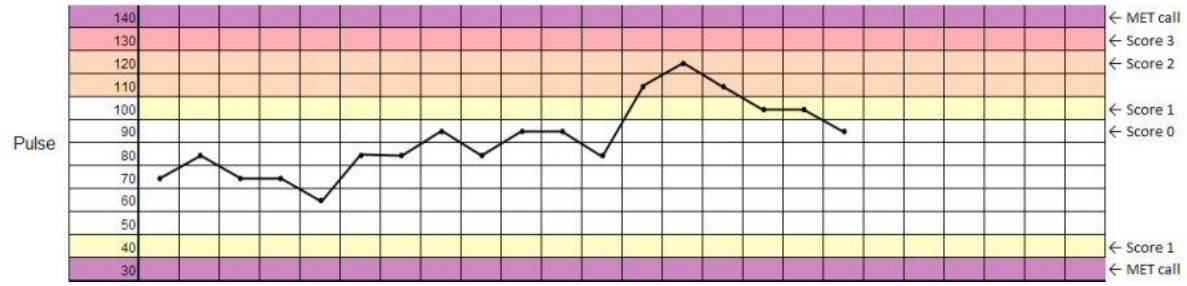
- Plot the value on a graph that has line(s) indicating physiological abnormality



- Write the value in a box with graded colouring, where the colours correspond to a scoring system or graded responses for physiological abnormality



Plot the value on a graph with graded colouring, where the colours correspond to a scoring system or graded responses for physiological abnormality



I would find it easier to <u>detect patient deterioration</u> when blood pressure and pulse are together on the same graph (for example, Image 1 below), rather than on separate graphs (for example, Image 2 below). Please indicate your level of agreement with this statement:

Strongly disagree		Neutral		Strongly agree
1	2	3	4	5

Image 1: An example of blood pressure and pulse plotted together on the same graph

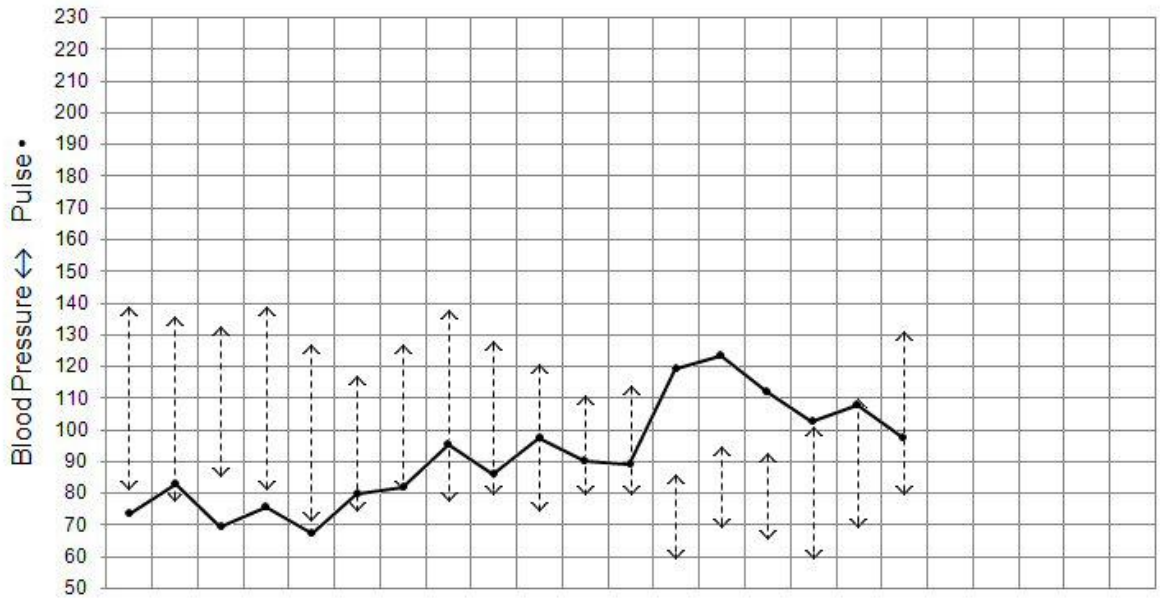
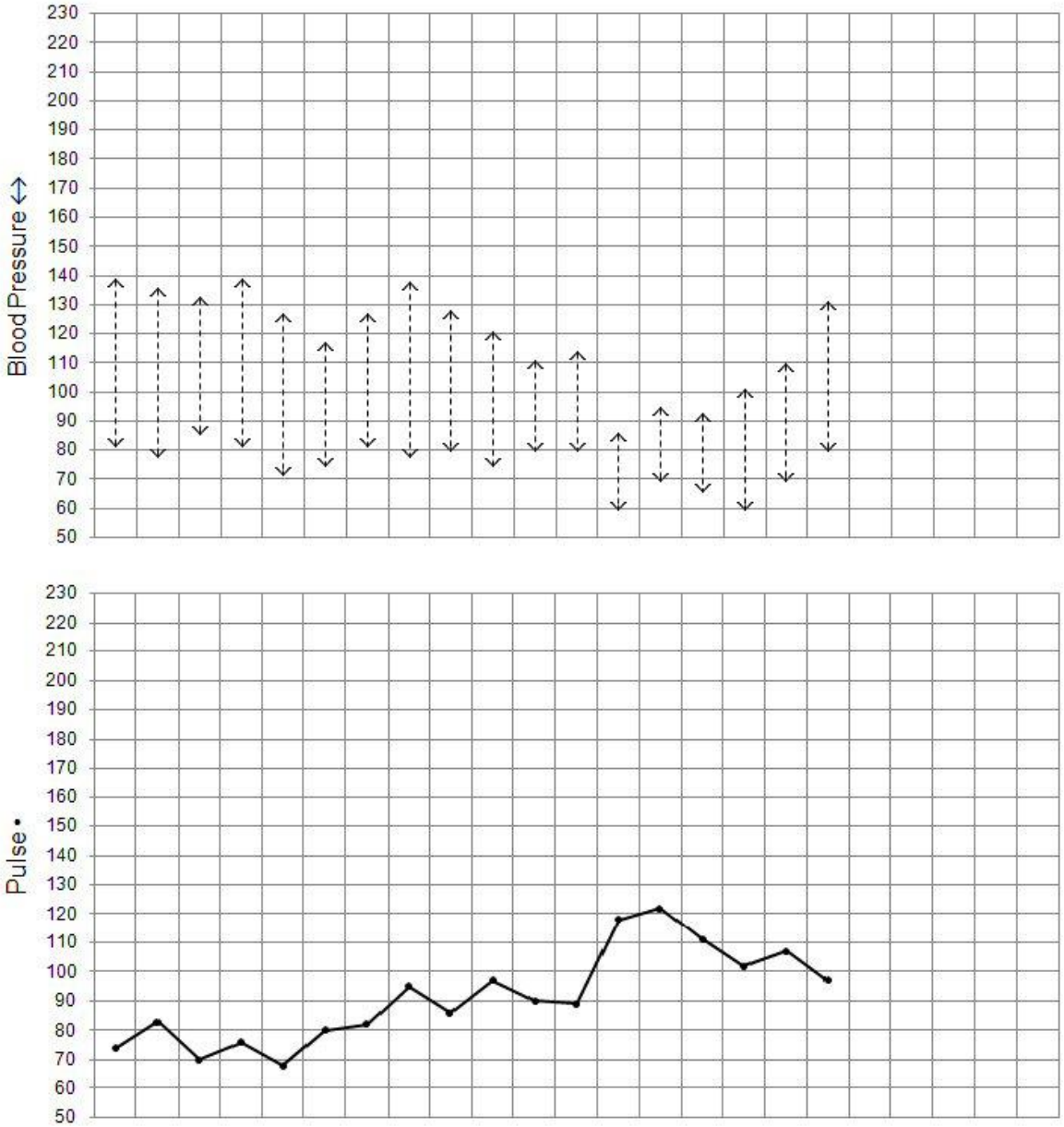


Image 2: An example of blood pressure and pulse plotted on separate graphs



I would find it easier to <u>detect patient deterioration</u> when both systolic and diastolic blood pressure are recorded together (for example, Image 3 below), rather than only systolic blood pressure (for example, Image 4 below). Please indicate your level of agreement with this statement:

Strongly disagree		Neutral		Strongly agree
○	○	○	○	○
1	2	3	4	5

Image 3: An example of recording both systolic and diastolic blood pressure

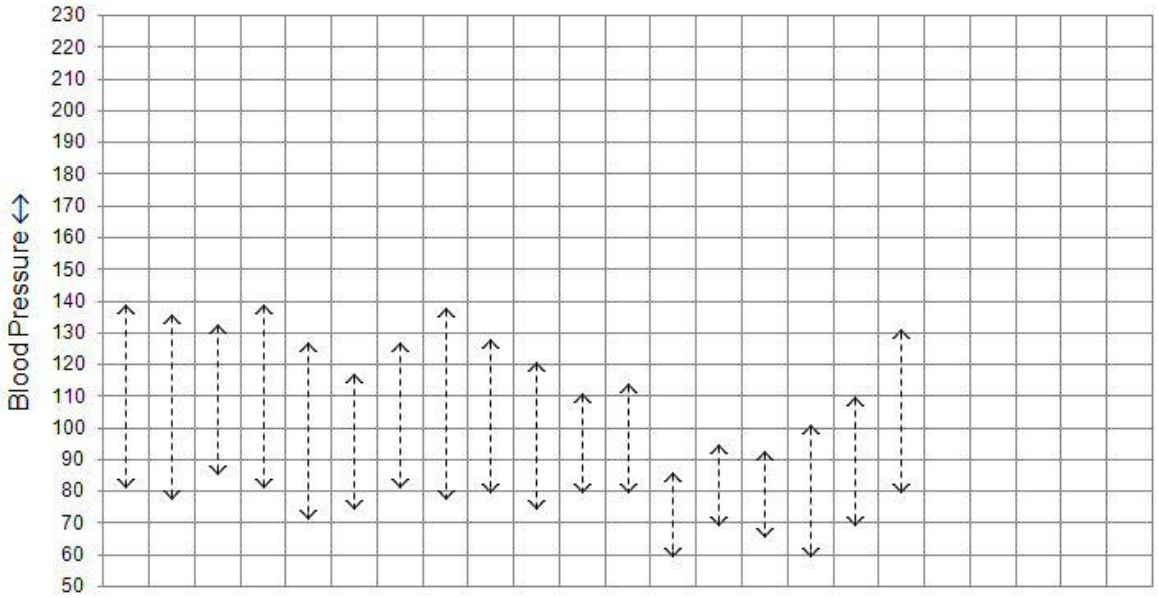
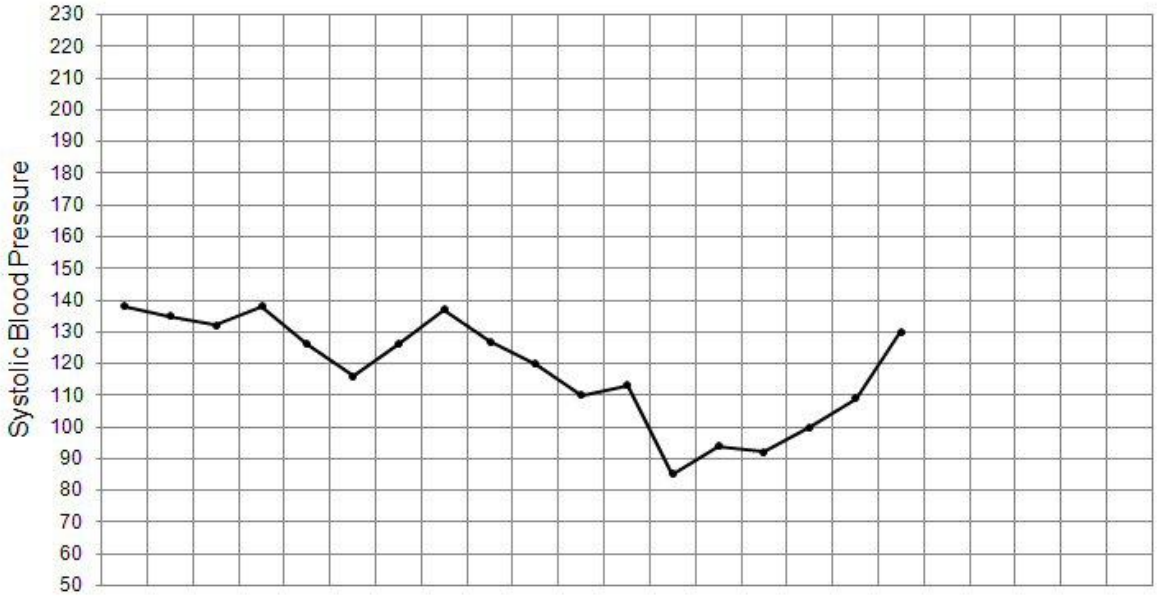


