



THE DETERIORATING TRAUMA PATIENT



1. Key messages.....	1
2. Overview.....	3
3. Introduction.....	4
4. Clinical observation of major trauma patients.....	5
5. The role of the team in recognition of deterioration.....	8
6. Early activation or consultation.....	10
7. Further information.....	10
8. Appendix 1: R2 Observation and response charts example.....	11
9. Appendix 2: ADDS Observation and response chart example.....	12
10. Appendix 3: ABCDEFG for deteriorating patients.....	13
11. Appendix 4: AGREEII Score Sheet – The deteriorating trauma patient guideline.....	14
12. References.....	16

1. Key messages

The Victorian State Trauma System provides support and retrieval services for critically injured patients requiring definitive care, transfer and management. This deteriorating trauma patient guideline provides evidence-based advice on the initial management and transfer of major trauma patients who present to Victorian health services with severe injuries.

This guideline is developed for all clinical staff involved in the care of trauma patients in Victoria. It is intended for use by frontline clinical staff that provide early care for major trauma patients; those working directly at the Major Trauma Service (MTS) as well as those working outside of a MTS.

These guidelines provide the user with accessible resources to effectively and confidently provide ongoing care and monitoring for deterioration in critically injured patients. They provide up-to-date information for frontline healthcare clinicians. The guideline has followed the AGREE II methodology for guideline development and is under the auspice of Victorian State Trauma Committee (VSTC).¹

Clinical emphasis points

Early identification and management of deterioration in trauma patients follows the same principles as in any clinical setting:

- Early identification of potentially life-threatening problems, particularly those that are readily reversible, may be life-saving.
- Deterioration in a trauma patient is a complex matrix of identified and potentially unrecognised injuries.
- Established and implemented approaches currently in use provide a framework for evaluating and managing deteriorating patients.



THE DETERIORATING TRAUMA PATIENT



- Careful monitoring of trauma patients with close attention to and documentation of vital signs is necessary to identify those at risk.
- A structured approach is required for recognising and managing life threats in trauma patients.
- Calling for help early from Adult Retrieval Victoria (ARV) as well as local resources will help manage a deteriorating trauma patient.

The Deteriorating Trauma Patient



Make early contact with ARV for advice from the major trauma services and to initiate retrieval.

- Always leave a patient with an established care plan and strategy for review.
- Escalate or ask for help if concerned about a patient.

Early Activation

- Initiate in house / local rapid response system
- Consider assistance from Ambulance Victoria

Early Warning Signs



AIRWAY / C-SPINE

- Obstructed Airway
- Stridor / Wheeze
- Swelling of upper airway



BREATHING

- RR < 9 or > 31
- SpO₂ < 95%
- Tracheal Tug
- Any breathing difficulties



CIRCULATION

- HR < 49 or > 130/min
- Sys BP < 90 OR > 180mmHg
- Peripheral cyanosis



DISABILITY

- Fall in GCS > 2 points
- Seizure
- Alteration in mentation
- New/Uncontrolled pain

If the front line clinician is concerned, initiate response even if the patient appears stable and safe.

Early Intervention



AIRWAY / C SPINE

- Initiate airway manoeuvres (Chin lift / jaw thrust)
- Consider oral airway insertion
- Consider early intubation



BREATHING

- Apply SpO₂ monitoring
- Administer oxygen as necessary to achieve SpO₂ 94-98%
- Auscultate and examine chest
- Ventilate as necessary



CIRCULATION

- Establish IV access
- Apply 3 lead ECG monitoring
- Consider fluid administration
- Take 12 lead ECG
- Take bloods for analysis



DISABILITY

- Assess level of consciousness using GCS
- Check pupils
- Check BSL
- Review medication
- Pain Management

In addition: Check patient temperature and ensure normothermic. Treat accordingly if out of range. Consider further imaging if available and time allows.

Need more help or patient not responding to treatment?

ACTIVATE EXTERNAL RESPONSE

ARV escalation - initiate contact with ARV to:

- Communicate your concerns regarding the patients status
- Seek guidance and assistance with interventions / treatment options
- Use tele / videoconference support capacity (where available)
- Prioritise ongoing management of patient and escalate retrieval for definitive care when required

Possible Outcomes

- Local management with support
- Retrieval to a Rural Trauma Service
- Retrieval to a Metropolitan Trauma Service
- Retrieval to a Major Trauma Service



3. Introduction

Deteriorating trauma patients

The early recognition and response to clinical deterioration is vital in order to prevent adverse events in the patient care episode including: avoidable morbidity, cardiac arrest, unplanned ICU admission and death. There is clear evidence that changes in physiological vital signs precede these events and research indicates that failure to appropriately recognise and respond to deteriorations or to escalate care in patients who are deteriorating directly leads to adverse outcomes for the patient.

Data from the Victorian government from 2010-2011 show that of the admissions direct to ICU from the ED, 70% were recognized as critically ill or injured on arrival, with 30% assessed as moderate to low acuity who then had an unplanned ICU admission².

Early recognition of clinical deterioration is essential for timely escalation of care, clinical response and appropriate management of the patient's condition³.

Medical Emergency Teams (MET) in hospitals are designed to review patients in the early stages of deterioration in order to attempt to reduce serious adverse events, cardiac arrests and unplanned ICU admissions. That same principle applies to the ED with a similar team based approach to trauma management⁴. (*See below*)

Similarities and differences between MET services and trauma team		
Variable	Trauma team	MET service
Location of patient	Emergency department or trauma centre	Hospital ward
Team leader	Typically emergency department doctor	Typically intensive care unit registrar
Patient profile	Young with few co-morbidities	Elderly with multiple co-morbidities
Presenting problem	Trauma	Hypoxia, hypotension and tachycardia
Need for early intervention	Concept of "golden hour"	Shown for sepsis, myocardial ischaemia, stroke

A fundamental feature of emergency care is managing that risk of clinical deterioration. Trauma patients, however, can be more complex and the sudden deterioration of any particular vital sign may be the result of the complex interaction of several injuries.

