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Acknowledgements

The Care and Needs Scale (CANS) was developed to address a gap in the availability of a psychometrically sound measure that was able to capture the unique type of support needs experienced by people with traumatic brain injury. Because the nature of disability after traumatic brain injury is commonly manifest in the psychosocial domain, it is less readily apparent than is physical disablement. Consequently, disability after traumatic brain injury is often unrecognized and/or underestimated.

I thank the Lifetime Care and Support Authority of New South Wales, Australia for their interest in the CANS and the Motor Accidents Authority of New South Wales for financial support to conduct a comprehensive set of psychometric studies. I am especially grateful to Dr Cheryl Soo, Project Manager of the multi-centre studies. Her expertise and high standards ensured that the seven psychometric studies were conducted in an exemplary manner. Appreciation is expressed to my clinical colleagues in the three Brain Injury Rehabilitation Units in Sydney: Kate Hopman, Marcella Forman Tanya Secheny, Dr Grahame Simpson and Lauren Gillett from the Liverpool Hospital service; Vanessa Aird, Dr Stuart Browne, Dr Carissa Coulston, Belinda Carr (née Armstrong), Jeanine Allaous, and Dr Clayton King from the Royal Rehabilitation Centre Sydney service; and Dr Kathy McCarthy, Dr Joe Gurka, Jill Hummell, and Louise Diffley from the Westmead Hospital service. Additionally, at times when data collection got out of hand for the psychometric studies, Bridget Myles and Joe Hanna came to the rescue.

RLT
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Background and development

The Care and Needs Scale (CANS; Tate, 2004) is an 8-level categorical scale that is designed to measure the level of support needs of older adolescents and adults with traumatic brain injury. It is intended to be administered by health professionals with experience working in a rehabilitation setting with people with brain injury. The CANS is suitable for people who are 16 years of age and older. A paediatric version of the scale (PCANS; Soo, Tate, Williams, Waddingham, Waugh, 2008; Soo, Tate, Anderson, Waugh, 2010) is currently under development for age ranges 5 to 15 years.

Development of the CANS and its conceptual framework has been described elsewhere (Tate, 2004; 2010). In brief, the impetus to develop the CANS arose because there were no suitable scales that adequately measured the variety and extent of support needs experienced by people with traumatic brain injury. It was constructed in accordance with current conceptualisation underlying International Classification of Functioning, Disability and Health (ICF; WHO, 2001). Items from the Needs Checklist map to eight of the nine domains from the Activities/Participation component of the ICF (all domains except d1: learning and applying knowledge). The Support Levels map to three of the five Environmental Factors: e1: products and technology, e3: supports and relationships, and e5: services, systems and policies. The Needs Checklist and Support Levels were derived from the author’s clinical and research experience, along with the literature on published scales of disability and outcome. Various configurations of Support Levels were trialled with a group of 67 people with traumatic brain injury, the final version of eight levels being the most clinically informative.

Research findings on the psychometric properties of the CANS are summarised in Tate (2010). It has now been extensively examined and shows excellent levels of inter-rater and test-retest reliability, along with substantial evidence supporting its criterion and construct validity (see Tate, 2004; Soo, Tate, Hopman, Forman, Secheny, Aird, Browne & Coulston, 2007; Soo, Tate, Aird, Allaous, Browne, Carr, Coulston, Difffley, Gurka & Hummell, 2010). Results of these studies are summarised on pages 18 to 21 of this manual.

Scale description

The CANS comprises two sections: a Needs Checklist and Support Levels. (The CANS recording form is reproduced in the Appendix on page 23). The checklist of items (Needs Checklist) that underpins the Support Levels sample the types of activities that research studies and clinical experience have shown are most frequently disrupted after a traumatic brain injury. The two sections are described in more detail below.

Section 1: Needs Checklist – for evaluating the type of care and support need
(Left hand column of the recording form) This 24-item checklist covers the type of care and support need. This ranges from very basic needs (e.g., tracheostomy management, feeding) through to instrumental activities of daily living (e.g., domestic) and social participation activities. The focus of the checklist is on functional activities, rather than impairments. See pages 5 to 8 for more details and operational definitions.

