Clinical Observations and Assessments Clinical Practice Standard (physiological (vital signs), neurovascular, neurological and fluid balance)

1. Purpose

The purpose of this policy is to establish minimum practice standards for physiological (vital signs), neurovascular, neurological and fluid balance observations and assessments throughout the WA Country Health Service (WACHS).

This policy is to be used in conjunction with:

- WA Health Recognising and Responding to Acute Deterioration Policy
- WA Health Clinical Handover Policy
- WACHS Documentation Clinical Practice Standard
- WACHS Recognising and Responding to Acute Deterioration (RRAD) Policy
- WACHS Recognising and Responding to Acute Deterioration (RRAD) Procedure

Further information relating to Child and Adolescent Health Service (CAHS), Women and Newborn Health Services (WHNS) can be found via HealthPoint if not covered in this policy.

2. Scope

All medical, nursing, midwifery and allied health staff (including students) employed within WACHS.

All health care professionals are to work within their scope of practice appropriate to their level of training and responsibility.

This policy pertains to all health care settings in WACHS and is pertinent to all patients.

3. General Information

The Clinical Observation and Assessment Clinical Practice Standard (CPS) should be considered in conjunction with patient history, medications, current presentation and current interventions, treatments and therapies. It focuses on the assessment of common physiological data used to monitor patients and clinical processes that support the recognition and timely response for deteriorating patients.[1-4]

Observations are not to be taken in isolation; the clinician must integrate a focused/ comprehensive assessment of the patient. Reviewing observation trends is critical to early identification of deterioration. A systematic approach is recommended when taking observations as they establish baseline data against which to compare future measurements and to detect actual and potential health problems.[4, 6]

The physical condition of the patient needs to be taken into consideration when undertaking observations including but not limited to:

- visual appearance e.g. general appearance, skin colour, tissue turgor, skin temperature, sweating, grimace, guarding, posture
- behavioural signs e.g. cognitive impairment, confused, crying, incomprehensible noises, and inappropriate actions.
- other factors to consider may include changes in: fluid balance, blood glucose levels, decreased urine output, loss of blood or body fluid or wounds.

4. Patient Monitoring

An individualised comprehensive care plan (see Related / Documents Forms) is to be documented in the patient's healthcare record as soon as practicable (within 24 hours), and in relation to the specific requirements for clinical risk prevention and management. At a minimum, the plan must consider:

- patient history and presence of comorbidities, alerts and risks of harm
- agreed goals and actions for the patient's treatment and care
- identification of any support people a patient wishes to have involved in decision making about their care
- medications, psychosocial, religious and cultural factors that could influence patient monitoring
- frequency and type of specific clinical observations
- any restrictions to patient monitoring associated with patient preferences (end of life care patient goals, advance health directives).

Refer to:

- WACHS Recognising and Responding to Acute Deterioration (RRAD) Policy
- WACHS Recognising and Responding to Acute Deterioration (RRAD) Procedure

5. Staffing Responsibilities

All clinicians must be able to:

- systematically assess a patient appropriate to their professional scope of practice
- understand and interpret abnormal physiological parameters and other abnormal observations
- call for assistance for patients who are deteriorating/appear to be deteriorating
- initiate appropriate early interventions for patients who are deteriorating
- respond with life and limb sustaining measures in the event of severe or rapid deterioration (in the absence of advanced health directives or Goal of Patient Care treatment limitations), pending the arrival of emergency assistance, and where appropriate contribute to the ongoing acute management of the patient
- document in the patients' healthcare record all clinical observations, assessments and interventions/escalations.

6. Key Points prior to Undertaking Observations and Assessments

- The patient/carer/family has received information relating to the intended observations and assessments, and appropriate verbal consent is given (as applicable).
- Patient identification and procedure matching processes are undertaken as required.
- Ensure to maintain patient privacy and dignity.
- Offer the presence of a chaperone where appropriate to patient and clinician requirements (e.g. examination of a child; offer of female to female examination).
- Provide the opportunity for an accredited interpreter and/ or Aboriginal Liaison Officer where appropriate to the patient's language or communication requirements.

7. Clinical Communication

Information exchange is to adhere to the Department of Health Clinical Handover Policy using the iSoBAR framework.

Clinical Handover is to include information about the most recent observations and clinical assessment particularly clinical observations outside normal range to other clinicians involved in the care of the patient.

With the implementation of the Paediatric Acute Recognition and Response Observation Tool (PARROT) iSoBAR NOW is being used as a communication strategy that focuses attention on the need for timely action to recognise and respond to changing clinical situation. The NOW acronym stands for needs, observations, why. Its intention is to prompt clinicians to consider what needs to happen right NOW.

iSOBAR NOW

Needs - What are the immediate needs of the clinician to best support the patient's safety?
Observations - What are the specific observations raising concerns about the patient?
Why - What are the potential consequences to the patient of the clinician's action or inaction?

8. Partnering with Consumers

- Consider cultural, ethical and communication requirements.
- Consideration to the patient's wishes and "What Matters to Them".
- Provide opportunity for the patient, family and carer to be actively involved in the care by providing information to share decision making.
- Provide information to patient/family/carer how they can directly escalate care if they are worried:

Aishwarya's CARE Call Aishwarya's CARE Call processes and resources

Paediatric "Tell us if you are worried" handout (A5) or poster (A3)

9. Compliance Monitoring

Compliance with this CPS can be monitored by auditing documentation and process, reviewing trends though the Clinical Incident Management Systems and investigations, and quality improvement activity, as required. Compliance with this CPS should be reported to relevant site governance committees.

Failure to comply with this policy may constitute a breach of the WA Health Code of Conduct (Code). The Code is part of the Integrity Policy Framework issued pursuant to section 26 of the *Health Services Act 2016* (HSA) and is binding on all WACHS staff which for this purpose includes trainees, students, volunteers, researchers, contractors for service (including all visiting health professionals and agency staff) and persons delivering training or education within WACHS.

WACHS staff are reminded that compliance with all policies is mandatory.

