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The Royal Children's Hospital Clinical Practice Guideline

Post Traumatic Amnesia Assessment and Management

Aim:

The aim of this guideline is to inform evidence-based post traumatic amnesia (PTA) assessment and management practices for children admitted to the Royal Children's Hospital (RCH) following a mild, moderate or severe Traumatic Brain Injury (TBI). Children with moderate and severe TBI are initially managed by acute medical, nursing and allied health teams and then routinely transferred to inpatient Victorian Paediatric Rehabilitation Services (VPRS) services. Children who have sustained a mild TBI, or who have suffered a traumatic mechanism of injury putting them at risk of mTBI are managed by a range of medical units, wards and allied health teams at RCH.

Key Points:

- Children require prompt PTA assessment following TBI.
- Nursing staff can complete PTA assessment for children post mild TBI within the first 24 hours of injury.
- PTA management plans and therapy approaches should be individualised to the child and their stage of TBI recovery.
- Children in PTA require prompt referrals to acute allied health teams and the Victorian Paediatric Rehabilitation Service (VPRS).

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Introduction: Traumatic Brain Injury and Post Traumatic Amnesia

Childhood Traumatic Brain Injury TBI is a leading cause of morbidity and mortality [1], and can result in cognitive, motor, social, emotional and behavioural impairments which can subsequently impact overall development as well as a young person's re-engagement in meaningful everyday activities [2].

Post traumatic amnesia (PTA) is a hallmark feature of TBI that commonly follows emergence from coma [3]. PTA is a period when a child is confused, disoriented and unable to recall day to day events [4]. The duration of PTA has been found to be the best predictor of outcomes in childhood TBI, with longer durations of PTA being related to worse functional outcomes [5]. Recognition, assessment and management of PTA is an important initial step in the rehabilitation process for TBI. TBI is classified according to severity; with scores from the Glasgow Coma Scale (GCS) and length of PTA determining severe, moderate and mild severity [6,7].

Traumatic Brain Injury classification:

TBI severity	GCS score at scene of injury	Clinical notes and PTA length
Severe TBI	8 or less	Note if seizure or medications impact GCS at scene. PTA > 7 days [8].
Moderate TBI	9-12	Note if seizure or medications impact GCS at scene. PTA 1 – 7 days [8].
Mild TBI (mTBI)	13-15	Initial GCS should be guided by Ambulance Victoria reports and/or bystander reports if available. PTA lasts less than 24 hours [6, 7, 8].

Moderate and Severe Traumatic Brain Injury and PTA Assessment

Refer to Appendix 1 for moderate and severe TBI PTA assessment and management pathway.

PTA assessment tools:

To assess PTA, a range of tools are used across the age spectrum as per the table below.

Age range	Standardised PTA tool	Comment
8 years and above	Westmead PTA Scale (WPTAS)	Scored out of 12. Child/adolescent needs to score 12/12 on 3 consecutive days to be deemed clear from PTA [9].
4 - 7 years, 11 months	Sydney Post-Traumatic Amnesia Scale (SYPTAS)	Scored out of 5. Child needs to score 5/5 on 3 consecutive days to be deemed clear from PTA [4, 10].
0-3 years, 11 months	No standardised PTA scales available.	OT/Neuropsychology play and activity-based assessment recommended to guide PTA assessment, management and discharge planning.

The Westmead PTA Scale (WPTAS) has been validated in typically developing hospitalised children above 8 years of age as well as adolescents. PTA scale administrators should refer to the WPTAS instructions for administration information (Appendix 2) [9]. The Abbreviated Westmead PTA Scale (A-WPTAS) can be used to screen for PTA in mild TBI [11, 12, 13]. For further A-WPTAS assessment procedures and administration guidelines refer to the mild TBI and PTA section of this guideline.

For children aged 4-7 years and 11 months, the Sydney Post-Traumatic Amnesia Scale (SYPTAS) has been found to be a reliable and developmentally valid tool to assess orientation and memory. Test administrators should refer to the SYPTAS manual for administration information stored in the acute and VPRS OT departments [10].

No standardised measure of PTA for children <4 years of age is available. PTA in this age group is determined by informal functional assessment completed by OT and neuropsychologists. Staff can utilise ".otnd" EMR smart phrase series to guide clinical reasoning and assessment for this age group.

PTA assessment procedures:

For children with moderate and severe TBI, standardised, daily PTA assessments are only appropriate to be administered once children are able to demonstrate a consistent yes or no response [9]. PTA assessments are completed by acute OT and VPRS OT staff.

- Once children demonstrate a consistent yes or no response, daily PTA assessment should be commenced as soon as possible.
- PTA scale selection should be based on the child's age and pre-existing cognitive abilities. Date of birth and age documented on EMR should be confirmed with families before commencing PTA assessment with children.
- Timing and completion of the daily assessment should be guided by the alertness levels of the child being assessed.
- Acute OT will work closely with PICU nursing and medical staff to ensure that the first PTA assessment is completed within an appropriate time for children to recover from recent extubation. The impact of sedating medications should also be considered by OT in the early stages of PTA assessment.

- Facial and name recall items of the PTA scales should be administered using photographs of faces. Names of therapists are to be written on the back of photographs.
- If children have failed the A-WPTAS with OT or nursing staff and are being transitioned onto the WPTAS, OTs should continue with the same A-WPTAS picture cards (cup, key and bird) for day two of WPTAS testing.
- Children are deemed to be out of PTA once they are able to demonstrate the ability to score 12/12 on the WPTAS, or 5/5 on the SYPTAS, on three consecutive days [9, 10]. This is due to the common occurrence of 'islands of memory' in PTA (i.e. where children in PTA may demonstrate appropriate orientation and recall of day to day events on one day and yet be disoriented the next day).
- Activity-based assessments should complement the formalised PTA assessment to build rapport with the child or adolescent as well as to develop a broader understanding of their cognitive state.
- When PTA assessment is required after hours, the after-hours OT service is responsible for completing PTA assessments. For children who are transferred to VPRS on a Friday, the after-hours OT service can be utilised on weekends to complete PTA testing on the immediate weekend following transfer of bed card. This service is available on Saturday and Sunday from 9am – 1pm.
- If it is anticipated there will be no after-hours OT available to complete PTA assessments over the weekend, weekday OT staff will approach senior nursing staff on Friday afternoon to organise completion of PTA assessments over the weekend.
- Children who are admitted over the weekend who require PTA screening or assessment should be referred to the OT After-Hours service as soon as possible.

