

## References

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## Appendix 1 What the ICF looks like

The classification has three components; Body functions and structures, Activities and Participation, and Environmental factors. Each component consists of various domains, or separate sets of related physiological functions, anatomical structures, actions, tasks, areas of life, and external influences. The components and related domains are below (Table A1.1).

Environmental factors represent an important new component of the ICF in recognition of their profound influence on functioning and disability. Personal factors are recognised but not classified in the ICF. (Personal factors may include age, sex, and Indigenous status.)

**Table A1.1: Components, definitions and domains of ICF**

Component & definition	Domains
<p><b>Body functions</b> are the physiological functions of the body systems (including psychological functions).</p>	<p>Mental Functions</p> <p>Sensory functions and pain</p> <p>Voice and speech functions</p> <p>Functions of the cardiovascular, haematological, immunological and respiratory systems</p> <p>Functions of digestive, metabolic and endocrine systems</p> <p>Genitourinary and reproductive functions</p> <p>Neuromusculoskeletal and movement-related functions</p> <p>Functions of the skin and related structures</p>
<p><b>Body structures</b> are anatomical parts of the body such as organs, limbs and their components.</p> <p><b>Impairments</b> are problems in body function and structures such as significant deviation or loss.</p>	<p>Structures of the nervous system</p> <p>The eye, ear and related structures</p> <p>Structures involved in voice and speech</p> <p>Structures of the cardiovascular, immunological and respiratory systems</p> <p>Structures related to digestive, metabolic and endocrine systems</p> <p>Structures related to the Genitourinary and reproductive systems</p> <p>Structures related to movement</p> <p>Skin and related structures</p>
<p><b>Activity</b> is the execution of a task or action by an individual.</p> <p><b>Participation</b> is involvement in a life situation.</p> <p><b>Activity limitations</b> are difficulties an individual may have in executing activities.</p> <p><b>Participation restrictions</b> are problems an individual may experience in involvement in life situations.</p>	<p>Learning and applying knowledge</p> <p>General tasks and demands</p> <p>Communication</p> <p>Mobility</p> <p>Self-care</p> <p>Domestic life</p> <p>Interpersonal interactions and relationships</p> <p>Major life areas, such as education, work and employment and economic life</p> <p>Community, social and civic life</p>

*Continued*

**Table A1.1 (continued): Components, definitions and domains of ICF**

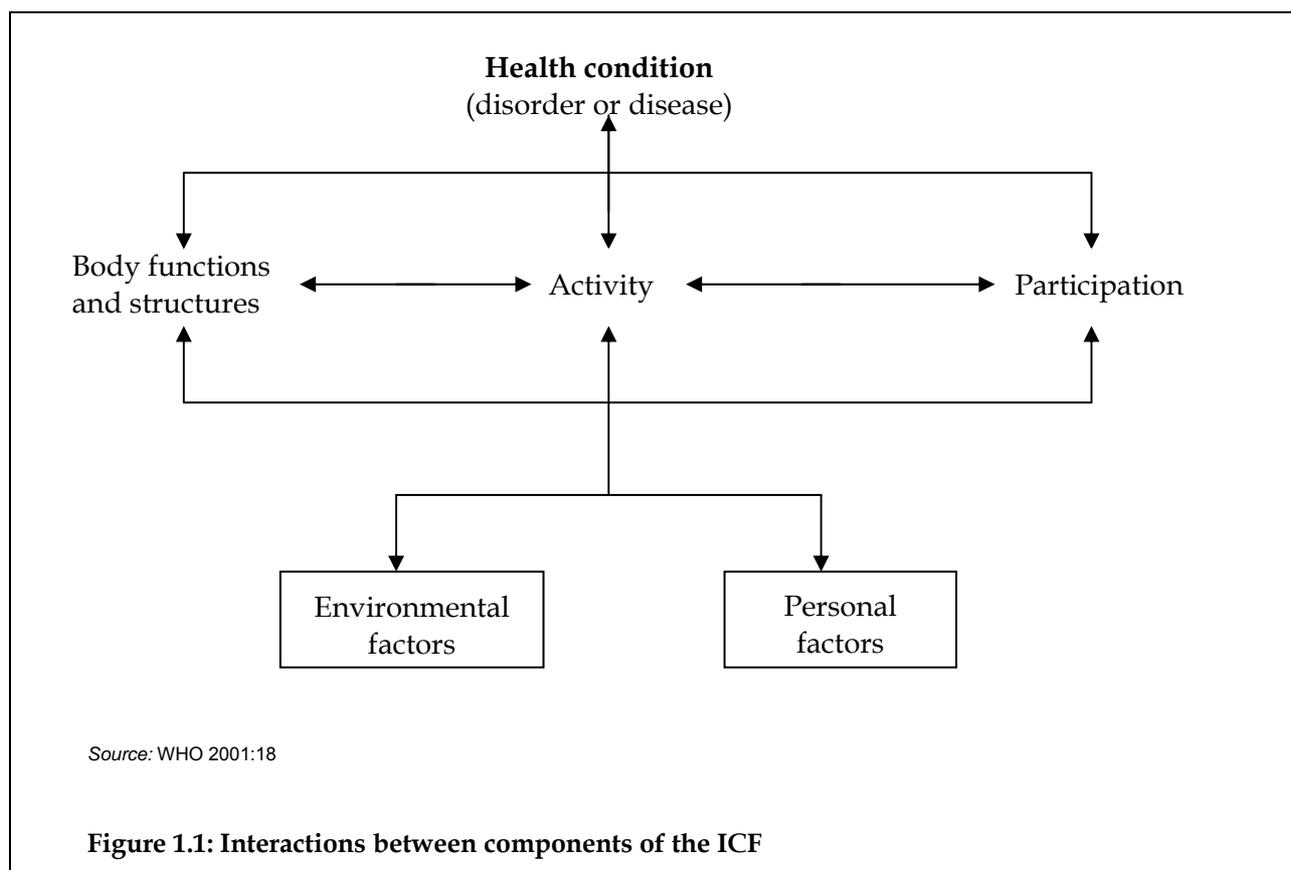
<p><b>Environmental factors</b> make up the physical, social and attitudinal environment in which people live and conduct their lives. These are either <i>barriers</i> to or <i>facilitators</i> of the person's functioning.</p>	<p>Products and technology          Natural environment and human-made changes to the environment          Support and relationships          Attitudes          Services, systems and policies</p>
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Source: WHO 2001.

## Interactions between the components of ICF

Figure 1.1 shows the ICF model of functioning and disability and the dynamic interactions between the components of the ICF. The interactions are in both directions, so for example, the presence of a disability may modify the health condition. It is important to collect data on each of the components and explore the associations between them.

The Environmental factors interact with the individual with a health condition and influence the level and extent of the individual's functioning.



## Qualifiers

Qualifiers are measures coded after the relevant domain. These qualifiers are essential to meaningful use of the classification because of the neutral terms of the domains. All domains are coded using a uniform or 'generic' qualifier to record the extent of the 'problem' in relation to impairment, activity limitation or participation restriction.

Environmental factors may be coded as either barriers or facilitators. It is recognised that these qualifiers need calibration to relate them to existing assessment instruments in the field. In addition to the generic qualifier, qualifiers for specific components have been proposed.

The ICF generic qualifier (Table 6.1) has a five point scale ranging from 'No problem' to 'complete problem'. For each verbal descriptor there is a range of percentages for those instances where calibrated assessment instruments and standards are available.

**Table A1.2: ICF generic qualifier**

xxx.0	NO impairment/difficulty/barrier/facilitator	(none, absent, negligible,...)	0-4%
xxx.1	MILD impairment/difficulty/barrier/facilitator	(slight, low,...)	5-24%
xxx.2	MODERATE impairment/difficulty/barrier/facilitator	(medium, fair,...)	25-49%
xxx.3	SEVERE impairment/difficulty/barrier/facilitator	(high, extreme,...)	50-95%
xxx.4	COMPLETE impairment/difficulty/barrier/facilitator	(total,...)	96-100%
xxx.8	not specified		
xxx.9	not applicable		

The percentages aim to make the distinction between functioning below and above a 'clinical' threshold with a 5% margin of error at either end of the scale; the MILD category being below the clinical threshold and MODERATE and SEVERE above. Functioning is described in terms of the duration, frequency and intensity of the problem in functioning. For example, a moderate problem is described as indicating 'a problem is present less than 50% of the time, with a medium alteration in functioning which happens occasionally over the last 30 days' (WHO 2001:220).