10. Records Management

Records Management Policy
Health Record Management Policy

11. Relevant Legislation

Aged Care Act 1997 (Commonwealth)
Health Services Act 2016 (WA)
Carers Recognition Act 2004 (WA)
Health Practitioner Regulation National Law (WA) Act 2010
Mental Health Act 2014 (WA)
State Records Act 2000 (WA)

12. Relevant Standards

National Safety and Quality Health Service Standards
Partnering with Consumers Standard: 2.06
Comprehensive Care Standard: 5.03, 5.04, 5.11 – 5.14, 5.19, 5.21 - 5.23
Communicating for Safety Standard: 6.03, 6.04, 6.07 – 6.11
Recognising and Responding to Acute Deterioration Standard: 8.01 – 8.13

13. Relevant WA Health Policies

Clinical Handover Policy - MP0095
Clinical Incident Management Policy 2019 - MP0122/19
Recognising and Responding to Acute Deterioration Policy - MP0086/18
Information Security Policy - MP0067/17
WA Health Consent to Treatment Policy
Post-Fall Management Guidelines in Western Australian Healthcare Settings 2018

14. Related WACHS Documents

PCH Assessment of Acute Pain in infants, children and adolescents Guideline
PCH Neurological Observations Clinical Guideline
MR70a WACHS Antenatal Inpatient Care Plan
MR75 WACHS Newborn Care Plan
MR80 WACHS Vaginal Birth Care Plan
MR81 WACHS Caesarean Postnatal Care Plan
MR111 WACHS Nursing Admission, Screening and Assessment Tool - Adults
MR115 WACHS Paediatric Short Stay Medical Admission
MR120 WACHS Adult Nursing Care Plan
MR120P WACHS Paediatric Nursing Care Plan
MR140A Adult Observation & Response Chart AORC
MR140B Maternal Observation and Response Chart (M-ORC)
MR140D Newborn Observation & Response Chart (N-ORC)
MR140E Paediatric Acute Recognition and Response Observation Tool (PARROT less than 3 Months)
MR140F Paediatric Acute Recognition and Response Observation Tool (PARROT 3 - 12 Months)
MR140G Paediatric Acute Recognition and Response Observation Tool (PARROT 1 - 4 Years)
MR140H Paediatric Acute Recognition and Response Observation Tool (PARROT 5 - 11 Years)
MR140i Paediatric Acute Recognition and Response Observation Tool (PARROT 12+ Years)
MR142 Neonatal/Paediatric Respiratory Observation Chart
MR144 WACHS Fluid Balance Work Sheet
MR144P WACHS Neonatal / Paediatric Fluid Balance Worksheet
MR147 WACHS Adult Neurological Observation Chart
MR147A WACHS Paediatric Neurological Observations Chart
MR149 WACHS Neurovascular Observation Chart
MR184 WACHS Inter-hospital Clinical Handover Form
MR184A WACHS Resident Handover
MR184B WACHS Intra-hospital Clinical Handover Form
MR184C WACHS Interhospital Transfer Maternal Form
MR184P Interhospital Transfer Neonatal Paediatric
MR00H.1 State Goals of Patient Care
MR00H.1P Paediatric Goals of Patient Care
RC00H.1 WACHS Residential Goals of Care
RC5 WACHS Resident Admission Assessment
RC7 WACHS Resident Care Plan
SMHMR902 Mental Health Assessment – Adult
SMHMR903 Mental Health Physical Examination

SMHMR905 Mental Health Risk Assessment and Management Plan (RAMP)
SMHMR907 Mental Health Treatment, Support and Discharge Plan
WACHS Advance Health Directive and Enduring Power of Guardianship Guideline
WACHS Bladder Management Continence Clinical Practice Standard
WACHS Documentation Clinical Practice Standard
WACHS Enteral Tubes and Feeding – Adult Clinical Practice Standard.
WACHS Goals of Patient Care Guideline
WACHS Maternity and Newborn Care Guidelines – Endorsed for Use in Clinical Practice Policy
WACHS Nutrition Screening, Assessment and Management Procedure
WACHS Oxygen Therapy and Respiratory Devices – Adults CPS
WACHS Recognising and Responding to Acute Deterioration (RRAD) Policy
WACHS Recognising and Responding to Acute Deterioration (RRAD) Procedure
WACHS Specimen Collection Procedure
WNHS Postnatal Care: Quick Reference Guide
WNHS Postnatal: Subsequent Care

15. References

1. Elliott M, Coventry A. Critical care: the eight vital signs of patient monitoring. *British Journal of Nursing.* 2012;21(10):621-625.
2. Charlton K. Vital signs in the older person. Adelaide, SA: The Joanna Briggs Institute; 2012
3. Australian Commission on Safety and Quality in HealthCare. Goal 1.3: Recognising and responding to clinical deterioration action guide. In: ACSQH, ed. Sydney, NSW: ACSQH; 2012. Accessed 12 May 2016.
4. Australian Commission on Safety and Quality in HealthCare. (RTF) Safety and quality improvement guide standard 9: Recognising and responding to clinical deterioration in acute health care. In: ACSQH, ed. Sydney, NSW: ACSQH; 2012. Accessed 12 May 2016.
5. Armstrong B, Walthall H, Clancy M, Mullee M, Simpson H. Recording of vital signs in a district general hospital emergency department. *Emergency medicine journal : EMJ.* Dec 2008;25(12):799-802.
6. Australian Commission on Safety and Quality in Health Care. National consesus statement: Essential elements for recognising and responding to clinical deterioration. Sydney: ACSQHC; 2010. Accessed 8 November 2016.
7. Neurovascular assessment: recommended practice. Adelaide, SA: Joanna Briggs Institute; 2011
8. Sharma L. Neurovascular assessment: clinician information. Adelaide, SA: Joanna Briggs Institute; 2012
9. Wright E. Neurovascular impairment and compartment syndrome. *Paediatric Nursing.* 2009;21(3):26-29.
10. Judge NL. Neurovascular assessment. *Nurs Stand.* Jul 18-24 2007;21(45):39-44
11. Teasdale G, Allan D, Brennan P, McElhinney E, Mackinnon L. Forty years on: Updating the Glasgow Coma Scale. Nursing Times. 2014; 110 (42):12-6.

12. No author. Head Injury: Neurological Assessment Glasgow Coma Scale. Joanna Briggs Institute; 2013.

13. Shepherd A. Measuring and managing fluid balance. Nursing Times. Jul 19-25 2011; 107 (28):12-16.

16. Definitions

Carer	A person who provides personal care, support and assistance to another individual who needs it because they have a disability, a medical condition (including a terminal or chronic illness) or a mental illness, or are frail and/or aged
Patient	A person who is receiving care in a health service organisation

17. Appendices

Appendix 1: Physiological Observations (Vital Signs)
Appendix 2: Neurovascular Observations
Appendix 3: Full Neurological Observations
Appendix 4: Fluid Balance Monitoring

This document can be made available in alternative formats on request for a person with a disability

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Appendix 1: Physiological Observations (Vital Signs)

- Physiological Observations must be documented on an endorsed WACHS Observation and Response Charts (refer to Section 13 Related Forms), or in community health and outpatient settings in the patient's healthcare record.
- PARROT charts are to be used for all paediatric patients (up to 15 years +364 days). In some specialty areas this may be in addition to specialised documentation, for example critical care/ICU charts.
- Refer to site escalation templates for actions required for abnormal observations that may indicate clinical deterioration, and the escalation of care in individual sites. Refer to WACHS Recognising and Responding to Acute Deterioration (RRAD) Procedure.
- Advance Care Directives, Advance Care Plans, Goals of Patient / Resident Care or Care Plan for the Dying Person must be considered with monitoring physiological observations and escalation responses.