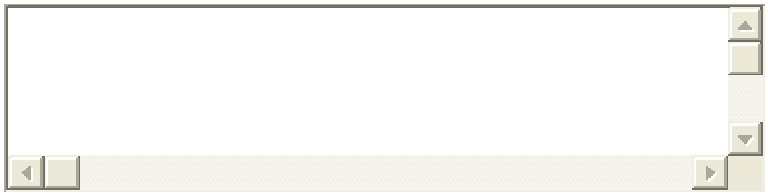
Image 4: An example of recording only systolic blood pressure



The next few statements refer to your institution's current Observation Chart. Please indicate your level of agreement:

	StronglyDisagree 1	2	3	Neutral 4	5	StronglyAgree
The Observation Chart has a user-friendly design.						
The Observation Chart is easy to record vital signs on.						
Staff may make errors when recording vital signs on the Observation Chart.						
The design of the Observation Chart may cause errors when recording vital signs.						
The Observation Chart clearly signals when a patient's vital signs are deteriorating.						
Staff may make errors in detecting when a patient's vital signs are deteriorating.						
The design of the Observation Chart may cause errors in detecting when a patient's vital signs are deteriorating						
The Observation Chart clearly states how to respond when a patient's vital signs are deteriorating.						
Staff may make errors when responding to a patient's vital signs deteriorating.						
The design of the Observation Chart may cause errors in responding to a patient's vital signs deteriorating.						
The design of the Observation Chart supports Staff's clinical decision making.						
I like the design of the Observation Chart.						
I like the Observation Chart as a whole.						

Please enter any comments you would like to make about the Observation Chart.



The final questions are about an example Observation Chart that is under review by the Research Team. Please take 1 to 2 minutes to look at the de-identified Chart.

The next few statements refer to the example Observation Chart shown above. Please indicate your level of agreement:

	Stronglydisagree 1	2	Neutral 3	4	Stronglyagree 5	
The Observation Chart has a user-friendly design.						
The Observation Chart is easy to record vital signs on.						
Staff may make errors when recording vital signs on the Observation Chart.						
The design of the Observation Chart may cause errors when recording vital signs.						
The Observation Chart clearly signals when a patient's vital signs are deteriorating.						
Staff may make errors in detecting when a patient's vital signs are deteriorating.						
The design of the Observation Chart may cause errors in detecting when a patient's vital signs are deteriorating.						
The Observation Chart clearly states how to respond when a patient's vital signs are deteriorating.						
Staff may make errors when responding to a patient's vital signs deteriorating.						
The design of the Observation Chart may cause errors in responding to a patient's vital signs deteriorating.						
The design of the Observation Chart supports Staff's clinical decision making.						
I like the design of the Observation Chart.						
I like the Observation Chart as a whole.						

Please enter any comments you would like to make about the example Observation Chart:

The example Observation Chart did not display on my computer.

- Yes
- No

End of survey questions.

Please enter your email address if you would like to enter the prize draw to win a new Apple iPhone. Your survey responses and your email address will be stored separately to maintain your anonymity.

I would like to receive a summary of the survey's findings sent via email.

- Yes
- No

Thank you for taking part in the survey. You have been entered in the prize draw to win a new Apple iPhone.

Appendix B: Participant Information About the Online Survey

The University Of Queensland AUSTRALIA

School of Psychology
Web Experiments

An Online Survey of Health Professionals' Opinions of Adult General Observation Charts

patientsafety centre

AUSTRALIANCOMMISSIONON SAFETYANDQUALITYINHEALTHCARE

Queensland Health
Skills Development Centre

Participant Information (scroll down)

You are invited to take part in this online survey of health professionals. This survey aims to gauge the opinions of health professionals regarding the design and use of adult general observation charts. This survey is part of a larger project examining the design and use of observation charts to identify and respond to patient deterioration.

Win a new iPhone!*

If you complete our survey, you will be eligible to enter a prize draw to win a new Apple iPhone. All you have to do is **enter your email address after the end of the survey**. Your survey responses and your email address will be stored separately to maintain your anonymity.

What does participation in this survey involve?

We would like you to complete a 15 to 20 minute survey. You will need to complete the survey in one sitting. The survey program does not allow you to save your incomplete responses to return to at a later time.

You will be asked questions about your professional background and about various aspects of observation chart design. There will be an opportunity for you to make open-ended comments if you would like to.

What are the possible benefits?

This survey is part of a larger project examining the design and use of observation charts. Developing a more user-friendly observation chart is likely to reduce the number of serious adverse events associated with undetected patient deterioration.

How will I be informed of the findings of this survey?

A summary of the project's findings will be sent to you via an email if you enter your email address after the end of the survey. Your responses and your email address will be stored separately to maintain your anonymity.

What will happen to information generated in this survey?

Survey results will be communicated in a report to the Australian Commission on Safety and Quality in Health Care. It is intended that survey results also be published in a peer-reviewed scientific journal.

Is this research project approved?

This study has been reviewed and approved by the Queensland Health Central Office Human Research Ethics Committee. Should you wish to discuss the study with someone not directly involved, in particular in relation to matters concerning policies, information about the conduct of the study or your rights as a participant, or should you wish to make an independent complaint, you can contact the Coordinator, Human Research Ethics Committee (3234 0034 or Enable JavaScript to view Email Address)

Consenting to participate

Participation in this survey is completely **voluntary** and **confidential**. Information supplied by you will be **non-identifiable**. If you decide to take part and later change your mind, you are **free to withdraw from the survey at any time**.

By clicking **'I agree'** you are telling us that you:

- Understand what you have read
- Consent to take part in the survey

I Agree

I agree to participate in this project.

I Disagree

I DO NOT agree to participate in this project.

Thank you,

The Research Team

Research Team:

Assoc. Professor Marcus Watson	Dr Mark Horswill	Ms Megan Preece
Principal Investigator	Associate Investigator	Associate Investigator
Senior Director	Senior Lecturer	Project Manager
Skills Development Centre	University of Queensland	University of Queensland

Supported By:

Queensland Health Skills Development Centre
Queensland Health Patient Safety Centre
The University of Queensland School of Psychology
Australian Commission on Safety and Quality in Health Care