## Performance, capacity and the 'standard environment'

The ICF recognises two constructs that can be used with 'Activities and Participation': performance and capacity. 'Performance' is what the person does in their usual environment. 'Capacity' describes 'an individual's ability to execute a task or an action', and the ICF recommends it be assessed in a standardised environment, where a standardised environment may be (a) an actual environment commonly used for assessment in test settings; or (b) in cases where this is not possible, an assumed environment which can be thought to have a uniform impact' (WHO 2001). The notion of a 'standardised environment' has not been generally operationalised,

and there is not a body of knowledge to draw on. However, the recognition of these two constructs in the ICF underscores the importance of recording the environment in which activities are being performed.

Additional information on using the ICF may be found in the ICF Australian User Guide (AIHW 2003A) and in the ICF itself (WHO 2001).

## Appendix 2 Relating CVD clinical assessments to the ICF

Table A2.1: Framework for relating CVD clinical assessment tools to the ICF

Assessment Findings	ICF Domain	Assessment methods	Metrics/scaling	Issues	Reference
<b>BODY STRUCTURES</b>					
Altered brain structure	S110 Structure of the brain	Positive Emission Tomography (PET) Magnetic Resonance Imaging (MRI)	Normal/abnormal as reported by Radiologist.	Are these tests done routinely?	
Altered structure of coronary vessels	S4101 Structure of the cardiovascular system Arteries	Angiography	Normal/abnormal as reported by Radiologist. Criteria?	Are these tests done routinely?	
<b>BODY FUNCTIONS</b>					
Lung capacity reduced	b4402 Depth of respiration	VO2 Max		Clinic or lab based tests	
Dyspnoea – the discomfort caused by the urge to breathe	Sensations associated with cardiovascular and respiratory functions (b460)	Word labelled visual analogue scale	100mm visual analogue ends labelled none and extreme, resolution 2.5mm. Severe moderate and slight between.	Words only used as guides – whole scale used. Parametric qualities and high resolution	Lansing RW, Moosavi SH & Banzett RB 2002. Measurement of dyspnea: word labeled visual analogue scale vs. verbal ordinal scale. Respiratory Physiology and Neurobiology 134:77-83.
		Verbal ordinal scale	Semantic anchors Extreme, Moderate, Slight, Zero	Four point scale – can be related to word labelled visual analogue scales. The end labels are identical. Simpler rating task	
Elevated concentrations of lipids in the plasma	B4302 Metabolite-carrying functions of the blood	Blood test	Risk of CVD increases with levels over 4.5mmol/L Elevated Risk - Blood cholesterol levels of more than 5.5mmol/L High risk 6.5mmol/L		AIHW 2004. Heart, stroke and vascular diseases-Australian facts. Cat No. CVD27Canberra: AIHW
Hypertension Raised blood pressure	B4200 Increased blood pressure B4202 Maintenance of	Sphygmomanometry	Systolic blood pressure $\geq$ 140mmHg and or diastolic blood pressure $\geq$ 90mmHg and/or receiving medication	Confounded by mobility. The level of mobility that a person can achieve may influence the	AIHW 2004. Heart, stroke and vascular diseases-Australian facts. Cat No. CVD27Canberra: AIHW

Assessment Findings	ICF Domain	Assessment methods	Metrics/scaling	Issues	Reference
	blood pressure		for high blood pressure (WHO)	blood pressure measured. Position affects the measurement of blood pressure and people with stroke may not be able to get into the same position to provide consistent measurements.	
Decreased muscle tone	Muscle Tone Functions b735	Motricity Scale (Paresis)	Scale 0-100 0-50 – severe 51-95 – moderate 96-100 – normal or minimal		Sommerfeld DK, Eek E U-B, Svensson A-K, Holmqvist LW & von Arbin MH 2004. Spasticity after stroke: Its occurrence and association with motor impairments and activity limitations. Stroke 35:134-40.
Spasticity	Muscle tone functions (b735)	Modified Ashworth Scale for spasticity	Resistance of the relaxed limb to rapid passive stretch  0 – normal or lowered muscle tone to 4 a state where passive movement is impossible	Correlation between spasticity and disability low.  Suppression of spasticity may not result in parallel improvement in function.	
		Tendon reflexes <i>(is this a method?)</i>	Exaggerated tendon jerks as a result of hyperexcitability of the stretch reflex.		
		Electromyography			
Neurological deficit  Level of consciousness,  Speech and language function,  Neglect,  Visual fields  Eye movement,  Facial symmetry,	Consciousness functions (b110)  Mental functions of language (b167)  Proprioceptive functions (b260)  Visual field functions (b2101)  Functions of internal muscles of the eye (b216)  Tone of isolated muscles and muscle	Extraction from medical record. National Institutes of Health Stroke Scale		Used by clinical neurologists, extended to non-neurologists for clinical trials	Kasner et al. 2003. Modified National Institute of Health Stroke Scale can be estimated from medical records. Stroke 34: 568-

Assessment Findings	ICF Domain	Assessment methods	Metrics/scaling	Issues	Reference
Motor strength  Sensation  Coordination	groups (b7350)  Muscle power functions (b730)  Sensory function (domains from Ch 2)  Control of voluntary movement functions (b760)				
Level of consciousness	Consciousness functions (b110)	Glasgow Coma Scale	0-15  3-9 comatose  10-14 drowsy  15 alert and without paresis	Widely used in intensive care units. Used to predict outcome from acquired brain injury.	Wilson et al. Journal of Neurotrauma 1998 15:573-85.
Unilateral neglect – failure to respond to objects or people in selective parts of space	Orientation functions (b114)  Proprioceptive functions (b260)	Reported by allied health clinicians	Observed signs		Appelros P, Nydevikl, Karlsson GM, Thorwall A & Seiger Å 2003. Assessing unilateral neglect: shortcomings of standard test methods Disability and Rehabilitation 25(9):473-79.
Exercise Capacity  Level of aerobic fitness	Exercise tolerance functions (b455)  General physical endurance (b4550)  Aerobic capacity (b4551)  Fatiguability (b4552 )	Treadmill endurance  Step tests	Metabolic equivalent of task (METs)		
Depression & anxiety	Mental functions  <i>Check components and align with specific domains</i>	Beck depression scale		Association between depression and CHD	Bunker et al. 2003. 'Stress' and coronary heart disease: psychosocial risk factors MJA 178: 272-276.

Assessment Findings	ICF Domain	Assessment methods	Metrics/scaling	Issues	Reference
Loss of upper limb movement.	Power of muscles of one limb (b7302)	Upper limb subscale of the Motor Assessment scale (UL-MAS)	Each assessment uses a different range of domains and measures..	Wide variety of assessment scales with strengths and weaknesses relative to intended use.  Lack of sensitivity at upper and lower ends of skill.  Most limited to adult populations	Lannin NA 2004. Reliability, validity and factor structure of the upper limb subscale of the Motor Assessment Scale (UL-MAS) in adults following stroke. Disability and Rehabilitation 26(2):109-15.
		Assessment of Motor and process skills  Frenchay Arm Test  Arm Function Test  Rivermead Motor Assessment  Fugl-Meyer Assessment Scale  Action Research Arm Test			
		Arm Motor Ability test	Functional ability  Quality of movement  Time of performance	Correlation with motricity index.  Underestimate of performance for those with more severe motor impairments	Chae J, Labatia I & Yang G 2003. Upper limb motor function in hemiparesis. American Journal of Physical Medicine and Rehabilitation 82(1): 1-8.
<b>ACTIVITIES &amp; PARTICIPATION</b>					
Manual dexterity	Fine hand use (d440)	Nine Hole Peg Test	Speed at which nine pegs can be picked up and placed in a peg board. One hand at a time, dominant hand first.	Standardised equipment	Somerfeld DK, Eek E U-B, Svensson A-K, Holmqvist LW & von Arbin MH 2004. Spacticity after stroke Its occurrence and association with motor impairments and activity limitations. Stroke 35:134-40.
Slow or unstable walking pattern	Walking (d450)	Gait speed	Time over a set distance	"offers a simple and sensitive measure of outcome"	Wade et al. 1992. Physiotherapy intervention late after stroke and mobility. BMJ 304: 609-613.
Abnormal walking pattern	Walking (d450)	Get up and go test	Range 1- normal gait 5- severely abnormal gait. Inability to walk also registered		Somerfeld DK, Eek E U-B, Svensson A-K, Holmqvist LW & von Arbin MH 2004. Spacticity after stroke Its occurrence and association with motor impairments and activity limitations. Stroke 35:134-40.

