Maternity Early Warning System

Health Quality & Safety Commission New Zealand
Kupu Taurangi Hauora o Aotearoa

The New Zealand national maternity early warning system (MEWS) maternity vital signs chart user guide

February 2019

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Published February 2019

Available online at www.hqsc.govt.nz/mews

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1. Introduction and scope

Begin the maternity vital signs chart (MVSC) for any pregnant woman, or recently pregnant woman (up to and including 42 days later), who is assessed as requiring or admitted requiring repeat observations of vital signs. Do not use the chart for routine intrapartum care. In the rare circumstance that a woman is identified with pre-existing or emerging concerns during labour (eg, known cardiac condition or emerging sepsis), you may use it to supplement the partogram. Women who require care in an intensive care unit or high dependency unit do not require the MVSC as these units have their own specific multifaceted charts. Before women are transferred from an intensive care unit or high dependency unit to a ward area, chart the final vital signs on an MVSC and include a plan to address any ongoing abnormalities in a set timeframe.

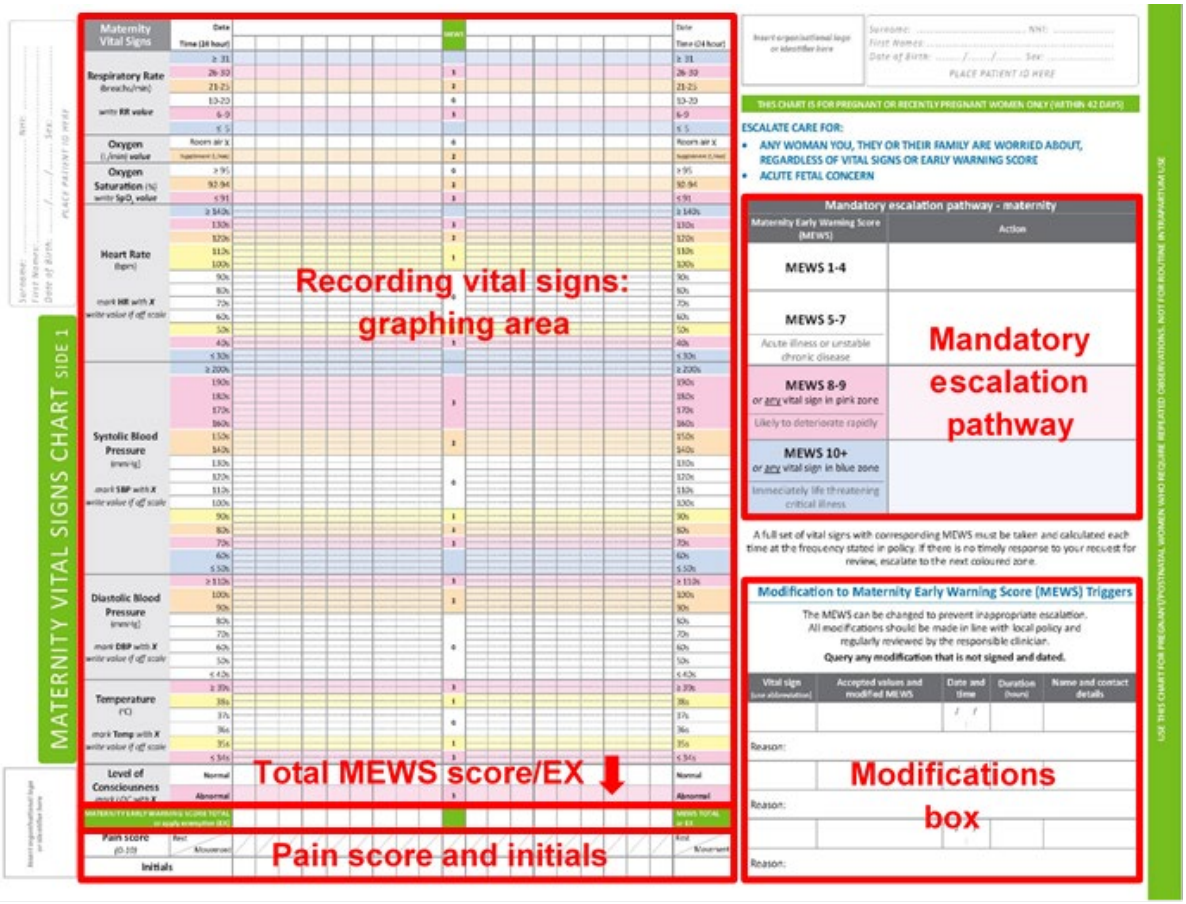
You calculate the maternity early warning system (MEWS) score from eight vital sign measurements, with the score increasing as the vital signs deviate further from the normal zone. The score triggers an escalating clinical response so that clinicians with the right skills can intervene and manage the woman's deterioration promptly. We developed the national MVSC and maternity early warning system based on the best available human factors and clinical evidence. We then tested them for usability in four different hospital sites, which included both a large tertiary hospital and smaller secondary care maternity units.