Section 2: Support Levels – for assessing the length of time that can be left alone
(Right hand column of the recording form) This section covers the extent or frequency of care and support need. A rating is made in one of eight categories, which range from very high levels of care and support needs (e.g., ‘cannot be left alone’, ‘can only be left alone for a few hours’) to very low levels (e.g., ‘can be left alone for more than a week’, ‘is completely independent’). See page 9 for more details.
Section 1: Needs Checklist - Type of care and support need

In this section (left hand column of the recording form) there is a 24-item activity checklist and each of the items is operationally defined on pages 6 to 8. The checklist items are roughly classified into a hierarchy of five groups (A to E) representing decreasing levels of support needs:

**Group A**
- tracheostomy management
- nasogastric/PEG feeding
- bed mobility (e.g., turning)
- wanders/gets lost
- exhibits behaviours (including emotional distress) that have the potential to cause harm to self or others
- has difficulty in communicating basic needs due to language impairments
- toileting/continence
- feeding
- transfers/mobility (including stairs and indoor surfaces)

**Group B**
- personal hygiene/toileting
- bathing/dressing
- simple food preparation

**Group C**
- shopping
- domestic
- medication use
- money management
- everyday devices (e.g., telephone, television)
- transport and outdoor surfaces
- parenting skills
- interpersonal relationships
- leisure and recreation/play
- employment/school

**Group D**
- informational supports (e.g., advice)
- emotional supports

A final group caters to those people who do not have care or support needs:

**Group E**
- Lives fully independently, with or without physical or other aids (e.g., hand rails, diary notebooks), and allowing for the usual kinds of informational and emotional supports the average person uses in everyday living.
The following operational definitions were developed by the CANS Research Team (Tate et al., in preparation)

1. **Tracheostomy:** This is primarily for dysphagia. 
   Operational definition of support activities that may be required: preparation for suction, suction process, dressings, cleaning equipment, equipment changes, apply speaking valve (NB: in agitated patients observation may also be required to prevent patient pulling tube out)

2. **Nasogastric/PEG:** This is primarily for feeding and insertion of fluids. 
   Operational definition of support activities that may be required: preparation of fluids/bolus/medications, set up, insertion, monitoring and prevention of aspiration, flushing, cleaning equipment (NB: in agitated patients observation may also be required to prevent patient pulling out tube; activities may also include wound management in situations where this is required)

3. **Bed mobility:** This is primarily for turning and positioning to prevent pressure sores. 
   Operational definition of support activities that may be required: preparation (splints off and on, hoisting bed up and down), turning, positioning in bed/chair (NB: if person has a pressure wound, then management of this complication will also be required)

4. **Wandering:** People designated as those who wander are at risk and they generally require full-time surveillance. 
   Operational definition of support activities that may be required: observation, retrieval, ensuring confinement

5. **Behaviours:** This refers to challenging behaviours of sufficient severity to cause harm to self or others. It includes (but is not restricted to) physical aggression (e.g., hitting, biting, throwing things), impulsive behaviours (e.g., crossing road without caution, turning on hot taps), emotional distress (e.g., suicide ideation, major depressive episodes, post-traumatic psychoses). These disorders will either be observed directly or identified via assessment. 
   Operational definition of support activities that may be required: observation, recording, implementing interventions, dealing with crises

6. **Communication:** This primarily applies to people who have difficulty expressing their needs, including (but not restricted to) people requiring augmented communication devices, those who have severe speech impairment or are unable to initiate speech. 
   Operational definition of support activities that may be required: Attention and response of communication recipient during, at minimum, basic activities of daily living (morning bath, 5 toiletings, 3 meals and snacks, retiring to bed)

7. **Continence:** This refers to bladder and bowel control. 
   Operational definition of support activities that may be required: 
   a) For those people on a structured continence program: toilet timing, preparation (e.g., positioning the person, use of a hoist) wiping, cleaning, dressing. 
   b) For those whose impairments are too severe for a continence program (e.g., those in a minimally conscious state), nappies/diapers may need to be changed requiring wiping, cleaning, dressing; leg-bag (e.g., from supra-pubic catheter, uridome) may need drainage, bowel care (e.g., enemas) may be required 
   c) A minimal continence program consists of reminders to prevent continence accidents
8. Feeding: This refers to activities directly involved in the feeding process. It does not include preparation of the meals (rate under domestic), nor shopping for food items (rate under shopping). Operational definition of support activities that may be required: set-up, feeding process, supervision and monitoring, clearing and cleaning

9. Transfers/indoor mobility: This refers to activities to assist with locomotion. Operational definition of support activities that may be required: Transfers – in and out of chair, bed, bath, toilet and other activities each day (e.g., therapy, shopping, recreational activity). Transfers may involve operation of a hoist, or require 2 people. Indoor mobility – assist with stairs, supervision of movement around house, pushing wheelchair.