Trauma patient management requires careful observation in the period from arrival at the healthcare facility with a focus on two key outcomes of traumatic injury:

- *Primary injury*: the outcomes of the initial mechanical forces that occur from the traumatic event.



- *Secondary injury*: not mechanically caused outcomes of traumatic injuries that may be superimposed on the primary injuries already identified.⁵

Effectively managing a deteriorating trauma patient may require simultaneous resuscitation and assessment. Any deterioration of a trauma patient indicates a need to revisit primary and secondary assessment to guide further intervention.

Key to successfully managing a deteriorating major trauma patient is rapid assessment and intervention with escalation of care to external resources where there are no local resources available, or when patient care is beyond the capacity of the health service⁶.

Early communication with ARV clinicians and using tele/videoconference facilities may provide additional support and guidance to clinicians.

Track and Trigger

The Australian Commission on Safety and Quality in Health Care (ACSQHC) recommend that all patients in acute care settings have access to a standardised system of response to guide healthcare providers. Track and Trigger systems actively promote the early recognition of clinical deterioration through regular assessment of vital signs (tracking) and aid in supporting clinical decision making via identification of predetermined physiological criteria (triggers) that indicate when to escalate care. The implementation across all health services of *Recognising and responding to clinical deterioration* (Standard 9) is now fundamental to health service accreditation⁷. This approach uses standardised, colour-coded charts with 'track and trigger' mechanisms to guide escalation of care, reflecting approaches required under the essential elements of the standards. In the 2nd edition currently being introduced across Australia, this standard is now changing to *Recognising and responding to acute deterioration* (Standard 8). The new standard builds on the existing Standard 9 from the first edition. The main changes are that the new standard recognises that deterioration can be physiological, mental or both. Therefore systems need to be in place to recognise and respond to patients' physical and mental deterioration.⁸

See Appendix 1: R2 Observation and Response Chart example.

See Appendix 2: Adult Deterioration Detection System Observation and Response Chart example.

4. Clinical observation of major trauma patients

Major trauma patients may present significant challenges and induce substantial stress on staff, with a loss of situational awareness resulting in key indications for escalation of care being missed. Studies have shown that multi-tasking and task switching can lead to missed indicators of patient deterioration and that clear charting methods, using easily identifiable thresholds for escalation, can reduce adverse events in patient care.

Alongside this, patients in the ED are at increased risk of unrecognised, unreported and/or undertreated clinical deterioration. Many factors come together to increase the likelihood of this such as time pressures, uncontrolled workloads and limited resources. Add to this the relative unknown history of the patient with non-specific complaints that carry a wide range of differential diagnosis.



Recognising and responding to clinical deterioration

The initial clinical management of a major trauma presentation needs to rely on both the collection of concise data and on astute observations gained from clinical examination of the patient to relay to consulting team members.

Clinical criteria for escalation of care provides decision support for clinical staff to ensure there are clear guidelines on when to intensify and increase frequency of communication and observation. Respiratory rate changes, specifically tachypnoea is the most sensitive and specific indicator of clinical deterioration so should be measured frequently and accurately.

Staff should also be aware of acute changes in the patient over time such as fluctuations in pupillary response, confusion, agitation or delirium or an acutely cold, clammy, cyanotic or pulseless extremity.

Additionally, clinicians need to be aware of changes in frequent observations that are documented routinely during the patient's initial assessment and early management.

The following tables indicate key criteria requiring further assistance with patient assessment and management.

Early warning signs of patient deterioration⁹

Partial airway obstruction (excluding snoring)
Oxygen saturation 90–95%
Respiratory rate 5–9 bpm or 30–40 bpm
Pulse rate 40–50 or 120–140
Systolic BP 80–100 mmHg or 180–240 mmHg
Poor peripheral circulation
Urine output < 200 mL over eight hours
Greater than expected drainage fluid loss
A drop in GCS of 2 points or GCS < 12 or any seizure
New or uncontrolled pain (including chest pain)
ABGs PaO ₂ 50–60, PCO ₂ 50–60, pH 7.2–7.3, BE –5 to –8 mmol/L
BSL 1–3 mmol/L

Late warning signs of patient deterioration⁹

Airway obstruction or stridor
SpO ₂ < 90%
Respiratory rate < 5 bpm or > 40 bpm
Pulse rate < 40 or > 140
Systolic BP < 80 or > 240 mmHg



Excess blood loss not controlled by ward staff
Unresponsive to verbal command or GCS < 8
Urine output < 200 mL in 24 hours or anuria
ABGs PaO ₂ < 50, PCO ₂ > 60, pH < 7.2, BE < -7
BSL < 1 mmol/L

Used with permission from:

<http://www.cec.health.nsw.gov.au/programs/between-the-flags>

The ACQSHC *National Consensus Statement: Essential elements for recognising and responding to clinical deterioration* require eight important clinical processes to be in place at all healthcare services:

- 1) Measurement and documentation of observations: establishing the need for the assessment of measureable physiological abnormalities that occur prior to adverse events.
- 2) Escalation of care: where an escalation protocol sets out the organisational response to dealing with different levels of physiological abnormality, including modifications to nursing care, increased monitoring, review by attending staff, review by senior medical and nursing staff, or calling for emergency assistance from intensive care or specialist teams.
- 3) Rapid response systems: where severe deterioration occurs, it is important that the capacity exists to obtain appropriate emergency assistance or advice prior to the occurrence of an adverse event. In some facilities this may be a combination of on-site and external clinicians or resources.
- 4) Clinical communication: effective communication and teamwork among clinicians is an essential element for recognising and responding to clinical deterioration. Poor communication has been identified as a contributing factor to incidents where clinical deterioration is not identified or properly managed.
- 5) Organisational support: without strong organisational support for implementation, the system will fail. There needs to be acceptance from senior management to help drive the health care facility to ensure that their systems for recognising and responding to clinical deterioration are operational and effective.
- 6) Education: It is essential to provide education to the clinical and nonclinical workforce in support of this standard in order to ensure familiarisation and usage in practice.
- 7) Evaluation: of new systems is important in order to establish their efficacy and determine if any changes are required to optimise performance
- 8) Technological systems and solutions: it is important to consider the use of technological systems and solutions which may aid in the delivery and accessibility of implementing new systems.