The purpose of this user guide is to provide information about the logistical and clinical considerations for using the national chart. For more detail about the background of the patient deterioration programme and its modifications for maternity, visit www.hqsc.govt.nz/our-programmes/patient-deterioration/. Also on the Commission website at www.hqsc.govt.nz/mews are factsheets about related topics such as the eight parameters that make up the MVSC, supplementary oxygen, sepsis, hypertension and capabilities for responders. An additional resource is an eLearning module for educators.

2. Chart overview

The national MVSC and early warning score are designed as a tool for detecting clinical deterioration in a population of hospitalised women who are currently pregnant or have recently been pregnant (up to and including 42 days later) and experience acute deterioration. Figure 1 illustrates the main areas of the chart that this user guide refers to. This section provides a brief overview of each area. The next section discusses these areas in detail in terms of their clinical use.

Figure 1: Overview of the national maternity vital signs chart



2.1. Recording vital signs: graphing area

The purpose of the graphing area is to document vital sign measurements and calculate and document the associated MEWS score. Calculating the score accurately relies on clinicians monitoring and documenting eight core vital sign parameters within the graphing area (area 1) of the chart. These eight parameters are:

- respiratory rate
- oxygen supplementation
- oxygen saturation
- heart rate
- systolic blood pressure
- diastolic blood pressure
- temperature
- level of consciousness.

Staff must be consistent in documenting in the graphing area so that it is easy to detect trends indicating deterioration or improvement in a woman's condition. It is easier to visualise trends if you record a symbol such as an 'X' rather than writing a value such as '88'.

If any of these eight parameters deviates from the norm, give it a score from 1−3. The score you assign increases as vital signs deviate further from the normal zone. You then add the scores for each individual parameter together to calculate the total score, which you document in the bottom row of the graphing area. Abnormal vital signs associated with a given score are also identified by the differently coloured zones on the chart. Individual vital

sign parameters in the pink or blue zones trigger escalation actions that the escalation pathway sets out, **regardless of the total score.**

Figure 2: Maternity early warning score colour key

Maternity early warning score colour key				
0	**1**	**2**	**3**	**RRT: rapid response team**

2.2. Mandatory escalation pathway

The escalation pathway states the actions you must take when you detect abnormalities in vital sign parameters. The overall score – or an individual parameter trigger in the pink or blue zone of the escalation pathway – indicates progressively higher levels of clinical risk. Your organisation needs to decide locally on what the response to each level of clinical risk in the escalation pathway will be in order to reflect available resources and processes of care.

2.3. Modifications box

You use the modifications box to individualise escalation triggers for women with chronic disease or known vital sign abnormalities that are not representative of clinical deterioration. You may make such modifications to one or more vital sign parameters.

For example, a fit woman with a known slow heart rate may inappropriately trigger escalation of care unless a single parameter modification for heart rate is made. Equally, you can make a time-limited modification in this box; for example, routine oxygen use following a general anaesthetic.

2.4. Pain score and initials boxes

Pain score, while not contributing to the overall MEWS score, can be a sign of deterioration. It is included at the bottom of the chart on the basis that it would normally be monitored with the same frequency as the other vital signs. Also at the bottom of the chart is a space for the clinician taking the observations to record their initials. More detailed documentation in the clinical notes will include name and designation.

2.5. Total MEWS score/EX

The exception to calculating a total MEWS score is when a woman does not require all vital signs to be taken. In this instance, enter ‘EX’ for ‘exemption’ into the score total box. See section 3.2 for further detail.

2.6. Other vital signs and parameters

Document other parameters – such as fluid balance, fetal movements, lochia and fundal height – separately from the MVSC. Although these are all important to the wellbeing of women and their babies, they are recorded less frequently than the vital signs that make up the total MEWS score.

The MVSC provides an opportunity to rationalise clinical documentation. It is a consistent, shorthand way to record a woman’s condition recognised across all maternity services. For example, you need only record ‘score=0’ instead of writing all the vital signs again in the clinical notes.

3. Clinical use

This section discusses clinical use of the MVSC. This includes:

- vital sign documentation
- making modifications to calling criteria
- calculating early warning scores
- escalation of care.

3.1. Documenting vital signs

Staff must document vital signs consistently so that you can recognise trends over time and assess them accurately. Inconsistent documentation can contribute to errors and potential delays in recognising physiological deterioration. Instructions for documenting each vital sign parameter, the accepted abbreviation and the unit of measurement appear in the grey column to the left of the graphing area of the vital signs chart.