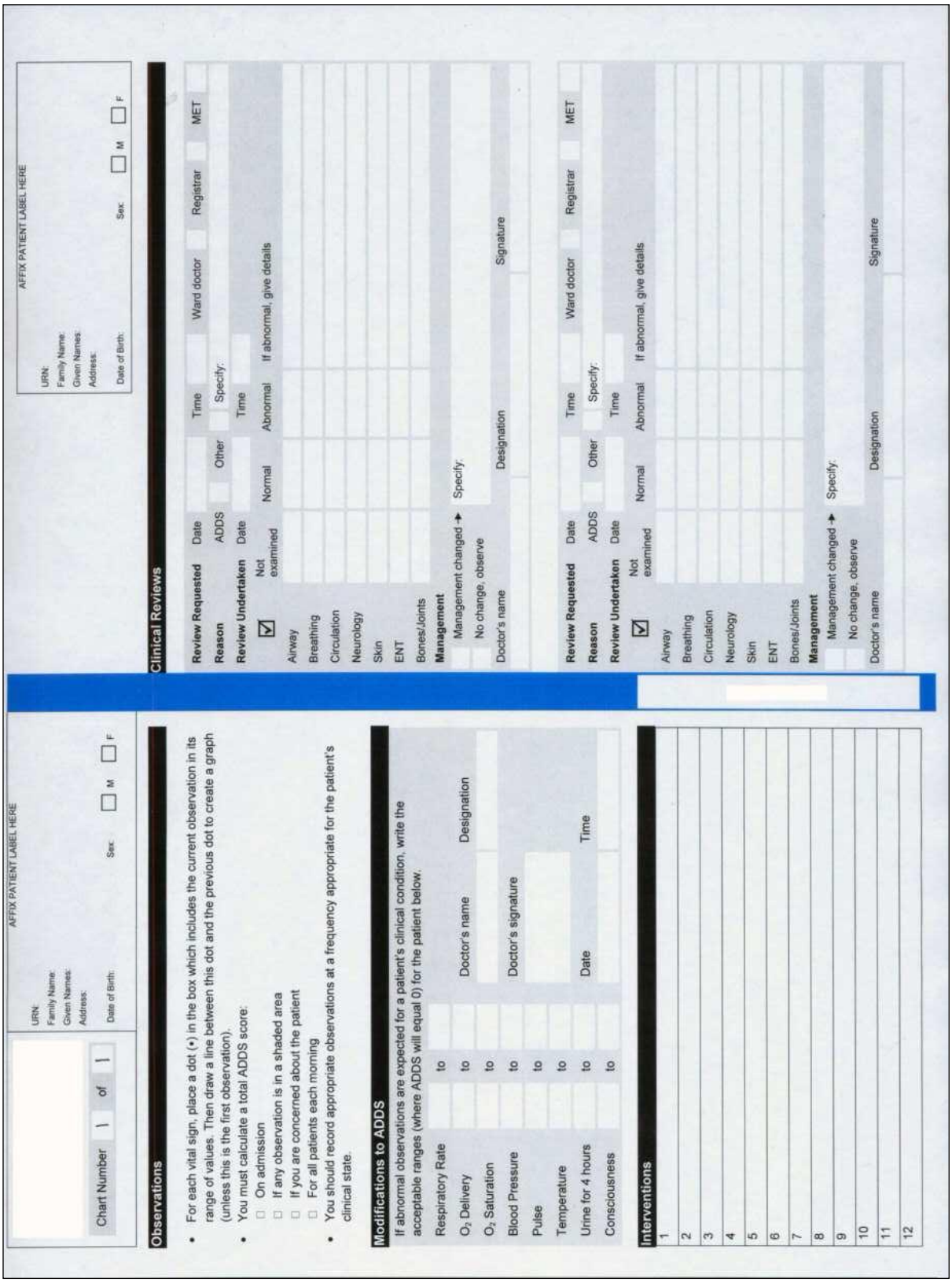
***Terms and Conditions**

1. **Introduction;** The Online Survey of Health Professionals' Opinions of Adult General Observation Charts Promotion ("Promotion") is conducted by The University of Queensland ("UQ") under the Charitable and Non-Profit Gaming Act 1999 (Qld).
   The winner of the prize will be selected in a random draw from all eligible entries received by the School of Psychology. Odds of winning will depend on the number of eligible entries received. Please note that at least 180 eligible responses are expected (at least 1,200 people have been invited to take part in this online survey with an estimated 15% response rate).
2. **Timing;** The Promotion will take place from the 19th October 2009 to the 30th November 2009 ("Promotion Period").
3. **Closing date;** The Promotion closes at 5.00pm on the 30th November 2009 ("Closing Date").
4. **Eligibility;** All prizes offered as part of the Promotion are open to all individuals who:
   a. are Australian residents; and
   b. have completed and submitted the Online Survey of Health Professionals' Opinions of Adult General Observation Charts.
5. **How to enter;** Eligible persons must have completed Online Survey of Health Professionals' Opinions of Adult General Observation Charts, with a valid email address.
   Entries received before 5pm on 30th November 2009 will be eligible to enter the prize draw.
   Only one entry per person will be registered and included in the draw for the prize.
6. **Selection of winner;** On 1st December 2009, UQ will randomly select a winner from all eligible entries received during the Promotion Period.
7. **Notification of the winner;** The winner will be notified via email within 48 hours of the prize being drawn.
   The winner must sign and return to the School of Psychology, a Personal Payment Details form to claim the Prize.
   If the Prize is not claimed by 4th January 2010, the Prize will be forfeited and the winner's entitlement will lapse.
8. **Prize;** Apple iPhone 3G 16Gb, RRP A$879.
9. **Data Collection.** Information provided in the Online Survey of Health Professionals' Opinions of Adult General Observation Charts will be used for the purpose of:
   a. research into the adult general observation charts;
   b. selecting a winner for this Promotion; and

   UQ will manage the personal information collected in accordance with its Privacy Management Policy located at http://www.uq.edu.au/privacy

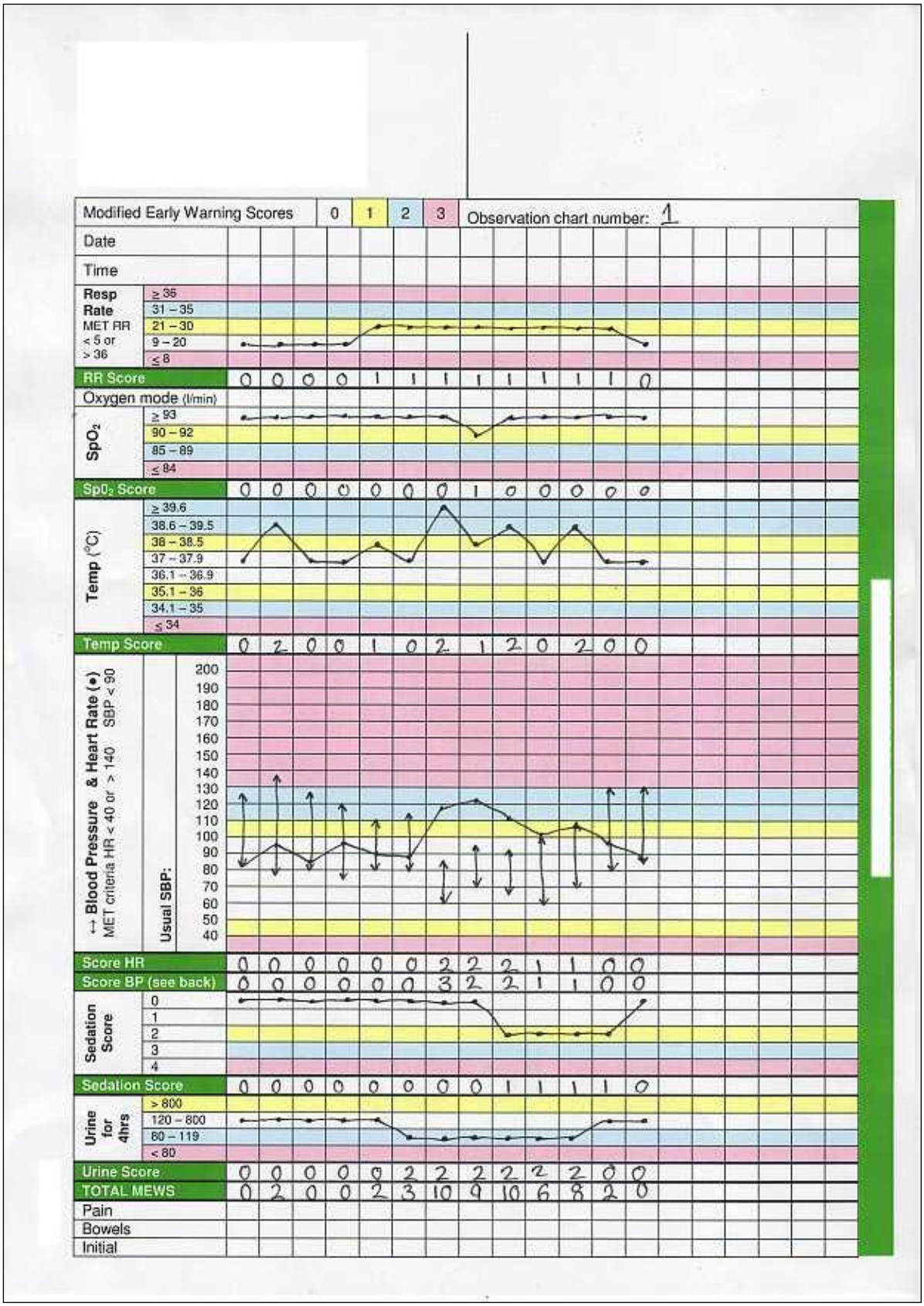
Appendix C: Observation Charts Included in the Online Survey

Chart 1



AFFIX PATIENT LABEL HERE
URN:
Family Name:
Given Names:
Address:
Date of Birth:
Sex: M F
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 MET 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
Adult Deterioration Detection System (ADDS)
If any observation is in a shaded area, add up the total ADDS score and take action.
Score 0
Score 1
Score 2
Score 3
Score 4
Score 5
MET call
Medical Emergency Team (MET) 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
Date
Time
Respiratory Rate (breaths / min)
O2 Delivery (L / min)
O2 Saturation (%)
Blood Pressure (mmHg)
(If Systolic BP ≥ 200, write value in box)
Pulse (beats / min)
(If Pulse ≥ 140, write value in box)
Temperature (C)
Urine for 4 hours (ml)
Consciousness (if necessary, wake patient before scoring)
Increased Pain
ADDS Scores
Respiratory Rate
O2 Delivery
O2 Saturation
Systolic BP
Pulse
Temperature
Urine for 4 hours
Consciousness
TOTAL ADDS
Circle the column showing the patient's usual Systolic BP
Score for the patient's current Systolic BP
MET Call
MET

Chart 2


Modified Early Warning Scores
0
1
2
3
Observation chart number: 1
Date
Time
Resp Rate
MET RR < 5 or > 36
≥ 35
31 – 35
21 – 30
9 – 20
≤ 8
RR Score
0 0 0 0 1 1 1 1 1 1 1 1 0
Oxygen mode (l/min)
SpO2
≥ 93
90 – 92
85 – 89
≤ 84
SpO2 Score
0 0 0 0 0 0 0 1 0 0 0 0 0
Temp (°C)
≥ 39.6
38.6 – 39.5
38 – 38.5
37 – 37.9
36.1 – 36.9
35.1 – 36
34.1 – 35
≤ 34
Temp Score
0 2 0 0 1 0 2 1 2 0 2 0 0
↕ Blood Pressure & Heart Rate (•)
MET criteria HR < 40 or > 140 SBP < 90
Usual SBP:
200
190
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
Score HR
0 0 0 0 0 0 2 2 2 1 1 0 0
Score BP (see back)
0 0 0 0 0 0 3 2 2 1 1 0 0
Sedation Score
0
1
2
3
4
Sedation Score
0 0 0 0 0 0 0 0 1 1 1 1 0
Urine for 4hrs
> 800
120 – 800
80 – 119
< 80
Urine Score
0 0 0 0 0 2 2 2 2 2 2 0 0
TOTAL MEWS
0 2 0 0 2 3 10 9 10 6 8 2 0
Pain
Bowels
Initial

Date										
Time										
Weight										
DVT/PE Risk	H M L	H M L	H M L	H M L	H M L	H M L	H M L	H M L	H M L	H M L
Waterlow										

Urinalysis

Date							
Time							
Leucocytes							
Nitrate							
Urobilinogen							
Protein							
pH							
Blood							
Specific Gravity							
Ketones							
Bilirubin							
Glucose							

Height:

Weight on Admission:

BMI

Pain Score
No pain – 0
Worst – 10

Sedation Score:
0 = awake & alert
1 = normally asleep, responds to stimuli
2 = mild, occasionally drowsy, easy to rouse
3 = moderate, frequently drowsy easy to rouse but unable to maintain wakeful state
4 = severe, somnolent, difficult to rouse

Other obs charts in use:
- ☐ PCA
- ☐ Epidural
- ☐ Neurological
- ☐ Blood transfusion
- ☐ Underwater seal
- ☐ Neurovascular
- ☐ Peak flow
- ☐ Alcohol withdrawal
- ☐ Fluid balance
- ☐ Bladder irrigation
- ☐ Post angiogram
- ☐ Post procedural
- ☐ Stool chart
- ☐ Blood glucose

Circle patient's usual BP

Additional Considerations

Current Blood Pressure / Usual SBP	190	180	170	160	150	140	130	120	110	100	90	80
200s	0	0	1	1	2	2	2	3	3	4	5	5
190s	0	0	0	1	1	1	2	2	3	3	4	4
180s	0	0	0	0	0	1	1	2	2	3	3	4
170s	1	0	0	0	0	1	1	2	2	3	3	3
160s	1	1	0	0	0	0	0	1	1	2	2	2
150s	1	1	1	0	0	0	0	0	1	1	2	2
140s	2	1	1	1	0	0	0	0	0	1	1	1
130s	2	2	1	1	0	0	0	0	0	0	0	1
120s	2	2	2	1	1	0	0	0	0	0	0	0
110s	3	2	2	2	1	1	0	0	0	0	0	0
100s	3	3	3	2	2	2	1	1	0	0	0	0
90s	4	3	3	3	2	2	2	2	1	1	0	0
80s	MET 4				MET 3				MET 2		1	0
70s											MET 1	

MET Criteria:

All respiratory & cardiac arrests

Threatened Airway, RR < 5 or > 36

Pulse < 40 or > 140

Systolic BP < 90

Sudden fall in level of consciousness, fall of GCS > 2, repeated or prolonged seizures