10. Personal hygiene: This refers to activities including grooming (shaving, combing hair, applying make-up), cleaning teeth, toileting, arranging clothes for toileting, wiping, period management for women, washing face and hands. Operational definition of support activities that may be required: set-up, assisting in the conduct of the activities, supervision and monitoring, cleaning

11. Bathing/dressing: This refers to activities involved in bathing/showering the body and washing hair and dressing the body. Operational definition of support activities that may be required: set-up, assisting in the conduct of the activities, supervision and monitoring

12. Simple food preparation: This refers to preparation of snacks and light meals (breakfast, morning tea, lunch, afternoon tea, supper). NB: preparation of the main meal is rated under item 14. Domestic Operational definition of support activities that may be required: preparation of the food, set-up, supervision

13. Shopping: Refers to shopping for food, clothes, linen, gifts, whitegoods, furniture, stocking of continence items, equipment, liaising with Office of the Protective Commission (OPC) to release funds for purchases, getting quotes to submit to the OPC etc. Operational definition of support activities that may be required: assistance in generating lists, supervision, completing the activity on behalf of the person. Does not include transport to and from the shopping area, which should be rated separately under transport.

14. Domestic: This refers to activities involved in maintaining the home with a clean and orderly environment, as well as preparing the main meal of the day. Operational definition of support activities that may be required: cleaning rooms of the house (including vacuuming/sweeping/washing floors, washing/drying/putting away dishes and cooking utensils, washing/ironing/putting away clothes, cleaning bathroom/toilet, putting out garbage), repairs to house interior and exterior, gardening, washing car etc. Planning, preparing and cooking main meal

15. Medication: This refers to administration of tablets, injections, nebulizers, wound management, ointment etc (NB: dressings for tracheostomy and nasogastric tubes are rated in Items 1 and 2 respectively). Operational definition of support activities that may be required: Administration, supervision, crushing tablets, memory prompts, physical assistance (upper limb manipulation, visual impairments), wound dressings, 4 hour nebulizer, checking blood-sugar levels for insulin, etc

16. Money Management: This refers activities involving financial matters. Operational definition of support activities that may be required: handling money (e.g., change from purchases), budgeting, reviewing bills, organising ongoing management of finances, specific management strategies and close liaison with those with special needs
(e.g., impulsive, reckless, poorly judged expenditures, clients easily taken advantage of etc., all of which result in their financial affairs being in jeopardy).

17. **Everyday devices:** This refers to operation of high and low technology devices. 
*Operational definition* of support activities that may be required: operating TV, phone (mobile/cell and land-line), video, computer, setting the alarm, palm pilot, automatic teller machine. Also included are environmental controls, wheelchair maintenance, operating hoist, bed, patching air mattress, and domestic devices (e.g. vacuum cleaner and microwave oven).

18. **Transport:** This refers to outdoor mobility. 
*Operational definition* of support activities that may be required: getting to and from destination. Does not include the activity/work at the destination itself.

19. **Parenting:** This refers to care that parents provide to look after children and adolescents. 
*Operational definition* of support activities that may be required: play, discipline, provision of physical needs (<2 years), guidance. For adolescents: advice, sex education, modelling and role-play scenarios, appropriate behaviour.

20. **Interpersonal relationships:** This refers to relationships with a) partner, b) family, c) friends and, d) other e.g., work colleagues and neighbours. These relationships may be within the context of: i) work/school, ii) home and, iii) leisure activities. 
*Operational definition* of support activities that may be required: education, behaviour management, counselling, social skills, modelling, conflict resolution.

21. **Leisure and recreation:** This refers to activities outside of employment. 
*Operational definition* of support activities that may be required: interests, hobbies, (exclude TV as leisure except if there are specific interest areas, e.g., sports, current affairs).

22. **Employment/school:** This refers to situations where employment is an option. 
*Operational definition* of support activities that may be required: paid and volunteer employment, computer training, technical and continuing education courses, up-skilling, specific training, sheltered workshop, supported employment, job coaching etc.

23. **Informational support:** This refers to practical advice on everyday matters. Informational supports may need to be quite intensive for people with major difficulties. 
*Operational definition* of support activities that may be required: problem solving, dealing with administration (including correspondence from various organisations), work done by case manager or social worker.