General Information

Physiological observations covered by this CPS are based on the minimum data set required for the assessment of patients, to plan comprehensive care and to identify the deteriorating patient [4].

Equipment Required

- Choice of equipment must be appropriate for the age and/or size of the patient.
- Equipment must be serviced and calibrated in accordance with manufacturer's recommendations to ensure reliability and accuracy
- Consider whether equipment is single or multiple uses. Ensure appropriate infection prevention strategies are in place, including use of single patient equipment and appropriate disinfection of equipment used for multiple patients

Patient Monitoring

The following physiological observations must be performed as a **minimum** set when physiological observations are performed:

- respiratory rate
- oxygen saturation
- heart rate
- blood pressure
- temperature
- level of consciousness (Alert, Voice, Pain, Unresponsive – AVPU).

In addition, for paediatric patients – Central Capillary Refill Time (CRT) is performed.

Additional physiological observations and other patient-specific observations (e.g. maternity, paediatrics, HDU/ICU) may be included based on the clinical condition of the patient as per medical instructions or as per escalation protocol. Consider there may be complimentary charts in use (such as acute pain management, neurovascular, neurological, chest drain, ventilation charts).

Frequency of Physiological Observations

A full set of Physiological observations (vital signs) must be completed as per the age appropriate observation and response charts/tools:

- on all in-patients experiencing an acute episode of care
- on all patients at the time of admission or initial assessment
- on presentation to an emergency department or clinic as an acute episode of care
- prior to inter and intra hospital transfer
- at least every eight hours (three times a day) for acutely admitted patients
- at least once in every 24hrs for postnatal women following vaginal delivery with an uncomplicated pregnancy, normal admission observations, who have no comorbidities and remain stable as per Women's and Newborn Health Service (WNHS) Postnatal Care: Quick Reference Guide and WNHS Postnatal: Subsequent Care)
- at least once in every 24hrs for a sub-acute patient, as determined by the inpatient medical documentation and care plan
- at least once every 24 hours for an Acute Psychiatric Unit inpatient episode of care
- monthly for aged care and nursing home-type residents
- newborn observations should be performed as per WACHS Maternity and Newborn Care Guidelines – Endorsed for Use in Clinical Practice Policy.

For subsequent reduction of the frequency of observations consideration should be given to medical/nurse practitioner consultation.

Considerations for paediatric blood pressure frequency:

All 10 weighted parameters plus temperature need to be recorded to obtain a Total Early Warning Score (EWS) and full ABCDE patient assessment which includes recording a blood pressure.

BP recordings must be undertaken:

- at least once per shift (minimum 8 hourly) for acutely admitted patients, in order to obtain a Total EWS on the PARROT
- at least once in a 24-hour period, for long term patients, in order to obtain a Total EWS on the PARROT
- when a transfer occurs between clinical areas (i.e. Interhospital transfer, ED admission to ward, transfer from theatre)
- when any of weighted parameters move into scoring (shaded) area
- if the patient's clinical condition deteriorates
- if the patient has received sedation or a general anaesthetic (i.e. in ED or Recovery)
- when medically requested

If unable to record a blood pressure due to infant / child distress, then note this in the event section and escalate based on the available EWS. Record a Total EWS as soon as practicable once a blood pressure is able to be recorded.

Note: Where Medical staff order regular vital sign monitoring more frequently than 8 hourly which does not include blood pressure, the vital signs are charted on the PARROT chart as per usual. If a vital sign moves into a shaded area, triggering an EWS, blood pressure is completed as part of the Total EWS.

Physiological Observations Guideline

Respiratory Rate (RR)	• Count respiratory rate for 60 seconds when patient is at rest and prior to waking them when possible. Avoid periods of agitation or distress if able • Note rate, depth, rhythm/pattern, effort, any abnormal sounds e.g. grunting or wheezing • Note use of accessory and intercostal muscles, rib recession, tracheal tug
	Additional Paediatric/Newborn Considerations • A stethoscope should be used to assess respiratory rate in paediatrics with rapid breathing • Use the WACHS MR142 Neonatal/Paediatric Respiratory Observation Chart for all paediatric/newborn patients requiring oxygen therapy or admitted for a respiratory illness
Pulse Oximetry (SpO_2)	• Select a site with adequate perfusion, warm to touch, natural skin colour, with capillary refill < 3 seconds • Adult sites include; finger, toe, earlobes, forehead and bridge of nose. Finger probes are more accurate than ear probes • SpO_2 measurement does not provide information about the adequacy of ventilation (need $PaCO_2$) • Probe position to be monitored one to two hourly and site should be changed as required to avoid pressure injury • O_2 saturation should be monitored by pulse oximetry at least as frequently as physiological observations and clearly documented on the patient's observation record/chart with the O_2 flow rate • Continuous pulse oximetry is required for patients who are clinically unstable or sedated [7,9,10] • Record oxygen requirements and type of delivery device on observation record/chart when a patient is receiving oxygen • If patient is requiring increasing levels of oxygen to maintain oxygen saturations within normal parameters initiate escalation of care process • If the patient develops signs of deterioration or meets escalation criteria on the observation and response chart, clinicians are to initiate escalation of care process • Refer to WACHS Oxygen Therapy and Respiratory Devices – Adults CPS

Pulse Oximetry (SpO2)	**Additional Paediatric/Newborn Considerations** • Paediatric probe sites include; foot, palm of hand, great toe and thumb • Newborn probe sites should be wrist, hand or foot, preferably pre ductal (R Wrist) in the immediate postnatal period • Newborns receiving oxygen therapy should have continuous oxygen saturation monitoring, unless oxygen therapy is for a chronic condition, in which case can be monitored as per specific WACHS Maternity and Newborn Care Guidelines – Endorsed for Use in Clinical Practice Policy.. Use the MR142 Neonatal/Paediatric Respiratory Observation Chart for all paediatric/newborn patients requiring oxygen therapy or admitted for a respiratory illness
Heart Rate (HR)	• Use radial artery for pulse assessment in adults. Manual palpation is recommended • Note rate, rhythm/regularity, amplitude/volume • Palpate the pulse for 30-60 seconds, if pulse irregular count for full 60 seconds and perform apex radial assessment
	Additional Paediatric / Newborn Considerations • Children (<2 yrs. of age) brachial artery (or femoral) with apex auscultation • Newborns (< 28 days) apex auscultation

Blood Pressure (BP)	• Select BP cuff appropriate to the size and age of the patient
	• If unsure about reading, suggest manual measurement if equipment available at site
	• Patient should be seated or lying and avoid talking or moving during measurement of BP
	• The upper arm is the preferred site for measurement of BP in adults and children. If not accessible:
	  ○ Adults - forearm or ankle are the preferred sites
	  ○ Children - calf may be considered
	  ○ The thigh is the least preferred site in adults and children
	• Incorrect cuff size and fitting can lead to inaccurate readings. The cuff bladder should cover 80-100% of the chosen limb's circumference. Cuff should cover a minimum of 40% of the length between shoulder and elbow
	• Patients in high acuity clinical areas such as in ICU, ED or Theatre may require invasive BP measurement via an arterial line
	Do not use
	• BP cuff on the affected arm for patients with:
	  ○ Stroke related hemiparesis/ paralysis
	  ○ Arteriovenous fistula
	  ○ Axillary lymph node dissection, lymphoedema and/or radiotherapy
	cont.