In managing a deteriorating patient in all health services, the Consensus Statement provides clear guidelines on the development and governance of rapid response systems.

5. The role of the team in recognition of deterioration

The acronym DETECT can be used to assist in identifying and managing deteriorating patients and to guide staff as to when to escalate assessment and intervention or activate a rapid response team if available at the health service¹⁰.

There are a range of parameters that should be taken into consideration when deciding if escalation of care is required.

- Many institutions now advocate for escalation and clinical review even if the only criteria met is that staff are concerned about the patient.

This may be without markedly abnormal observations and no added differential diagnosis. Further communication may assist in identifying acute changes in the patient's condition.

The activation of local resources may include contributions from pre-hospital team members such as emergency response personnel, secondment of in-house staff to assist or the recall of off-duty staff. The potentially challenging circumstances of managing a deteriorating patient require leadership and early planning. It should also include nominating a skilled staff member to supervise and guide assessment and intervention.

Importantly, the lead of the response team should remain, where possible, dedicated to this single role, and not become involved in direct intervention. This may be limited by the need to assist in managing the patient as advanced skills of the leader may be required; however, they should return to the supervisory role as soon as possible to manage overarching supervision, continuously scoping for changes in the patient's condition and indications for further intervention.

For health services with limited capacity, communication with ARV contributes to the team assessment and management of a deteriorating trauma patient.

This additional communication with experienced staff may provide the required clinical support to improve patient care and offer staff assurance that the patient is being appropriately managed under difficult circumstances.

The DETECT algorithm (see table below), promotes the use of a systematised process to detect Deterioration, Evaluate, Treat, Escalate and Communicate with your Team. This system promotes a 'concern, communicate and care for' approach for these patients to ensure they receive simple, early intervention to reverse deterioration.

The DETECT algorithm, 'detect deterioration' uses the ABCDEFG¹¹ format (see Appendix 3) to ensure effective assessment of the patient is undertaken including collecting important information that may indicate the patient is heading down the 'slippery slope' and for effectively communicating the patient's status.



DETECT algorithm

D	<p>Detect deterioration</p> <ul style="list-style-type: none"> •Recognise that you have a problem by gathering information relating to your patient. •Use the ABCDEFG algorithm (look, listen, feel). •Identify early and late warning signs. 	<p>Trauma examples</p> <p>Increasing respiratory rate, increasing heart rate, falling blood pressure, ongoing revealed blood loss, pallor, altered conscious state, decreased urine output.</p>
E	<p>Evaluate</p> <ul style="list-style-type: none"> •Likely causes of deterioration. •Whether your skills and the skills of those around you will meet the patient’s needs. •If and when to call for help. •The urgency of the response. •Continue to constantly re-evaluate. 	<p>Evolving head injury and changing conscious state where the cause appears obvious but need to exclude concealed haemorrhage and complications of chest trauma compromising ventilation.</p> <p>Consider early communication of any problems identified.</p>
T	<p>Treatment</p> <ul style="list-style-type: none"> •Prioritise interventions using the ABCDEFG algorithm to guide your decision making. •Commence simple treatments such as oxygen, positioning your patient and establishing IV access. •Call for help if you can’t manage. 	<p>Begin basic life support if required, check oxygen administration, ensure large-bore IV access and administer resuscitation fluids, position patient as needed (for example, left lateral/sit up) check point of care/formal blood tests, prepare equipment for interventions such as intubation.</p>
E	<p>Escalate</p> <ul style="list-style-type: none"> •Be aware of signs of further deterioration, or failure to reverse deterioration. •Know how and who to call for more assistance. •Know when the patient’s clinical management requires advanced skills. 	<p>Notify the senior doctor/nurse in charge, activate local protocols, re-contact ARV, use internal and/or external resources where capacity exists.</p>
C	<p>Communicating in Teams</p> <ul style="list-style-type: none"> •Provide leadership where appropriate. •Coordinate activities within the team. •Use the ISBAR algorithm to communicate clearly. 	<p>Revise, prepare and communicate the patient’s care plan, assess outcomes of intervention, designate a team leader and other roles to the response team members, consider tele/video conferenced support from ARV.</p>



	• Document clearly the patient's outcome in the healthcare record.	
T		

Used with permission from:

<http://www.cec.health.nsw.gov.au/programs/between-the-flags>

6. Early activation or consultation

If critical care clinical advice is required or it is anticipated that transfer to an MTS will be needed, early retrieval consultation and activation is essential (phone ARV on 1300 368 661).

Early retrieval activation ensures access to critical care advice and a more effective retrieval response.

Early activation and timely critical care transfer improves clinical outcomes for the patient. If you are undecided, call the ARV coordinator, who can provide expert guidance and advice over the phone or via tele/videoconference, and link to an MTS as required.

7. Further information

- FINAL DRAFT: National Safety and Quality Health Service Standards (second edition)
- <https://www.safetyandquality.gov.au/wp-content/uploads/2017/09/National-Safety-and-Quality-Health-Service-Standards-second-edition.pdf>
- 8: Recognising and Responding to Acute deterioration: overview.
- <https://www.safetyandquality.gov.au/wp-content/uploads/2017/09/8-Recognising-and-Responding-to-Acute-Deterioration.pdf>



8. Appendix 1: R2 Observation and response charts example

Ux1 Number _____
 Family name _____
 Given name _____
 Patient initials _____

Date of birth _____

Patient status (tick box) M F

DRAFT - NOT FOR USE

(If the patient status has been used here)

Emergency Call

Response Criteria

- Any observation (in a purple area)
- You are worried about the patient/it
- You are worried about the above criteria

Actions Required

- Place Emergency call
- Begin initial support/interventions
- Advanced the support/provide/escalate patient immediately

Repeating to Triage/Clinical Review

Response Criteria

- Any observation (in an orange area)
- You are worried about the patient/it
- You are worried about the above criteria

Actions Required

- Senior medical officer review (purple bar or above) within 30 minutes
- Request review, and note on the back of this form
- Increase frequency of observations (Specify frequency)

General Instructions

- You must record appropriate observations:
 - On admission
 - At a frequency appropriate for the patient's clinical state.
 - You must record and use 1 or observations:
 - If the patient is deteriorating or an observation is in a shaded area
 - Whenever you are concerned about the patient.
 - When graphing observations, place a dot (•) in the centre of the box which includes the current observation in its range of values and connect it to the previous dot with a straight line. For blood pressure, use the symbol indicated on the chart.
 - Whenever an observation falls within a shaded area, you must indicate the actions required for that colour, unless a modification has been made (see criteria).
 - If observations fall within both purple and orange coloured areas for the same time period, the actions required for the purple area apply.