24. **Emotional support:** This refers to matters focusing on psychological well-being, as well as emotional problems including dealing with adjustment issues, going through ‘tough times’, mild to moderate degrees of anxiety, depression, low self-esteem, anger management and so forth. 
*Operational definition* of support activities that may be required: counselling, coaching, advice with regard to interpersonal relationships, monitoring etc.
Section 2: Extent (frequency) of support needs - Length of time that can be left alone

In this section (right hand column of the recording form) there are eight levels of supports, again grouped hierarchically (see Table 1 below). When the activity checklist regarding the person’s level of functioning is completed, these responses are used to determine, on the basis of clinical judgement, the level of support needed. The level of support need corresponds to the length of time that the person can be left alone.

Table 1: Support Levels of the CANS

<table>
<thead>
<tr>
<th>Level of support need</th>
<th>Length of time that can be left alone</th>
</tr>
</thead>
<tbody>
<tr>
<td>Level 7</td>
<td>Cannot be left alone</td>
</tr>
<tr>
<td></td>
<td>Needs nursing care, assistance and/or surveillance 24 hours per day</td>
</tr>
<tr>
<td>Level 6</td>
<td>Can be left alone for a few hours</td>
</tr>
<tr>
<td></td>
<td>Needs nursing care, assistance and/or surveillance 20-23 hours per day</td>
</tr>
<tr>
<td>Level 5</td>
<td>Can be left alone for part of the day, but not overnight</td>
</tr>
<tr>
<td></td>
<td>Needs nursing care, assistance, supervision and/or direction 12-19 hours per day</td>
</tr>
<tr>
<td>Level 4</td>
<td>Can be left alone for part of the day and overnight</td>
</tr>
<tr>
<td></td>
<td>Needs a person each day (up to 11 hours) for assistance, supervision direction and/or cueing for occupational activities, interpersonal relationships and/or living skills</td>
</tr>
<tr>
<td>Level 3</td>
<td>Can be left alone for a few days a week</td>
</tr>
<tr>
<td></td>
<td>Needs contact for occupational activities, interpersonal relationships, living skills or emotional support a few days a week</td>
</tr>
<tr>
<td>Level 2</td>
<td>Can be left alone for almost all week</td>
</tr>
<tr>
<td></td>
<td>Needs contact for occupational activities, interpersonal relationships, living skills or emotional support at least once a week</td>
</tr>
<tr>
<td>Level 1</td>
<td>Can live alone, but needs intermittent (i.e., less than weekly) contact for occupational activities, interpersonal relationships, living skills or emotional support</td>
</tr>
<tr>
<td>Level 0</td>
<td>Can live in the community, totally independently</td>
</tr>
<tr>
<td></td>
<td>Does not need contact.</td>
</tr>
</tbody>
</table>

1 In the original publication (Tate, 2004), the eight CANS levels ranged from 1 (“is completely independent”) to 8 (“cannot be left alone”), but the scoring system has since been revised with the eight levels ranging from 0 (“is completely independent”) to 7 (“cannot be left alone”), in order to anchor “completely independent” (i.e., no supports are required) to zero, rather than 1.
The CANS is completed by a clinician who has detailed current knowledge of the patient/client. It can also be used in interview format with a knowledgeable informant or the person with the brain injury (although in the latter case the clinician will need to determine whether the person has significant impairments in memory, judgement or awareness that may compromise reliable reporting). Additionally, the CANS can be completed on the basis of information derived from the patient’s medical record, scales of disability and so forth.

In situations where the clinician has knowledge of the patient/client and direct interview is not required, the CANS will only take a few minutes to complete. Interview format with an informant generally takes somewhat longer (10-15 mins).

First the clinician identifies all types of care and support need from the Needs Checklist of 24 activities in Section 1 (left hand column of the recording form; see Appendix, page 23 for the CANS recording form). Each of the 24 items from the Needs Checklist from Groups A to D is endorsed if the person has a need in that area irrespective of its nature or extent. This information is then used to determine the extent of care and support need in Section 2 (right hand column of the recording form). There are eight Support Levels and the level allocated is that which corresponds to the highest Group (A-D) of endorsed checklist items. Some degree of clinical judgement is used in synthesising the information from the Needs Checklist and converting it to a Support Level, and also taking account of current contextual factors in the individual’s life that may have bearing on the level of support required (see section on Rating Decisions, pp. 12-14). The Support Level allocated ranges from 0 to 7 (revised from Tate, 2004, which ranged from 1 to 8), with higher scores indicating greater intensity of support need.