PTA assessment clinical considerations:

- Pre-existing mental health conditions, neuropsychological, cognitive or behavioural needs should be well understood and considered as a part of the ongoing assessment of PTA. Test administrators may need to be flexible in how they deliver the standardised scales in an age appropriate manner to ensure the child is best engaged in the assessment process.
- The WPTAS and SYPTAS should be considered as a tool to assess children's progress in PTA as well as an indicator of how ready they are to engage in a more active rehabilitation program on the ward. See the PTA management section for further details.
- Formalised PTA testing can sometimes be anxiety provoking for children and families. OT and neuropsychologists should work closely with families to highlight progress children are making outside of the PTA scores.
- In the acute care setting, clinical judgement may be used to cease administration of the PTA scale prior to scoring three days of full scores. For example, children who have been intubated and sedated for the first week of their admission may have had their daily PTA assessment commenced later in their recovery, when they have potentially already recovered from PTA. In this situation a decision will be made jointly with senior OT staff, neuropsychology and medical teams based on PTA assessment scores, OT functional cognitive assessment and neuropsychology assessment.
- In instances where PTA is prolonged and there are no signs of resolution (i.e. after 4-6 weeks), clinical judgement can be used to cease administration of the PTA scale due to PTA scores likely being indicative of long-term cognitive deficits requiring rehabilitation [14]. This decision will be made closely with the medical, OT and neuropsychology teams in the inpatient rehabilitation setting.

Documentation and communication of PTA assessment:

- PTA scores and PTA environmental recommendations should be verbally reported back to the bedside nurse and ANUM by the treating OT immediately on completion of the PTA assessment.
- The PTA scales will be documented in the relevant EMR flowsheet (e.g. SYPTAS or WPTAS).
- Comment boxes in the flowsheets should be filled out when incorrect answers are provided so therapists can determine if there is any pattern to the incorrect responses being provided (i.e. if

expressive communication deficits are impacting scores). Flowsheet scores should be copied across to the relevant OT notes.

Further cognitive and neurological assessment:

- Whilst in PTA cognitive abilities fluctuate and can be transient, thus further assessment of cognition is best completed once children emerge from PTA [15].
- To understand and manage the complex interplay of cognition and communication difficulties, both speech pathology and neuropsychology assessments should be undertaken following moderate or severe TBI [16].
- Children may have additional visual, perceptual or upper limb deficits following TBI. This should be assessed by the OT whilst children are in PTA to allow OTs to plan for appropriate re-engagement in self-care and play activities. These assessments should be interpreted with caution due to cognitive difficulties likely impacting children's engagement in the assessments [15].

Management of children and adolescents in PTA in the acute phase

Referrals and multidisciplinary team involvement:

Children who have sustained moderate or severe TBI require an individualised and functionally based program delivered by a multidisciplinary team [17, 2, 18]. Important components of the acute and rehabilitation phases of the management of TBI include family and professional collaboration, access to multidisciplinary services as well as patient and family goal-based therapy [2].

- Early referrals to acute OT, Speech Pathology (SP), Physiotherapy (PT), Social Work (SW) and Music Therapy (MT) are essential to support the early stages of PTA management and TBI recovery [19, 20].
- Prompt referral to VPRS is required as soon as the child is medically stable.

PTA management in the early stages of TBI recovery

Refer to Appendix 1 – moderate and severe TBI PTA pathway for summary of PTA assessment and management processes.

Development of PTA management plans:

Whilst children are in PTA, their environment and return to daily activities should be planned and monitored to foster rehabilitation whilst also avoiding overstimulation [21]. Rehabilitation activities should be tailored to the stage of TBI recovery [2]. Management plans will be developed by the OT team in the acute setting, in collaboration with the MDT. Once children transition to inpatient VPRS, PTA management plans will continue to be reviewed and updated by neuropsychology.

- Children will have PTA management plans tailored specifically to their individual recovery.
- OT and/or neuropsychology will consult with the bedside nurse regarding the implementation of the PTA management plan to ensure it can be feasibly implemented on a 24-hour basis. Nursing staff will feedback to OT/neuropsychology if changes need to be made to a child's PTA management plan.
- PTA management plans will be regularly revised by OT and neuropsychology as children recover post TBI.
- Children's PTA management plans are individualised based on the following factors:
    - TBI severity
    - Assessed stage of recovery from TBI based on score on Ranchos Los Amigos Scale (https://www.rch.org.au/kidsinfo/fact_sheets/Brain_injury_Stages_of_recovery/)

- Levels of alertness, photophobia (light sensitivity), agitation and the known triggers for agitation
- Daily PTA scores
- Premorbid mental health, development, cognition, behaviours, interests and hobbies
- Premorbid level of independence
- Family and nursing staff's capacity to support with therapy activities in-between scheduled therapy sessions
- Mobility and falls risk
- Any additional neurological deficits – e.g. motor weakness, visual or perceptual difficulties

Environmental recommendations in the early stages of PTA:

Children who are in PTA should be cared for in a safe, quiet, calm and consistent environment.