DO NOT WRITE IN THESE SPACES

Date	Time	Widex 200	Widex 140	Widex 200	Widex 140
		Wide: 200	Wide: 140	Wide: 200	Wide: 140
		200-240	120-160	200-240	120-160
		240-280	160-200	240-280	160-200
		280-320	200-240	280-320	200-240
		320-360	240-280	320-360	240-280
		360-400	280-320	360-400	280-320
		400-440	320-360	400-440	320-360
		440-480	360-400	440-480	360-400
		480-520	400-440	480-520	400-440
		520-560	440-480	520-560	440-480
		560-600	480-520	560-600	480-520
		600-640	520-560	600-640	520-560
		640-680	560-600	640-680	560-600
		680-720	600-640	680-720	600-640
		720-760	640-680	720-760	640-680
		760-800	680-720	760-800	680-720
		800-840	720-760	800-840	720-760
		840-880	760-800	840-880	760-800
		880-920	800-840	880-920	800-840
		920-960	840-880	920-960	840-880
		960-1000	880-920	960-1000	880-920
		1000-1040	920-960	1000-1040	920-960
		1040-1080	960-1000	1040-1080	960-1000
		1080-1120	1000-1040	1080-1120	1000-1040
		1120-1160	1040-1080	1120-1160	1040-1080
		1160-1200	1080-1120	1160-1200	1080-1120
		1200-1240	1120-1160	1200-1240	1120-1160
		1240-1280	1160-1200	1240-1280	1160-1200
		1280-1320	1200-1240	1280-1320	1200-1240
		1320-1360	1240-1280	1320-1360	1240-1280
		1360-1400	1280-1320	1360-1400	1280-1320
		1400-1440	1320-1360	1400-1440	1320-1360
		1440-1480	1360-1400	1440-1480	1360-1400
		1480-1520	1400-1440	1480-1520	1400-1440
		1520-1560	1440-1480	1520-1560	1440-1480
		1560-1600	1480-1520	1560-1600	1480-1520
		1600-1640	1520-1560	1600-1640	1520-1560
		1640-1680	1560-1600	1640-1680	1560-1600
		1680-1720	1600-1640	1680-1720	1600-1640
		1720-1760	1640-1680	1720-1760	1640-1680
		1760-1800	1680-1720	1760-1800	1680-1720
		1800-1840	1720-1760	1800-1840	1720-1760
		1840-1880	1760-1800	1840-1880	1760-1800
		1880-1920	1800-1840	1880-1920	1800-1840
		1920-1960	1840-1880	1920-1960	1840-1880
		1960-2000	1880-1920	1960-2000	1880-1920
		2000-2040	1920-1960	2000-2040	1920-1960
		2040-2080	1960-2000	2040-2080	1960-2000
		2080-2120	2000-2040	2080-2120	2000-2040
		2120-2160	2040-2080	2120-2160	2040-2080
		2160-2200	2080-2120	2160-2200	2080-2120
		2200-2240	2120-2160	2200-2240	2120-2160
		2240-2280	2160-2200	2240-2280	2160-2200
		2280-2320	2200-2240	2280-2320	2200-2240
		2320-2360	2240-2280	2320-2360	2240-2280
		2360-2400	2280-2320	2360-2400	2280-2320
		2400-2440	2320-2360	2400-2440	2320-2360
		2440-2480	2360-2400	2440-2480	2360-2400
		2480-2520	2400-2440	2480-2520	2400-2440
		2520-2560	2440-2480	2520-2560	2440-2480
		2560-2600	2480-2520	2560-2600	2480-2520
		2600-2640	2520-2560	2600-2640	2520-2560
		2640-2680	2560-2600	2640-2680	2560-2600
		2680-2720	2600-2640	2680-2720	2600-2640
		2720-2760	2640-2680	2720-2760	2640-2680
		2760-2800	2680-2720	2760-2800	2680-2720
		2800-2840	2720-2760	2800-2840	2720-2760
		2840-2880	2760-2800	2840-2880	2760-2800
		2880-2920	2800-2840	2880-2920	2800-2840
		2920-2960	2840-2880	2920-2960	2840-2880
		2960-3000	2880-2920	2960-3000	2880-2920
		3000-3040	2920-2960	3000-3040	2920-2960
		3040-3080	2960-3000	3040-3080	2960-3000
		3080-3120	3000-3040	3080-3120	3000-3040
		3120-3160	3040-3080	3120-3160	3040-3080
		3160-3200	3080-3120	3160-3200	3080-3120
		3200-3240	3120-3160	3200-3240	3120-3160
		3240-3280	3160-3200	3240-3280	3160-3200
		3280-3320	3200-3240	3280-3320	3200-3240
		3320-3360	3240-3280	3320-3360	3240-3280
		3360-3400	3280-3320	3360-3400	3280-3320
		3400-3440	3320-3360	3400-3440	3320-3360
		3440-3480	3360-3400	3440-3480	3360-3400
		3480-3520	3400-3440	3480-3520	3400-3440
		3520-3560	3440-3480	3520-3560	3440-3480
		3560-3600	3480-3520	3560-3600	3480-3520
		3600-3640	3520-3560	3600-3640	3520-3560
		3640-3680	3560-3600	3640-3680	3560-3600
		3680-3720	3600-3640	3680-3720	3600-3640
		3720-3760	3640-3680	3720-3760	3640-3680
		3760-3800	3680-3720	3760-3800	3680-3720
		3800-3840	3720-3760	3800-3840	3720-3760
		3840-3880	3760-3800	3840-3880	3760-3800
		3880-3920	3800-3840	3880-3920	3800-3840
		3920-3960	3840-3880	3920-3960	3840-3880
		3960-4000	3880-3920	3960-4000	3880-3920
		4000-4040	3920-3960	4000-4040	3920-3960
		4040-4080	3960-4000	4040-4080	3960-4000
		4080-4120	4000-4040	4080-4120	4000-4040
		4120-4160	4040-4080	4120-4160	4040-4080
		4160-4200	4080-4120	4160-4200	4080-4120
		4200-4240	4120-4160	4200-4240	4120-4160
		4240-4280	4160-4200	4240-4280	4160-4200
		4280-4320	4200-4240	4280-4320	4200-4240
		4320-4360	4240-4280	4320-4360	4240-4280
		4360-4400	4280-4320	4360-4400	4280-4320
		4400-4440	4320-4360	4400-4440	4320-4360
		4440-4480	4360-4400	4440-4480	4360-4400
		4480-4520	4400-4440	4480-4520	4400-4440
		4520-4560	4440-4480	4520-4560	4440-4480
		4560-4600	4480-4520	4560-4600	4480-4520
		4600-4640	4520-4560	4600-4640	4520-4560
		4640-4680	4560-4600	4640-4680	4560-4600
		4680-4720	4600-4640	4680-4720	4600-4640
		4720-4760	4640-4680	4720-4760	4640-4680
		4760-4800	4680-4720	4760-4800	4680-4720
		4800-4840	4720-4760	4800-4840	4720-4760
		4840-4880	4760-4800	4840-4880	4760-4800
		4880-4920	4800-4840	4880-4920	4800-4840
		4920-4960	4840-4880	4920-4960	4840-4880
		4960-5000	4880-4920	4960-5000	4880-4920
		5000-5040	4920-4960	5000-5040	4920-4960
		5040-5080	4960-5000	5040-5080	4960-5000
		5080-5120	5000-5040	5080-5120	5000-5040
		5120-5160	5040-5080	5120-5160	5040-5080
		5160-5200	5080-5120	5160-5200	5080-5120
		5200-5240	5120-5160	5200-5240	5120-5160
		5240-5280	5160-5200	5240-5280	5160-5200
		5280-5320	5200-5240	5280-5320	5200-5240
		5320-5360	5240-5280	5320-5360	5240-5280
		5360-5400	5280-5320	5360-5400	5280-5320
		5400-5440	5320-5360	5400-5440	5320-5360
		5440-5480	5360-5400	5440-5480	5360-5400
		5480-5520	5400-5440	5480-5520	5400-5440
		5520-5560	5440-5480	5520-5560	5440-5480
		5560-5600	5480-5520	5560-5600	5480-5520
		5600-5640	5520-5560	5600-5640	5520-5560
		5640-5680	5560-5600	5640-5680	5560-5600
		5680-5720	5600-5640	5680-5720	5600-5640
		5720-5760	5640-5680	5720-5760	5640-5680
		5760-5800	5680-5720	5760-5800	5680-5720
		5800-5840	5720-5760	5800-5840	5720-5760
		5840-5880	5760-5800	5840-5880	5760-5800
		5880-5920	5800-5840	5880-5920	5800-5840
		5920-5960	5840-5880	5920-5960	5840-5880
		5960-6000	5880-5920	5960-6000	5880-5920
		6000-6040	5920-5960	6000-6040	5920-5960
		6040-6080	5960-6000	6040-6080	5960-6000
		6080-6120	6000-6040	6080-6120	6000-6040
		6120-6160	6040-6080	6120-6160	6040-6080
		6160-6200	6080-6120	6160-6200	6080-6120
		6200-6240	6120-6160	6200-6240	6120-6160
		6240-6280	6160-6200	6240-6280	6160-6200
		6280-6320	6200-6240	6280-6320	6200-6240
		6320-6360	6240-6280	6320-6360	6240-6280
		6360-6400	6280-6320	6360-6400	6280-6320
		6400-6440	6320-6360	6400-6440	6320-6360
		6440-6480	6360-6400	6440-6480	6360-6400
		6480-6520	6400-6440	6480-6520	6400-6440
		6520-6560	6440-6480	6520-6560	6440-6480
		6560-6600	6480-6520	6560-6600	6480-6520
		6600-6640	6520-6560	6600-6640	6520-6560
		6640-6680	6560-6600	6640-6680	6560-6600
		6680-6720	6600-6640	6680-6720	6600-6640
		6720-6760	6640-6680	6720-6760	6640-6680
		6760-6800			