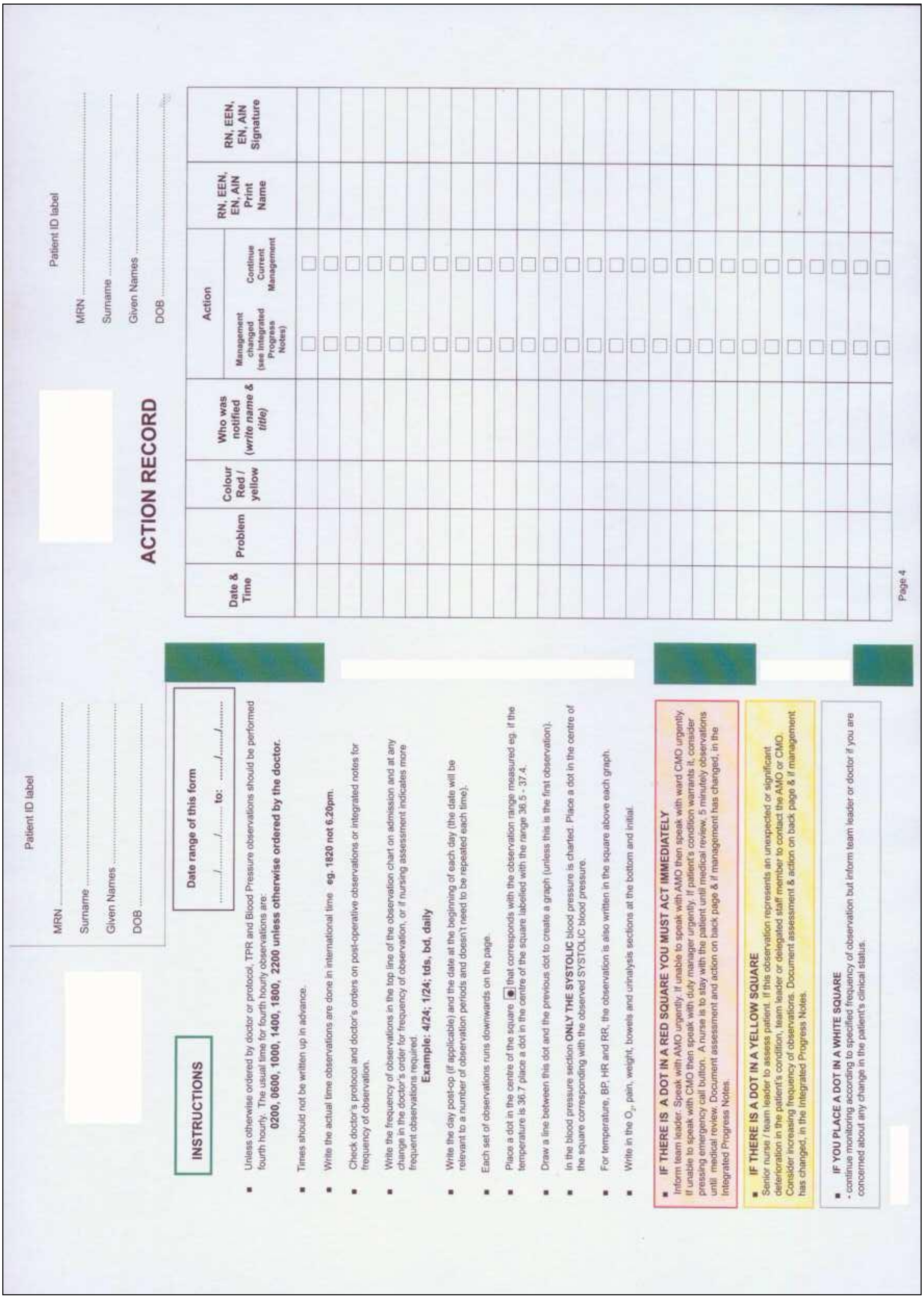
Any patient you are seriously worried about that does not fit the above criteria

Date/Time	Modification to MEWS	Signature

Action if MEWS ≥ 4

Date/Time	MEWS	Action	Signature

Chart 3



Patient ID label

MRN ....

Surname ....

Given Names ....

DOB ....

INSTRUCTIONS

Date range of this form

......../......../........ **to:** ..../......../........

- Unless otherwise ordered by doctor or protocol, TPR and Blood Pressure observations should be performed fourth hourly. The usual time for fourth hourly observations are:
  0200, 0600, 1000, 1400, 1800, 2200 unless otherwise ordered by the doctor.
- Times should not be written up in advance.
- Write the actual time observations are done in international time **eg. 1820 not 6.20pm.**
- Check doctor's protocol and doctor's orders on post-operative observations or integrated notes for frequency of observation.
- Write the frequency of observations in the top line of the observation chart on admission and at any change in the doctor's order for frequency of observation, or if nursing assessment indicates more frequent observations required.
  Example: 4/24; 1/24; tds, bd, daily
- Write the day post-op (if applicable) and the date at the beginning of each day (the date will be relevant to a number of observation periods and doesn't need to be repeated each time).
- Each set of observations runs downwards on the page.
- Place a dot in the centre of the square [●] that corresponds with the observation range measured eg. if the temperature is 36.7 place a dot in the centre of the square labelled with the range 36.5 - 37.4.
- Draw a line between this dot and the previous dot to create a graph (unless this is the first observation).
- In the blood pressure section **ONLY THE SYSTOLIC** blood pressure is charted. Place a dot in the centre of the square corresponding with the observed SYSTOLIC blood pressure.
- For temperature, BP, HR and RR, the observation is also written in the square above each graph.
- Write in the O_2, pain, weight, bowels and urinalysis sections at the bottom and initial.

- **IF THERE IS A DOT IN A RED SQUARE YOU MUST ACT IMMEDIATELY**
Inform team leader. Speak with AMO urgently. If unable to speak with AMO then speak with ward CMO urgently. If unable to speak with CMO then speak with duty manager urgently. If patient's condition warrants it, consider pressing emergency call button. A nurse is to stay with the patient until medical review, 5 minutely observations until medical review. Document assessment and action on back page & if management has changed, in the Integrated Progress Notes.

- **IF THERE IS A DOT IN A YELLOW SQUARE**
Senior nurse / team leader to assess patient. If this observation represents an unexpected or significant deterioration in the patient's condition, team leader or delegated staff member to contact the AMO or CMO. Consider increasing frequency of observations. Document assessment & action on back page & if management has changed, in the Integrated Progress Notes.

- **IF YOU PLACE A DOT IN A WHITE SQUARE**
- continue monitoring according to specified frequency of observation but inform team leader or doctor if you are concerned about any change in the patient's clinical status.

ACTION RECORD

Patient ID label

MRN ....

Surname ....

Given Names ....

DOB ....

Date & Time	Problem	Colour Red / yellow	Who was notified (*write name & title*)	Action: Management changed (see Integrated Progress Notes)	Action: Continue Current Management	RN, EEN, EN, AIN Print Name	RN, EEN, EN, AIN Signature