Assessment Findings	ICF Domain	Assessment methods	Metrics/scaling	Issues	Reference
Moving around is difficult.	Bridging from supine (d4108) Sitting from supine (d4100) 3 minute sitting balance (d4153) Sit to stand from chair (d4103) 1 minute standing balance (d4154) 10m walk (d450)	Mobility scale for acute stroke patients	Best of three performances rated on a 6 point scale 1 - Unable to do 2 - Maximum assistance 1 or 2 people. Minimal contribution by individual 3 - Moderate assistance one person. Patient able to perform part of the activity 4 – Minimal assistance, hands on for part of the activity 5 – Supervised, verbal input no hands on. 6 – Unassisted and safe. No verbal input.	Specific for acute stroke patients. Concurrent validity with well validated scales, such as the Motor assessment scale, Barthel Index, Functional Independence measure.  For rapid evaluation at the early stages post stroke.  All the items are from the mobility chapter of the ICF.  The items are at the 4 digit level.  Environmental factors are stated.	Simondson JA, Goldie P & Greenwood KM 2003. The mobility scale for acute stroke patients: concurrent validity. Clinical Rehabilitation 17:558-64.
Performance of activities of daily living	21 domains including: Changing and maintaining body position (d 410-d429) Transfers (d420) Fine hand use (d440) Hand & arm use (d445) Walking & moving (d450-469)	General motor function (GMF) assessment scale  21 motor functions including mobility and upper limb functioning	Dependence (help from another person) 2 or 3 point scale  Pain  Insecurity triggered by performance of daily physical tasks  Pain and insecurity defined as negative and situation specific emotional responses.  Dichotomous responses.	Both patient and professional view. Multi-dimensional, not disease specific	Åberg AC, Lindmark B & Lithell H 2003. Development and reliability of the General Motor Function Assessment Scale (GMF) – A performance-based measure of function- related dependence, pain and insecurity. Disability and Rehabilitation 25(9):462-72.

Assessment Findings	ICF Domain	Assessment methods	Metrics/scaling	Issues	Reference
	Drinking Eating Dressing (upper) Dressing (lower) Toilet Washing Bladder Bowel In/out WC Bath 50m walk Stairs	Barthel Index – self administered	Each item scored according to: perform independently, with assistance or supervision or not at all. Range 0 (complete dependence) -100 (independence in ADL).	Disagreement between self report and observation.  Ceiling and floor effects for some groups of patients.  Insensitivity to change	Valach L, Signer S, Hartmeier A, Hofer K & Steck GC 2003. Chdeoke-McMaster stroke assessment and modified Barthel Index self-assessment in patients with vascular brain damage. International Journal of Rehabilitation Research 26(2):93-9.

Assessment Findings	ICF Domain	Assessment methods	Metrics/scaling	Issues	Reference
	<p><u>Personal Care</u></p> <p>d550 Eating (Feeding)</p> <p>d520 caring for body parts (Grooming)</p> <p>d510 Washing oneself (Bathing)</p> <p>d540 Dressing (upper body)</p> <p>d530 Toileting</p> <p><u>Sphincter control</u></p> <p>b610 Urinary excretory functions (Bladder management)</p> <p>b525 Defecation functions (Bowel management)</p> <p><u>Mobility</u></p> <p>d420 Transferring oneself (Transfers –</p> <ul style="list-style-type: none"> <li>• bed chair</li> <li>• toilet</li> <li>• bath or shower)</li> </ul> <p><u>Locomotion</u></p> <p>d450 Walking or d465 moving around using equipment (using wheelchair)</p> <p>d4551 Climbing (Stairs)</p>	<p>Functional Independence Measure</p>	<p>18 items, over 6 different domains. The individual performance is scored on an ordered scale of 7 down to 1 on each item. A score of 7 is recorded if the performance is fully independent and 1 indicates that the individual is fully dependent on another to complete the task. The FIM measures whether the individual can carry out a specific activity independently, or if help is needed, and how much help is required.</p>	<p>Discrepancy between clinician and patient scoring used to indicate level of awareness. Level of awareness is a negative predictor for some rehabilitation outcomes.</p> <p>Mixture of ICF activities and participation domains and Body function domains.</p>	<p>Hartman-Maeir et al. 2003. Awareness of disabilities in stroke rehabilitation—a clinical trial. Disability and Rehabilitation 25: 35-44.</p>

Assessment Findings	ICF Domain	Assessment methods	Metrics/scaling	Issues	Reference
	<u>Communication</u> <ul style="list-style-type: none"> <li>b1670 reception of language (comprehension)</li> <li>b1671 expression of language (expression)</li> </ul> <u>Social cognition</u> D710 Basic interpersonal interactions (Social interaction) d175 Solving problems b144 Memory				
Physical limitations		Self report – walking several blocks, climbing several flights of stairs, pulling or pushing large objects, lifting or carrying wights over 10lbs	Difficulty, inability or avoidance		Dunlop DD, Lyons JS, Manheim LM, Song J & Chang RW 2004. Arthritis and heart disease as risk factors for major depression. The role of functional limitation. Medical Care 42(6):502-11.
Level of awareness of ability to care for self is over or underestimated	30 domains of self care, interpersonal skills, cognitive functioning, and emotional status	Patient Competency Rating Scale	Rated by patient and significant other and clinician on a 5 point rating scale Can't do, Very difficult to do, Can do with some difficulty, Fairly easy to do Can do with ease. Indicates self awareness of current strengths and weaknesses.	Developed for traumatic brain injury but used in stroke population. Difference between patient and relative scores indicating tendency to overestimate certain abilities.	Prigatano GP et al.1986. Neuropsychological Rehabilitation After Brain Injury. Baltimore: Johns Hopkins University Press.
Daily task limitations	ADL - dressing (d540), toileting (d530), bathing (d510), eating (d550), walking across a room	Self report on task limitations expected to last 3 months or more.	Cannot do, receiving help, using a device, or do not do because of physical, mental, emotional or memory problems.		Dunlop DD, Lyons JS, Manheim LM, Song J & Chang RW 2004. Arthritis and heart disease as risk factors for major depression. The role of functional limitation. Medical Care

Assessment Findings	ICF Domain	Assessment methods	Metrics/scaling	Issues	Reference
	(d4500), transferring in and out of bed (d410).  IADL – Hot meal preparation (d630), shopping (d6200), using a telephone (d3600), taking medication (d5702), managing money (d870),				42(6):502-11.
<b>ENVIRONMENTAL FACTORS</b>					
Living alone	Support and relationships, unspecified (e399)	Social Isolation			Bunker et al. 2003. 'Stress' and coronary heart disease: psychosocial risk factors MJA 178: 272-276.
Low participation in physical activities.	Built environment (e150) Natural environment (e210) Economic issues (e165) Emotional and psychological barriers Equipment barriers (e140) Barriers related to use and interpretation of guidelines, codes regulations and laws (e5552) Information-related barriers (e5350) Professional knowledge, education and training issues (e5850) Perceptions and attitudes of persons who are not disabled (e445), including	Interview: Consumers with disabilities, architects, fitness and recreation professionals, city planners and park district managers.	Qualitative reporting of barriers and facilitators to participation in physical activities	Different barriers identified by consumers and different professionals (architects, fitness and recreation professionals, city planners and park district managers).	Rimmer JH, Riley B, Wang E, Rauworth A & Jurkowski J 2004. Physical activity participation among persons with disabilities: Barriers and Facilitators. American Journal of Preventive Medicine 26(5):419-25.

Assessment Findings	ICF Domain	Assessment methods	Metrics/scaling	Issues	Reference
	professionals (e455) Policies (e5552) and procedures (e5551) at the facility and community level Availability of resources (e5400)				

**Table A2.2: Personal factors that may affect outcomes of CVD management.**

Assessment Findings	Assessment method	Metrics/scaling	Issues	Reference
Age	NHDD data item	Data domain		
Sex	NHDD data item			
Smoking status		Never smoked Ex-smoker Current smoker <21 cigarettes per day Current smoker > 21 per day		
Smoking dependence	Fagerstrom test	5 questions single score: 0 low dependence to 10 high dependence		Fagerstrom KO, Heatherton TF, Kozlowski LT 1991. Nicotine addiction and its assessment. Ear Nose Throat J.; 69:763-765.
Motivation to stop smoking		Direct questions: yes/no answers	Whether the perspective of clinician and/or patient is not recorded.	
Physical inactivity	Self reported time undertaking	Frequency and duration of moderate intensity physical activity  30 minutes of moderate intensity physical activity most if not all days of the week to achieve health benefits.  Examples of moderate intensity activity includes brisk walking, swimming, doubles tennis and cycling.	Reliability of self report	National Physical Activity Guidelines for Australians – cited AIHW, Heart, stroke and vascular diseases- Australian facts 2004.
Alcohol consumption	Self report	Males: Low risk - up to 28 standard drinks a week Risky – 29-42 High risk >43	Females: Up to 14 15-28 > 29	Reliability of self report  NHMRC alcohol guidelines - cited AIHW, Heart, stroke and vascular diseases-Australian facts 2004.
Poor nutrition	Self report Energy intake Intake of fats Types of fats Intake of salt	No more than 30% of energy intake as fat is recommended. Saturated fats no more than 10%. Unsaturated 6-8%  Two or more serves of fruit and five or more serves of vegetables	Reliability of self report	NHMRC Guidelines - cited AIHW, Heart, stroke and vascular diseases- Australian facts 2004.  Australian dietary guidelines.

