

Electronic annex 2d

Comparison of the WHIM, CRS-R and SMART tools

Summary of assessment tool features and contents

Features	WHIM	CRS-R	SMART
Overview of cost, validity, content and features according to recommendations for neurobehavioural assessments to allow for clinical decision-making in selection of assessments of disorders of consciousness (DOC).			
Assessors' training	Not mandatory	Not mandatory	Mandatory
Training recommended for assessment validity	Yes, but no specific training provided	Yes – free training CD provided	Yes – mandatory. A range of training options are available
Cost	Manual £51.50 Forms: £1.64 per record sheet (25 assessments)	Free download	Course: 5-days: £785 plus SMART Kit – £499 (one per unit) limited free places for Level 1 units 2-day course: £149
Tool validity (Seel <i>et al</i> 2010) ¹	Moderate reservations	Minimal reservations	Moderate reservations
Addresses prerequisites impact on responses on each assessment, ie positioning/medication in each session.	No	No	Yes
Family/friends/team observation incorporated	Can be recorded by family	Partially	Yes
Serial assessment by same assessor mandatory	No – a variety of assessors may be beneficial to observe different responses	No	Yes, 10 assessments within 3-week period
Range of techniques provided	Moderate	Moderate	Good

CRS-R = JFK Coma Recovery Scale – Revised; SMART = Sensory Modality Assessment and Rehabilitation Technique; WHIM = Wessex Head Injury Matrix.

(continued)

Features	WHIM	CRS-R	SMART
How do assessment tools address the recommendation for behavioural assessment of neuro-cognitive responsiveness? (Giacino <i>et al</i> 2002 p352)²			
Adequate stimulation should be administered to ensure maximum arousal	Yes	Yes	Yes
Serial reassessment incorporating systematic observation and reliable measurement should be used to confirm the initial assessment	Recommended	Recommended	Mandatory
Factors adversely affecting arousal should be addressed	Recommended	Not identified	Mandatory
A variety of different behavioural responses should be investigated using a broad range of eliciting stimuli	Partially	Partially	Yes
Attempts to elicit behavioural responses should not involve behaviours that frequently occur on a reflexive level	Yes, if consistent experienced assessor involved	Yes, if experienced assessor involved	Yes
Command following trials should incorporate motor behaviours that are within the patient's capability	Partially	Partially	Mandatory
Examination procedures should be conducted in a distraction-free environment	Recommended but not mandatory	Not mandatory	Mandatory
Observations of family members, caregivers and professional staff should be considered	Yes	Not required, but may occur	Yes
Need for experienced assessors (Giacino 1997, Andrews 1999) ^{3,4}	Recommended, but not mandatory	Recommended, but not mandatory	Yes Mandatory
Technique/responses observed	WHIM	CRS-R	SMART
Pupil response	No	Yes	Yes
Eye movement	Yes	Yes	Yes
Motor behaviours recorded, eg leg flexion	No	1 min Not recorded	Yes listed 10 min x 10
Arousal protocol	No	Yes	Yes

(continued)

Technique/responses observed	WHIM	CRS-R	SMART
Visual responses			
Pupil response to light	No	Yes	Yes
Blink to light	No	No	Yes
Visual response to threat	No	Yes Centre field	Yes Centre field and each quadrant
Visual focusing auditory instruction	Yes	Yes	Yes
Visual tracking auditory instruction	Yes	Yes Mirror Bright object	Yes Toothbrush Photograph Mirror or other stimuli in treatment phase
Tracks assessor	Yes	No	Yes
Visual focusing written instruction	No	No	Yes
Visual tracking written instruction	No	No	Yes
Follows written instruction	No	No	Yes 3–6
AF switch press written instruction	No	No	Yes
Yes/No switch written instruction	No	No	Yes
Visual discrimination with verbal instructions	Yes Object, picture Yes/No cards (all not mandatory)	Yes Object	Yes/No cards Colour cards
Location of stimuli in visual field: L–Left, R–Right, U–Up, D–Down	L,R	L,R	L,R,U,D
Visual discrimination with written instructions Location	No	No	Yes/No cards Colour cards L,R,U,D
Eye contact	Yes	No	Yes
Explores picture	Yes	No	No
Auditory responses			
Response to loud sound and voice: No response (N), Reflexive (R), Withdrawal (W), Localising (L)	L	N,R,L	N,R,W,L
Ignores distraction	Yes	No	No
Following verbal instruction	Yes	Yes 2 commands given	Yes 3–6 commands given
Presses single auditory feedback switch to instruction	No	No	Yes
Yes/No responses with single auditory feedback switch	No	No	Yes
Touch/point to object	Yes	Yes Object	In SMART treatment manual following assessment

(continued)

Technique/responses observed	WHIM	CRS-R	SMART
Tactile responses			
Response to light stimuli face/upper limbs: No response, Reflexive, Withdrawal, Localising	No	No	Yes N,R,W,L
Tap on shoulder: Reflexive, Withdrawal, Localising	No	No	Yes R,W,L
Differentiate 2 tactile stimuli	No	No	Yes
Olfactory responses			
Response to olfactory stimuli: No response, Reflexive, Withdrawal, Localising	No	No	N,R,W,L
Differentiate 2 olfactory stimuli	No	No	Yes
Gustatory responses			
Response to olfactory stimuli: No response, Reflexive, Withdrawal, Localising	R	No	N,R,W,L
Differentiate 2 olfactory stimuli	No	No	Yes
Functional communication			
Vocalisation/gesture spontaneous	No	Yes	Yes
Vocalisation/gesture to stimuli	Yes	Yes	Yes
Non-meaningful words/facial expression, rambling speech	Yes	No	Yes
Purposeful facial expression/ mouthing words/sounds/words, whispers	Yes	Yes	Yes
Discriminates but no Yes/No ie gesture	Yes	Yes	Yes
Yes and No	Yes	Yes	Yes
Answers biographical question	No	No	Yes
Answers situational questions	Yes	Yes (visual and or auditory set) 2–6	In SMART treatment manual following assessment
Answers orientation question	Yes	No	No

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Technique/responses observed	WHIM	CRS-R	SMART
Higher level function	Words to express mood, time of day, orientation, recall of items, previous session, name staff member, left/right of self	Words to instruction Verbalisation, alphabet board, writing	Words to instruction Letter scanning, presses auditory feedback switch, verbalisation, alphabet board, writing
Motor			
No response, Reflexive, Withdrawal, Localising	Yes	Yes	Yes
Discriminating	Yes Playing cards	Yes	Yes
Functional activity	Pen	Comb, cup or any choice	Comb, pen Treatment phase: any choice
Pointing – motor	Yes coins	No	Treatment
Wakefulness/arousal			
Eye opening	Yes (>30 sec)	Yes	Yes
Length of time eyes open per session	Yes (<30 sec; >30 sec)	No	Yes
Wakefulness per modality	No	No	Yes
Prompts required to remain awake	No	Yes	Yes

References

- 1 Seel RT, Sherer M, Whyte J *et al.* Assessment scales for disorders of consciousness: evidence-based recommendations for clinical practice and research. *Arch Phys Med Rehabil* 2010;91:1795–813.
- 2 Giacino JT, Ashwal S, Childs N *et al.* The minimally conscious state: definition and diagnostic criteria. *Neurology* 2002;58:349–53.
- 3 Giacino JT, Kalmar K. The vegetative and minimally conscious states: A comparison of clinical features and outcome. *J Head Trauma Rehabil* 1997;12:36–51.
- 4 Andrews K. The vegetative state—clinical diagnosis. *Postgrad Med J* 1999;75:321–4.

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