Page 4

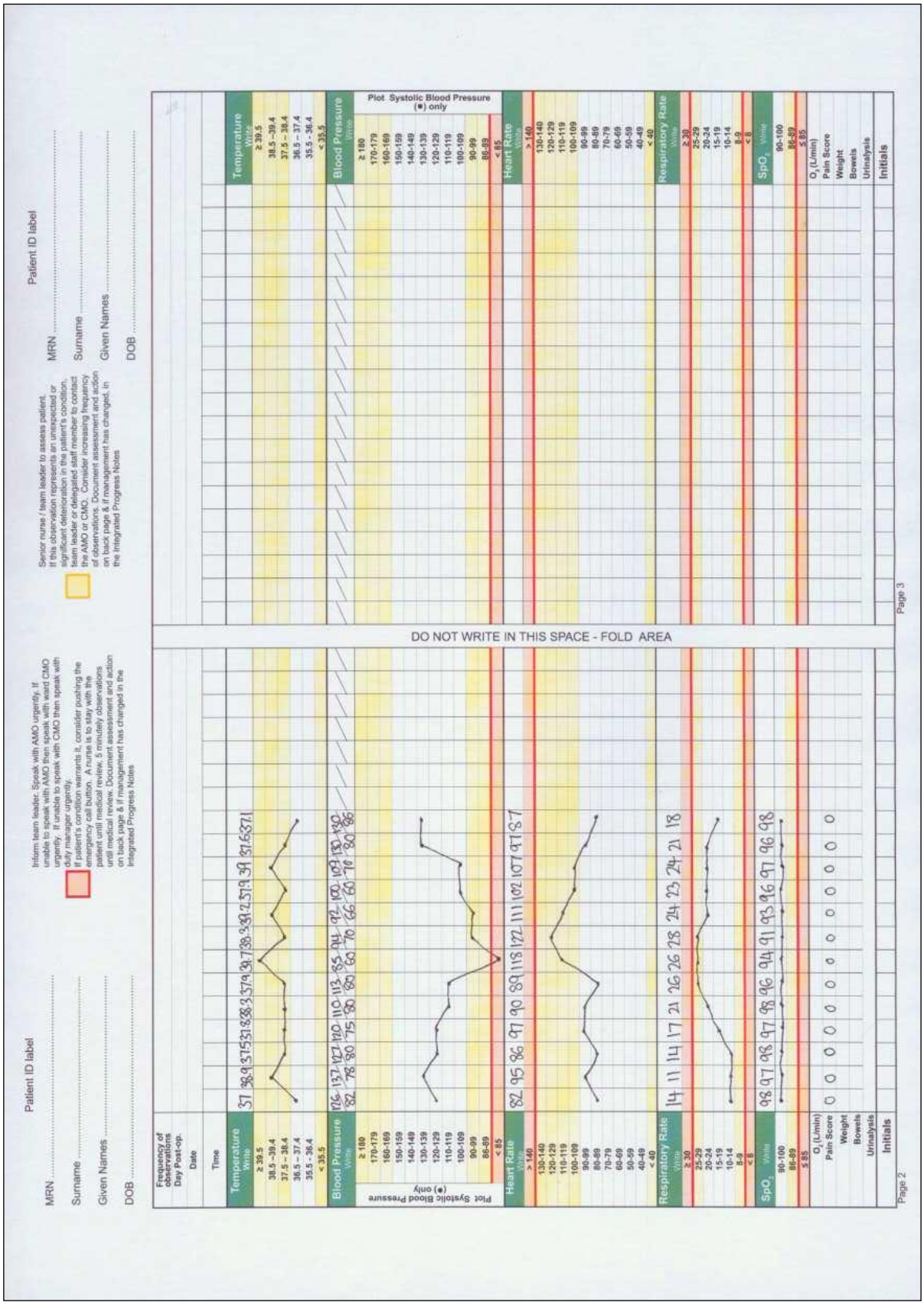
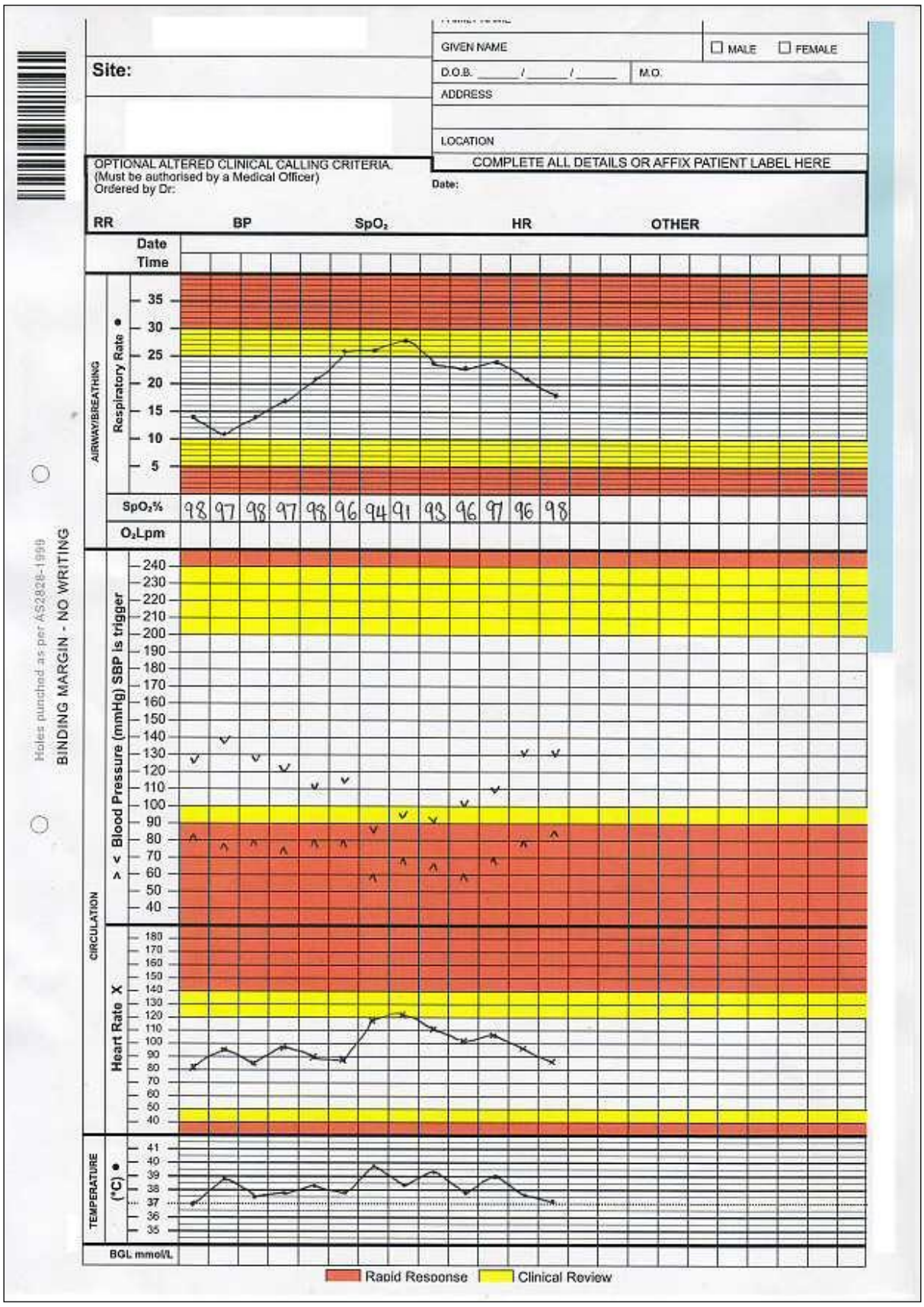
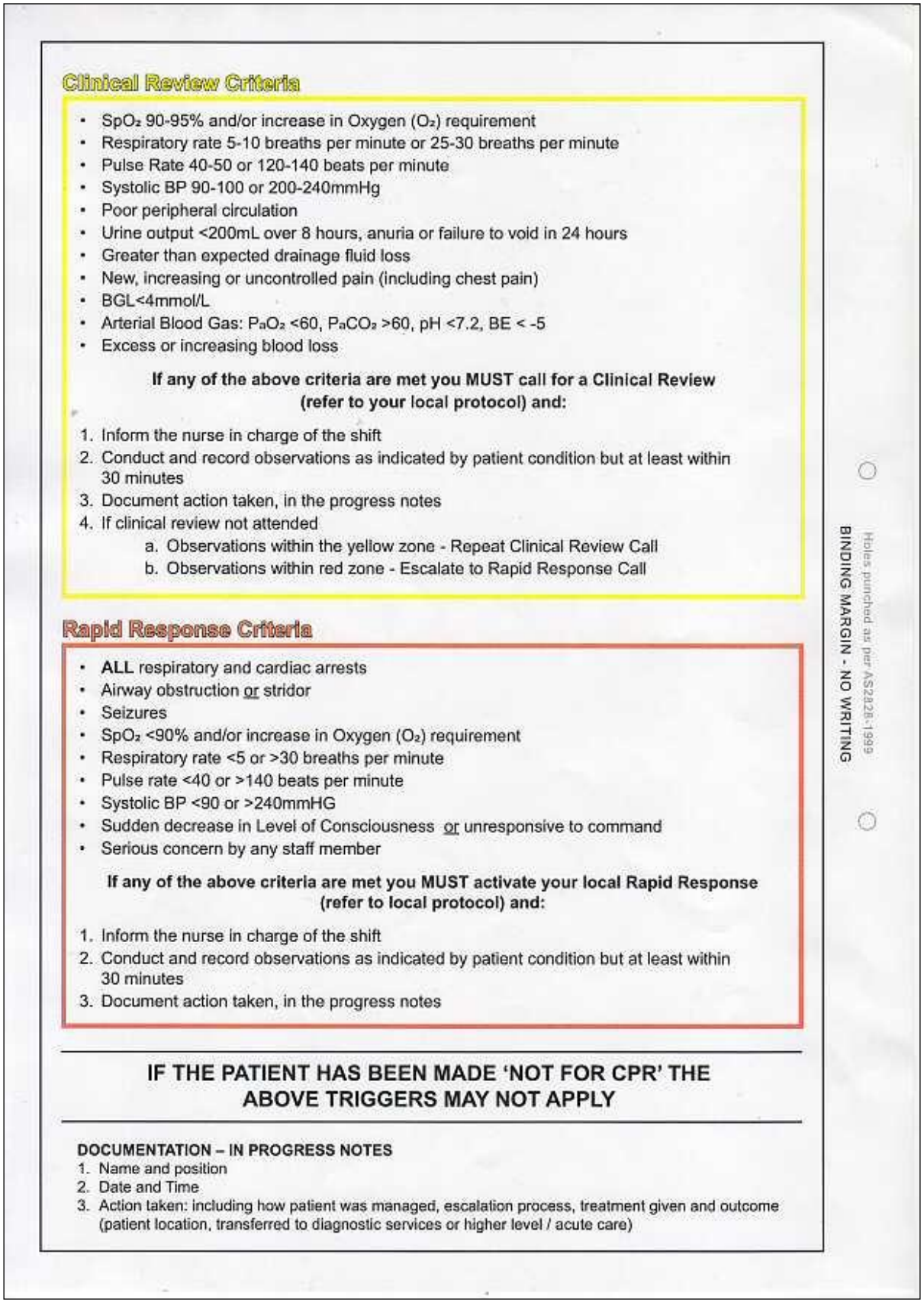

Patient ID label
MRN
Surname
Given Names
DOB
Inform team leader. Speak with AMO urgently. If unable to speak with AMO then speak with ward CMO urgently. If unable to speak with CMO then speak with duty manager urgently.
If patient's condition warrants it, consider pushing the emergency call button. A nurse is to stay with the patient until medical review. 5 minutely observations until medical review. Document assessment and action on back page & if management has changed in the Integrated Progress Notes
Senior nurse / team leader to assess patient. If this observation represents an unexpected or significant deterioration in the patient's condition, team leader or delegated staff member to contact the AMO or CMO. Consider increasing frequency of observations. Document assessment and action on back page & if management has changed, in the Integrated Progress Notes
Patient ID label
MRN
Surname
Given Names
DOB
DO NOT WRITE IN THIS SPACE - FOLD AREA
Frequency of observations
Day Post-op.
Date
Time
Temperature
Write
≥ 39.5
38.5 –39.4
37.5 – 38.4
36.5 – 37.4
35.5 - 36.4
< 35.5
Blood Pressure
Write
Plot Systolic Blood Pressure (●) only
≥ 180
170-179
160-169
150-159
140-149
130-139
120-129
110-119
100-109
90-99
86-89
≤ 85
Heart Rate
Write
≥ 140
130-140
120-129
110-119
100-109
90-89
80-89
70-79
60-69
50-59
40-49
< 40
Respiratory Rate
Write
≥ 30
25-29
20-24
15-19
10-14
8-9
< 8
SpO2
Write
90-100
86-89
≤ 85
O2 (L/min)
Pain Score
Weight
Bowels
Urinalysis
Initials
Page 2
Page 3

Chart 4


Site:
GIVEN NAME
MALE
FEMALE
D.O.B.
M.O.
ADDRESS
LOCATION
COMPLETE ALL DETAILS OR AFFIX PATIENT LABEL HERE
OPTIONAL ALTERED CLINICAL CALLING CRITERIA
(Must be authorised by a Medical Officer)
Ordered by Dr:
Date:
RR
BP
SpO2
HR
OTHER
Date
Time
AIRWAY/BREATHING
Respiratory Rate
SpO2%
98 97 98 97 98 96 94 91 93 96 97 96 98
O2Lpm
CIRCULATION
Blood Pressure (mmHg) SBP is trigger
Heart Rate
TEMPERATURE
(°C)
BGL mmol/L
Rapid Response
Clinical Review
BINDING MARGIN - NO WRITING
Holes punched as per AS2828-1998



Clinical Review Criteria

- SpO_2 90-95% and/or increase in Oxygen (O_2) requirement
- Respiratory rate 5-10 breaths per minute or 25-30 breaths per minute
- Pulse Rate 40-50 or 120-140 beats per minute
- Systolic BP 90-100 or 200-240mmHg
- Poor peripheral circulation
- Urine output <200mL over 8 hours, anuria or failure to void in 24 hours
- Greater than expected drainage fluid loss
- New, increasing or uncontrolled pain (including chest pain)
- BGL<4mmol/L
- Arterial Blood Gas: P_aO_2 <60, P_aCO_2 >60, pH <7.2, BE < -5
- Excess or increasing blood loss

If any of the above criteria are met you MUST call for a Clinical Review (refer to your local protocol) and:

1. Inform the nurse in charge of the shift
2. Conduct and record observations as indicated by patient condition but at least within 30 minutes
3. Document action taken, in the progress notes
4. If clinical review not attended
   a. Observations within the yellow zone - Repeat Clinical Review Call
   b. Observations within red zone - Escalate to Rapid Response Call

Rapid Response Criteria

- **ALL** respiratory and cardiac arrests
- Airway obstruction or stridor
- Seizures
- SpO_2 <90% and/or increase in Oxygen (O_2) requirement
- Respiratory rate <5 or >30 breaths per minute
- Pulse rate <40 or >140 beats per minute
- Systolic BP <90 or >240mmHG
- Sudden decrease in Level of Consciousness or unresponsive to command
- Serious concern by any staff member

If any of the above criteria are met you MUST activate your local Rapid Response (refer to local protocol) and:

1. Inform the nurse in charge of the shift
2. Conduct and record observations as indicated by patient condition but at least within 30 minutes
3. Document action taken, in the progress notes

