Early Recognition of the Deteriorating Patient

Maternity and Neonatal COMPASS
Learning Outcomes of COMPASS

• Link oxygen delivery physiology with vital sign measurements
• Recognise the deteriorating Maternity and Neonatal patient
• Initiate appropriate and timely interventions utilising MEWS and NEWS escalation
• Demonstrate effective communication (ISBAR)
Recognition of the Deteriorating Patient

Vital Signs performed

Interpreted by nurse

Communicate ISBAR

Timely and appropriate review

Reassess
- re-escalate if required

Timely and appropriate management

Interpreted by doctor
Australia Council on Health Care Standards

Standard 1 - Governance for Safety and Quality in Health Service Organisations
Standard 2 - Partnering with Consumers
Standard 3 - Preventing and Controlling Healthcare Associated Infections
Standard 4 - Medication Safety
Standard 5 - Patient Identification and Procedure Matching
Standard 6 - Clinical Handover
Standard 7 - Blood and Blood Products
Standard 8 - Preventing and Managing Pressure Injuries
Standard 9 - Recognising and Responding to Clinical Deterioration in Acute Health Care
Standard 10 - Preventing Falls and Harm from Falls
The importance of both **recognising** and **responding** to clinical deterioration is illustrated in the following true story.
Savita’s Story

• 31 year old female
• G1 P0
• 17/40 gestation

• Sunday 21 October:
  – 1530hrs
  – Presents to hospital with low backache – Dx inevitable miscarriage
  – Admitted to overflow ward as antenatal ward full ★
  – Blood results reveal elevated WCC
• Monday 22 October
  – 0030hrs
  – Spontaneous rupture of membranes
  – 0820hrs – review by consultant – plan to observe and monitor - observations 4/24 ⭐
  – u/s confirms presence of fetal heart
  – 1525hrs – low BP ⭐
  – 1800hrs – low BP and increased heart rate ⭐
  – 2140hrs – increased heart rate ⭐
  – 2200hrs – commenced on oral AB’s
Savita’s Story

• Tuesday 23 October
  – 0820hrs
  – Routine ward round with consultant ★
  – Plan to remain on oral AB’s and continue to monitor fetal heart
  – 3 recordings of elevated HR ★
  – 2100hrs – Savita c/o weakness. MO contacted to review patient, MO not immediately available – request not escalated for review by another MO ★
Savita’s Story

- **Wednesday 24th October**
  - 0415hrs – Savita complains of feeling cold and shivery, has started vomiting
  - Observations reveal fever, tachycardia, low BP and pain, documented offensive vaginal discharge
  - 0630hrs – Junior doctor contacted to review Savita
  - 0700hrs -Commenced on IVT, O2 and IV AB’s
  - Dx with sepsis related to chorioamnionitis
Wednesday 24th October

- 0825hrs – ward round – HR and temp still elevated
- 1300hrs – further deterioration (↓BP and elevated HR) - Dx septic shock secondary to chorioamnionitis
- 1500hrs Spontaneous delivery of foetus
- 1645hrs Admitted to HDU, then ICU,
- died on Sunday 28th October
Savita’s Story
Summary of findings of care provided:

• “Failure in the provision of the most basic elements of patient care and also the failure to recognise and act upon signs of clinical deterioration in a timely and appropriate manner”

• “a number of missed opportunities which, had they been identified and acted upon, may have potentially changed the outcome of her care.”
How does Standard 9 help us to recognise and respond to clinical deterioration?

- Early Warning Scores
  - a score which indicates early signs of deterioration, a score of four or above triggers the Escalation process

Other escalation processes include:
  - MET
  - CARE for Patient Safety
How does Standard 9 help us to recognise and respond to clinical deterioration?

• COMPASS education

• Ongoing chart audit/feedback to ward areas

• Organisational Support
Vital Signs physiology
Oxygen delivery chain

Arterial Oxygen Content

\[ \{ \text{SaO2} \times \text{Hb} \} + \{ \text{PaO2} \} \]

Cardiac Output x Peripheral Vascular Resistance

\[ \text{Stroke Volume} \times \text{Heart Rate} = \text{BP} \]

BLS

Temp & BGL & LOC

Urine Output

Note: All the RED are vital sign hence vital signs are vital
Oxygen Delivery

- All cells require energy to function
- In order to produce energy the cells require oxygen
Aerobic Pathway

• Aerobic respiration
  – Turns glucose and oxygen into water and carbon dioxide
  – The energy from this reaction produces ATP (energy for cells)
  – For this to occur the cells require oxygen delivery to the cells
Anaerobic Pathway