9. Appendix 2: ADDS Observation and response chart

UR Number: _____

Family: **DRAFT - NOT**

Other: **FOR USE**

Date of birth: _____

(Add patient description below here)

Adult Deterioration Detection System (ADDS)

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

□	Score 0
□	Score 1
□	Score 2
□	Score 3
□	Emergency call

Actions Required

Total ADDS Score 1-3

- Inform senior nurse and/or Team Leader
- Increase frequency of observations (Specify frequency)

Total ADDS Score 4-5

- Senior nurse and/or junior medical officer review within 30 minutes
- Increase frequency of observations (Specify frequency)

Total ADDS Score 6-7

- Senior medical officer review (regular or above) within 30 minutes
- Request review, and notify the back of this form
- Increase frequency of observations (Specify frequency)

Total ADDS Score 8

- Senior medical officer review (regular or above) within 30 minutes
- Request review, and notify the back of this form
- Increase frequency of observations (Specify frequency)

Emergency call if:

- Any observation is in a purple area
- Wheely 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

DO NOT WRITE IN THIS SHADING MARGIN

Date Time	Respiratory Rate (breaths / min)	O ₂ Saturation (%)	O ₂ Flow Rate (L / min)	Blood Pressure (mmHg)	Heart Rate (beats / min)	Temperature (°C)	Consciousness	Intervention	E.g. %
Write > 26	30-34	96-100	Write > 200	Write > 140	Write > 140	Write > 39.1	Alert		
25-29	25-29	92-97	150k	100k	40k	38.5-39.0	To Voice		
20-24	20-24	90-94	170k	130k	50k	38.0-38.4	To Pain		
15-19	15-19	88-92	190k	150k	60k	37.5-37.9	Unresponsive		
10-14	10-14	86-90	210k	170k	70k	37.0-37.4			
Write < 6.4	Write < 6.4	84-88	230k	190k	80k	36.5-36.9			
3-5	3-5	82-86	250k	210k	90k	36.0-36.4			
Write > 200	Write > 200	80-84	270k	230k	100k	35.5-35.9			
150k	100k	78-82	290k	250k	110k	35.0-35.4			
170k	120k	76-80	310k	270k	120k	34.5-34.9			
190k	140k	74-78	330k	290k	130k	34.0-34.4			
150k	100k	72-76	350k	310k	140k	33.5-33.9			
170k	120k	70-74	370k	330k	150k	33.0-33.4			
190k	140k	68-72	390k	350k	160k	32.5-32.9			
150k	100k	66-70	410k	370k	170k	32.0-32.4			
170k	120k	64-68	430k	390k	180k	31.5-31.9			
190k	140k	62-66	450k	410k	190k	31.0-31.4			
150k	100k	60-64	470k	430k	200k	30.5-30.9			
170k	120k	58-62	490k	450k	210k	30.0-30.4			
190k	140k	56-60	510k	470k	220k	29.5-29.9			
150k	100k	54-58	530k	490k	230k	29.0-29.4			
170k	120k	52-56	550k	510k	240k	28.5-28.9			
190k	140k	50-54	570k	530k	250k	28.0-28.4			
150k	100k	48-52	590k	550k	260k	27.5-27.9			
170k	120k	46-50	610k	570k	270k	27.0-27.4			
190k	140k	44-48	630k	590k	280k	26.5-26.9			
150k	100k	42-46	650k	610k	290k	26.0-26.4			
170k	120k	40-44	670k	630k	300k	25.5-25.9			
190k	140k	38-42	690k	650k	310k	25.0-25.4			
150k	100k	36-40	710k	670k	320k	24.5-24.9			
170k	120k	34-38	730k	690k	330k	24.0-24.4			
190k	140k	32-36	750k	710k	340k	23.5-23.9			
150k	100k	30-34	770k	730k	350k	23.0-23.4			
170k	120k	28-32	790k	750k	360k	22.5-22.9			
190k	140k	26-30	810k	770k	370k	22.0-22.4			
150k	100k	24-28	830k	790k	380k	21.5-21.9			
170k	120k	22-26	850k	810k	390k	21.0-21.4			
190k	140k	20-24	870k	830k	400k	20.5-20.9			
150k	100k	18-22	890k	850k	410k	20.0-20.4			
170k	120k	16-20	910k	870k	420k	19.5-19.9			
190k	140k	14-18	930k	890k	430k	19.0-19.4			
150k	100k	12-16	950k	910k	440k	18.5-18.9			
170k	120k	10-14	970k	930k	450k	18.0-18.4			
190k	140k	8-12	990k	950k	460k	17.5-17.9			
150k	100k	6-8	1010k	970k	470k	17.0-17.4			
170k	120k	4-6	1030k	990k	480k	16.5-16.9			
190k	140k	2-4	1050k	1010k	490k	16.0-16.4			
150k	100k	0-2	1070k	1030k	50k	15.5-15.9			