IF THE PATIENT HAS BEEN MADE 'NOT FOR CPR' THE ABOVE TRIGGERS MAY NOT APPLY

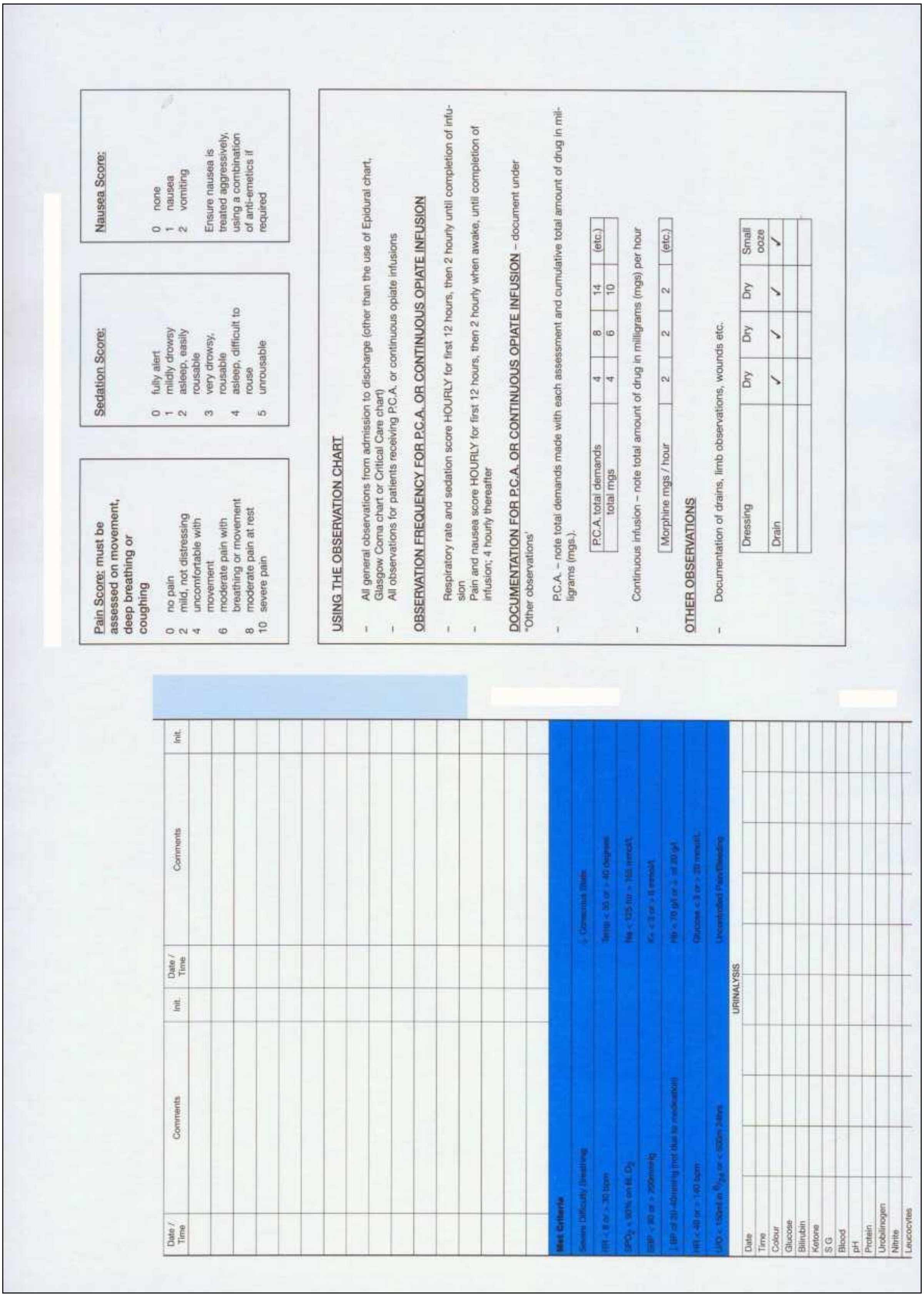
DOCUMENTATION – IN PROGRESS NOTES

1. Name and position
2. Date and Time
3. Action taken: including how patient was managed, escalation process, treatment given and outcome (patient location, transferred to diagnostic services or higher level / acute care)

Holes punched as per AS2828-1999

BINDING MARGIN - NO WRITING

Chart 5


Pain Score: must be assessed on movement, deep breathing or coughing
0 no pain
2 mild, not distressing
4 uncomfortable with movement
6 moderate pain with breathing or movement
8 moderate pain at rest
10 severe pain
Sedation Score:
0 fully alert
1 mildly drowsy
2 asleep, easily rousable
3 very drowsy, rousable
4 asleep, difficult to rouse
5 unrousable
Nausea Score:
0 none
1 nausea
2 vomiting
Ensure nausea is treated aggressively, using a combination of anti-emetics if required
USING THE OBSERVATION CHART
– All general observations from admission to discharge (other than the use of Epidural chart, Glasgow Coma chart or Critical Care chart)
– All observations for patients receiving P.C.A. or continuous opiate infusions
OBSERVATION FREQUENCY FOR P.C.A. OR CONTINUOUS OPIATE INFUSION
– Respiratory rate and sedation score HOURLY for first 12 hours, then 2 hourly until completion of infusion
– Pain and nausea score HOURLY for first 12 hours, then 2 hourly when awake, until completion of infusion; 4 hourly thereafter
DOCUMENTATION FOR P.C.A. OR CONTINUOUS OPIATE INFUSION – document under "Other observations'
– P.C.A. – note total demands made with each assessment and cumulative total amount of drug in milligrams (mgs.).
P.C.A. total demands 4 8 14 (etc.)
total mgs 4 6 10
– Continuous infusion – note total amount of drug in milligrams (mgs) per hour
Morphine mgs / hour 2 2 2 (etc.)
OTHER OBSERVATIONS
– Documentation of drains, limb observations, wounds etc.
Dressing Dry Dry Dry Small ooze
Drain ✓ ✓ ✓ ✓
Date / Time
Comments
Init.
Met Criteria
URINALYSIS
Date
Time
Colour
Glucose
Bilirubin
Ketone
S G
Blood
pH
Protein
Urobilinogen
Nitrite
Leucocytes

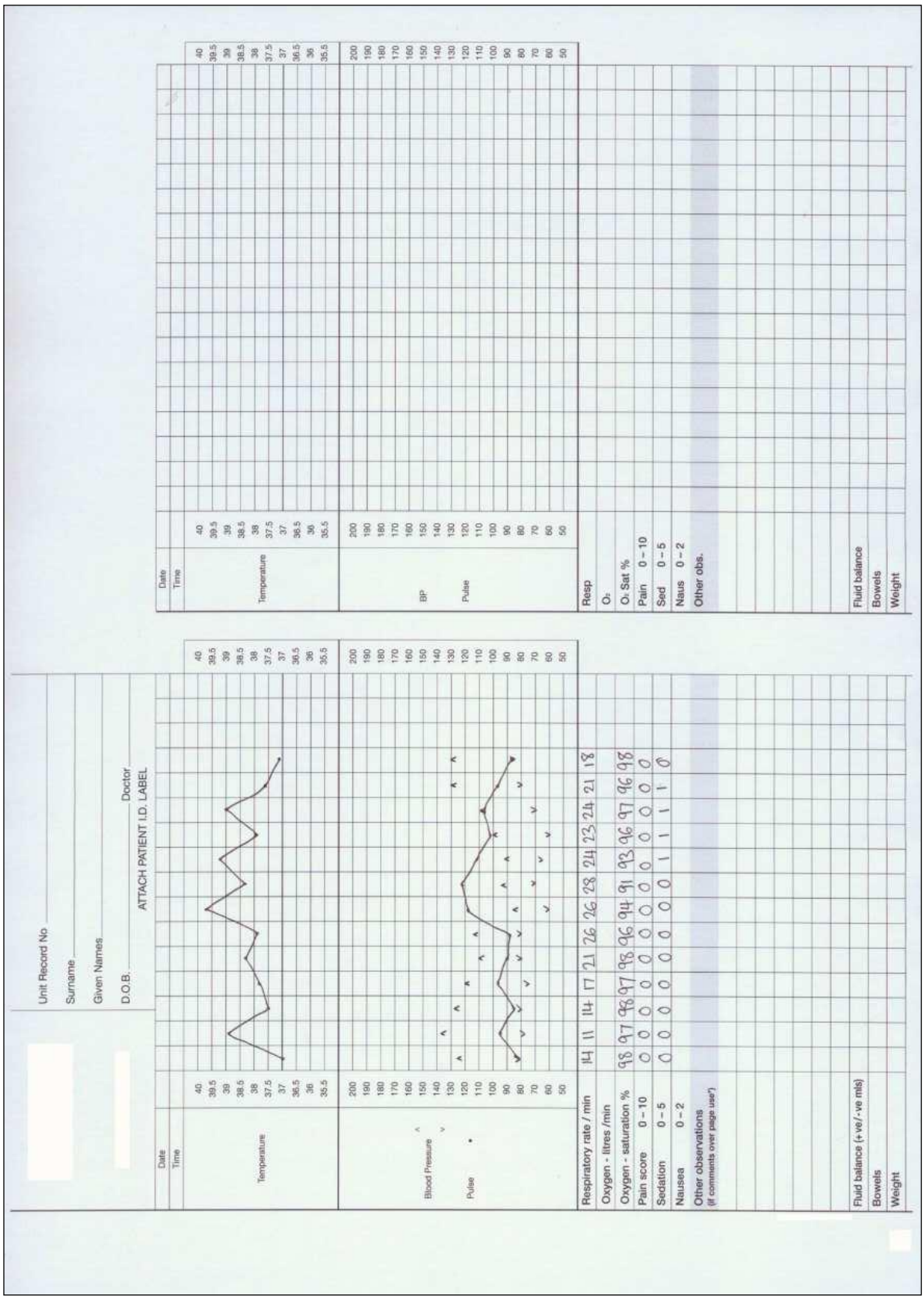
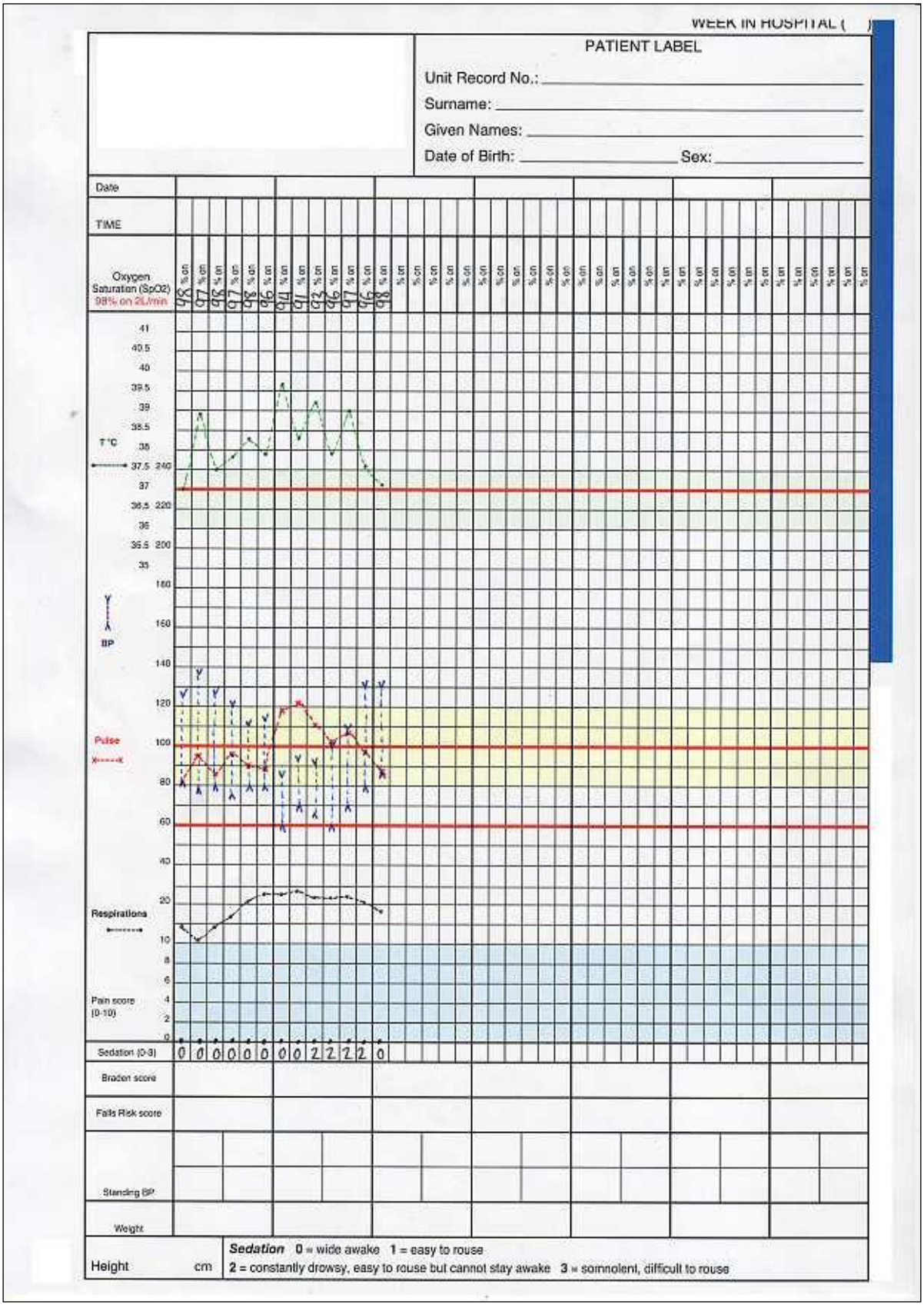
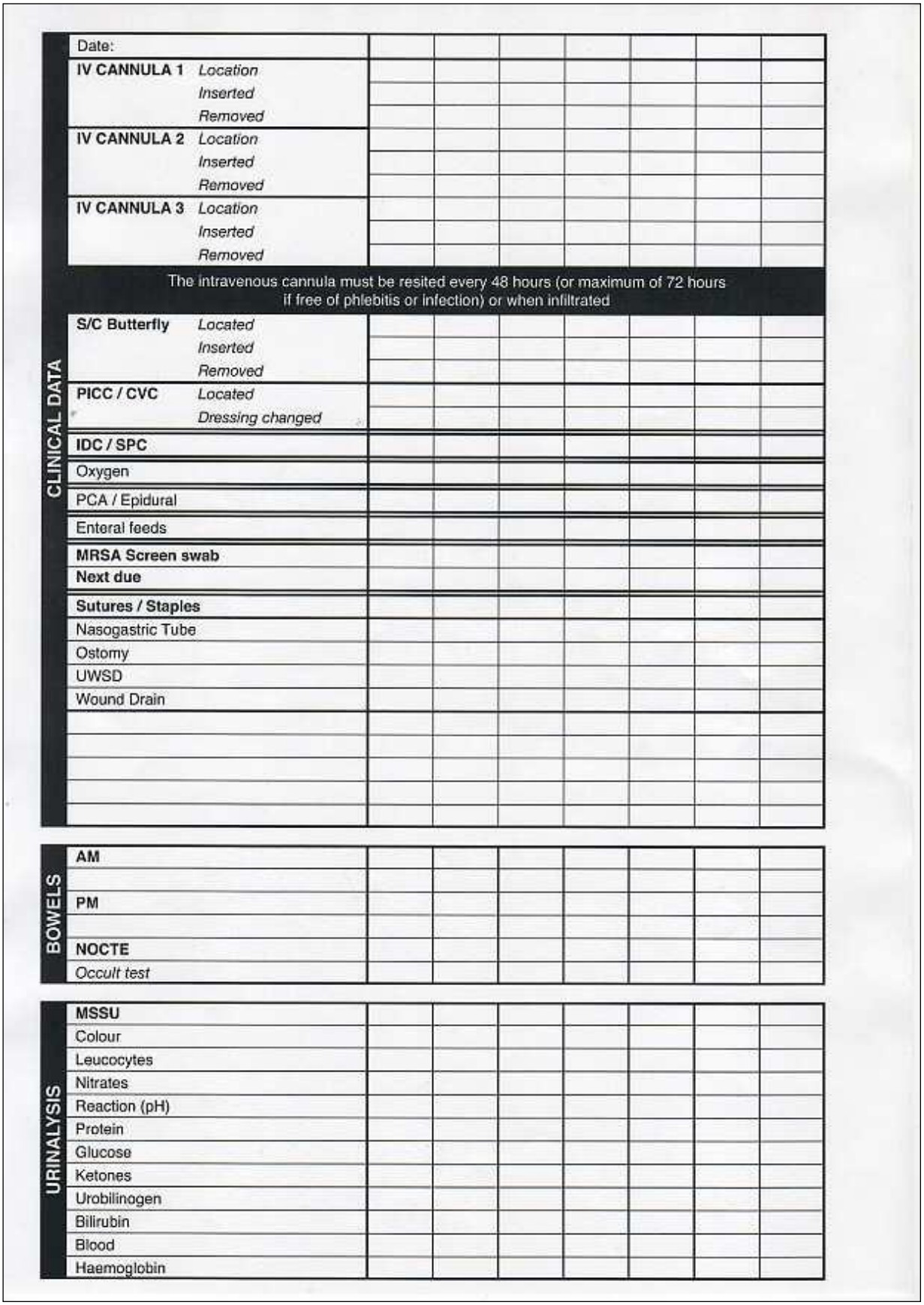