- Familiar possessions and photos in their room may be reassuring [21].
- Children in PTA should have their own single room and remain there as much as possible to allow them to become familiar with their surroundings [21]. This is especially important for children who are in PICU or in the initial stages of their TBI recovery.
- Where medically feasible, children in PTA are to be cared for in a quiet pod where there are minimal external noises outside of their room.
- If children are highly photophobic, they may require their blinds to be drawn and a dark room. If children are not photophobic, natural light can be used during the day to support sleep/wake cycles.

Self-care, routines and therapy:

For children in the early stages of PTA a daily routine may not be possible due to short and/or fluctuant alert periods.

- In the early stages of PTA recovery, therapists will plan to be flexible to make the most of the children's alert periods to complete assessments and early rehabilitation activities.

Family education and support:

Family education and support should be provided during all stages of recovery, including the early phase.

- In the early stages of PTA, visitors are limited to two familiar visitors at one time (i.e. close family members) who the child knows very well and who have up to date education on the child's PTA management plan [21].
- Families are to be regularly provided with verbal and written education to help them to understand PTA and how to minimise triggering agitation, specific to their child [21].
- Education to families regarding their child's PTA management plan will be provided consistently and regularly. This will need to be repeated to family members in both verbal and non-verbal formats as required [22].
- The MDT will refer to the documented PTA management plan in the plan of care on EMR to ensure families are receiving up to date and consistent information from all team members.
- SW will have regular and consistent involvement with families of children in PTA.

Sleeping:

Children in PTA can have a disturbed sleep/wake cycle. All cares will be clustered to encourage sleep as well as prevent children from being woken multiple times unnecessarily (for example completing nursing neuro observations at the same time as PTA assessment).

Safety:

To reduce agitation in PTA, restraints should be avoided [21]. Children should instead be set up to move around freely with appropriate adult supervision.

- When a child is mobile yet very impulsive or agitated, they will require 24/7 supervision from family members and at times from 1:1 nursing staff. This is important to prevent falls, injuries and to prevent children from absconding.
- Where children in PTA are very impulsive and attempting to get out of bed whilst being unable to safely mobilise, they may require a lo-lo bed with mattresses either side to prevent falls and injury. The OT should be consulted to jointly decide with nursing staff the safest bedding solution to prevent injury to children and nursing staff.
- When children are pulling at lines and adult supervision is unable to be provided, soft mittens may be appropriate. This should be decided upon jointly by nursing staff, OT, neuropsychology and MDT. Refer to RCH restraint policy on the intranet for further details: Physical and Mechanical restraint.
- Families will be provided with regular education and support to outline the level of supervision and support their child requires over a 24-hour period. If families are unable to provide this level of support, SW, MDT and nursing team will develop a plan for appropriate family support and/or increased staffing levels to allow for adequate supervision.
- For children who are highly agitated and displaying significant behaviours of concern appropriate escalation of care should be considered including consultation with neuropsychology, the managing medical team, mental health, and the Code Grey team.

Communication and interaction with a child in PTA:

A reliable means of communication should be established early with support from SP [21].

- When interacting with children in PTA, be calm, talk clearly, quietly and slowly and repeat information as necessary.
- Information provided to children should be developmentally appropriate, simple and direct. Provide reassurance frequently.
- SP will provide information about the best means of communication specific to each child. Refer to the documented PTA management plan on EMR prior to interacting with the child.
- Discussions which may be confusing or overwhelming for children for children in PTA (i.e. between medical teams and parents) should be held outside of the room.

PTA management when children are emerging from PTA

Refer to Appendix 1 – moderate and severe TBI PTA pathway for summary of PTA assessment and management processes.

Environment and care location:

As per the child's wider PTA management plan, the environment is to be tailored to the child's stage of their recovery from TBI to ensure children have the opportunity to recover and reorientate to normal day to day activities.

- Children who are emerging from PTA (i.e. 'tail end PTA' with scores above 10/12 on WPTAS) may not always tolerate a calm and controlled environment.
- Children in 'tail end' PTA will have an active and structured daily routine relevant to their premorbid activity interests or responsibilities. This will be developed in the acute or rehabilitation care setting especially for children with moderate TBI's who may recover more quickly from PTA than children with severe TBI.

- For children who are physically mobile and who are emerging from PTA, restricting their care to their room can sometimes create increased levels of agitation. In these instances, flexibility may be required. Refer to PTA management care plan for individualised approach.
- If care outside of the room is deemed appropriate by the MDT, it is to be time limited and planned to be at quiet times of the day to avoid overstimulation (e.g. 10 minutes after hours to a quiet area with close supervision). The cognitive load of time outside of the room as well as a busy therapy routine must be balanced and closely monitored. MDT members will jointly plan when children are ready to tolerate time outside of their room to ensure children and family members receive consistent information.

Self-care, routines and therapy:

Once a child has more predictable alert and settled periods, a daily routine will be implemented as soon as possible to appropriately plan therapy times, self-care activities, rest breaks and provide structure to support cognitive rehabilitation.

- All therapy must be conducted in an environment that does not exacerbate agitation.
- As implicit learning remains relatively intact in PTA, children can benefit from physically oriented therapies [22, 24].
- To allow children's mobility to be progressed, PT's may need to take children outside of the room to a quiet part of the ward. This is to be planned with OT, neuropsychology and NS to avoid overstimulation from the ward environment.
- MT input has been found to harness early patient responsiveness to foster cognitive rehabilitation. Familiar songs which are repetitive, predictable and temporally structured may also decrease agitation in patients in PTA [20].
- Child Life Therapy (CLT) can also ensure children have access to appropriate resources (e.g. books, toys, games) to meaningfully engage them whilst recovering from PTA.
- In the later stages of PTA, a child's daily routine will include planned therapy sessions (with OT, PT, MT, SP, SW and CLT) as indicated, planned rest breaks, planned leisure activities as well as self-care activities.
- As soon as clinically feasible, the OT will engage children in developmentally appropriate goal directed activities of daily living (ADL) retraining with errorless learning cognitive rehabilitation principles [3, 23]. These activities can include:
  - Sitting out of bed for meals
  - Maximising independence with eating
  - Toileting in bathroom +/- equipment as planned by OT
  - Showering and/or bathing +/- equipment
  - Dressing +/- equipment as planned by OT
  - Grooming (e.g. hair care, brushing teeth, skin care)
  - Light meal preparation
  - ADL retraining resources are available on the RCH OT drive.