Assessment Findings	Assessment method	Metrics/scaling	Issues	Reference
Socio economic factors	Self report	Level of education Income Employment Method of paying for health care	Reliability of self report	

Note: Personal factors are recognised in the ICF but not classified.

## Appendix 3 Relating musculoskeletal clinical assessments to the ICF

Table A3.1: Framework for relating musculoskeletal clinical assessments to the ICF

Assessment Findings	ICF Domain	Assessment method	Metrics/scaling	Issues	Reference
<b>BODY STRUCTURES</b>					
Abnormal synovial fluid	s (depends on joint(s) affected. Eg Elbow joint (s73001))	Laboratory test	Group 1 – Clear yellow - Non-inflammatory states, trauma Group 2 – Cloudy – Inflammatory arthritis; excludes most patients with OA. Group 3 – Thick exudates, brownish – Septic arthritis, gout Group 4 – Hemorrhagic – Trauma, bleeding disorders, tumours, fractures	Invasive needle biopsy	Magee DJ 1992. Orthopedic Physical Assessment, 2nd ed. Philadelphia: WB Saunders.
Posture	Structure of trunk (s7600)	Observation against a 'standard' posture	Visual analysis	No quantitative data. Depends on expectations and experience of the observer. Variation in norms for specific ethnic populations	Kendall FP& McCreary EK 1983. Muscles testing and function, 3rd ed. Baltimore: Williams & Wilkins.
		Measured against a 'standard' posture	Plumb line, Tape measure, videotape or photographs	Depends on expectations and experience of the observer. Variation in norms for specific ethnic populations	
Deformity	s (depends on joint(s) affected. Eg Elbow joint (s73001))	Observed	Comparison with contra-lateral joint or population norm.		
		X-ray exam	Comparison with pre-morbid status as reported.		
Swelling	s (depends on joint(s) affected. Eg Elbow joint (s73001))	Observation and palpation	Qualitative and descriptive	Depends on expectations and experience of the observer.	

Assessment Findings	ICF Domain	Assessment method	Metrics/scaling	Issues	Reference
		Measured – tape measure Displacement volume	Linear circumference in mm vs volume in cc	Comparisons difficult.	
Skin, colour texture, scarring	Structure of areas of skin (s810)	Observation and palpation	Comparison with unaffected areas	Qualitative	
BODY FUNCTIONS					
Pain – site, intensity, duration, frequency	Sensation of pain (b280) Five digit level – pain in a specified body part	McGill-Melzack pain questionnaire	Four part: Where is your pain – body chart What does the pain feel like – 20 categories How does the pain change with time – pattern and things that increase and decrease How strong 5 point scale with descriptors, mild to excruciating		Melzack R 1975. The McGill pain questionnaire: major properties and scoring methods. <i>Pain</i> 1:277-99.
		Visual analogue scale	One of the most frequently used measurement scales in health care research 10 cm line with or without intermediate descriptors. No pain and most severe pain. Line may be vertical or horizontal.	Variation in response depending on orientation of line, whether there are descriptors, whether the person sees previously recorded scales, diurnal variation,	E.g. Duncan G, Bushnell M & Lavigne G. Comparison of verbal and visual analogue scales for measuring the intensity and unpleasantness of experimental pain. <i>Pain</i> , 1989;37: 295-303.
Joint tenderness		Palpation	Grade I – Patient complains of pain Grade II – Patient complains of pain and winces Grade III – Patient winces and withdraws limb Grade IV – Patient will not allow palpation of joint	Palpatory skills of tester. Interpersonal relationship between tester and patient – trust. (NB victims of torture) Cultural subjectivity of the experience of pain.	Magee DJ 1992. <i>Orthopedic Physical Assessment</i> , 2nd ed. Philadelphia: WB Saunders.
Abnormal reflexes	b7500 stretch motor reflex	Stretch reflex applied with patellar hammer	0 – Absent 1 – Diminished	Interpretation of observation by tester	Magee DJ 1992. <i>Orthopedic Physical Assessment</i> , 2nd ed. Philadelphia: WB Saunders.

Assessment Findings	ICF Domain	Assessment method	Metrics/scaling	Issues	Reference
			2 – Average 3 – Exaggerated 4 – Clonus		
Abnormal sensation	b265 touch function b280 sensation of pain b270 temperature b260 proprioception b2701 vibration	Touch Pain Temperature Position sense Vibration	Present or absent	Sensory distribution of nerves varies between individuals	Keegan J & Garrett FD 1948. The segmental distribution of the cutaneous nerves in the limbs of man. The Anatomical Record 101:409.
Abnormal gait – limp	b770 Gait pattern	Observation	Pattern, rhythm, step length, step frequency	Interpretation of observation by tester	
		Videotape with body markers Weight platform	Computer generated range of measures	Compared with norms	
Coordination	b760 Control of voluntary movement functions	Observation – heel along shin, finger to nose	Quality of movement	Interpretation of observation by tester	

Assessment Findings	ICF Domain	Assessment method	Metrics/scaling	Issues	Reference
Active muscle strength decreased	b730 muscle power functions	Muscle testing - Manual Concentric, Eccentric Isotonic, isometric,	5 – Complete ROM against gravity with maximal resistance 4 – Complete ROM against gravity and moderate resistance 3 – Complete ROM against gravity 2 – Complete ROM with effect of gravity eliminated 1 – Evidence of contraction but no joint motion 0 – No contraction palpated	Variation in ways of measuring. Subjective except for grade 3. Depends whether individual muscles or muscle groups are tested. Experience of tester will effect hand application, development of muscle tension, perception of maximal and moderate. Whether one, three, or 10 repetition maximum is used in test. Standardisation of type of muscle contraction, limb velocity, lever arm for resistance and joint angle are necessary. Variation in norms due to age, sex, type of muscle contraction, muscle size, previous training effect	Clarkson HM & Gilwich GB 1989. Musculoskeletal assessment: Joint range of motion and manual muscle strength. Baltimore: Williams & Wilkins.
		Muscle testing – Dynamometer - isokinetic	Quantify	Whether one, three, or 10 repetition maximum is used in test.	
Fatiguability of muscle	b740 muscle endurance functions	Ability of muscle to contract repeatedly against resistance or maintain an isometric contraction for a period of time	1 repetition sustained 2 Repeated contractions to fatigue	Depends on selected resistance. 1RM, 50% 1RM. Central and peripheral factors – such as effort and nutrition or muscle as well as external factors related to test procedure.	
Active range of movement	b710 Mobility of joint	Visual estimation	Degrees of movement or mm between	Reliability	

Assessment Findings	ICF Domain	Assessment method	Metrics/scaling	Issues	Reference
decreased	functions	Goniometer Tape measure	bony points	Sources of error – rounding, expectation of what normal should be.  Variations of norms for different occupations, ages, sex differences  Temperature  Patient effort  Comparisons between measurement of angles and distances between bony points	
		Manual testing	End feel  Hard – bone on bone  Soft – boggy sensation associated with oedema  Soft tissue apposition – compression of two muscle groups limits movement.  Tissue stretch – firm feel with rising tension.  Firm – springy sensation short of full ROM  Springy block – rebound feel associated with internal derangement  Empty – where there is considerable pain and movement is impossible – no mechanical block to movement  Spasm – where muscle contraction arrests movement	Palpation skills and interpretation by tester	

Assessment Findings	ICF Domain	Assessment method	Metrics/scaling	Issues	Reference
Passive range of motion decreased		Visual estimation Goniometer Tape measure	Angles between bones in degrees  Distances between bony points in mm	Reliability  Sources of error – rounding, expectation of what normal should be.  Variations of norms for different occupations, ages, sex differences  Temperature  Patient relaxation	
Range of motion increased  Hypermobility	b715 Stability of joint functions	ROM tests	As for restricted ROM		
<b>ACTIVITY AND PARTICIPATION</b>					
Problems with activities of daily living	Domains from chapters 4,5 & 6.	Task analysis or observation of actual or simulated activities of daily living, such as undressing/dressing, sitting and standing, squatting., gripping and pinching	Depends on domain, assessor, profession	Observed performance in test setting, interpretation of observation by tester.	
		Self report	Qualitative	Perception in relation to expectations of own 'normal'.	