Unit Record No
Surname
Given Names
D.O.B.
Doctor
ATTACH PATIENT I.D. LABEL
Date
Time
Temperature
Blood Pressure
Pulse
BP
Respiratory rate / min
Oxygen - litres /min
Oxygen - saturation %
Pain score 0 – 10
Sedation 0 – 5
Nausea 0 – 2
Other observations
(if comments over page use*)
Fluid balance (+ve/-ve mls)
Bowels
Weight
Resp
O2
O2 Sat %
Pain 0 – 10
Sed 0 – 5
Naus 0 – 2
Other obs.
Fluid balance
Bowels
Weight

Chart 6


WEEK IN HOSPITAL (
PATIENT LABEL
Unit Record No.:
Surname:
Given Names:
Date of Birth:
Sex:
Date
TIME
Oxygen Saturation (SpO2) 98% on 2L/min
T °C
BP
Pulse
Respirations
Pain score (0-10)
Sedation (0-3)
Braden score
Falls Risk score
Standing BP
Weight
Height cm
Sedation 0 = wide awake 1 = easy to rouse
2 = constantly drowsy, easy to rouse but cannot stay awake 3 = somnolent, difficult to rouse



CLINICAL DATA	Date:							
	IV CANNULA 1	*Location*						
		Inserted						
		Removed						
	IV CANNULA 2	*Location*						
		Inserted						
		Removed						
	IV CANNULA 3	*Location*						
		Inserted						
		Removed						
	The intravenous cannula must be resited every 48 hours (or maximum of 72 hours if free of phlebitis or infection) or when infiltrated							
	S/C Butterfly	*Located*						
		Inserted						
		Removed						
	PICC / CVC	*Located*						
		Dressing changed						
	IDC / SPC							
	Oxygen							
	PCA / Epidural							
	Enteral feeds							
	MRSA Screen swab							
	Next due							
	Sutures / Staples							
	Nasogastric Tube							
	Ostomy							
	UWSD							
	Wound Drain							
BOWELS	**AM**							
	PM							
	NOCTE							
	Occult test							
URINALYSIS	**MSSU**							
	Colour							
	Leucocytes							
	Nitrates							
	Reaction (pH)							
	Protein							
	Glucose							
	Ketones							
	Urobilinogen							
	Bilirubin							
	Blood							
	Haemoglobin							