Respiratory rate

Respiratory rate is frequently one of the first vital signs to become abnormal in the early stages of physical deterioration. Each row of the graphing area for respiratory rate (Figure 3) represents a range associated with severity of abnormality rather than a consistent numerical range. Document the actual numerical value on the chart so that you can detect trends.

Figure 3: Respiratory rate

Respiratory rate = 18 breaths/minute, white zone

Respiratory rate = 22 breaths/minute, orange zone

Supplemental oxygen

Women who require supplemental oxygen to maintain their oxygen levels are at increased risk of deterioration. Document the use of supplemental oxygen on the chart using a tick and numerical value (L/min) in the relevant box of the graphing area (Figure 4).

Oxygen is a drug with specific indications and contraindications. As such, you must prescribe it on the national medication chart and administer it using appropriate equipment for the prescribed flow rate to achieve a targeted oxygen saturation range.

Figure 4: Supplemental oxygen

No supplemental oxygen, white zone

Supplemental oxygen = 2L/minute, orange zone

Oxygen saturation

Document the numerical value for oxygen saturation in the relevant box of the graphing area (Figure 5).

Figure 5: Oxygen saturation

Oxygen Saturation (%) write SpO_2 value		
	≥ 95	96
	92-94	
	≤ 91	

Oxygen saturation = 96%, white zone

Oxygen Saturation (%) write SpO_2 value	
≥ 95	
92-94	
≤ 91	

Oxygen saturation = 93%, orange zone

Heart rate

Document heart rate by placing an 'X' in the relevant box of the graphing area (Figure 6). Each row of the graphing area for heart rate corresponds to a numerical range of 10 (eg, a heart rate in the 70s, 80s, 90s). In this way, you can clearly identify the relevant coloured zone if the heart rate value falls exactly on the line between zones (eg, a heart rate of 50 beats per minute is within the 50s range so scores within the yellow zone).

Figure 6: Heart rate

Heart Rate (bpm) mark HR with X write value if off scale	
≥ 140s	
130s	
120s	
110s	
100s	
90s	
80s	
70s	X
60s	
50s	
40s	
≤ 30s	

Heart rate = 75bpm, white zone

Heart Rate (bpm) mark HR with X write value if off scale	
≥ 140s	
130s	
120s	
110s	
100s	
90s	
80s	
70s	
60s	
50s	X
40s	
≤ 30s	

Heart rate = 50bpm, yellow zone

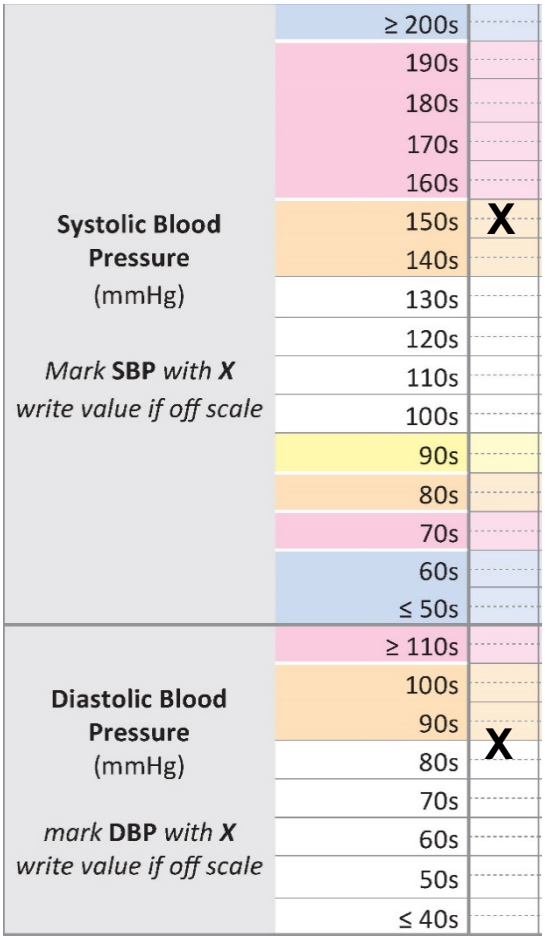
Systolic and diastolic blood pressure

Both systolic blood pressure and diastolic blood pressure are used to trigger escalation if either or both are outside the normal range. Document blood pressure by placing an 'X' in the relevant box of the graphing area (Figure 7). If you wish, you can join the two 'X' measures for blood pressure with a dotted line, as the right-hand side of Figure 7 shows.