Blood Pressure (BP)	**Do not use** (cont.) • Automated BP device in patients with low platelet count or known haematological problems, cardiac arrhythmias, or weak radial pulse, • Atherosclerosis, hypertension or hypotension - manual BP is preferred in these circumstances • Automated BP device for Obstetric patients with an elevated BP - manual BP is required.
Temperature (T°)	• Sites reflecting core temperature are more reliable i.e. tympanic membrane measurement is more accurate than an oral measurement. • Correct placement is essential for accurate reading Where possible use the same site and method of measurement **Do not use** • Oral thermometers for cognitively impaired patients • Glass or mercury thermometers • Tympanic/aural thermometer in patients with known ear infections
	Additional Paediatric / Newborn Considerations • Digital axilla, oral (sublingual) and tympanic measurement of body temperature are routinely employed in WACHS • Choice of method/device is dependent on age, developmental milestones, user preference and experience; and at all times is guided by the manufacturer's instructions • The axillary method is preferred in children <10 years; oral temperatures may be used in older children • The use of tympanic thermometers requires the correct technique and is not recommended for use in patients with known ear infections or when excessive wax is present • The use of Infra-red thermometers (i.e. using temporal artery) is discouraged due to inaccuracies • Personal thermometers (i.e. those bought in from home, or personally owned) **must not be used** at WACHS sites • Bladder, oesophageal, nasopharyngeal and rectal methods may be used to measure true core temperature in critically unwell patients only (i.e. intubated, ventilated, unconscious)
Conscious Level	• Use Alert, Vocal Stimuli, Pain Stimuli or Unresponsive to Stimuli (AVPU) model and report if abnormal or has altered since last review • Consider need for Glasgow Coma Scale (GCS) assessment if the AVPU is abnormal For further information refer to Appendix 3: Full Neurological Observations

Conscious Level	**Additional Paediatric / Newborn Considerations** • AVPU (Alert, Voice, Pain, Unresponsive) is utilised on the all the PORC charts and all PARROT charts (except the "Less than 3 month" chart where Alert/Normal, Voice/Sleepy, Pain/Irritable/Jittery and Unresponsive/Poor tone descriptors are used) • A more formal GCS (Glasgow Coma Score), utilising the specific age determinants as per MR147A WACHS Paediatric Neurological Observations Chart need to be considered for patients who score 'V', 'P' or 'U' on the AVPU scale
Pain Score	• Select the most appropriate pain intensity rating scale for the patient. Consideration should be given to developmental, cognitive, emotional, language and cultural factors. • Commonly used pain score tools include but are not limited to: o Numerical rating scale (NRS). The patient rates their pain from 0-10 where 0 is no pain and 10 is the worst pain imaginable o For children use of the 'Faces, Legs, Activity, Cry and Consolability Pain Scale' (FLACC) - based on five pain behaviours that are sensitive and specific for the assessment of acute and post-operative pain. Each observational item is divided into three categories and is scored 0, 1 and 2, respectively. The total pain assessment is determined by adding the category score from each individual item, to give a total score out of 10 **or** Faces Pain Scale – Revised (FPS-R) - based on six realistic facial expressions that are sensitive and specific for the assessment of acute, procedure related, post-operative and disease related pain – utilising a 0-10 scale (refer to PCH Assessment of Acute Pain in infants, children and adolescents Guideline) o Verbal rating scale (VRS) describing pain as mild, moderate or severe. Used for patients who have difficulty using the numbers on the visual/numerical rating scales e.g. patients with cognitive impairment o Assessment of non-verbal pain behaviours is necessary for all patients but imperative in neonates and infants, non-communicating or unconscious patients • For consistency the selected scale must be used repeatedly for that patient • Ensure scale selected is clearly documented in healthcare record.

Appendix 2: Neurovascular Observations

- Neurovascular observations are to be documented on the MR149 WACHS Neurovascular Observation Chart, or in community health and outpatient settings in the patient's healthcare record
- Neurovascular observations should be completed until stability of the extremity is attained and maintained.
- The frequency of neurovascular observations will be determined by the patient's clinical condition, and in consultation with the Medical Officer (MO)
- Continued staff education and clinical proficiency is required to use the tool and ensure consistency amongst staff
- The unaffected limb is to be assessed concurrently with the affected limb during the neurovascular observations
- Refer to site escalation templates for actions required for abnormal observations that may indicate clinical deterioration, and the escalation of care in individual sites. Refer to WACHS Recognising and Responding to Acute Deterioration (RRAD) Procedure.

General Information

Neurovascular observations involve the evaluation of the peripheral circulation, vascular integrity of a limb and neurological status of the patient[7]. Neurovascular impairment is frequently caused by pressure on the nerve or on the vascular supply to an extremity where prompt recognition can minimise the risk of complications to the patient [8].

Some conditions and factors can affect the reliability of the assessment e.g. paralysis, diabetes, peripheral vascular disease, epidural/regional therapy, dressing materials and patient limb positioning.

If the clinicians' ability to palpate peripheral pulses or to observe for oedema or movement is hindered, it is sufficient to rely on the remaining parameters for assessment.

Indications for neurovascular observations

- Trauma to an extremity e.g. fractures/dislocations/crush injury/deep lacerations
- Application of traction, plaster, back slab, restrictive dressings, splints or casts
- Post operatively
- Spinal injuries
- Vascular injuries
- Burns
- Any report of altered sensation
- Underlying co morbidities i.e. tumours
- Tendon, artery, nerve repairs or split skin grafts

Compartment Syndrome

Compartment syndrome is a potential complication of musculoskeletal trauma and/or surgery resulting from increased pressure in the muscle compartment in the closed fascial space, which results in cellular anoxia, muscle ischaemia and death[9].

Regular neurovascular observations must occur to allow for early recognition of abnormal findings. Early recognition is paramount to facilitate treatment to reduce severity of compartment syndrome and the possibility of limb loss or death if left untreated.