170k	120k	Write > 200	1090k	1050k	60k	15.0-15.4			
190k	140k	150k	1110k	1070k	70k	14.5-14.9			
150k	100k	170k	1130k	1090k	80k	14.0-14.4			
170k	120k	190k	1150k	1110k	90k	13.5-13.9			
190k	140k	210k	1170k	1130k	100k	13.0-13.4			
150k	100k	230k	1190k	1150k	110k	12.5-12.9			
170k	120k	250k	1210k	1170k	120k	12.0-12.4			
190k	140k	270k	1230k	1190k	130k	11.5-11.9			
150k	100k	290k	1250k	1210k	140k	11.0-11.4			
170k	120k	310k	1270k	1230k	150k	10.5-10.9			
190k	140k	330k	1290k	1250k	160k	10.0-10.4			
150k	100k	350k	1310k	1270k	170k	9.5-9.9			
170k	120k	370k	1330k	1290k	180k	9.0-9.4			
190k	140k	390k	1350k	1310k	190k	8.5-8.9			
150k	100k	410k	1370k	1330k	200k	8.0-8.4			
170k	120k	430k	1390k	1350k	210k	7.5-7.9			
190k	140k	450k	1410k	1370k	220k	7.0-7.4			
150k	100k	470k	1430k	1390k	230k	6.5-6.9			
170k	120k	490k	1450k	1410k	240k	6.0-6.4			
190k	140k	510k	1470k	1430k	250k	5.5-5.9			
150k	100k	530k	1490k	1450k	260k	5.0-5.4			
170k	120k	550k	1510k	1470k	270k	4.5-4.9			
190k	140k	570k	1530k	1490k	280k	4.0-4.4			
150k	100k	590k	1550k	1510k	290k	3.5-3.9			
170k	120k	610k	1570k	1530k	300k	3.0-3.4			
190k	140k	630k	1590k	1550k	310k	2.5-2.9			
150k	100k	650k	1610k	1570k	320k	2.0-2.4			
170k	120k	670k	1630k	1590k	330k	1.5-1.9			
190k	140k	690k	1650k	1610k	340k	1.0-1.4			
150k	100k	710k	1670k	1630k	350k	0.5-0.9			
170k	120k	730k	1690k	1650k	360k	0.0-0.4			
190k	140k	750k	1710k	1670k	370k	0.0-0.4			
150k	100k	770k	1730k	1690k	380k	0.0-0.4			
170k	120k	790k	1750k	1710k	390k	0.0-0.4			
190k	140k	810k	1770k	1730k	400k	0.0-0.4			
150k	100k	830k	1790k	1750k	410k	0.0-0.4			
170k	120k	850k	1810k	1770k	420k	0.0-0.4			
190k	140k	870k	1830k	1790k	430k	0.0-0.4			
150k	100k	890k	1850k	1810k	440k	0.0-0.4			
170k	120k	910k	1870k	1830k	450k	0.0-0.4			
190k	140k	930k	1890k	1850k	460k	0.0-0.4			
150k	100k	950k	1910k	1870k	470k	0.0-0.4			
170k	120k	970k	1930k	1890k	480k	0.0-0.4			
190k	140k	990k	1950k	1910k	490k	0.0-0.4			
150k	100k	1010k	1970k	1930k	50k	0.0-0.4			
170k	120k	1030k	1990k	1950k	60k	0.0-0.4			
190k	140k	1050k	2010k	1970k	70k	0.0-0.4			
150k	100k	1070k	2030k	1990k	80k	0.0-0.4			
170k	120k	1090k	2050k	2010k	90k	0.0-0.4			
190k	140k	1110k	2070k	2030k	100k	0.0-0.4			
150k	100k	1130k	2090k	2050k	110k	0.0-0.4			
170k	120k	1150k	2110k	2070k	120k	0.0-0.4			
190k	140k	1170k	2130k	2090k	130k	0.0-0.4			
150k	100k	1190k	2150k	2110k	140k	0.0-0.4			
170k	120k	1210k	2170k	2130k	150k	0.0-0.4			
190k	140k	1230k	2190k	2150k	160k	0.0-0.4			
150k	100k	1250k	2210k	2170k	170k	0.0-0.4			
170k	120k	1270k	2230k	2190k	180k	0.0-0.4			
190k	140k	1290k	2250k	2210k	190k	0.0-0.4			
150k	100k	1310k	2270k	2230k	200k	0.0-0.4			
170k	120k	1330k	2290k	2250k	210k	0.0-0.4			
190k	140k	1350k	2310k	2270k	220k	0.0-0.4			
150k	100k	1370k	2330k	2290k	230k	0.0-0.4			
170k	120k	1390k	2350k	2310k	240k	0.0-0.4			
190k	140k	1410k	2370k	2330k	250k	0.0-0.4			
150k	100k	1430k	2390k	2350k	260k	0.0-0.4			
170k	120k	1450k	2410k	2370k	270k	0.0-0.4			
190k	140k	1470k	2430k	2390k	280k	0.0-0.4			
150k	100k	1490k	2450k	2410k	290k	0.0-0.4			
170k	120k	1510k	2470k	2430k	300k	0.0-0.4			
190k	140k	1530k	2490k	2450k	310k	0.0-0.4			
150k	100k	1550k	2510k	2470k	320k	0.0-0.4			
170k	120k	1570k	2530k	2490k	330k	0.0-0.4			
190k	140k	1590k	2550k	2510k	340k	0.0-0.4			
150k	100k	1610k	2570k	2530k	350k	0.0-0.4			
170k	120k	1630k	2590k	2550k	360k	0.0-0.4			
190k	140k	1650k	2610k	2570k	370k	0.0-0.4			
150k	100k	1670k	2630k	2590k	380k	0.0-0.4			
170k	120k	1690k	2650k	2610k	390k	0.0-0.4			
190k	140k	1710k	2670k	2630k	400k	0.0-0.4			
150k	100k	1730k	2690k	2650k	410k	0.0-0.4			
170k									