Assessment Findings	ICF Domain	Assessment method	Metrics/scaling	Issues	Reference
Daily living skills <ul style="list-style-type: none"> <li>• Feeding</li> <li>• Dress upper body</li> <li>• Dress lower body</li> <li>• Grooming</li> <li>• Care of perineum/clot hing at toilet</li> <li>• Wash or bathe</li> <li>• Vocational</li> </ul>	<ul style="list-style-type: none"> <li>• d550 Eating</li> <li>• d540 Dressing</li> <li>• d540 Dressing</li> <li>• d520 Caring for body parts</li> <li>• d530 Toileting</li> <li>• d510 Washing oneself</li> <li>• d840-859 Work and employment</li> </ul>				Convery FR, Minter MA, Amiel D & Connett KL 1977. Polyarticular disability: a functional assessment. Archives of Physical Medicine and Rehabilitation 58:494-99.
Mobility <ul style="list-style-type: none"> <li>• Supine to sit</li> <li>• Sitting to standing</li> <li>• Transfer toilet</li> <li>• Transfer tub or shower</li> <li>• Transfer automobile</li> <li>• Walk on level</li> <li>• Walk outdoors</li> <li>• Up &amp; down stairs</li> <li>• Wheelchair 10 yards</li> </ul>	<ul style="list-style-type: none"> <li>• d4100</li> <li>• d4103</li> <li>• d4200</li> <li>• d4200</li> <li>• d4200</li> <li>• d4500</li> <li>• d4602</li> <li>• d4551 Climbing</li> <li>• d4700</li> </ul>				

Assessment Findings	ICF Domain	Assessment method	Metrics/scaling	Issues	Reference
Activities of self care and mobility	<ul style="list-style-type: none"> <li>d510</li> <li>d540</li> <li>d530</li> <li>d550</li> <li>d520</li> <li>d410</li> <li>d4500</li> </ul>	<b>Katz ADL Scale</b> <ul style="list-style-type: none"> <li>bathing</li> <li>dressing</li> <li>toileting</li> <li>feeding</li> <li>grooming</li> <li>transferring</li> <li>walking short distance</li> </ul>	Scale, No help needed, help needed and unable to be done. Often dichotomized into dependent and independent	<p>Reporting bias — carers differ from person being assessed.</p> <p>Coarse scale, not able to measure a gradient of disability because of dichotomous scoring</p>	Katz S, Ford AB, Moskowitz RW, Jackson BA, Jaffe MW. 1963. Studies of illness in the aged. The index of ADL: a standardized measure of biological and psychosocial function. Journal American Medical Association. 185:914-9.
	<ul style="list-style-type: none"> <li>d560</li> <li>d550</li> <li>d540</li> <li>d510</li> <li>b620</li> <li>b525</li> <li>d4200</li> <li>d450</li> <li>d4551</li> <li>d4700</li> </ul>	<b>Barthel index</b> <ul style="list-style-type: none"> <li>drinking</li> <li>feeding</li> <li>dressing</li> <li>washing &amp; bathing</li> <li>bladder control</li> <li>bowel control</li> <li>transfer from toilet</li> <li>walking</li> <li>stair climbing</li> <li>managing a wheelchair</li> </ul>	<p>Independent</p> <p>Need assistance</p> <p>Cannot do with out help</p> <p>Weights between 0-15 assigned to items to form a summary scale 0-100 with higher scores indicating greater independence</p>	<p>Self report vs 'actual' performance</p> <p>Barthel a predictor of mortality in stroke patients</p> <p>Two concepts – impairment and activity limitation. Impairments of bladder and bowel function.</p>	Mahoney FI & Barthel DW 1965. Functional evaluation: the Barthel index. Maryland State Medical Journal 14:61-5.
Participation in life areas	<ul style="list-style-type: none"> <li>Ch 4 Mobility</li> <li>Ch 5 Self care &amp; Ch 6 Domestic life</li> <li>Ch 8 Major life areas &amp; Ch 9 Community, social and civic life</li> </ul>	<b>London Handicap Scale</b> <ul style="list-style-type: none"> <li>Getting around</li> <li>Looking after yourself</li> <li>Work &amp; leisure</li> </ul>	<p>Six point scale</p> <ul style="list-style-type: none"> <li>Not at all</li> <li>Very slightly</li> <li>Quite a lot</li> <li>Very much</li> <li>Almost completely</li> </ul>	Self report, proxy report possible	Harwood RH, Gompertz P & Ebrahim S 1994. Handicap one year after stroke: validity of a new scale. Journal of Neurology, Neurosurgery, and Psychiatry 57:825-29.

Assessment Findings	ICF Domain	Assessment method	Metrics/scaling	Issues	Reference
	<ul style="list-style-type: none"> <li>Ch 7 Interpersonal relations</li> <li>Ch 1 Learning and applying knowledge</li> <li>Economic self sufficiency d870</li> </ul>	<ul style="list-style-type: none"> <li>Getting on with people</li> <li>Awareness of surroundings</li> <li>Affording things you need</li> </ul>	<ul style="list-style-type: none"> <li>Completely</li> </ul> Weightings applied to items		
<b>ENVIRONMENTAL FACTORS</b>					
Presence of appropriate products technical aids and equipment in the work place.	e135 products & technology for employment	Work place assessment Man – machine systems	Relationship between person and controls, displays, between controls and displays Design of work space – heights, distances, line of sight Job design Stress & fatigue Handling & lifting Skill Observation and enquiry		Grandjean E 1988. Fitting the task to the man, 4th ed. London: Taylor and Francis.
Type of flooring	e1150 general products and technology for use in daily living	Observation or questioning of individual or proxy about floor type.	Presence or absence of carpeted wooden floors.		Simpson, AHRW, Lamb S, Roberts PJ, Gardner TN & Grimley Evans J 2004. Does the type of flooring affect the risk of hip fracture? Age & Ageing 33:242-46.

Note: Personal factors are recognised in the ICF as a component of functioning, disability and health, however personal factors are not classified

## Appendix 4 Relating ABI clinical assessments to the ICF

Table A4.1: Notes on selected instruments used to measure outcome after ABI

Measurement tool	Intended use	ICF components*	Items	Measurement scale	Method of administration
Glasgow Outcome Scale (GOS) Also Extended GOS (GOS-E) <i>see Fortune &amp; Wen 1998</i> <a href="http://www.tbims.org/combi/list.html">www.tbims.org/combi/list.html</a>	Developed to describe the severity of persisting disability after brain injury, and to complement the Glasgow Coma Scale; assess overall social outcome.	B, A, P (capacity, not performance)	Concentrates on social and personal functioning. No items as such, but detailed descriptions of scale categories. Scoring based on structured interview—answers to Qs based on whether they represent a change from pre-injury functioning	5 categories: dead, vegetative, severely disabled (conscious but dependent for daily support), moderately disabled (disabled but independent), good recovery (capacity to resume normal occupational and social activities). The GOS-E divides each of last 3 categories into 'lower' and 'upper', to give 8 categories.	Clinician report, based on structured interview and other sources of information (see Wilson et al. <i>Journal of Neurotrauma</i> 1998 15:573-85.)
Ability to occupy time (Tennant et al. 1995) <i>see Fortune &amp; Wen 1998</i>		P	Ability to occupy time defined as being in full- or part-time employment, education or homemaking		
Community outcome scale (Stilwell et al. 1998) <i>see Fortune &amp; Wen 1998</i>	To measure aspects of outcome that depend on community response, in terms of minimising barriers and the impact of particular problems, rather than solely on impairments and activity limitations caused by the brain injury				
Functional Independence Measure (FIM) <i>see Fortune &amp; Wen 1998</i> <a href="http://www.tbims.org/combi/list.html">www.tbims.org/combi/list.html</a>	To measure change over course of inpatient rehabilitation (not ABI-specific)	A	18 items, corresponding with daily activities (but few cognitive, behavioural and communication related functional items relevant to ABI)		In conference, by observation or by telephone interview