Signs of Compartment Syndrome

Assessment for the signs and symptoms of Neurovascular deficit should take into account the following '7Ps':

Pain	Excessive pain on passive extension and flexion of the extremity. Excessive pain to what is expected that is not relieved by increasing amounts of analgesia[10]
Pallor (colour)	May indicate potential late sign of arterial injury[10].
Poikilothermic (temperature)	Coldness can indicate inadequate arterial blood flow Hot can indicate inadequate venous return
Pulselessness	No pulse present can indicate death of a tissue.
Paraesthesia (sensation)	Abnormal sensations e.g. numbness, tingling of extremity. Lack of ability to complete active movement, caused by prolonged nerve compression or nerve damage
Paralysis	Deficit may cause muscles in the affected compartment to become paralysed as a consequence to nerve damage or necrosis
Pressure	Skin appears tight and shiny

Equipment Required

- Choice of equipment must be appropriate for the age and/or size of the patient
- Equipment must be serviced and calibrated in accordance with manufacturer's recommendations to ensure reliability and accuracy

Patient Monitoring

- On initial presentation establish a baseline assessment of neurovascular function on affected and unaffected limbs
- Ongoing frequency of observations will be determined by the treating medical team

Neurovascular Observation Guidelines

Pain

Pain is a reliable indicator of neurovascular impairment. Assess the patients' pain score at rest, during active/passive movement, pre and post administration of analgesia. The intensity of the pain is measured by asking the patient to rate their pain using an appropriate pain scale (refer to Appendix 1: Physiological Observations).

If pain is un-retractable and inconsistent with the injury or mechanism of injury then an urgent assessment for compartment syndrome should be initiated.

Skin Colour

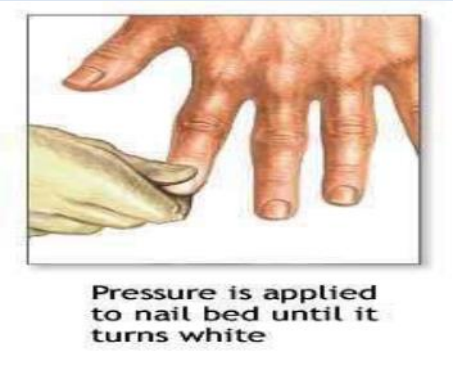
Visually inspect the limb / digit and assess any changes in colour. Colour is assessed to monitor the blood flow in and out of the patients' extremity and indicates the adequacy of arterial supply and venous return.

Skin Temperature

Assess the temperature of the whole limb / digit using the back of the hand. If an injury is present, assess the temperature proximal and distal to the site of the injury. Temperature is assessed to monitor the blood flow in and out of the patients' extremity.

Capillary Refill

Peripheral capillary refill should be used to measure arterial perfusion in patients who present with an inaccessible pulse due to plaster casts/bandages etc.

	**Procedure** • Remove any nail polish and ensure the nail is clean • Press the nail bed downward with light to moderate pressure for 5 seconds whilst the digit is at heart level until blanching occurs, release the pressure and observe how long it takes for normal colour to return • If the nail is damaged or unsuitable for assessment use the skin area below the nail Note: Pressure should not need to be applied for any longer than five seconds. Consideration should be given to environmental temperature and artificial nails when assessing capillary refill performance

Distal Pulses

Distal pulses are assessed to determine the presence of arterial blood flow so as to ensure there is adequate perfusion reaching past the level of injury / surgery and the remainder of the limb effectively. If the pulses are deemed weak or absent, then the pulse should be assessed using a Doppler**.**

Document pulses as - Absent, Weak, Strong, Doppler.

Pulses that may need to be assessed:

Upper Limb	**Lower Limb**
• Brachial • Radial	• Femoral • Popliteal • Posterior Tibialis • Dorsalis Pedis Note: The dorsalis pedis can be absent in 12% of the population. Use posterior tibial pulse to establish arterial perfusion if absent. Both pulses should be assessed if possible.

Doppler Auscultation

A Doppler machine can be used to detect and hear pulses that are otherwise difficult to find.

Note: Be aware that Doppler machines may differ in appearance and make.

Procedure

- Clean the end of probe before and after use. Alcohol swabs can be used on the probe tip and for general cleaning purposes.
- Use a liberal amount of contact gel between skin and probe. (Use water based ultrasound gel only).
- Gently place the probe at a 45 degree position to the skin surface and adjust position until the loudest audio signal is obtained. The audible volume can be adjusted. Applying too much pressure to the probe can occlude the artery and make it difficult to auscultate the pulse. Arteries emit a high pitched pulsatile sound. Veins emit a non – pulsatile sound similar to rushing wind.
- Once the optimum position is found keep the probe as still as possible.
- Do not use in the presence of flammable gases such as anaesthetic agents, oxygen or entonox.
- Mark the pulse area once it is found on the patient's limb.

Sensation

The patient should be asked to close their eyes while the sensation is being evaluated. An assessment of sensation should be made by first asking the patient if he or she feels any altered sensation of the affected limb – consider any nerve blocks or epidurals. A patient should be able to detect sensation if the affected digits are touched lightly. If the patient complains of pins and needles or Paraesthesia further investigation is warranted.

Movement

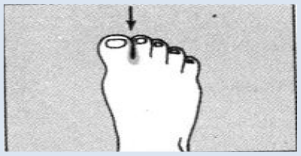
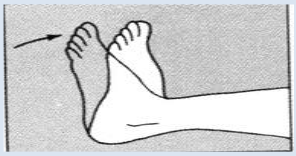
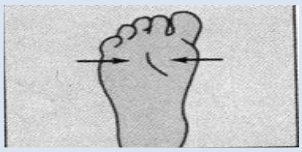
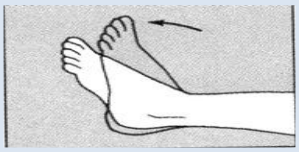
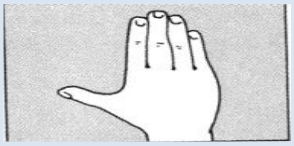
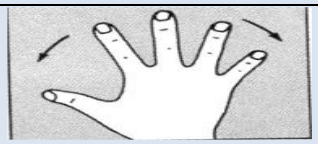
Assess active or passive range of movement in both limbs (unaffected side followed by affected side).

Movement of a limb is documented as normal, decreased, limited or absent.

Taking into consideration the restrictions of dressing and or plaster and their injury, the patient should be able to demonstrate active movement of the joint. Severe pain on passive movement of digits or toes requires immediate attention, as it may be a sign of compartment syndrome

Peripheral Neurologic Integrity

Peripheral nerve integrity is determined by sensation and motor function of the upper and lower extremities.