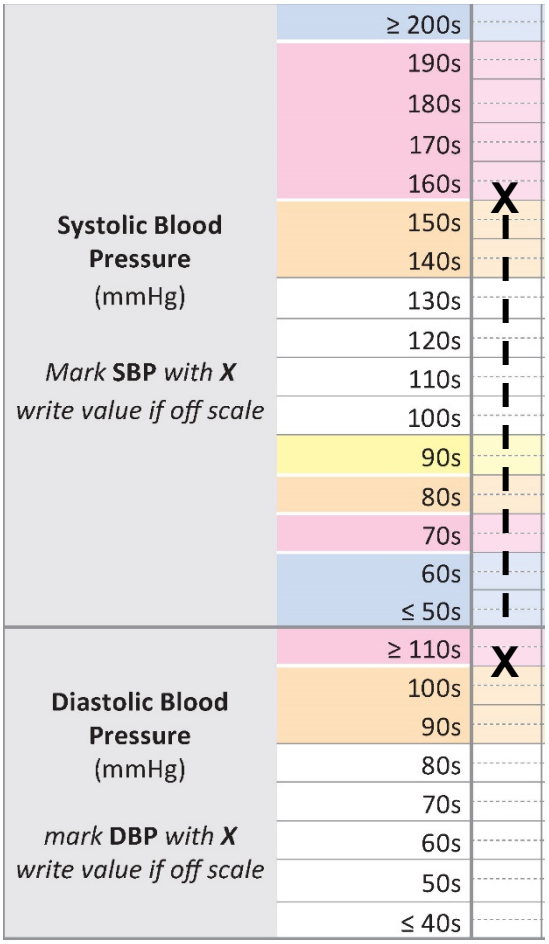
Each row of the graphing area for blood pressure corresponds to a numerical range of 10 (eg, a blood pressure in the 90s, 100s, 110s). In this way, you can clearly identify the relevant coloured zone if the blood pressure value falls exactly on the line between zones (eg, a blood pressure of 90 mmHg is within the 90s range so scores within the orange zone). Only a diastolic blood pressure of 90 or more will generate a MEWS score.

Measure blood pressure using an appropriate size of cuff for the woman and document the size on her care plan.

Figure 7: Systolic and diastolic blood pressure



Blood pressure = 155/90 – remember to plot SBP and DBP in separate rows

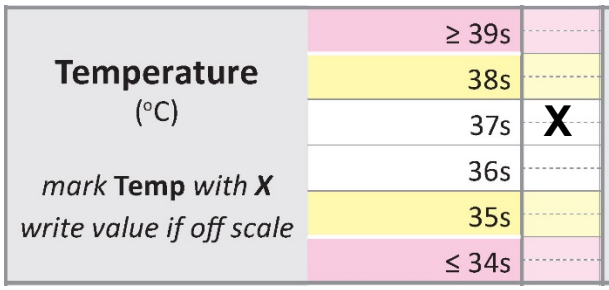


Blood pressure = 160/112 – you can join SBP and DBP with a dotted line if you wish

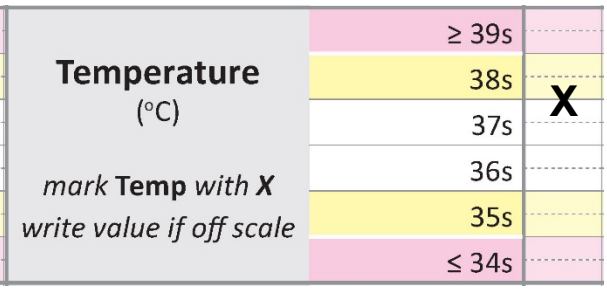
Temperature

Measure temperature using a consistent method each time (eg, oral, axillary, tympanic) and record on care plan. Document temperature using an 'X' in the relevant box of the graphing area (Figure 8) so that you can easily detect trends over time. With this approach, you can clearly identify the relevant coloured zone if the temperature value falls exactly on the line between zones (eg, a temperature of 38.0°C is in the 38s range and is therefore in the yellow zone).

Figure 8: Temperature



Temperature = 37.6°C, white zone



Temperature = 38.0°C, yellow zone

Level of consciousness

Assess level of consciousness as either normal or abnormal (for any woman, a level of consciousness that is not normal is an indication of becoming unwell). Document your assessment by placing an 'X' in the relevant box of the graphing area (Figure 9). You need to rouse the woman to assess level of consciousness. If the woman wakes normally from sleep and is alert on waking, then document level of consciousness as 'Normal'. If you think a woman has low clinical risk with an otherwise normal set of vital sign observations, and does not need to be woken to record a full set of vital signs at night, then document this in her clinical record.