- The MDT and NS will closely monitor agitation levels before, during and after therapy to ensure a 'just right challenge' is set within and outside of therapy sessions to promote early return to ADL's.

Play and leisure:

Return to play and leisure activities must be considered whilst children are in PTA, especially when emerging from PTA. To support return to usual activities as well as managing challenging behaviours, it is important to have an understanding of the child's baseline play and leisure interests and current cognitive and physical impairments.

- After informal play-based assessment with OT, OTs can provide recommendations to family and nursing staff to facilitate return to play and leisure activities in between therapy times in conjunction with neuropsychology.
- These activities need to be presented at the 'just right' level of challenge to ensure that the child achieves success in play. Selection of the appropriate activity also needs to consider attention, problem solving or recall difficulties.
- The MDT can work closely with CLT to ensure children have access to age appropriate toys and activities to support their cognitive rehabilitation.

Screen Time:

Screen time can be overstimulating for children in PTA. Generally, screen time is to be limited especially if children are agitated, photophobic or are displaying significant attention deficits.

- Other behavioural management and engagement strategies will be implemented prior to relying on screen time (e.g. movement, books, music, self-care, familiar play activities) as per the documented PTA management plan.
- If screen time is thought to reduce agitation, it should initially be for no longer than 5-10 minutes at a time with a focus on engaging in screen-based activities which do not require any new learning. E.g. looking at old photos or watching a favourite section of a movie which is a part of the child's long-term memory and interests. Later in a child's recovery, screen time may be increased dependent upon OT and neuropsychology recommendations. This would be outlined within the child's PTA management plan.

Visitors:

In the later stages of PTA emergence, social contact will be considered as a part of the child's recovery.

- Decisions regarding increased or different visitors (such as close friends or extended family) will be made in consultation with OT, neuropsychology and medical teams to determine appropriate timing and format of visits to ensure these visits are supportive of cognitive recovery.

Discharge planning:

Children who are deemed to still be in PTA should not be discharged home.

- Discharge planning after moderate and severe TBI is mostly completed during an inpatient VPRS stay. Acute OT will provide a thorough handover to VPRS OT upon transfer which may include a joint OT session with acute and VPRS OT to ensure consistency of care.
- On rare occasions where children can be discharged from the acute setting (i.e. once cleared from PTA after moderate TBI), discharge planning must be completed jointly by the acute MDT and VPRS via inpatient consult from the RCH VPRS team.
- Early referrals to VPRS will ensure this joint acute and VPRS discharge planning process does not delay discharge or give mixed messages to family members.

Documentation:

PTA management plans are documented on EMR as a "Plan of care" which can be readily accessed via the inpatient notes.

- An FYI flag will also be entered in EMR by acute OT or VPRS neuropsychologist to alert the team to the location of the PTA management plan. Weekday staff will update this on a daily basis as a means to continually individualise the PTA management plan based on the child's stage of recovery and ability to engage in their environment.

- OT and neuropsychology staff can use the '.ptamgmtplan' smart phrase to structure their documentation of PTA management plans in EMR.

Mild TBI and PTA Assessment

Background:

The definition of mild TBI (mTBI) continues to have a lack of consensus, with the terms mTBI and concussion used synonymously in the literature [25, 7]. Accurate reporting of GCS at the scene of the injury, especially in children, can be challenging and should be based on bystander reports if available [7]. Children with mTBI have been found to universally demonstrate neurocognitive deficits especially when initially admitted to hospital, thus adequate assessment and education prior to discharge home is warranted [25]. Children with premorbid conditions and intracranial pathology can be at risk of prolonged Post Concussive Symptoms (PCS) [6, 26]. PCS can include headaches, dizziness, blurry vision, cognitive challenges (e.g. difficulty concentrating), fatigue, balance problems or mood changes. PTA has been found to still be present when GCS is reported as 15 in mTBI, thus a PTA screen should be completed for those who have an injury with any mechanism putting them at risk of mTBI, even when GCS is reported to be 15 [12]. Mechanisms of injury putting children at risk of mTBI can include high speed motor vehicle accidents, motor bike accidents, push bike accidents, falls, football tackles and diving accidents. Early identification and management of mTBI is important to best plan recovery and management [27]. Children who have sustained mTBI's are known to usually recover well after a short period of altered consciousness characterized by confusion and disorientation [2].

The scope of this section of the guideline is specific to PTA assessment and discharge planning for children admitted to the ward after sustaining a mild TBI or possible mild TBI after a traumatic event.

PTA assessment procedures and considerations after mild TBI:

Refer to Appendix 3 for Mild TBI clinical pathways for children admitted under neurosurgery, paediatric surgery or orthopaedics at RCH.

Paediatric surgery, orthopaedics and nursing staff PTA assessment pathway:

- Prior to commencing assessment after mTBI, children should be screened for any premorbid conditions (e.g. prior head injuries, mental health or neuropsychological conditions) which may impact initial assessment of mTBI.
- The preferred instrument for PTA screening for mTBI is the Abbreviated Westmead PTA Scale (A-WPTAS) which has been validated in typically developing hospitalised children and adolescents aged 7 years and above [11].
- The A-WPTAS is brief, taking nursing staff approximately three minutes to complete. Refer to Appendix 3 for A-WPTAS administration processes and training videos [13].
- If children pass the A-WPTAS within the first 24 hours, they can then be deemed 'out of PTA' and considered for discharge home by nursing staff with support from the mTBI pathway (Appendix 4).