Peroneal Nerve	 **Sensation**	 **Motion**	**Sensation** Feeling pressure at the web space between the great toe and second toe **Motion** The patient is able to dorsiflex the ankle and extend toes at the metatarsal phalangeal joint
Tibial Nerve	 **Sensation**	 **Motion**	**Sensation** Feeling present on the medial and lateral surfaces of the foot **Motion** Have the patient plantar flex ankle and toes
Radial Nerve	 **Sensation**	 **Motion**	**Sensation** Feeling at the web space between the thumb and index **Motion** Have patient hyperextend thumb then wrist and hyperextend the four fingers at the metacarpal phalangeal joints.
Ulnar Nerve	 **Sensation**	 **Motion**	**Sensation** Touch the distal fat pad of the small finger **Motion** Have patient abduct all fingers
Median Nerve	 **Sensation**	 **Motion**	**Sensation** Feeling at the distal surface of the index finger **Motion** Have patient oppose thumb

Appendix 3: Full Neurological Observations

This appendix does not include guidance for paediatric neurological observations. Refer to PCH Neurological Observations Clinical Guideline**, and utilise** MR147a WACHS Paediatric Neurological Observations Chart

- Full neurological observations must be documented on a MR147 WACHS Adult Neurological Observation Chart, or in community health and outpatient settings in the patient's healthcare record
- The frequency of neurological observations will be determined by the patient's clinical condition, and in consultation with the Medical Officer (MO)
- Assessment must occur if there is any identified change to a patient's neurological status or level of consciousness.
- Continued staff education and clinical proficiency is required to use the tool and ensure consistency amongst staff
- Refer to site escalation templates for actions required for abnormal observations that may indicate clinical deterioration, and the escalation of care in individual sites. Refer to WACHS Recognising and Responding to Acute Deterioration (RRAD) Procedure.

General Information

There are **two** primary functions in neurological assessment:

1. Determine current neurological status
2. Assessment of changed or impaired level of consciousness and coma due to a wide range of conditions

Full Neurological Observation incorporates the following patient assessments:

- **A**lert, **V**ocal, **P**ainful Stimuli, **U**nresponsive to Stimuli - **AVPU** (Quick Check)
- Monitoring of physiological observations
- Glasgow Coma Scale (Ongoing Assessment)
- Observation of focal neurological signs including:
  - pupil size and reaction to light
  - motor function
  - sensory function
  - mental status.

Indications for Full Neurological Observations

- History of head trauma
- Following a Fall
- Toxicology (alcohol or drug ingestion)
- Episode of collapse or loss of consciousness
- Evidence of a change in level of consciousness
- Neurological intervention/surgery
- When a patient requires sedation.

Neurological Symptoms

Headache	Fevers	Changes to memory
Nausea or vomiting	Alterations to bladder or bowel function	Syncope/Change in level of consciousness
Seizures	Changes in vision, hearing, speech	Alteration in swallow function
Numbness and Paraesthesia	Changes in Mood and Sleep Pattern	Paralysis/Weakness

Causes of Altered Neurological Status

Altered neurological status can be consequential to multiple causes. The diagram below provides examples but is by no means exhaustive:

Structural Insults
Haematoma
Cerebral Aneurysm
Stroke
Cerebral Tumour

Metabolic Insults
Loss of substrate
Shock – Hypovolaemic
Hypoxia
Hypoglycaemia
Cardiogenic
Focal Ischaemia – Stroke

Abnormal Pathology
Hypo or Hyponatraemia
Hyperosmolarity
Hyperglycaemia
Seizures
Mental illness
Hypercalcaemia

External
Trauma
Alcohol consumption
Hypothermia
Heat Exhaustion
Drugs – illicit/prescription
Envenomation

Patient Monitoring

The minimum frequency of observations for patients with GCS equal to 15 (excluding post-fall) should be as follows:

- half-hourly for 2 hours
- then 1-hourly for 4 hours
- then 2-hourly thereafter.

Following a fall, neurological observations should be performed as recommended in the WA Health Post-Fall Management Guidelines in Western Australian Healthcare Settings.

Should the patient with GCS equal to 15 deteriorate at any time after the initial two hour period, observations should revert to half-hourly (if instructed by MO/senior nurse) or hourly and follow the original frequency schedule.

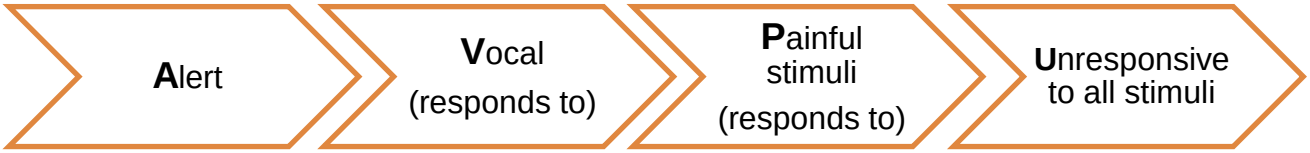
To reduce inter-observer variability and unnecessary referrals, a second member of staff should confirm deterioration before escalation to the medical officer. This confirmation should be carried out immediately. Where a confirmation cannot be performed immediately (for example, no staff member available to perform the second observation) the medical officer should be contacted without the confirmation being performed.

Full Neurological Observations Guidelines

(AVPU) Alert / Vocal / Painful stimuli / Unresponsive

The AVPU method provides an initial rapid neurological assessment to determine conscious level of a patient. The AVPU assessment is to be performed as part of a patient's physiological observations.

If AVPU is abnormal, perform and document GCS.



Glasgow Coma Scale (GCS)

If there is a sudden drop in the GCS by two points or more activate a Medical Emergency Response (MER) call. Rrefer to site escalation templates for actions required for abnormal observations that may indicate clinical deterioration, and the escalation of care in individual sites. Refer to WACHS Recognising and Responding to Acute Deterioration (RRAD) Procedure.

The score attained from the GCS provides an initial assessment and baseline comparison with future scores to determine improving, deteriorating or static clinical states.

The GCS describes in words the best responses to three components of consciousness:

- Eye opening
- Verbal response
- Motor response

GCS Considerations

- Ascertain if English is the primary language and engage an interpreter if required.
- If the patient is under the influence of substances e.g. alcohol, drugs or medication, the GCS score may be affected
- Other Communication barriers may be present e.g. aphasia, eyelid dyspraxia, hearing, visual impairment that may require alteration to the assessment techniques used. Acute aphasia disorders usually develop quickly as a result of head injury or stroke, whereas progressive aphasia develops slowly from a potential brain tumour, infection or dementia. The symptoms and type of aphasia is determined by the extent of brain damage or atrophy sustained. It is important that the healthcare practitioner documents any communication barriers that may impact the assessment or GCS score.
- Medical Devices e.g. tracheotomy, endotracheal tube (ETT). No consensus exists for the correct method of scoring intubated or pharmacologically paralysed patients.
- Environment should have limited background noise and distractions.
- Consistency between users is imperative as irregular scoring may potentially lead to a compromise in patient safety.
- If appropriate, obtain patient history from relatives, Paramedics, Police, General Practitioner, carers or friends, to ascertain any changes in patient's mood, intellect, memory and personality/behaviour.