- Energy can be produced without oxygen.
- This is through anaerobic metabolism.
  - This is a less efficient form of metabolism.
  - It produces waste products such as Lactic Acid.
  - Some cells cannot produce energy anaerobically so if oxygen delivery is compromised then the cells do not function.
    - For example: the Brain.
Arterial Oxygen Content

- Arterial Oxygen content requires:
  - Patent airway
  - Functioning lung tissue
  - Gas exchange
  - Hemoglobin to carry the oxygen

- A reduction in oxygen delivery results in an increased respiratory rate
  - To get more oxygen in
  - To assist in the removal of waste products (i.e. CO₂)
Cardiac Output

= Stroke Volume (amount pumped with each beat) x Heart Rate

Requires:
• Good volume
• A functioning pump
• And is dependent on peripheral vascular resistance

A reduction in cardiac output results in:
• Increased heart rate
• & may cause a decrease in BP
Compensation

When the body detects decreased oxygen delivery at the tissues or a reduction in cardiac output the body compensatory mechanisms occur. These include:

– Increased respiratory rate
– Increased heart rate
De- Compensation

• The result of failing/failed compensatory mechanisms is:
  – Reduction in oxygen saturations
  – A falling BP
• By monitoring complete sets of vital signs you can detect signs of reduced oxygen delivery through:
  – Compensation (↑HR and ↑RR)
  – Decompensation (↓SpO₂ and ↓BP)
  – Temperature assists in diagnosing the cause
  – Changes in level of consciousness indicate poor energy production and as such a reduction in level of consciousness should be accompanied by a check of the patients BGL.
Oxygen Delivery Chain

Arterial Oxygen Content $\times$ Cardiac Output $\times$ Peripheral Vascular Resistance $=$ BLS

$\{\text{SaO}_2 \times \text{Hb}\} + \{\text{PaO}_2\}$

Stroke Volume $\times$ Heart Rate

A RR B

C

Urine Output

Temp & BGL & LOC

Note: All the RED are vital sign hence vital signs are vital
Decreased oxygen delivery at the tissue level

↓

Anaerobic metabolism

↓

Increases Lactate production

↓

Acidosis

↓

Stimulates respiratory drive

↓

Increases the Respiratory Rate
When there is a reduction in the amount of oxygen being delivered to the tissues, cells revert to anaerobic metabolism. This increases the production of lactate. The subsequent buildup of lactic acid (or metabolic acidosis) stimulates an increase in respiratory rate.
Points to Note

• Deteriorating patients with COPD still need oxygen - patients die of hypoxia, not high CO2

• An increase in Respiratory Rate can occur with a normal SaO2 – note that normally well patients will compensate better

• Oxygen flow rates less than 6L/min for a Hudson mask should not be used

• Don’t rely on machines!
BP = Cardiac Output x Peripheral Vascular Resistance

What are some the causes of a reduction in Blood Pressure?
Circulation – causes of decreased BP

- Decreased intravascular blood volume
  - Hypovolaemia (Trauma, Bleeding, Gastric Losses)

- Decreased contractility of heart
  - Cardiomyopathy in pregnancy, Cardiogenic shock, Myocardial Infarct, Arrhythmias

- Decreased Peripheral Vascular Resistance
  - Vasodilation, Sepsis, Anaphylaxis, Medication induced
Level of consciousness

- BGL is the first thing to be checked in an unconscious patient

- If there is a sudden fall in consciousness or drop of GCS > 2 be concerned
Urine Output

Renal Function

• Urine output should be > 0.5mls/kg/hr. (lean body weight – this can be estimated from the last two digits of your height in cm. For eg if you are 165cm tall then your lean body weight is approximately 65kg)

• Monitoring of urine output is crucial when responding to a deteriorating woman

• Small window when oliguric to prevent acute renal failure
Hypothermia (35°C)

- Can indicate:
  - Sepsis, metabolic disorders, exposure to low temperatures, medication related.
  - HR, RR, & metabolic rate decreases
  - Confusion
  - Arrhythmias
  - Cardiac arrest
Regular vital signs are necessary for all admitted gynaecological, maternity and neonatal patients.