Figure 9: Level of consciousness

Level of consciousness = normal, white zone

3.2. Acknowledging exemption from scoring

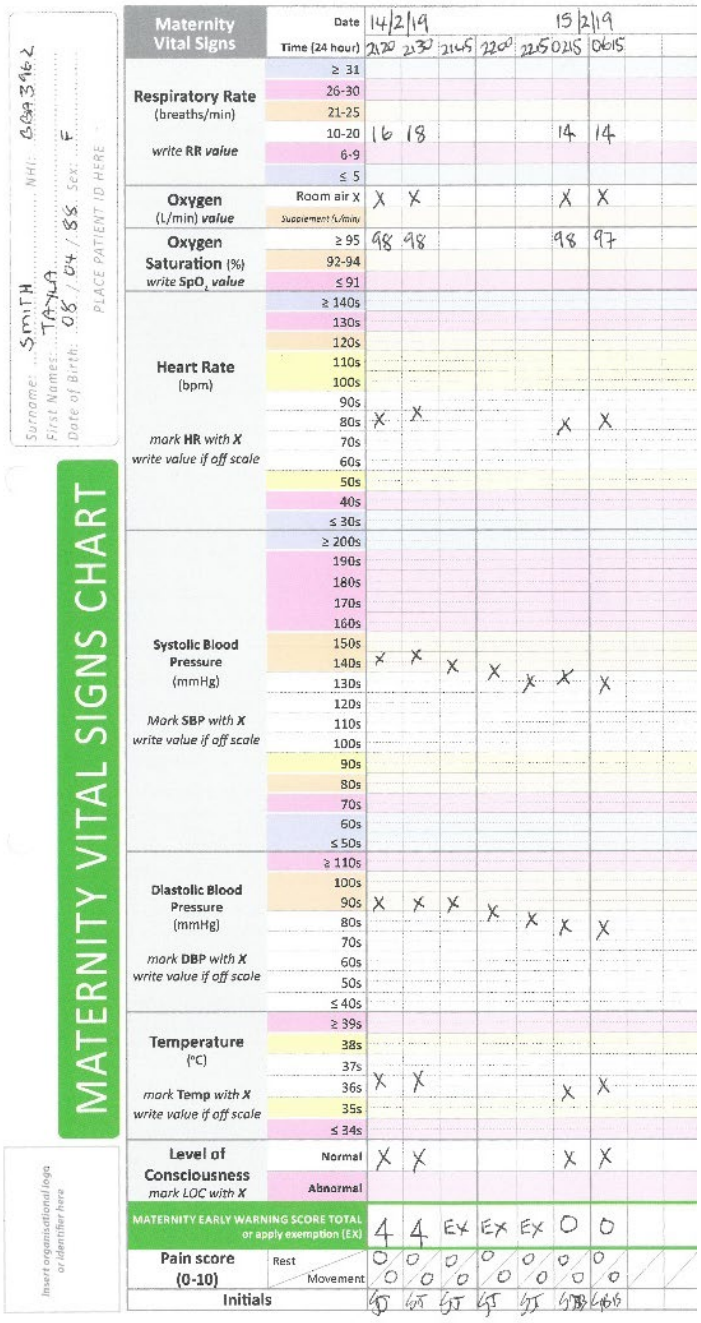
There is one exception to the requirement to calculate a total MEWS score. That applies when it is not necessary to take all vital signs for a woman. In this instance, please annotate 'EX' for 'exemption' in the score total box (as in Figure 10). This exemption is only to be used in the maternity wards and is acceptable for:

- regular repeated blood pressure recordings, such as every 15 minutes following antihypertensive administration
- women who require repeated respiratory rate observations following intrathecal opioid administration
- women who require repeated respiratory rate observations because of a patient-controlled analgesia pump
- women requiring an iron infusion.

It is important to record all vital signs on the same chart, both to visualise change and to prompt initiation of a full set of observations and appropriate assessment, either as part of a routine observation schedule or in response to deterioration. Single-parameter escalations still apply for these readings that are exempt for scoring – that is, any intermediate observations in the pink or blue zones still trigger an escalation at that level.

Figure 10 below illustrates an example where a woman was admitted with hypertension and antihypertensives administered, which required blood pressure observations every 15 minutes. When blood pressure stabilised, the woman's full set of observations resumed on a four-hourly basis.

Figure10: Exemption from scoring example: administration of hypertensives



3.3. Accountability

To fulfil documentation requirements, the clinician who undertook the observations must initial the very bottom of the chart (Figure 11). The initials should match the full name and designation identified in the body of the clinical notes.

Figure 11: Initialling the chart

3.4. Modifying calling criteria

You may modify the MEWS score triggers for individual women when chronic disease, drug therapies or other factors cause their vital signs to fall outside of the normal range on the national vital signs chart.

When making modifications, you must consider the clinical risk to the woman of normalising an abnormal vital sign range for her. You can mitigate clinical risk by discussing modifications with a senior clinician and reviewing them at regular intervals, so they remain appropriate as the woman's condition changes. You must document the duration of all modifications to ensure that timely clinical review is undertaken.

Develop policy guidance to ensure practice around the documentation of modifications is appropriate for your local population and hospital context. This includes identifying which clinicians can document a modification and expectations for timely review. Figures 12 and 13 give examples of appropriate documentation.