Eye Opening

If the patient is physically unable to open their eyes e.g. facial injuries or swelling record a 'c' on the GCS chart

Open Spontaneously **(Score 4)**	This observation is made without touching the patient i.e. patient opens eyes spontaneously when you approach them, or awakening from sleep
Open to Sound **(Score 3)**	Patient opens eyes when asked in a normal voice, or louder voice. Use patient's name to illicit a response
Open to Pressure **(Score 2)**	Apply graded physical pressure to elicit the eye opening response i.e. 1. fingertip pressure; 2. trapezius pinch; and 3. pressure to the supraorbital notch
None **(Score 1)**	Patients eyes remain continuously closed to stimuli, or remain continuously open with no blinking

Best Verbal Response

Assess the patient's ability to respond appropriately to questions posed to them. Only ask one question at a time and always allow adequate time for the patient to respond to your questions. Speak in a voice loud enough for the patient to hear, varying the questions as answers may be learned.

Interfering factors:

- A= Aphasia/dysphagia (terms can be used interchangeably) is an acquired communication disorder that impairs a person's ability to process language. Aphasia may be temporary or permanent.
- T= Tracheostomy tube, ETT

Orientated Response **(Score 5)**	Correctly gives name, place and date
Confused Response **(Score 4)**	The person is confused if any one of the three items (name, place and date) of information is not provided correctly, even if communication is through coherent phrases or sentences
Words Response (inappropriate) **(Score 3)**	The patient's response lacks structured sentences or phrases, it is classified as "words"
Sounds Response (incomprehensible) **(Score 2)**	Only moans / groans
None **(Score 1)**	No audible response, and no interfering factor

Best Motor Response

This measures the overall awareness and ability to respond by movement to external stimuli.

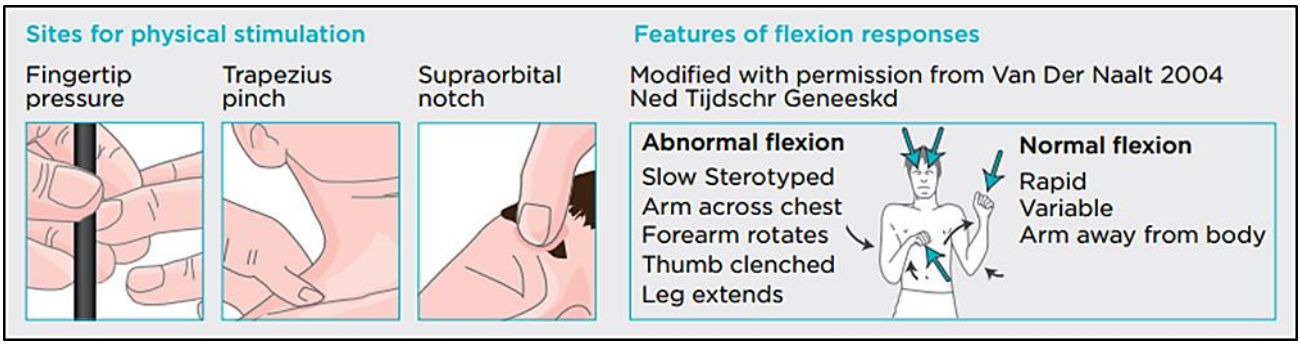
Motor responses can be affected by medications e.g. muscle relaxants and or sedation. This should be recorded for patients with impaired consciousness as follows:

- M = Muscle Relaxant
- S = Sedation

Obeys Commands **(Score 6)**	Patient follows a 2 part request such as – • Raise and lower your arms; or • Stick out your tongue and put back
Localises to pressure **(Score 5)**	Patient tries to locate towards a central pressure stimulus (head or neck) in an attempt to remove source. The arm moves across the midline towards the level of the chin
Normal Flexion (withdraws from pain) **(Score 4)**	Patient attempts to withdraw the limb away from the peripheral pressure stimuli i.e. bends arm at elbow rapidly but features are not predominantly abnormal
Abnormal Flexion **(Score 3)**	Patient flexes arm in response to peripheral pressure stimuli but appears abnormal e.g. arms flexed and wrists rotated
Extension **(Score 2)**	Extends arm at elbow in response to peripheral pressure stimuli
None **(Score 1)**	No movement in arms / legs, no interfering factor

Applying Pressure/Physical Stimuli

- Peripheral and central pressure stimuli refer to parts of the body the pressure is applied to, not the parts of the nervous system which transmit the stimulus to the brain.
- Pressure should be applied with gradual increasing intensity for 10-15 seconds to avoid soft tissue injury
- All pressure stimuli applied must stop following a response from the patient and will not continue for longer than 30 seconds.
- Peripheral stimuli must be used first. If there is no response to using peripheral stimulus, then central stimulus may be used.



Source: Teasdale G, Allan D, Brennan P, McElhinney E, Mackinnon L. Forty years on: Updating the Glasgow Coma Scale. Nursing Times. 2014; 110(42):12-6.

Observation of Neurological Signs

Assessment of Pupillary Activity

- Attempt to darken the room where possible as this allows for the best response to occur. Pupils are normally black, round and equal in diameter (average 2mm-6mm).
- If the patient is unable to open their eyes, consider manually opening the eyelid for them
- Ask the patient to stare at a distant object (if patient condition allows)
- Observe the patient's pupil size, shape and position prior to light stimulation
- Shine the pen torch from the outer aspect of the eye to the pupil. This should cause the pupil to contract briskly
- Assess for:
  - Speed of papillary reaction and size of pupil when constricted
  - Consensual (both pupils) reaction to the light stimulus
- Pupil reaction is documented as –
  + = reacts to light
  - = no reaction to light
  C = eye closed

Abnormal Pupillary Activity that requires Investigation

- Small and reactive pupils
- Dilated pupils. Consider eye medications as some can dilate pupils

Abnormal Pupillary Activity that requires Immediate Escalation

- Fixed/unreactive pupils should be escalated immediately
- Unequal pupils may be pathologic and requires immediate escalation. In about 15% of people, one pupil is less than 0.5mm smaller than the other (a normal variant)
- Pinpoint pupils

Assessment of Limb Movement

- A deteriorating pattern of limb movements may indicate increasing brain damage
- Each limb has to be individually assessed as clinically appropriate
- Record right and left limb movement separately (see example) if a difference exists
- Localised brain damage may impair the movement of an individual limb or limbs
- If the patient cannot follow commands, observe movement in response to pressure stimulus
- Spastic flexion, extension, and no response are descriptions in assessment made in response to pressure stimuli. Spastic flexion and extension occur after at least part of the brain is severely damaged and there are abnormal reflex responses to stimulation

Upper limb assessment

- Ask the patient to close their eyes and hold their arms straight out in front with palms upwards for 20 – 30 seconds. Observe for signs of weakness or drift
- Extend your hands to the patient. Ask them to push and pull against your hands. Observe for downward or inward drift to indicate hemiparesis and assess for equal strength.