The current vital sign Procedure stipulates that all inpatients require observations to be taken at a minimum of every 8 hours, unless documented in the notes by a medical officer.
Physiological differences during pregnancy

- Oxygen consumption increases by up to 20%
- Airway changes due to hyperaemia can make intubation difficult
- Risk of aspiration is increased due to the relaxation of smooth muscle (GI)
Physiological differences during pregnancy

• Peripheral vascular resistance is decreased, this results in decreased diastole which is why both systole and diastole are scored in Maternity MEWS

• Heart rate increased by 10-15 bpm
Physiological differences during pregnancy

- Increased blood volume → increased cardiac output
- Aortocaval compression when in supine position significantly reduces venous return and cardiac output
- Hypercoaguable state → increased risk VTE
When do you use a Maternity MEWS observation Chart?

On all pregnant women and up to 6 weeks post partum

- For all other patients use the Adult General Observation Chart
How does the Maternity MEWS Chart work?

• Track and trigger system
• Each observation is plotted on the chart
• Observations in the white zone score “zero”
• Observations in the coloured zones score between 1-4 (depending on the colour)
• Total score of all vital signs is calculated
• Escalation starts with a MEWS of 4
Note:

There will be times when the MEWS does not score enough to trigger a medical review, but clinical assessment indicates that the patient would benefit from a medical review.
Remember

Connect the dots
Graphical representation of vital signs
Two Maternity charts: Antenatal and Postnatal
Scoring guidance boxes correspond to the row where the systolic or diastolic value is drawn.
<table>
<thead>
<tr>
<th>Sedation scoring</th>
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</thead>
<tbody>
<tr>
<td><strong>Awake</strong></td>
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<tr>
<td><strong>Mild</strong></td>
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<tr>
<td><strong>Moderate</strong></td>
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<td><strong>Severe</strong></td>
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</tbody>
</table>
# Antenatal Maternity Observations

The following observations are to be performed as per Care Plan.

<table>
<thead>
<tr>
<th>Date</th>
<th>Time</th>
</tr>
</thead>
</table>

Antenatal blood loss (tick as appropriate ✓)

- Nil blood loss ✓
- Spotting
- Increasing blood loss
- Sudden heavy loss

Notify Team Leader

Liquor (tick as appropriate ✓)

- Intact membranes
- Clear ✓
- Lightly blood stained ✓

Notify Team Leader

Moderately to heavily blood stained
- Meconium

Fetal heart rate (beats/minute)

- FHR 1
- FHR 2
Postnatal Maternity observations

### Birth summary

<table>
<thead>
<tr>
<th>Date/Time of birth:</th>
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<tbody>
<tr>
<td>Anaesthetic (circle):</td>
<td>NIV, EPIDURAL, SPINAL, GENERAL</td>
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<td>Mode of birth (circle):</td>
<td>NVB, INSTRUMENTAL, CAESAREAN</td>
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</tbody>
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#### POSTNATAL Maternity Observations
To be performed as per Care Plan

- **Date**
- **Time**

#### Fundus (tick as appropriate ✓)
- Central
- Firm
- Boggy
- Off centre
- Above umbilicus

- □ = Notify Team Leader

#### Perineum (tick as appropriate ✓)
- Nil concerns
- Odour
- Pain increase
- Swelling increase
- New haematoma

- □ = Notify Team Leader

#### Lochia (tick as appropriate ✓)
- Scant
- Moderate
- Heavy
- Clots

- Scant = 1 pad per 4 hours  Moderate = 2 pads per 2 hours  Heavy = > 2 pads per 2 hours

#### Caesarean Section Wound Check (tick as appropriate ✓)
- Clean and dry
- Scant coze
- Moderate to heavy coze
- Erythema
- Dehiscence

- □ = Notify Team Leader
### MEWS for BP- non maternity pts

#### Usual / Target SBP:

Circle the column showing the patient's usual systolic BP

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<th>Score current SYSTOLIC BP using circled column</th>
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4/MET
You cannot get a BP score unless you know the patient’s usual BP.

• This patient’s BP is 115/70, what is the BP score?

### MEWS for BP - non maternity pts

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**Usual / Target SBP:** 150/90

**Score current SYSTOLIC BP using circled column:** 4/MET
Usual Systolic Blood Pressure

- Preadmission clinics
- Old notes
- Information from the patient, family or a general practitioner
- If unsure start with usual of SBP 120–130 mmHg.
  - Choose a BP from this range and review after 4 hours
Seagull Sign

<table>
<thead>
<tr>
<th>Blood Pressure &amp; Heart Rate (°)</th>
<th>MEWS HR</th>
<th>MEWS BP</th>
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<tbody>
<tr>
<td>200 &amp; more</td>
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</table>
Sea gull sign
Sea gull sign
The seagull sign indicates a decrease in cardiac output and failing compensation mechanisms.

When there is a drop in stroke volume (e.g., hypovolaemia from PPH) the heart rate will increase to maintain an adequate cardiac output.