Discharge planning after mild TBI (paediatric surgery, orthopaedics and nursing staff PTA pathway):

- Refer to Mild TBI pathway (Appendix 3) for details of discharge planning roles, prompts and follow up recommended for this population.
- Prior to discharge home, the following needs to be completed by nursing staff:
  - Clearance of PTA using the A-WPTAS within first 24 hours of mTBI.
  - Discussion with family to ensure child is close to their baseline level of function and no further allied health referrals are required prior to discharge.
  - If required, initiate referrals to OT (for further functional and cognitive assessment) and PT for mobility assessment to ensure safe and supported discharge home.

- Consider whether children are at educational risk and refer to inpatient Education Institute as appropriate.
- Provide relevant RCH fact sheets regarding mild TBI and expected recovery processes (https://www.rch.org.au/kidsinfo/fact_sheets/Head_injury/) [28, 29].
- Provide verbal education including guidance on graded return to self-care, activity, school and socialization [26, 28].
- Provide verbal education regarding warning signs, prevention of further injury and management of cognitive and physical rest [26].

- The acute OT and PT teams may refer children to Post Acute Care (PAC) if deemed essential to facilitate safe and supported discharge home.

Neurosurgery and OT PTA assessment pathway:

- Prior to commencing assessment after mTBI, children should be screened for any premorbid conditions (e.g. prior head injuries, mental health or neuropsychological conditions) which may impact initial assessment of mTBI.
- For children admitted under the neurosurgery bed card and/or have neurosurgery consulting (+/- intracranial pathology) the inpatient OT service will complete the PTA screen as well as more in depth functional assessment prior to discharge home. This is due to this population of mTBI being at higher risk of more complex neurological sequelae and/or persistent PCS requiring OT assessment prior to DC home [6].
- For children below 7 years of age, the A-WPTAS is not developmentally appropriate. In this instance, an OT play based assessment will be used.
- If children do not pass the A-WPTAS within the first 24 hours of mTBI, they must be referred to acute weekday or weekend OT as soon as possible to continue with daily PTA assessment.

Discharge planning after mild TBI (Neurosurgery and OT PTA screening pathway):

- Refer to Mild TBI pathway (Appendix 3) for details of discharge planning roles, prompts and follow up recommended for this population.
- Prior to discharge home, the following needs to be completed by acute OT staff:
  - Clearance of PTA using the A-WPTAS or informal play-based assessment appropriate to age.
  - Further functional assessment, neurological screening +/- cognitive assessment as appropriate for age and clinical presentation.
  - Initiate referrals to PT for mobility assessment as indicated.
  - Discussion with family to ensure child is close to their baseline level of function and no further allied health referrals are required prior to discharge (i.e. SW or SP).
  - Consider whether children are at educational risk and refer to inpatient Education Institute as appropriate.
  - Provision of relevant RCH fact sheets regarding mild TBI and expected recovery processes (https://www.rch.org.au/kidsinfo/fact_sheets/Head_injury/) [28, 29].
  - Provision of verbal education including guidance on graded return to self-care, activity, school and socialization [26, 28].
  - Provision of verbal education regarding warning signs, prevention of further injury and management of cognitive and physical rest [26].
- The acute OT and PT teams may refer children to Post Acute Care (PAC) and/or request medical team refer to outpatient VPRS if deemed essential to facilitate safe and supported discharge home.
- Children admitted under Neurosurgery will routinely be followed up by the Neurosurgery team as an outpatient after 4-6 weeks.

Accessing support post discharge after mTBI:

- The majority of children recover from a mTBI after a few days [2]. A small percentage of children and adolescents (predominantly those with premorbid conditions or previous head injuries) have difficulty returning to their baseline level of function after a mTBI.
- Children may not return to their baseline level of function due to persisting PCS impacting their ability to engage in everyday activities.
- If families note children do not return to their baseline function after 4-6 weeks post mTBI, they need to seek appropriate multidisciplinary interventions to support their child's return to school, sport and everyday activities [26].
- Families can self-refer to the outpatient VPRS service as per details provided on the RCH head injury fact sheet which will be provided upon discharge.

Companion documents:

- Appendices 1-4 – Clinical pathways for post traumatic amnesia (PTA) in moderate and severe traumatic brain injury (TBI), mild TBI and age specific PTA assessment tool protocols.

Resources:

For family friendly information sheets refer to RCH fact sheets as follows:

- Brain Injury - Stages of recovery
- Brain Injury - Post Traumatic Amnesia
- Brain Injury - Cognitive Fatigue
- Head injury - General advice
- Head injury - Return to school and sport

This guideline was developed in October 2020 following a literature review, benchmarking of like paediatric hospitals, staff and family surveys. This guideline was developed by the RCH acute OT department with input from neurosurgery, VPRS, neuropsychology, MCRI and nursing staff with thanks.