Lower limb assessment

- Ask the patient to lie on their back. Place the patient's leg with knee flexed and foot resting on the bed. Ask the patient to keep their foot down while you try to extend the leg
- Instruct the patient to straighten the leg while you offer resistance. Assess for equal strength in flexion and extension

Grading Weakness

- Normal power: Movements are appropriate for the normal muscle strength for that patient
- Mild weakness: Moves with difficulty against resistance and cannot fully lift against gravity
- Severe weakness: Moves a limb laterally but has great difficulty against gravity and cannot move against resistance
- Spastic flexion: The arm bends slowly at the elbow and is very stiff
- Extension: The limb straightens at the elbow or knee joint

Appendix 4: Fluid Balance Monitoring

- Fluid balance should be documented on the WACHS MR144 Fluid Balance Work Sheet or the WACHS MR144P Neonatal / Paediatric Fluid Balance Worksheet
- Each site should ensure that the volumes of cups, bowls, jugs etc. used for serving fluid to patents are easily available to all clinicians for documenting accurate oral fluid intake.
- This appendix does not pertain to community health or outpatient settings

General Information

Fluid balance is a term used to describe the balance of the input and output of fluids in the body to allow metabolic processes to function correctly. As a result of illness and disease, fluid balance cannot always be regulated to maintain homeostasis.
A fluctuation of fluid volume between 5-10% can have an adverse effect on health leading to shock, organ failure and ultimately death[13].
Types of fluid balance assessment:

- Clinical Assessment – signs and symptoms of dehydration or fluid overload, urinalysis
- Clinical Monitoring – Fluid Balance Chart (FBC), body weight
- Laboratory Assessment – Urea and electrolytes, creatinine

Indications for Fluid Balance Monitoring may include (but not limited to)

- Patients with altered fluid intake
  - Nil by Mouth e.g. pre or postoperative, dysphagia
  - Decreased oral intake
  - Enteral feeding i.e. nasogastric
  - Intravenous fluid therapy
  - Subcutaneous fluid therapy
  - Age – babies and small children
  - Cognitive impairment
- Patients with altered fluid output:
  - Vomiting
  - Nasogastric aspiration or drainage
  - Diarrhoea / excessive colostomy loss
  - Urine output (total) less than 0.5mL/kg/hr
  - Excessive urination i.e. diuretics/diabetes
  - Indwelling Catheter
  - Dialysis – intermittent or continuous
  - Wound drains
  - Excessive blood loss
- Medical conditions:
  - Sepsis
  - Heart failure
  - Pre-Eclampsia
  - Renal impairment or failure
  - Dehydration
  - Burns
  - Oedema
  - Malnutrition
  - Electrolyte deficits – hyperkalaemia / hypokalaemia

Patient Monitoring

An individualised management plan is to be documented in the patients' health records.

- Accurately document input and output volumes
- All staff involved in recording intake and output must be familiar with the fluid capacity of glasses, cups, bowls, jugs etc. used within each site
- Document patient weight according to management plan
- Inform patient of fluid balance monitoring and provide equipment required i.e. urinal, measuring jug, pen and paper as required
- Review biochemistry – urea and electrolytes. Refer to WACHS Specimen Collection Procedure
- Clinical signs and symptoms i.e. altered level of consciousness, cognitive impairment, confusion, headache, fatigue, shortness of breath which may indicate a change in clinical condition requiring medical attention. Refer to Appendix 1: Physiological Observations, WACHS Recognising and Responding to Acute Deterioration (RRAD) Procedure, and Appendix 3: Full Neurological Observations
- Complete cumulative subtotals totals for input and output at the end of the primary clinician's shift.
- The 2400 hour balance is to be completed and a positive or negative balance calculated and documented in the patients' health record.
- Consult and liaise with the Medical Officer (MO) or Senior Clinician (SC) or Dietitian for further management or treatment.

Fluid Balance Monitoring Guidelines

Input	Additional Information
Oral fluids – e.g. drinks, soups, jelly and ice cream	Do not document any fluid volume on the FBC until it has been consumed. Document volume and type of fluid.
Enteral Tube / Feeding – e.g. Nasogastric	Document volume and type as per oral intake. Refer to WACHS Enteral Tubes and Feeding – Adult Clinical Practice Standard.
Intravenous (IV) / subcutaneous (SC) fluid therapy – Normal Saline 0.9%, packed red cells	This includes all (IV) and (SC) fluids and medications. Bag (or syringe) number, type of fluid and amount to be recorded in appropriate column i.e. labelled infusion or intravenous. Volume of fluid infused each hour to be recorded.
Irrigation	e.g. Transurethral Resection of Prostate (TURP) Document date, time, bag number and intake volume.

Output	Additional Information
Urine output – includes commode, urinal, toilet, indwelling catheter. (IDC), incontinence pads.	Patient must be informed to use pan or urinal for accurate documentation. Measure and document volume in column labelled urine/IDC. Weighing scales should be used to calculate the amount of urine in a wet pad for patients incontinent of urine, or a wet nappy. (1mg = 1mL) Refer to WACHS Bladder Management Continence Clinical Practice Standard
Bowel	Volume and character must be documented in column labelled bowel. (According to the Bristol Stool Chart / site specific protocol)
Gastric - Vomitus	Measure and document volume and character in column labelled gastric.
Gastric- Nasogastric aspirate	Measure and document volume and character in column labelled gastric.
Drains – Haemovacs, Redivacs	Measure and document volume and character in column labelled drainage.
Irrigation	e.g. Transurethral Resection of Prostate (TURP) Record urine volumes – hourly urine measurements are not accurate with bladder washout in progress. (Output must be equal or greater than input).

Australian Standard for Measuring Cup, Spoons and Litre Measures

Measuring spoons	Millilitres (mL)
1 tablespoon 1 teaspoon 1/2 teaspoon 1/4 teaspoon	20 mL 5 mL 2.5 mL 1.25 mL
Fractional cup measures	
1 cup 1/2 cup 1/3 cup 1/4 cup	250 mL 125 mL 85 mL 65 mL
Litre measures	
1 litre (4 cups) 3/4 litre (3 cups) 1/2 litre (2 cups) 1/4 litre (1 cup)	1000 mL 750 mL 500 mL 250 mL

Refer to the WACHS Nutrition Screening, Assessment and Management Procedure.