Measurement tool	Intended use	ICF components*	Items	Measurement scale	Method of administration
Functional Assessment Measure (FIM+FAM) <i>see Fortune &amp; Wen 1998</i> <a href="http://www.tbims.org/combi/list.html">www.tbims.org/combi/list.html</a>	Expanded version of the FIM, developed for assessing rehabilitation outcomes of people with ABI	B, A	18 FIM items, plus 12 items that emphasise cognitive, communicative and psychosocial function; activities divided into: self-care, sphincter control, mobility, locomotion, communication, psychosocial adjustment and cognitive function	Scale from 1 (total assist) to 7 (complete independence) for each item; assesses the individual's level of independence, amount of assistance required, use of adaptive or assistive devices, and the percentage of a given task completed successfully	Clinician rated (based on observed performance)
Agitated Behavior Scale (ABS) <a href="http://www.tbims.org/combi/list.html">www.tbims.org/combi/list.html</a>	Acute phase	B	14 items describing behaviours (e.g. short attention span; uncooperative; repetitive behaviours; self-abuse). Observation environment to be recorded.	4 points: absent; present to a slight degree; present to a moderate degree; present to an extreme degree	Clinician assessment
Awareness Questionnaire <a href="http://www.tbims.org/combi/list.html">www.tbims.org/combi/list.html</a>	As a measure of impaired self-awareness	A & P	17 items covering seeing, hearing, memory, organisation, controlling emotions, living independently, managing money, getting along with people, etc (clinician form includes question about impaired self-awareness)	5 points, from 'much worse' to 'much better' (comparison with ability before injury)	3 separate forms to be completed by person with TBI, family member, and clinician (but usually administered by neuropsychologist)
Disability Rating Scale (DRS) <a href="http://www.tbims.org/combi/list.html">www.tbims.org/combi/list.html</a>	For moderate to severe brain injury; inpatient rehabilitation—intended to track individuals from coma to community	B, A, P? (intended to cover the three ICIDH dimensions)	Eye opening, communication, motor response, feeding, toileting, grooming, level of functioning (physical and cognitive dependency), employability	Different scale categories for each item. Max score of 29 (person without disability would score 0)	Self-administered or self- or proxy-report via interview (may be possible to score based on medical record)
Coma/Near Coma (CNC) Scale <a href="http://www.tbims.org/combi/list.html">www.tbims.org/combi/list.html</a>	To measure small clinical changes in patients with severe brain injury, to indicate severity of sensory, perceptual and primitive response deficits	B Symptoms	Expansion of the DRS	11 items (patient response to a range of stimuli), 3 response level cats for each, summarised as overall level of awareness/responsivity (5 points from no coma to extreme coma)	Clinician administered

Measurement tool	Intended use	ICF components*	Items	Measurement scale	Method of administration
Confusion Assessment Protocol (CAP) <a href="http://www.tbims.org/combi/list.html">www.tbims.org/combi/list.html</a>	Developed as research tool used in inpatient rehab. (clinical utility yet to be demonstrated)	B Symptoms	Combination of other measurement tools for assessing symptoms of Post-traumatic Confusional State, covering: disorientation, cognitive impairment, restlessness, fluctuation in presentation, night-time sleep disturbance, decreased daytime level of arousal, psychotic-type symptoms.	Patients exhibiting 4 or more of the symptoms tested for are designated 'confused'	Clinician administered (incl. tests, e.g. recite months of year; where are you? etc)
Community Integration Questionnaire (CIQ) <a href="http://www.tbims.org/combi/list.html">www.tbims.org/combi/list.html</a>	Measure of community integration	P	15 items relevant to home integration, social integration and productive activities	Frequency of performing activities, and whether alone or together with someone else	Self-report (or proxy)
Craig Handicap Assessment and Reporting Technique (CHART) Also CHART Short Form <a href="http://www.tbims.org/combi/list.html">www.tbims.org/combi/list.html</a>	For use in the years following initial rehabilitation	A, P (based on ICIDH handicap domains) E (some Qs ask whether / how often help received with an activity)	32 questions to assess physical independence, mobility, occupation, social integration, economic self-sufficiency, orientation and cognition. (CHART short form has 19 questions)	7 sub-scales, scored 0 to 100 (average for person without disability); may be summed to give total CHART score	Self-report (or proxy), with interviewer
Craig Hospital Inventory of Environmental Factors (CHIEF) Also CHIEF Short Form <a href="http://www.tbims.org/combi/list.html">www.tbims.org/combi/list.html</a>	Assessment of frequency and magnitude of perceived physical, attitudinal and policy barriers to participation	E	25 questions about whether aspects of the environment have been a problem for the person (design and layout of home, availability of education/training, attitudes of others, etc)  Questions relate to past 12 months.  (CHIEF short form has 12 items)	Score is a product of the frequency (daily, weekly, monthly, less than monthly, never) and magnitude (whether the barrier is a big or little problem)	Self- or interviewer-administered (proxy response not recommended)
Family Needs Questionnaire (FNQ) <a href="http://www.tbims.org/combi/list.html">www.tbims.org/combi/list.html</a>	To provide information about the needs of family members after TBI event (intended for clinical and research use)	E	40 items covering health info, emotional support, instrumental support, professional support, community support network, and involvement with care	Scale to indicate importance of needs and extent to which each need has been met	Self-report

Measurement tool	Intended use	ICF components*	Items	Measurement scale	Method of administration
Rancho Level of Cognitive Functioning Scale (LCFS) www.tbims.org/combi/list.html	To assess cognitive functioning in post-coma patients (an older tool)	B, A, P	Does not have items as such (?) but detailed descriptions of scoring categories	8 points from 'no response', through various categories of 'confused', to 'purposeful-appropriate'	Clinician report
Mayo-Portland Adaptability Inventory (MPAI) www.tbims.org/combi/list.html	Clinical evaluation during the post-acute (post-hospital) period	B, A, P, E	3 subscales: Ability index (12 items; A), Adjustment index (11 items; B, P), Participation index (9 items; A, P). Scores can be summed for each subscale and overall	4-point scale used for scoring each item	Self-, proxy- or clinician-report
Mississippi Aphasia Screening Test (MAST) www.tbims.org/combi/list.html	Screening measure for people with severely impaired communication/language skills, to detect change over time	A	9 indexes, each with 1–10 items (naming, automatic speech, repetition, writing, verbal fluency, yes/no accuracy, object recognition, following instructions, reading instructions)	Score for each index; can be summed to give score/50 for expressive and receptive subscales, and overall score /100	Clinician administered (by applying tests, e.g. count to 10, repeat these words, spell these words, etc)
Neurobehavioral Functioning Inventory (NFI) www.tbims.org/combi/list.html	to collect information on spectrum of behaviours and symptoms associated with brain injury	B, A Symptoms	e.g. misplacing things, losing track of time, breaking or throwing things, feeling hopeless, etc (proprietary product, so materials not available)	No info (proprietary product)	Two versions—one self-report, one for family members
Orientation Log (o-Log) www.tbims.org/combi/list.html	Measure of orientation to time, place and circumstance in a rehab population, to document changes over time	A	10 questions (e.g. city, month, day of week, clock time)	Each question scored 3=spontaneous/free recall, 2=logical cueing, 1=multiple choice, phonetic cueing, 0=unable, incorrect, inappropriate. Scores summed to obtain a total score from 0 to 30 (can also produce scores for orientation to time, place, situation).	Clinician administered
Patient Competency Rating Scale (PCRS) www.tbims.org/combi/list.html	To evaluate self-awareness	B, A	30 items covering ADLs, behavioural and emotional function, cognitive abilities, and physical function	5-point Likert scale to report degree of difficulty with tasks/functions. Item scores can be summed or averaged in different ways for comparison with scores recorded by 'significant other'	Self-report compared with report of 'significant other' (or clinician) to assess self-awareness (inferred from discrepancies)