10. Appendix 3: ABCDEFG for deteriorating patients

A	Airway	Look <ul style="list-style-type: none"> For any signs of airway obstruction. For evidence of mouth/neck/swelling/haematoma. For security of artificial airway. 	Listen <ul style="list-style-type: none"> For noisy breathing e.g. gurgling, snoring or stridor. 	Feel <ul style="list-style-type: none"> For the presence of air movement. For security of artificial airway. 	
B	Breathing	Look <ul style="list-style-type: none"> At the chest wall movement, to see if it is normal and symmetrical. To see if the patient is using their neck and shoulder muscles to breathe (accessory muscles). At the patient to measure their respiratory rate. 	Listen <ul style="list-style-type: none"> To the patient talking to see if they can complete full sentences. For noisy breathing e.g. stridor, wheezing. 	Feel <ul style="list-style-type: none"> For the position of the trachea to see if it is central. For the surgical emphysema or crepitus. If the patient is diaphoretic (sweaty). 	
C	Circulation	Look <ul style="list-style-type: none"> At the skin colour for pallor and peripheral cyanosis. At the capillary refill time. At the patient's central venous pressure and jugular venous pressure. 	Listen <ul style="list-style-type: none"> To the patient for complaints of dizziness and headaches. For patient's blood pressure and heart sounds. 	Feel <ul style="list-style-type: none"> Your patient's hands and feet to see if they are warm or cold. Your patient's peripheral pulses for presence, rate, quality, regularity and equality. 	
D	Disability	Look <ul style="list-style-type: none"> At the level of consciousness. For facial symmetry, abnormal movements, seizure activity or absent limb movements. At pupil size, equality and reaction to light. 	Listen <ul style="list-style-type: none"> To patients response to external stimuli and pain. For slurred speech. For patient's orientation to person, place and time. 	Feel <ul style="list-style-type: none"> For patient's response to external stimuli. For muscle power and strength. 	
E	Exposure	Look <ul style="list-style-type: none"> For any bleeding e.g. investigate wounds and drains that may be hidden by bed clothes. 	Listen <ul style="list-style-type: none"> For air leaks in drains. For bowel sounds. 	Feel <ul style="list-style-type: none"> The patient's abdomen. 	
F	Fluids	Look <ul style="list-style-type: none"> At the observation and fluid charts, noting the fluid in put and output. At losses from all drains and tubes. At the amount and colour of the patient's urine and urinalysis results. 	Listen <ul style="list-style-type: none"> For patient's complaints of thirst. 	Feel <ul style="list-style-type: none"> The skin turgor. 	
G	Glucose	Look <ul style="list-style-type: none"> At blood glucose levels. For signs of low glucose, including confusion and decreased conscious state. At medication chart for insulin and oral hypoglycaemics. 	Listen <ul style="list-style-type: none"> For patient's complaints of thirst. For patient's orientation to person, time and place. 	Feel <ul style="list-style-type: none"> If the patient is diaphoretic (sweaty, cold or clammy). 	
Give oxygen		<ul style="list-style-type: none"> Based on your assessment (above) decide on an appropriate oxygen flow rate or percentage. If in doubt commence on 4L/min on a Hudson mask and increase as indicated by oxygen saturation or patient condition 			
Position your patient		<ul style="list-style-type: none"> Position your patient to optimise their breathing – usually this is as upright position as possible and as tolerated by the patient. Place the patient in the left lateral position if they are unconscious but have adequate breathing and circulation and where there is no evidence of spinal injury. 			
Call for help if you can't manage		<ul style="list-style-type: none"> Establish IV if not present, +/- fluids. 			
Never leave a deteriorating patient without a priority management and review plan		Document and communicate clearly: <ul style="list-style-type: none"> All treatments provided. Outcomes of treatment implemented. What care is still required. The plan should include expected outcomes and when the patient will be reviewed again			