If no intervention the increasing heart rate will eventually reduce stroke volume, this decreases cardiac output and therefore blood pressure - a sign that compensation mechanisms are failing.
## Notification Flowchart - Maternity

<table>
<thead>
<tr>
<th>MEWS</th>
<th>Notify</th>
<th>Escalate</th>
<th>Observations</th>
<th>Intra-hospital escort</th>
</tr>
</thead>
<tbody>
<tr>
<td>MEWS 4-5</td>
<td>Team Leader/CMC RMO to review within 30 minutes</td>
<td>After 60 minutes if nil review or improvement escalation as per MEWS 6-7</td>
<td>Vital signs: ½ hourly for 1 hour, Commence fluid balance chart. If patient improves, decrease vital sign frequency to: Hourly for 4 hours, 4 hourly for 24 hours.</td>
<td>Registered Nurse/Midwife</td>
</tr>
<tr>
<td>MEWS 6-7</td>
<td>Team Leader/CMC Registrar to review within 15 minutes</td>
<td>After 60 minutes if nil review or improvement escalation as per MEWS ≥ 8</td>
<td></td>
<td>Registered Nurse/Midwife &amp; RMO</td>
</tr>
<tr>
<td>MEWS ≥ 8</td>
<td>Team Leader/CMC Contact Registrar to review immediately Contact Consultant</td>
<td>Consider MET if nil review or improvement</td>
<td></td>
<td>Registered Nurse/Midwife &amp; Registrar</td>
</tr>
</tbody>
</table>
## MEWS Escalation Table

<table>
<thead>
<tr>
<th>MEWS</th>
<th>Notify</th>
<th>Escalate</th>
<th>Observations</th>
<th>Intra hospital escort</th>
</tr>
</thead>
</table>
| MEWS 4 - 5 | • Team Leader  
          • RMO to review within 30 mins  | After 60 minutes  
          If nil review or nil improvement escalate per MEWS 6 - 7  | Vital signs:  
          ➔ ½ hourly for 1 hour  
          ➔ Commence fluid balance chart  | RN/RM  |
| MEWS 6 - 7 | • Team Leader  
          • Registrar to review within 30 mins  | After 60 minutes  
          If nil review or nil improvement escalate per MEWS ≥ 8  | If patient improves, “decrease frequency of vital signs” to:  
          ➔ Hourly for 4 hours  
          ➔ 4 hourly for 24 hours  | RN/RM and RMO  |
| MEWS ≥ 8 | • Team Leader  
          • Contact Registrar to review immediately  
          • Contact Consultant  | Consider MET if nil review or nil improvement  |                                                        | RN/RM and REG  |
Pre-existing conditions

• Some patient’s may have pre-existing chronic conditions that require a deviation from the MEWS (Maternity or Adult)

• This should be documented on the back of the observation chart by the admitting Consultant or senior Registrar

• Tick the box on the front page to indicate there has been a change
MEWS and MET

- If vital signs meets hospital criteria for MET or Code Blue then call Code Blue
- Some patients may meet the MET criteria but not trigger a high MEWS score if an individual parameter is altered
- The MEWS protocol is activated with a score of 4
• A full set of vital signs should be documented on all patients at the following times:
  – On **admission** and at time of initial assessment
  – **Postoperatively** as per policy
  – **Post procedure** as ordered
  – 4/24 if transferred from a **critical care area** (e.g. ICU, CCU, ED) or following an **inter-hospital** transfer
  – In addition as prescribed by a medical officer
  – If the patient’s condition deteriorates
So your patient is deteriorating – what do you do next??
What is the best way to communicate deterioration?
“ISBAR” method of Communication

• **IDENTIFY**
  • Yourself, the Doctor, and the Patient.

• **SITUATION**
  • What are you calling about? State this!

• **BACKGROUND**
  • Further detail about the patient; may include
    • Procedures; medical history; current therapy etc.

• **ASSESSMENT**
  • What do YOU think the problem is!

• **RECOMMENDATION**
  • What would you like the Doctor to do.
A deteriorating patient
What else should you do?

Gather information about your patient ....
But where do you find it?
Management plans

• Who does what? When? How?
• Who do I inform of changes?

You need a Management Plan...
Document any decisions/actions taken as a result of the observations

- Helps the flow of information,
- Medico legal requirement
- Remember if you don’t write down it didn’t happen!
Recognition of the Deteriorating Patient

PATHOPHYSIOLOGY

DETERIORATING PATIENT
COFFEE BREAK

CASE STUDIES