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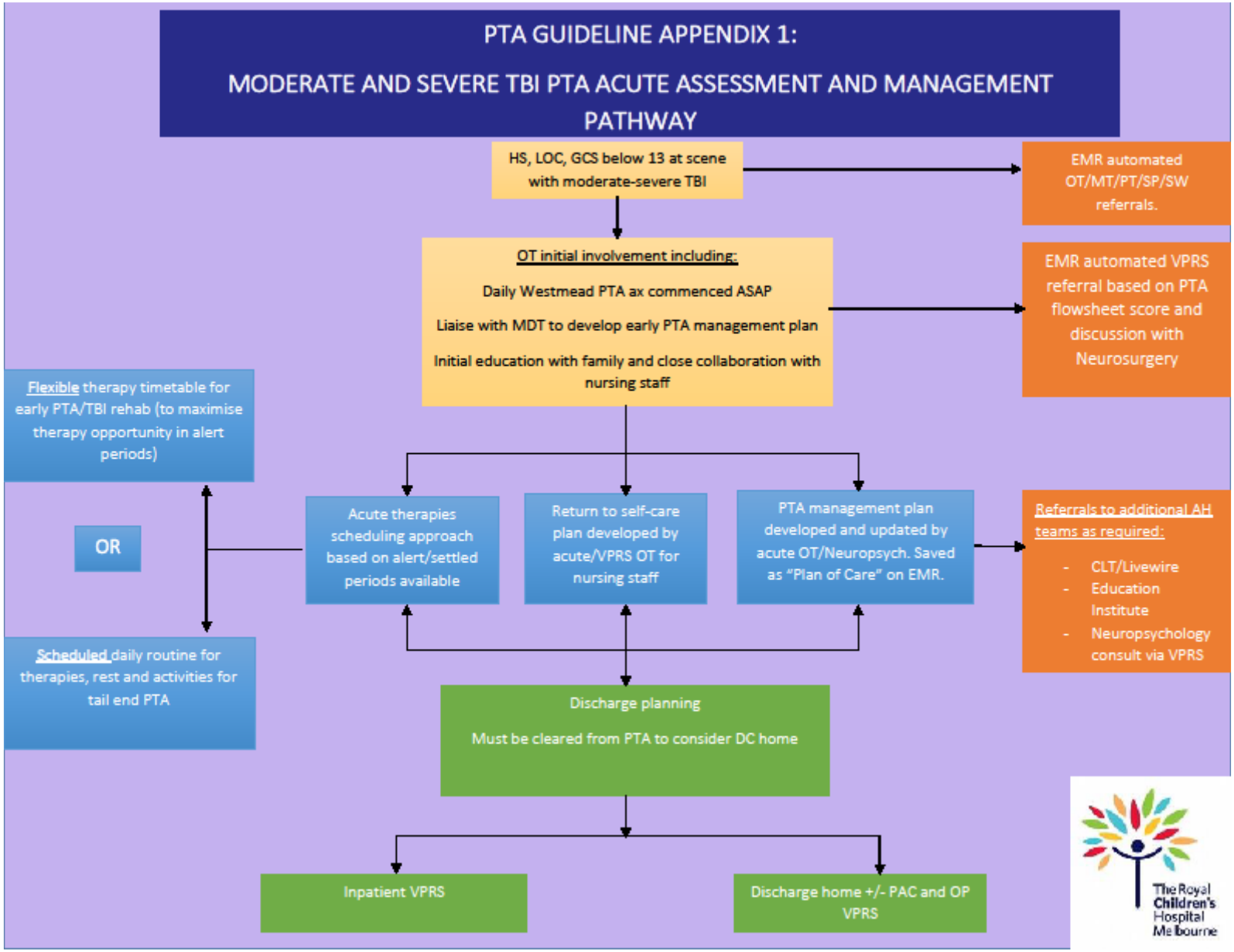
Appendices


PTA GUIDELINE APPENDIX 1:
MODERATE AND SEVERE TBI PTA ACUTE ASSESSMENT AND MANAGEMENT PATHWAY
HS, LOC, GCS below 13 at scene with moderate-severe TBI
EMR automated OT/MT/PT/SP/SW referrals.
OT initial involvement including:
Daily Westmead PTA ax commenced ASAP
Liaise with MDT to develop early PTA management plan
Initial education with family and close collaboration with nursing staff
EMR automated VPRS referral based on PTA flowsheet score and discussion with Neurosurgery
Flexible therapy timetable for early PTA/TBI rehab (to maximise therapy opportunity in alert periods)
OR
Scheduled daily routine for therapies, rest and activities for tail end PTA
Acute therapies scheduling approach based on alert/settled periods available
Return to self-care plan developed by acute/VPRS OT for nursing staff
PTA management plan developed and updated by acute OT/Neuropsych. Saved as "Plan of Care" on EMR.
Referrals to additional AH teams as required:
- CLT/Livewire
- Education Institute
- Neuropsychology consult via VPRS
Discharge planning
Must be cleared from PTA to consider DC home
Inpatient VPRS
Discharge home +/- PAC and OP VPRS
The Royal Children's Hospital Melbourne

Appendix 2:

WPTAS administration guidelines (RCH PTA guideline 2012):

On day 1 of testing only the 7 orientation questions should be completed. The maximum possible score on day 1 of testing is 7/7. Incorrect answers should be corrected at the end of testing. After questions are complete, the 5 memory items (name/face & 3 picture cards) should be shown and practised on day 1 (for recall on day 2). The examiner must ensure that the memory items have been encoded by asking the patient to repeat what they need to recall for the following day.

If children have failed the A-WPTAS and are therefore being transitioned onto the WPTAS, continue with the same A-WPTAS picture cards (cup, key and bird) for day two of WPTAS testing.

From day 2 and all subsequent days the patient should be asked all 12 questions (i.e., orientation and memory). Incorrect answers should be corrected at the end of testing. Picture cards should be changed only when the child obtains a score of 12/12 on the WPTAS.

In line with the standardised administration procedures of the WPTAS, the period of PTA is deemed to be over on the 1st of three consecutive days on which the child has scored 12/12. The specification of 3 consecutive days of a score of 12/12 is important to ensure a period of continuous remembering in view of the common occurrence of "islands of memory" in PTA.

Ask the child to answer the following questions. Do not allow parent/family to prompt or hint. Make sure child cannot see orientation board/calendar or clock. For all items a wrong answer scores 0. If child says "I don't know" or does not respond repeat question and give choice of 3 options. 3 options should be sequential (i.e. What day is it, is it Mon, Tues or Wed?) and position of the correct answer in the sequence should be alternated across questions. Note: Do not offer 3 options if child has already given the wrong answer.

1. How old are you?
   If says "don't know" or gives no response give 3 options, e.g. "How old are you, are you 8, 9 or 10?"

2. What is your date of birth? OR When is your birthday?
   Must provide date, month and year.
   If fails to provide year ask What year were you born?