Figure 12: Example of temporary score modification for supplemental oxygen after anaesthesia

Vital sign (use abbreviation)	Accepted values and modified MEWS	Date and time	Duration (hours)	Name and contact details
O_2	MEWS=0 if 2L/min or less	20/3/19 11:30	4 hours	*N. Rivera* #6132
Reason:	Post-anaesthesia			

Figure 13: Example of score modification for heart rate for woman with athletic bradycardia

Vital sign (use abbreviation)	Accepted values and modified MEWS	Date and time	Duration (hours)	Name and contact details
HR	MEWS=0 if 50−59, 1 if 40−49, 3 if <40	20/3/19 11:30	Until discharge	*D. Ramoray* #2611
Reason:	Long distance cyclist: 50−59 = normal HR for her			

3.5. Calculating the total score and using single-parameter triggers

You can detect deterioration using a total MEWS score calculated from the eight vital sign parameters, or a single vital sign parameter in the pink- or blue-coloured zones.

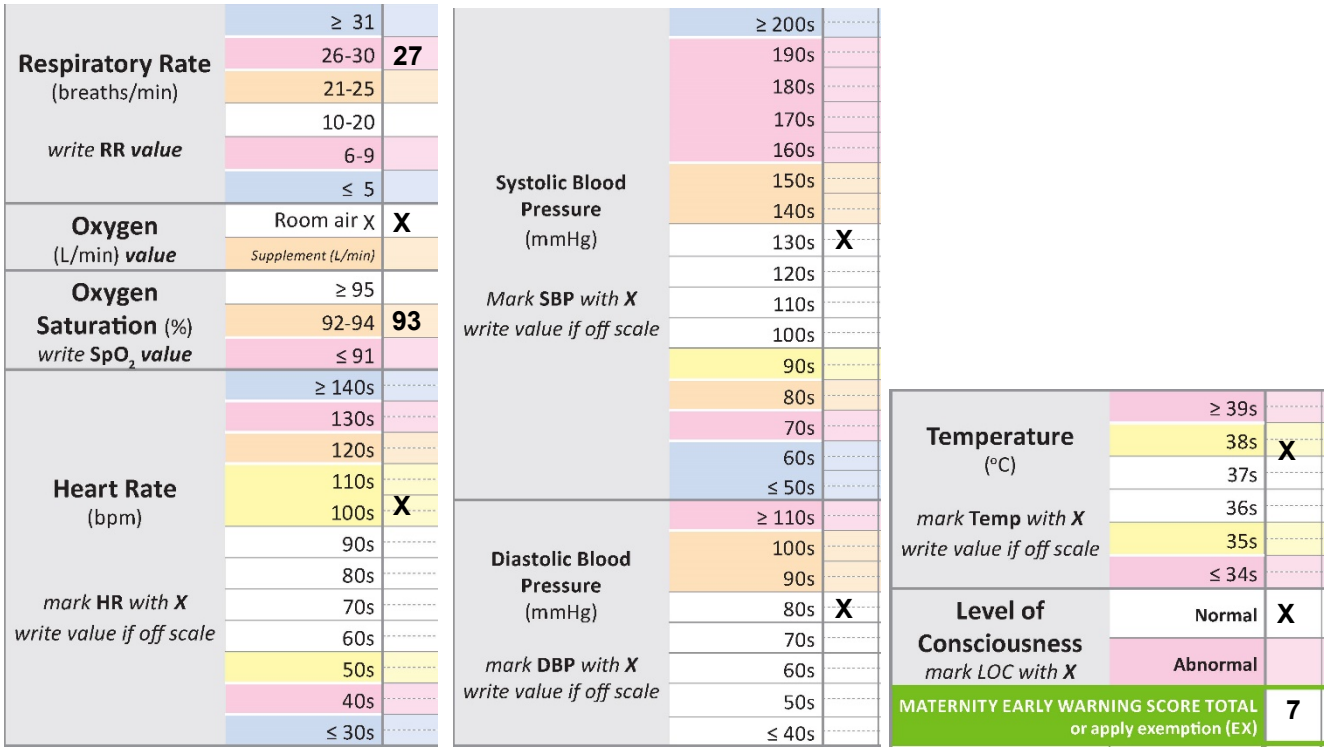
Each vital sign parameter has coloured zones (yellow, orange and pink) that are associated with a score of 1−3. You add together the score for each of the eight vital sign parameters to get a total MEWS score. The total score can trigger action according to the escalation pathway. The blue zone is not associated with a score as any parameter in the blue zone indicates severe deterioration and should immediately prompt a rapid response call. Table 1 illustrates the MEWS score matrix.