Measurement tool	Intended use	ICF components*	Items	Measurement scale	Method of administration
Satisfaction With Life Scale (SWLS) <a href="http://www.tbims.org/combi/list.html">www.tbims.org/combi/list.html</a>	To assess life satisfaction at annual follow-up post brain injury	P?	5 items: 1. In most ways my life is close to my ideal; 2. The conditions of my life are excellent; 3. I am satisfied with my life; 4. So far I have gotten the important things I want in life; 5. If I could live my life over, I would change almost nothing.	7 point scale from 'strongly agree' to 'strongly disagree'. Sum to give total score	Self-report (not to be completed by proxy); also to be completed by 'significant other' to assess their life satisfaction
Service Obstacles Scale (SOS) <a href="http://www.tbims.org/combi/list.html">www.tbims.org/combi/list.html</a>	To evaluate individuals' and caregivers' perceptions of brain injury services in the community with regard to quality and accessibility	E	6 questions covering satisfaction with treatment resources (4 Qs), finances as an obstacle to receiving services (1 Q), and transportation as an obstacle to receiving services (1 Q)	7 point Likert scale from 'strongly agree' to 'strongly disagree'; overall score for satisfaction with treatment resources by summing scores for 4 Qs in that component	Self report (by person with ABI or caregiver)
Supervision Rating Scale (SRS) <a href="http://www.tbims.org/combi/list.html">www.tbims.org/combi/list.html</a>	Measure of level of supervision person receives from caregivers	E	Amount of supervision received (regardless of level of need); not broken into individual items—just overall level of supervision	13-point ordinal scale that can be grouped into 5 categories (independent, overnight supervision, part-time supervision, full-time indirect supervision, full-time direct supervision)	Clinician rated, based on interviews with person and informant
Care and Support Needs Scale (CANS)	Assessing level of support needs	A, P E	24 items, which map to ICF A&P Chapters 3–8 (map to codes at different levels of detail)	8-level categorical scale from 'cannot be left alone' to 'can live in the community, totally independently'	Form completed by clinician who knows patient

**Table A4.2: Domains of functioning, and core areas within domains, as pertinent to TBI**

<b>Domain</b>	<b>Core areas for TBI</b>	<b>Mapping to ICF codes</b>
Mobility	Transfers Walking/using wheelchair Stairs	d410–d429 (changing and maintaining body position) d450–d469 (walking and moving) d44551 (climbing)
ADL	Feeding Grooming Bathing Dressing Toileting Continence	d550 (eating) d520 (caring for body parts) d510 (washing oneself) d540 (dressing) d530 (toileting) d5301 (regulating urination); d5301 (regulating defecation)
IADL	Telephone Shopping Food preparation Housekeeping Laundry Transportation Finances	d3600 (using telecommunication devices) d610–d629 (acquisition of necessities) d630 (preparing meals) d640 (doing housework) d6400 (washing and drying clothes and garments) d470–d489 (moving around using transportation) d860–d879 (economic life)
Cognition	Orientation Memory and learning Language, speech and communication Attention Executive functions (problem solving, planning and organisation; reasoning and decision-making; flexibility; conceptual thought)	b114 (orientation functions) d130–d159 (basic learning) d310–d349 (communication—receiving, producing) d160 (focusing attention) b164 (higher level cognitive functions); d160–d179 (applying knowledge); d2 (general tasks and demands)
Behaviour	Self-regulation (Impulsivity, disinhibition, anger management problems) Drive and initiative Social interactions Awareness and insight	b152 (emotional functions)  b130 (energy and drive functions) d7 (interpersonal interactions and relationships) b1644 (insight)
Participation	Work/study/voluntary work Getting on with people Recreational activities/self-improvement activities Living in the community	d810–d859 (education; work and employment) d7 (interpersonal interactions and relationships) d920 (recreation and leisure)  d910 (community life)

*Note:* 'Domain' in this work doesn't refer to ICF domains but a general area of functioning as described in the TBI literature

*Source:* Tate et al. 2002.

**Table A4.3: Outcome measurement instruments recommended by the Brain Injury Outcome Study for assessing outcome after TBI**

Measurement instrument	Rater <sup>(1)</sup>	Notes
Acute and subacute stages		
Glasgow Coma Scale		Measures duration of coma
Westmead or Modified Oxford Scales		Measures post traumatic amnesia
<b>In-patient rehabilitation</b>		
Disability Rating Scale	CI	8-item scale measuring outcome including basic functioning (awareness and arousability), daily activities (cognitive functioning for self care tasks), and psychosocial functions (independent living and employability). Designed for severe TBI. Scores 0–30. Scored by direct observation, interview, or phone. Clients can receive the same DRS rating for different reasons; limited utility and sensitivity; high item redundancy.
Functional Independence Measure	CI	18 items; measures function across motor, self-care, and cognitive domains. Items scored on a 7-point scale (from total assistance needed' to 'complete independence'). Items found not to adequately assess cognition, behavioural, psychological or community participation domains; items weighted towards assessment of physical, self-care and basic cognitive functioning, and typically show ceiling effects for the majority of people with TBI by 6 mths post injury.
Mayo-Portland Adaptability Inventory	CI	30 items, covering impairments and activities in 6 domains, each rated on a 4-point scale. Only 2 of the 6 subscales showed good measurement properties at rehab admission and 18-month follow-up.
(This set of measures could be completed in less than 30 minutes by a clinician with knowledge of the patient)		
After discharge		
Mayo-Portland Adaptability Inventory (impairments and activity limitations)	CI	See above
Sydney Psychosocial Reintegration Scale (participation restriction)	S	Measures restriction in participation; 12 items sampling 3 domains (occupational activity, interpersonal relationships, and independent living skills); responses on 7-point scale from 'no change' to 'extreme amount of change'. Performed relatively well at 18-months post injury, but self-rated measures probably not reliable earlier post injury (e.g. at admission to rehab).
	P	Version designed to be completed by the relative rates relatives' perceptions of change in participation restriction for the client with TBI. Found suitable for use 18 mths post injury.
Medical Survey Short Form (SF–36) (quality of life)	S	Designed to measure general health, sampling 8 health domains (items on impairment, disability and 'handicap'). Able to be completed by most clients at 18 months post injury. Useful because internationally validated and normative data available for the Australian population.
General Health Questionnaire (psychological wellbeing of clients and relatives)	S	Designed to measure psychological components of ill health., based on recent frequency of symptoms. 4 subscales: somatic symptoms, anxiety, social dysfunction, and severe depression) with 7 items in each, scored on a 4-point scale. Found to be appropriate for use at 18 mths post injury (although some problems with the severe depression scale).
	P	One of the 4 subscales found suitable, the remaining 3 'may be suitable'.

Note: (1) S = self; P = proxy; CI = clinician.

Source: Tate et al. 2004.

## Appendix 5 Relating generic and population measures of functioning and health-related quality of life to the ICF

Table A5.1: A framework for relating the content of five generic outcome measures to the ICF

ICF Domains	London HS	AQOL	WHO-DAS 2	15 D	SF 36	ABS SDAC Survey	ABS proposed 2006 census question
<b>Body Structures</b>							
Structures of the nervous system (ch 1)						Nervous or emotional condition	
The eye, ear and related structures (ch 2)							
Structures involved in voice and speech (ch 3)							
Structures of the cardiovascular, haematological, immunological and respiratory systems (Ch 4)							
Structures related to the the digestive, metabolic and endocrine systems (Ch 5,)							
Structures relating to the Genitourinary and reproductive functions (Ch 6)							
Structures related to movement (ch 7)						Arms and fingers Feet and legs Disfigurement or deformity	

ICF Domains	London HS	AQOL	WHO-DAS 2	15 D	SF 36	ABS SDAC Survey	ABS proposed 2006 census question
Skin and related functions (ch 8)							
<b>Body functions</b>							
Mental functions(b/s Ch 1)	Awareness of your surroundings thinking and memory	Thinking about how I generally feel: anxious, worried or depressed	Learning a new task  Concentrating on doing something for ten minutes	Mental function— thinking and memory		Loss of consciousness  Difficulty learning  Memory loss  Nervous or emotional condition  Making decisions	
b126 Temperament and personality functions		Thinking about how I generally feel: anxious, worried or depressed		Distress anxious			
b130 Energy and drive functions				Vitality	Did you feel full of pep in the past four weeks? ( <i>would you place this under emotional functions?</i> )  Did you have a lot of energy?  Did you feel worn out?  Did you feel tired?		
b134 Sleep functions		I am able to sleep...		Sleeping-onset, quality amount maintenance			
b152 Emotional functions			How much have you been	Discomfort and symptoms	Have you been a happy person?	Coping with feelings or	

ICF Domains	London HS	AQOL	WHO-DAS 2	15 D	SF 36	ABS SDAC Survey	ABS proposed 2006 census question
			emotionally affected by your health problems?	e.g very sad, melancholic,	Have you been a very nervous person?  Have you felt so down in the dumps that nothing could cheer you up?  Have you felt downhearted and blue?  Have you felt calm and peaceful?	emotions	
<b>Sensory functions and pain (b Ch 2)</b>	See below	See below		See below		See below	
b210 seeing and related functions	<b>Awareness of your surroundings</b> vision	<b>Physical senses</b> Vision		<b>Vision</b> difficulty and assistance		Sight	
b230 Hearing functions	<b>Awareness of your surroundings</b> hearing	<b>Physical senses</b> Hearing		<b>Hearing</b> – difficulty and assistance		hearing	
b280-289 Pain		<b>Psychological well being</b> Pain		<b>Discomfort and symptoms</b> Physical discomfort and symptoms, e.g. pain, ache	How much bodily pain have you had during the past 4 weeks??  How much did pain interfere with your normal work?	Chronic or recurrent pain	
<b>Voice and speech functions (b Ch 3)</b>	<b>Awareness of your surroundings</b> speaking	<b>Physical senses</b> Communication		<b>Speech</b>		speech	