3. What month are we in? Must provide *name* of month.
   If 'don't know' or gives no response give 3 options, e.g. "Is it May, June or July?"

4. What time of day is it? Is it morning, afternoon or night?
   Must provide one of 3 options given.

5. What day of the week is it?
   If 'don't know' or gives no response give 3 options, e.g. "Is it Sunday, Monday or Tuesday?"

6. What year are we in?
   Can prompt with "The year is 2000 and …..?
   If 'don't know' or gives no response give 3 options, e.g. "Is it 2009, 2010 or 2011?"

7. What is the name of this place?
   Must provide The Children's or RCH, just saying Hospital is not sufficient for 1 point.

If ‘don’t know’ or gives no response give 3 options, e.g. “Are you in hospital, at home or at a hotel?” If answers correctly ask “Are you at the Royal Children’s Hospital, Monash Children’s Hospital or Royal Melbourne Hospital” Child must answer both parts correctly to get 1 point.

8. Have you seen my face before?
   Yes or no answer required. If answers incorrectly still ask question 9.

9. What is my name?
   If ‘don’t know’ or gives no response give 3 options, e.g. “Is it Joy, Jill or Jo?”. 3 options should start with same letter and have same number of vowels or syllables.

10. What were the 3 picture cards that I showed you yesterday?
    Note correct and incorrect answers. If ‘don’t know’ or gives no response, either show them all 9 cards, one at a time; or lay all the 9 cards out on a table. In both cases they must pick the 3 target cards either by saying 'yes' / 'no' or by pointing.

The patient may also spontaneously recall 1 or 2 cards and then need to use one of these presentation modes to pick the remaining target cards. Score 1 point for each card that is correct. *(NB: The position in which the cards are placed or presented should vary each day.)*

Rehearsing with the patient

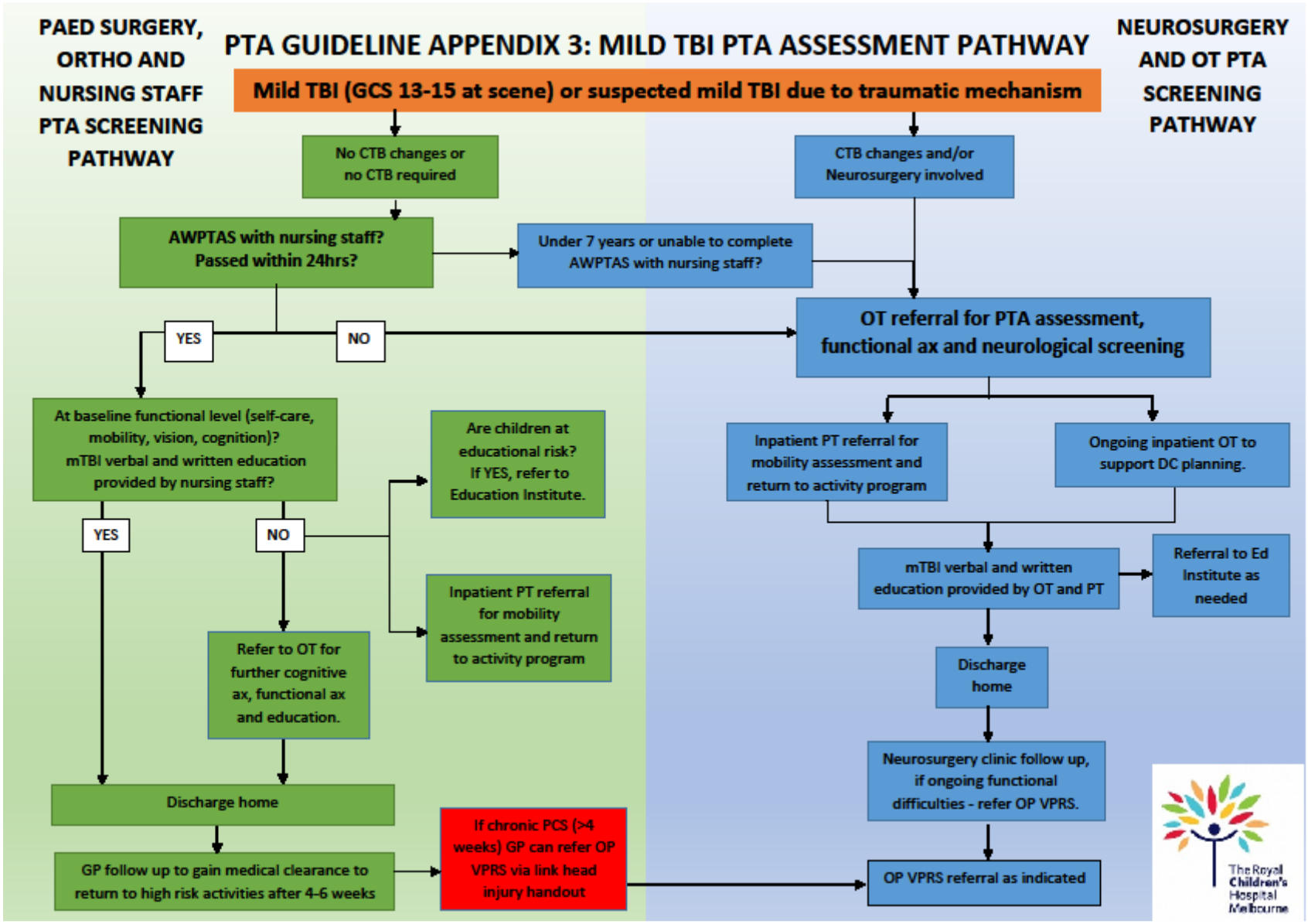
At the end of testing you need to rehearse with the child the correct responses. That is, before leaving the patient you must correct their mistakes, tell them what they have to remember for tomorrow and check whether they have encoded it properly.