Table 1: MEWS score matrix

Score	RRT	3	2	1	0	1	2	3	RRT
Zone	Blue	Pink	Orange	Yellow	White	Yellow	Orange	Pink	Blue
RR	≤5	6–9			10–20		21–25	26–30	≥31
O_2			Yes		Room air				
SpO_2		≤91	92–94		≥95				
HR	≤39	40–49		50–59	60–99	100–119	120–129	130–139	≥140
SBP	≤69	70–79	80–89	90–99	100–139		140-159	160–199	≥200
DBP					≤89		90–109	≥110	
Temp		≤34.9		35–35.9	36–37.9	38–38.9		≥39	
LOC					normal			abnormal	

You must take the actions corresponding to the trigger for the most severe level of deterioration recorded on the chart. For example, if the total score is 4 but a single parameter lies in the 'pink zone' on the chart, take the action associated with the pink zone. Figure 14 shows how this process works: in this example, the total score is 7 (triggering actions for the MEWS 5–7 zone on the escalation pathway) but, because the single parameter of respiratory rate is in the pink zone, you should take the actions for the MEWS 8–9 pink zone escalation pathway.

Figure 14: Example of a single pink zone parameter (respiratory rate) overruling the total score



3.6. Escalating care

Figure 15 below illustrates the escalation pathway where the MEWS score triggers specific actions (which your organisation decides on locally). You **must** take the actions corresponding to the trigger for the most severe level of deterioration. Make rapid response calls (triggered by an individual parameter in the blue zone or total score of 10+) even when senior clinicians are already at the bedside. This is important for role-modelling and normalising a culture of calling for help. You should also escalate care based on clinical concern or worry, or acute fetal concern (using fetal wellbeing as a surrogate marker of maternal wellbeing), regardless of a woman's vital signs or MEWS score. This includes bypassing the usual escalation process and making a rapid response call when you are seriously concerned.

The trigger for escalation of care is either a total MEWS score calculated from all eight core vital signs, or a single significantly abnormal parameter. Any vital sign that falls into a zone indicating significant deviation from the norm (ie, in the pink or blue zones) triggers the action associated with that zone. Take the action triggering the most senior clinical review.

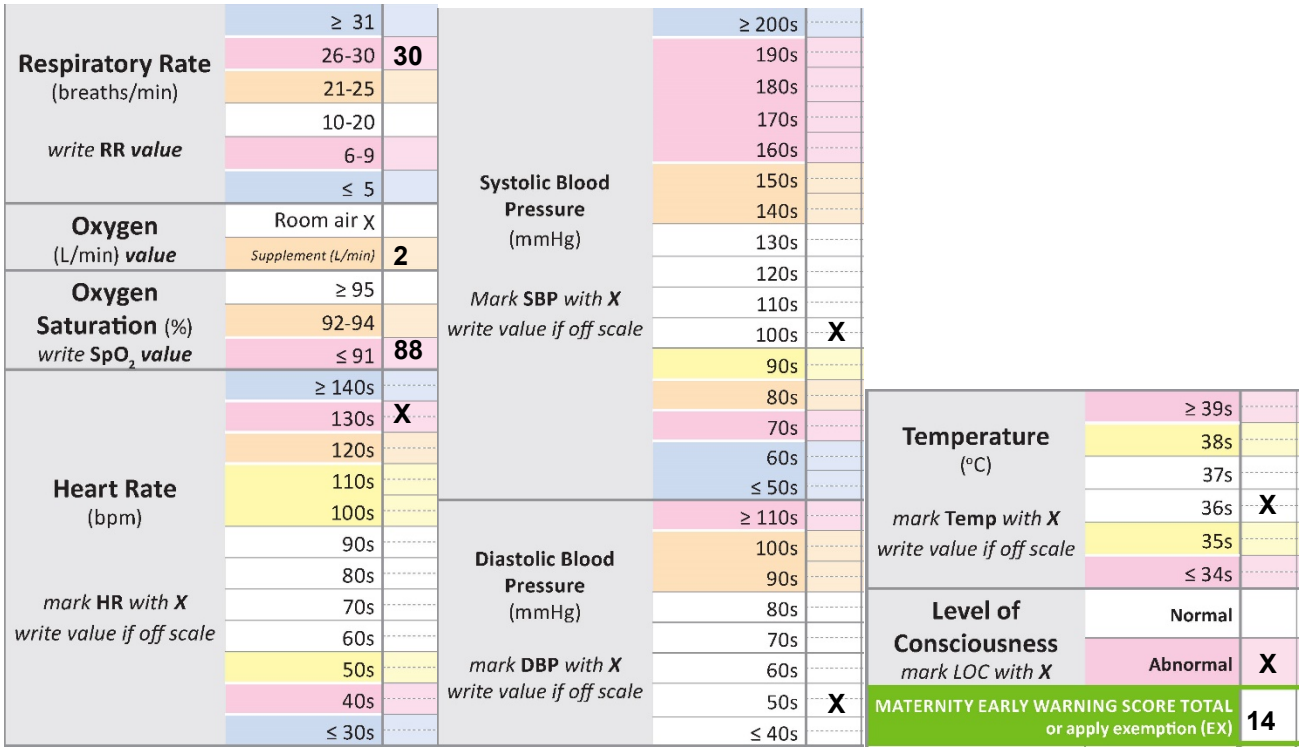
For example, a single parameter in the pink zone would earn a MEWS score of 3. A total MEWS score of 3 would trigger the action equivalent to the 1–4 zone on the escalation pathway; **however**, with a single parameter in the pink zone, you take the action for the pink zone.