ICF Domains	London HS	AQOL	WHO-DAS 2	15 D	SF 36	ABS SDAC Survey	ABS proposed 2006 census question
Functions of the cardiovascular, haematological, immunological and respiratory systems (b Ch 4)				Breathing – difficulty on activity		Shortness of breath	
Functions of the digestive, metabolic and endocrine systems (Ch 5, b)							
b525 Defecation functions				Elimination control of bowel		incontinence	
Genitourinary and reproductive functions (Ch 6, b)							
b620 Urination functions				Elimination control of bladder		incontinence	
b 640 sexual functions				Sexual activity			
Neuromusculoskeletal and movement related functions (Ch 7, b)						gripping	
<b>Activities (A) and participation(P) (d)</b>							
Learning and applying knowledge (d Ch1)			Learning a new task	Mental function includes thinking, memory		Difficulty learning or understanding things Memory loss Reading/writing Making decisions	
d 160-179 Applying Knowledge						Reading/writing	
General tasks and demands (A,P Ch 2)							

ICF Domains	London HS	AQOL	WHO-DAS 2	15 D	SF 36	ABS SDAC Survey	ABS proposed 2006 census question
<b>Communication( A,P Ch 3)</b>		Communicating with others—being understood and understanding		Speech		Understanding others and being understood (verbal and non-verbal)	Communication: understanding, or being understood by others
<b>Mobility (A,P, Ch 4)</b>	<b>Getting around</b> —get from one place to another, using any help, aids or means of transport that you normally have available	<b>Independent living</b>	Walking a long distance, such as a kilometre Standing long periods	<b>Mobility</b> – difficulty and assistance walking indoors, outdoors and on stairs.	moderate activities	Physical activity and work	
d410-d429 Changing and maintaining body position					bending	Transfers in and out of bed and in a chair. bending	Getting out of bed
d430 Lifting and carrying					Lifting or carrying groceries		
d450 Walking			Walking long distance		Walking (one block or more than a mile)	Walk 200m	
d 455 Moving around		Mobility around community			Participating in <b>vigorous activities</b> – eg. running, strenuous sport Climbing several / one flights of stairs	Moving around the house and outside stairs	Moving around at home or places away from the home
<b>Self care (A,P, Ch 5)</b>	<b>Looking after yourself</b> Includes self care and things like dressing, washing, shaving.	<b>Independent living</b> Help with self care Personal care tasks	See below	See below	See below	See below	
d510 Washing oneself			Washing your whole body		Bathing	Showering and bathing	showering

ICF Domains	London HS	AQOL	WHO-DAS 2	15 D	SF 36	ABS SDAC Survey	ABS proposed 2006 census question
d 530 toileting						toileting	toileting
d540 Getting dressed			Getting dressed		dressing yourself	Getting dressed	dressing
d550 Eating				<b>Eating</b> – difficulty and assistance		Eating a meal, cutting up food	eating
<b>Domestic life (A,P Ch 6)</b>	<p><b>Looking after yourself</b> Cooking, laundry, housework, shopping</p> <p><b>Work and Leisure</b> Housework</p>	<p>When doing household tasks: (for example, preparing food, gardening, using the video recorder, radio, telephone or washing the car)</p> <p>Family role</p> <p>Help with household tasks</p>	Taking care of your household responsibilities	<b>Usual activities</b> includes housework	Regular daily activities	Housework/household chores Vacuuming Gardening Preparing meals	
<b>Interpersonal relationships (A,P Ch 7)</b>	<p><b>Getting on with people</b> Includes family friends, carers, strangers</p>	<p><b>Social relationships</b> Warm and close relationships with friends and family</p> <p>Relationships with other people and loneliness</p> <p>Family role</p>	<p>Dealing with people you do not know</p> <p>Maintaining a friendship</p>		Normal social activities with family, friends, neighbours or groups.	Social activities	
<b>Major life areas (A,P Ch 8)</b>	<p><b>Affording the things you need</b></p> <p><b>Work and leisure</b> Work (remunerative or non-remunerative)</p> <p><b>Looking after yourself:</b> looking after money</p>		Day to day work	<b>Usual activities</b> employment, studying.	Work and regular daily activities	Everyday activities Work Social activities Education level Employment and/or employment	

ICF Domains	London HS	AQOL	WHO-DAS 2	15 D	SF 36	ABS SDAC Survey	ABS proposed 2006 census question
						history	
<b>Community social and civic life (A,P Ch 9)</b>	<b>Work and leisure</b> <b>Getting on with people.</b> Think about family, friends and people you might meet during the day.		Joining in community activities	<b>Usual activities</b> free-time activities.	Social activities with family, friends, neighbours or groups	Everyday activities Golf/bowling Social activities	
<b>Environmental factors</b>							
<b>Products and technology (e, Ch 1)</b>	<ul style="list-style-type: none"> <li><b>Getting around:</b> '...using any help, aids or means of transport that you normally have available'</li> </ul>	<ul style="list-style-type: none"> <li>To what extent do I rely on medicines or <b>medical aids?</b></li> <li>Thinking about my vision, including when using my glasses or contact lenses if needed...</li> <li>Thinking about my hearing, including using a hearing aid if needed...</li> </ul>	—	<ul style="list-style-type: none"> <li><b>Mobility:</b> I am able to walk without help indoors (with or without an appliance)</li> <li><b>Vision:</b> I see normally... (with or without glasses)</li> <li><b>Hearing:</b> I can hear normally (with or without an hearing aid)</li> </ul>	—	Contact lenses or glasses Hearing aid/cochlear implant Hearing dogs, light signals, TTY phone Walking aids (cane/crutches, frame, wheelchair, scooter, specially modified car, public transport) Electronic aids (picture board, computer, synthesised speech output systems) Large print books	
<b>Natural environment and human made changes to environment</b>						Changes to work environment	
<b>Support and</b>	<ul style="list-style-type: none"> <li><b>Getting around:</b> <i>see above</i></li> </ul>	<ul style="list-style-type: none"> <li>Do I need</li> </ul>	—	<ul style="list-style-type: none"> <li>'help'</li> </ul>	—	Help or	Does the person

ICF Domains	London HS	AQOL	WHO-DAS 2	15 D	SF 36	ABS SDAC Survey	ABS proposed 2006 census question
relationships (e, Ch 3)	<ul style="list-style-type: none"> <li>Looking after yourself: '...you need help...'</li> </ul>	<p>any help looking after myself?</p> <ul style="list-style-type: none"> <li>When doing household tasks: I need no help at all...etc</li> </ul>		<p>required from others</p> <ul style="list-style-type: none"> <li>Mobility</li> <li>eating</li> </ul>		<p>supervision (regular/irregular, by whom and how frequently)</p>	<p>ever need someone to help with, or be with them for...</p>
Services, systems and policies						<p>Services available (education, employment)</p> <p>Financial pension, allowance or assistance</p>	
Concepts not directly specified in the ICF			General health summary measures		General health summary measures	General health summary measures	

**Table A5.2: The relationship of response categories to the ICF qualifiers**

ICF Qualifiers		SF-26				WHODAS-2	15-D	AQOL	London Handicap Scale
0 No problem	0-4(%)	No, not limited at all	No	none	Not at all	none	I am able to ... normally (without difficulty)	I....by myself without any difficulty/ I need no help at all	You can do everything you want to.
1 MILD problem	5-24		Yes? (this could go anywhere from mild–complete)	Very mild	Slightly	mild	I can...with slight difficulty	Occasionally I need some help...	You can do almost all the things you want to do.
2 MODERATE problem	25-29	Yes, limited a little		Mild	Moderately	Moderate	I can...with considerable difficulty	I need help with more difficult tasks	You find something to do most of the time, but cannot do some things for as long as you would like
				Moderate					You are unable to do a lot of things but can find something to do most of the time
3 SEVERE problem	50-95	Yes, limited a lot		Severe	Quite a bit	Severe	I am almost...	I need daily help with most or all ....	You are unable to do most things, but can find something to do some of the time
4 COMPLETE problem	96-100			Very severe	Extremely	Extreme/cannot do	I am almost completely...	I need daily help with most or all ....	You sit all day and do nothing. You cannot keep busy or take part in any activities.
8 not specified									
9 not applicable									