Chart 7

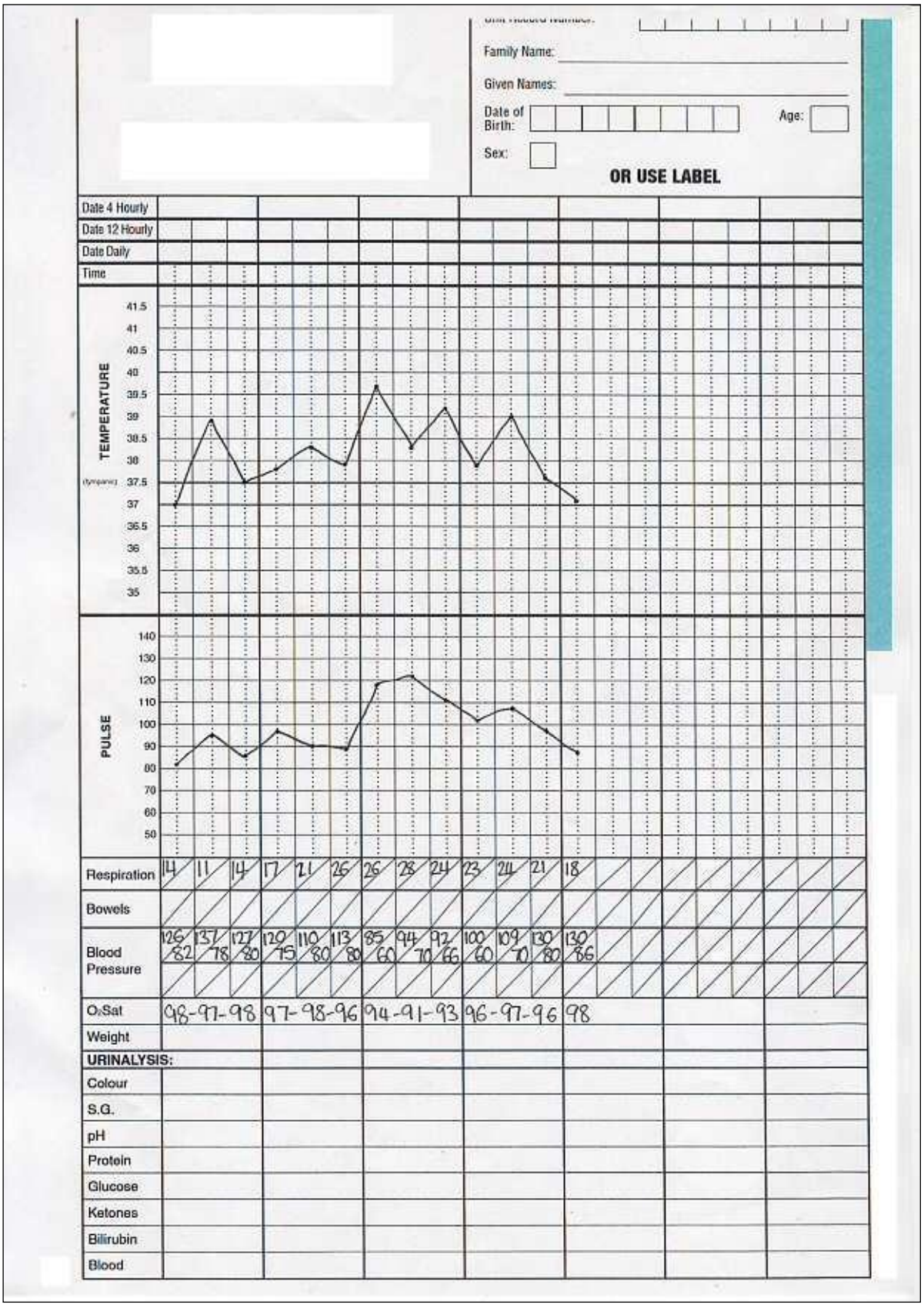
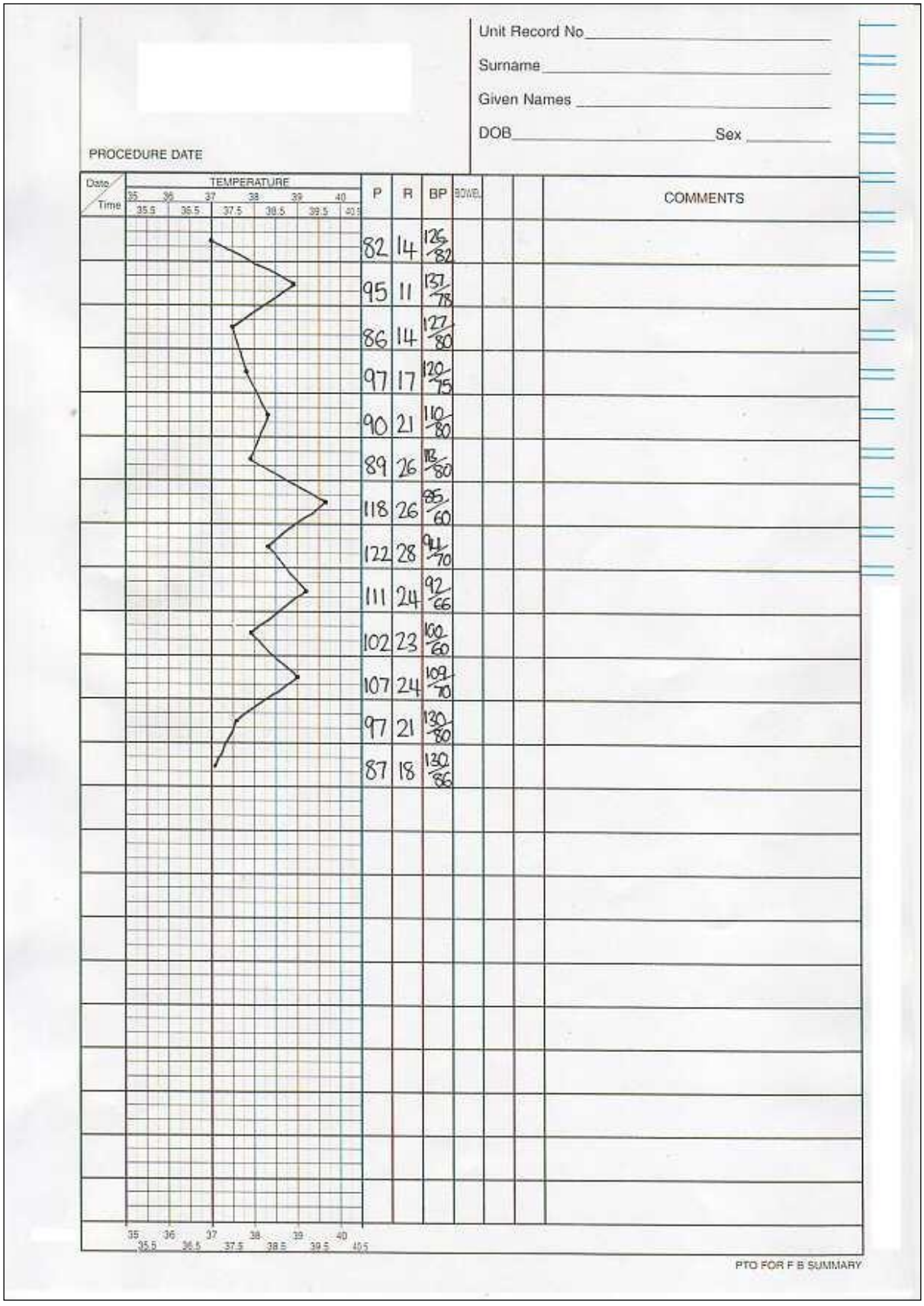

Family Name:
Given Names:
Date of Birth:
Age:
Sex:
OR USE LABEL
Date 4 Hourly
Date 12 Hourly
Date Daily
Time
TEMPERATURE
41.5
41
40.5
40
39.5
39
38.5
38
37.5
37
36.5
36
35.5
35
PULSE
140
130
120
110
100
90
80
70
60
50
Respiration
14 11 14 17 21 26 26 28 24 23 24 21 18
Bowels
Blood Pressure
126/82 137/78 127/80 120/76 110/80 113/80 85/60 94/70 92/66 100/60 109/70 130/80 130/86
O2Sat
98-97-98 97-98-96 94-91-93 96-97-96 98
Weight
URINALYSIS:
Colour
S.G.
pH
Protein
Glucose
Ketones
Bilirubin
Blood

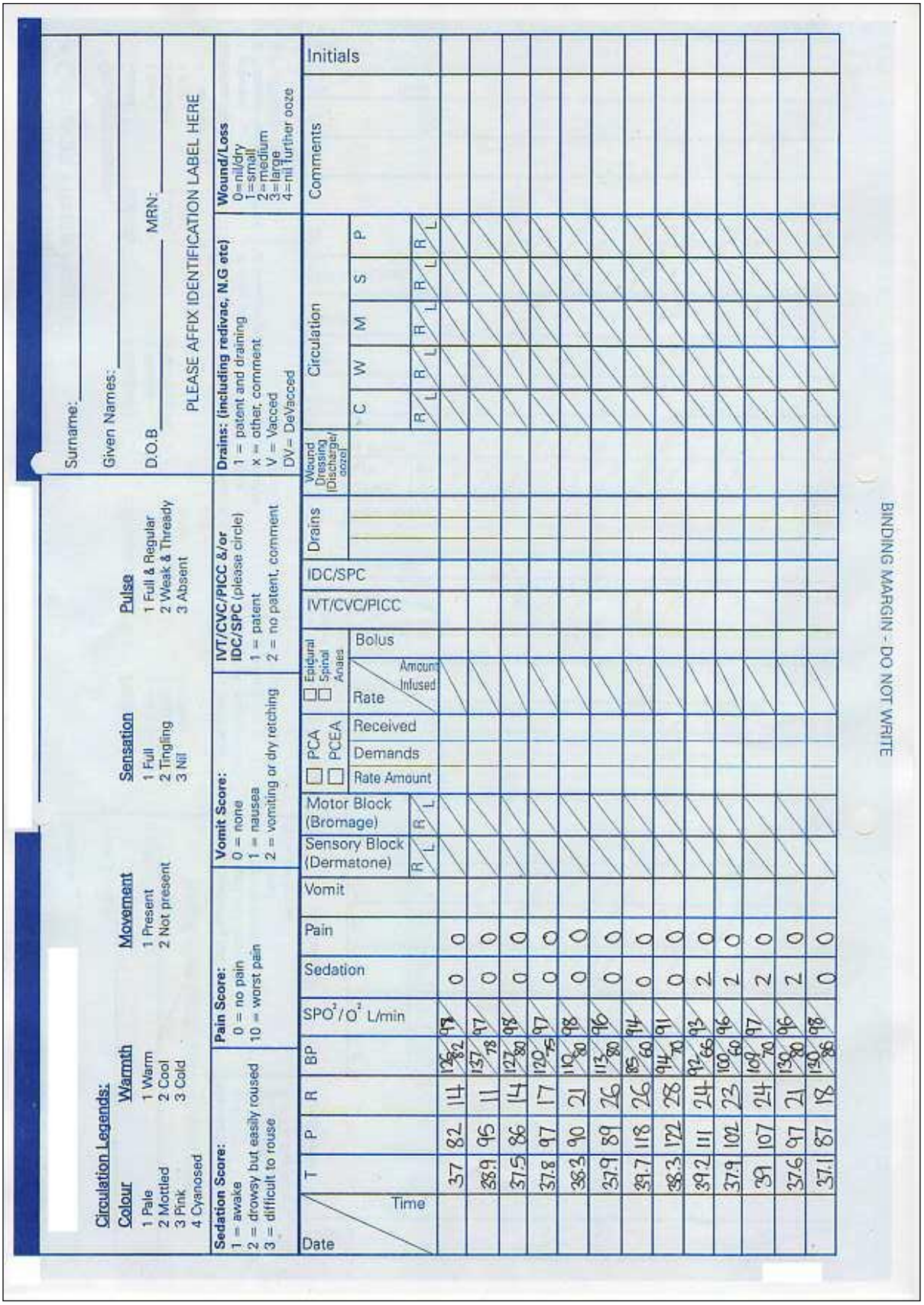
Chart 8


Unit Record No
Surname
Given Names
DOB
Sex
PROCEDURE DATE
Date
Time
TEMPERATURE
35 36 37 38 39 40
35.5 36.5 37.5 38.5 39.5 40.5
P
R
BP
BOWEL
COMMENTS
82 14 126/82
95 11 137/78
86 14 127/80
97 17 120/75
90 21 110/80
89 26 118/80
118 26 85/60
122 28 94/70
111 24 92/66
102 23 100/60
107 24 109/70
97 21 130/80
87 18 130/86
35 36 37 38 39 40
35.5 36.5 37.5 38.5 39.5 40.5
PTO FOR F B SUMMARY

FLUID BALANCE SUMMARY

DATE								
DAY								
IVT								
ORAL								
ENTERAL								
TOTAL INTAKE								
URINE	200 - 210	190 - 170	130 - 100	90 - 90	80 - 100	110 - 130	150	
ENTERAL								
BOWEL								
VOMIT								
DRAIN								
TOTAL OUTPUT								
24 HR BALANCE								
WEIGHT								
URINALYSIS								

Chart 9


Surname:
Given Names:
D.O.B
MRN:
PLEASE AFFIX IDENTIFICATION LABEL HERE
Circulation Legends:
Colour
1 Pale
2 Mottled
3 Pink
4 Cyanosed
Warmth
1 Warm
2 Cool
3 Cold
Movement
1 Present
2 Not present
Sensation
1 Full
2 Tingling
3 Nil
Pulse
1 Full & Regular
2 Weak & Thready
3 Absent
Sedation Score:
1 = awake
2 = drowsy but easily roused
3 = difficult to rouse
Pain Score:
0 = no pain
10 = worst pain
Vomit Score:
0 = none
1 = nausea
2 = vomiting or dry retching
IVT/CVC/PICC &/or IDC/SPC (please circle)
1 = patent
2 = no patent, comment
Drains: (including redivac, N.G etc)
1 = patent and draining
x = other, comment
V = Vacced
DV = DeVacced
Wound/Loss
0=nil/dry
1=small
2=medium
3=large
4=nil further ooze
Date
Time
T
P
R
BP
SPO²/O² L/min
Sedation
Pain
Vomit
Sensory Block (Dermatone)
Motor Block (Bromage)
PCA
PCEA
Epidural
Spinal
Anaes
Rate
Amount Infused
Bolus
Demands
Received
IVT/CVC/PICC
IDC/SPC
Drains
Wound Dressing (Discharge/ ooze)
Circulation
C
W
M
S
P
Comments
Initials
BINDING MARGIN - DO NOT WRITE