11. Appendix 4: AGREE II Score Sheet – The deteriorating trauma patient guideline

AGREE II Score Sheet: The deteriorating trauma patient guideline

Domain	Item	AGREE II Rating						
		1 Strongly Disagree	2	3	4	5	6	7 Strongly Agree
Scope and purpose	1. The overall objective(s) of the guideline is (are) specifically described.							X
	2. The health question(s) covered by the guideline is (are) specifically described.							X
	3. The population (patients, public, etc.) to whom the guideline is meant to apply is specifically described.							X
Stakeholder involvement	4. The guideline development group includes individuals from all the relevant professional groups.						X	
	5. The views and preferences of the target population (patients, public, etc.) have been sought.							X
Rigor of development	6. The target users of the guideline are clearly defined.							X
	7. Systematic methods were used to search for evidence.					X		
	8. The criteria for selecting the evidence are clearly described.						X	
	9. The strengths and limitations of the body of evidence are clearly described.						X	
	10. The methods for formulating the recommendations are clearly described.						X	
	11. The health benefits, side effects and risks have been considered in formulating the recommendations.						X	
	12. There is an explicit link between the recommendations and the supporting evidence.							X
	13. The guideline has been externally reviewed by experts prior to its publication.							X
	14. A procedure for updating the guideline is provided.							X
	15. The recommendations are specific and unambiguous.						X	
Clarity of presentation	16. The different options for management of the condition or health issue are clearly presented.							X
	17. Key recommendations are easily identifiable.							X



Domain	Item	AGREE II Rating						
		1 <i>Strongly Disagree</i>	2	3	4	5	6	7 <i>Strongly Agree</i>
Applicability	18. The guideline describes facilitators and barriers to its application.							X
	19. The guideline provides advice and/or tools on how the recommendations can be put into practice.							X
	20. The potential resource implications of applying the recommendations have been considered.							X
	21. The guideline presents monitoring and/ or auditing criteria.							X
	22. The views of the funding body have not influenced the content of the guideline.							X
Editorial independence	23. Competing interests of guideline development group members have been recorded and addressed.							X
Overall Guideline Assessment	1. Rate the overall quality of this guideline.	1 <i>Lowest possible quality</i>	2	3	4	5	6	7 <i>Highest possible quality</i>
	2. I would recommend this guideline for use.	Yes X	Yes, with modifications				No	



12. References

- ¹ Brouwers M, Kho ME, Browman GP, Burgers JS, Cluzeau F, Feder G, Fervers B, Graham ID, Grimshaw J, Hanna S, Littlejohns P, Makarski J, Zitzelsberger L for the AGREE Next Steps Consortium. AGREE II: Advancing guideline development, reporting and evaluation in healthcare. *Can Med Assoc J.* 2010. Available online July 5, 2010. doi:10.1503/cmaj.090449
- ² Considine J, Jones D, Bellomo, R. Emergency department rapid response systems: the case for a standardized approach to deteriorating patients. *European Journal of Emergency Medicine* 20:375-381. 2013.
- ³ Hosking J, Considine J, Sands N. Recognising clinical deterioration in emergency department patients. *Australasian Emergency Nursing Journal* (2014) 17, 59-67
- ⁴ Considine, J. & Jones, D. (2015). Rapid response systems and the emergency department. In Cameron, P, Jelinek, J, Kelly, AM, Brown, A & Little, M. *Textbook of Adult Emergency Medicine*. Fourth Edition. (pp. 875-880). Elsevier: Sydney
- ⁵ Boyle M, Smith E, Archer F. A review of patients who suddenly deteriorate in the presence of paramedics. *BMC Emergency Medicine*. 2008. 8:9. doi:10.1186/1471-227X-8-9
- ⁶ Shere-Wolfe R, Galvagno S, Grissom T. 2012. Critical care considerations in the management of the trauma patient following initial resuscitation. *Scand J Trauma Resusc Emerg Med.* 20(1)68. Available at: <http://www.sjtrem.com/content/20/1/68> (Accessed April 4 2014).
- ⁷ Australia. National consensus statement; essential elements for recognising and responding to clinical deterioration. Australian Commission on Safety and Quality in Health Care. 2010. Sydney
- ⁸ ACSQHC. (2017, September 4). *NSQHS Standards (second edition)*. Retrieved from Australian Commission on Safety and Quality in Health Care: <https://www.safetyandquality.gov.au/our-work/assessment-to-the-nsqhs-standards/nsqhs-standards-second-edition/>
- ⁹ Clinical Excellence Commission: Programs Between the Flags – keeping patients safe [cited 2014 June 17]
Available from: < <http://www.cec.health.nsw.gov.au/programs/between-the-flags>>.
- ¹⁰ American College of Surgeons. *Advanced Trauma Life Support*. 9th Edition. American college of Surgeons committee on Trauma. 2012, Chicago.
- ¹¹ Grol R, Grimshaw J. 2003. From best evidence to best practice: effective implementation of change in patients care. *The Lancet*. vol. 362, no. 9391, p. 1225–1230