Step 1 is to go through the incorrect items with the patient e.g. 'John you got a couple of items wrong: today is Monday; and it is morning.'

Step 2 is to remind the patient what they have to remember for tomorrow. Show the 3 picture cards and go through them with the patient. NOTE: the 3 pictures should be changed ONLY if the child scores 12/12.
Then say, 'John I will be coming to see you tomorrow and I want you to remember my name - Lesley - and the 3 pictures I have shown you - Bird, Flower and Cup.'

Step 3 is to check whether the patient has encoded the memory items properly. To do this you need to distract the patient for 1 to 2 minutes with an age appropriate game or conversation.
Then ask the patient what they have to remember for tomorrow. Tell the patient whether they were right or wrong and correct any mistakes. Then prior to leaving, show the patient the 3 picture cards again and say, 'John, I want you to remember my name - Lesley - and the 3 pictures I have shown you - Bird, Flower and Cup.'

Appendix 3:


PAED SURGERY, ORTHO AND NURSING STAFF PTA SCREENING PATHWAY
PTA GUIDELINE APPENDIX 3: MILD TBI PTA ASSESSMENT PATHWAY
NEUROSURGERY AND OT PTA SCREENING PATHWAY
Mild TBI (GCS 13-15 at scene) or suspected mild TBI due to traumatic mechanism
No CTB changes or no CTB required
CTB changes and/or Neurosurgery involved
AWPTAS with nursing staff? Passed within 24hrs?
Under 7 years or unable to complete AWPTAS with nursing staff?
YES
NO
OT referral for PTA assessment, functional ax and neurological screening
At baseline functional level (self-care, mobility, vision, cognition)? mTBI verbal and written education provided by nursing staff?
Are children at educational risk? If YES, refer to Education Institute.
Inpatient PT referral for mobility assessment and return to activity program
Ongoing inpatient OT to support DC planning.
YES
NO
Refer to OT for further cognitive ax, functional ax and education.
mTBI verbal and written education provided by OT and PT
Referral to Ed Institute as needed
Discharge home
Neurosurgery clinic follow up, if ongoing functional difficulties - refer OP VPRS.
Discharge home
If chronic PCS (>4 weeks) GP can refer OP VPRS via link head injury handout
GP follow up to gain medical clearance to return to high risk activities after 4-6 weeks
OP VPRS referral as indicated
The Royal Children's Hospital Melbourne

Appendix 4:

A-WPTAS training should be completed prior to administration via this website: www.aci.health.nsw.gov.au/networks/eci/clinical/clinical-resources/forms/awptas.

A-WPTAS administration process (Meares & Shores 2017):

General instructions

- Administer the A-WPTAS at hourly intervals for 4 hours, and as part of the routine hourly neurological observations. Each administration of the A-WPTAS is commonly referred to as a 'trial', thus a child is administered 5 'trials' on the A-WPTAS over a 4 hour period to confirm if they are in PTA or not.
- The scale should be commenced as soon as possible after the patient presents to the ward.
- Patients who are unable to demonstrate an optimal score on the motor (a score of 6) and eye response components (a score of 4) of the GCS are not suitable for the scale.
- Less than optimal scores on either the motor or eye-opening components suggest the patient has sustained a more severe TBI.

Specific assessment questions

- Ask the patient the 5 GCS verbal orientation questions:
    1. What is your name?
    2. What is the name of this place?
    3. Why are you here?
    4. What month are we in?
    5. What year are we in?
- Patient with GCS verbal component scores of 2 or below: 2 'incomprehensible sounds', or 1 'none' are not suitable for the scale.
- Give credit for each correct answer (where the total verbal orientation score is based on the quality of the patient's response: 5 'oriented' 4 'confused', or 3 'inappropriate sounds').
- If a patient's response is incorrect on any of the GCS verbal items immediately present the correct answer for memory storage and later recall
- If a patient says 'I don't know', or answers incorrectly present them with a multiple choice where the choice always includes the correct answer. For instance on Question 3: "Why are you here?" The patient must know why they were admitted to hospital. If not, give three options which includes the correct reason. For example, "Are you here because you had a car accident, a fall at work, or were injured playing football?"
- Show the 3 picture cards (cup, key, bird) to the patient for 10 seconds. For example, "John, I want you to remember the names of these 3 pictures." While pointing to each of the three cards ask the patient to say the names of the cards out loud: "cup, keys, bird".
- To determine if the names of the picture cards have been encoded and without exposing the cards again, ask the patient to tell you the names of the 3 cards. If necessary, repeat the previous step.
- Remind the patient you will be back in 1-hr to ask the names of the 3 picture cards and the verbal orientation items.
- The total score for Trial 1 is obtained by summing the motor, eye opening and verbal component scores of the GCS (range: GCS 13 - 15).
- 1 hour after Trial 1 and on the second and subsequent trials (Trials 2 to 5) ask the 5 verbal orientation items from the GCS and immediately correct any wrong response. Give credit for each correct answer (where the total verbal orientation score is based on the quality of the patient's response: 5 'oriented' 4 'confused', or 3 'inappropriate sounds')
- Ask what were the three pictures that were shown earlier? Score 1 for each picture card 7 that is correct.
- If one or more of the 3 picture cards are not recalled spontaneously a choice is given from 9 picture cards. Ask the patient to point to the 3 picture cards they were shown 1 hour before. Score 1 point for each picture card that is correctly recognised. If 1 or more of the 3 picture cards are not recognised repeat Trial 1 instructions.

- The total score of each trial (Trials 2 - 5) is out of 18, which is made up of the sum of the GCS score components (range: GCS 13 - 15) and the number of picture cards that are correctly recalled or recognised (range: 0 - 3).
- A patient is considered to be out of PTA the first time they attain a score of 18 out of 18 and testing is ceased.
- Patients who fail after 4 hr of observations (<18/18 after trials 2-5) should be referred to OT for ongoing daily PTA assessment.