Figure 25: Escalation pathway

Mandatory escalation pathway - maternity	
Maternity Early Warning Score (MEWS)	Action
MEWS 1-4	
MEWS 5-7 Acute illness or unstable chronic disease	
MEWS 8-9 *or* any vital sign in pink zone Likely to deteriorate rapidly	
MEWS 10+ *or* any vital sign in blue zone Immediately life threatening critical illness	

Similarly, if four parameters fell in the pink zone, each would score 3 and therefore reach a total MEWS score of 12. In this case, you take the action for a total score of 10+ (a rapid response call) rather than the action for the pink zone. Figure 16 illustrates this process for a woman with suspected severe sepsis who has a total MEWS score of 14.

Figure 16: Example of the total score overruling single-parameter pink zone triggers



4. Design and printing information

This section provides information about design and print requirements for the MVSC. Your organisation needs to develop an escalation pathway appropriate to your local area before you can use it clinically. You can make a few other amendments according to locally agreed policy and practice. The details that follow cover:

- required amendments
- allowable amendments
- print specifications.

4.1. Required amendments

You must develop the escalation action pathway to reflect local systems and practice, including the lead maternity care provider in the development process and following the Ministry of Health's *Referral Guidelines*.[1] Set out the pathway in unambiguous language, briefly and clearly stating expected actions and responses for each level of physiological abnormality.

You will need to enter the succinctly worded escalation action pathway in the 'action' area of the chart (provided as an editable pdf). Use the guidance document, *MEWS escalation mapping tool*, to develop the response for each level of physiological abnormality.

[1] Ministry of Health. 2012. *Guidelines for Consultation with Obstetric and Related Medical Services (Referral Guidelines)*. Wellington: Ministry of Health.

4.2. Allowable amendments

Table 2 sets out the amendments you may make to the MVSC.

Table 2: Allowable amendments to the maternity vital signs chart

Chart area	Allowable amendment
Left margin	For scanning purposes, you may add a barcode or QR code
Central column of the graphing area	You may replace 'RRT' with a locally relevant number or acronym (eg, '777' or 'MET').
Top right of the chart	You may add a black-and-white version of the organisational logo to the left of the patient label. **Do not use coloured logos** as they add visual clutter and distract from the main purpose of the chart.
Right of the chart under mandatory escalation pathway	You may add the name and number of your relevant local policy to the following sentence: 'A full set of vital signs with corresponding MEWS score should be taken and calculated each time at the frequency stated in *[insert policy name and number here]*.'

4.3 Colour specifications

CMYK (cyan, magenta, yellow and black) and RGB (red, green, blue) are two different ways of achieving a particular colour. Most printers print in CMYK colour and most screens display RGB colour. The charts were designed using CMYK colour because they are intended for print use. The CMYK colour values listed in the table below are used at 60 percent tint on the graphing area of the vital sign chart to enable clear documentation with a black or blue ball point pen. The colour values are used at 100 percent tint in the other sections of the chart such as the columns to the right and left of the graphing area, and the left-hand column of the escalation pathway.

You may, on occasion, want to use the colours in a screen format and this means converting them to RGB values. Both the CMYK and RGB values for each of the chart colours are listed in the table below. The CMYK and RGB colours have been used to shade the boxes in the table and you will see that there are minor differences. This is to be expected.

You can select RGB values in Word documents using the 'more colours' option in the shading or font colours tabs. Open 'more colours' then select 'custom' and insert the RGB values.

Table 3: Maternity vital signs chart colour specifications

Colours	C	M	Y	K	R	G	B
Yellow	0	0	40	0	255	255	153
Orange	0	12	27	0	255	224	186
Pink	0	25	0	0	255	192	216
Blue	18	9	0	0	209	232	255

4.4. Print specifications

The chart must be professionally printed to the following specifications:

- Paper size is A3 landscape
- Double-sided (side 1 and side 2)
- Minimum paper quality of 150gsm (uncoated stock)
- Fold: chart is creased twice at 205mm and 310mm (from the left-hand edge) and then

Z-folded in front along these creases (see figure 16 below)

- Hole punched left and right-hand side with two holes each side
- No print offset required

Figure 17: Maternity vital signs chart showing Z-fold