It will be noted from the CANS recording form that there is overlap between the CANS levels of support (Section 2) and the grouped hierarchy comprising the activity checklist (Section 1):

<table>
<thead>
<tr>
<th>Activity checklist (Section 1)</th>
<th>CANS levels (Section 2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group A</td>
<td>Levels 4, 5, 6 or 7</td>
</tr>
<tr>
<td>Group B</td>
<td>Level 4</td>
</tr>
<tr>
<td>Group C</td>
<td>Levels 1, 2, 3 or 4</td>
</tr>
<tr>
<td>Group D</td>
<td>Levels 1, 2 or 3</td>
</tr>
<tr>
<td>Group E</td>
<td>Level 0</td>
</tr>
</tbody>
</table>

This is intentional, and is designed to reflect the clinical reality that support needs for any given activity will range from a minimal amount of support through to maximal support. The specific level of support required for a single activity will vary depending on a number of factors, including (but not restricted to) the following:

a) the severity of the activity limitations
b) the combined effects of all the limitations (cf., the whole can be greater than the sum of the parts)
c) the influence of other impairments (e.g., memory)
d) contextual factors, such as the availability of environmental supports (e.g., equipment, aids, services, social supports)

Thus, for people who require supports for feeding, for example, their support level will range from Level 4 (‘can be left alone for part of the day or overnight’) to Level 7 (‘cannot be left alone’) because feeding is from a Group A activity.

It is also noted that activities from different groups may well require the same level of support. For example, housework from Group C may require Level 4 support (‘can be left alone for part of the day or overnight’), and equally activities at a higher level of disablement (eg, Group A, feeding) may also require this same level of support. Clearly, however, the type of that support will vary.
The guiding principle in allocating a Support Level is that the level of support required (Section 2) cannot be less than the level indicated by the group in which the highest activity limitation is endorsed (activity checklist in Section 1), and conversely it cannot be higher.

For example, in rating David’s level of support (see below), the highest activity limitation endorsed came from Group C (specifically, supervision for selected instrumental activities of daily living). Therefore David’s rating must be selected from the CANS level that corresponds to Group C activities (in this case, CANS Levels 4, 3, 2, or 1). His CANS rating cannot be Levels 5, 6, or 7 (which occur for Group A activities), nor would it be Level 0 (which refer to Group E). The clinician will judge which of these CANS Levels is most appropriate for David, depending upon his circumstances and other impairments he experiences (see Rating Decisions, pp.12-14).

**CANS activity checklist for David**

**Group A: CANS Levels 7, 6, 5 or 4:** Requires nursing care, surveillance for severe behavioural/cognitive disabilities, and/or assistance with very basic ADLs:
- tracheostomy management
- nasogastric/PEG feeding
- bed mobility (e.g., turning)
- wanders/gets lost
- exhibits behaviours (including emotional distress) that have the potential to cause harm to self or others
- has difficulty in communicating basic needs due to language impairments

Physical/standby assistance or supervision for:
- toileting/continence
- feeding
- transfers/mobility (including stairs and indoor surfaces)

**Group B: CANS Level 4:** Requires assistance, supervision, direction and/or cueing for basic ADLs:
- personal hygiene/toileting
- bathing/dressing
- simple food preparation

**Group C: CANS Levels 4, 3, 2 or 1:** Requires assistance, supervision, direction and/or cueing for instrumental ADLs and/or social participation:
- shopping
- domestic
- medication use
- money management
- everyday devices (e.g., telephone, television)
- transport and outdoor surfaces
- parenting skills
- interpersonal relationships
- leisure and recreation/play
- employment/school

**Group D: CANS Levels 3, 2 or 1:** Requires supports:
- informational supports (e.g., advice)
- emotional supports

**Group E: CANS Level 0:** Fully independent:
- Lives fully independently, with or without physical or other aids (e.g., hand rails, diary notebooks), and allowing for the usual kinds of informational and emotional supports the average person uses in everyday living.
Rating decisions

As noted, allocation of a CANS Support Level involves some degree of clinical judgement. The following points provide guidance on the decision making process:

Rate the present (here and now) circumstances

A rating on the CANS is made with reference to the patient’s/client’s present circumstances. It is recognised that a change in circumstances (e.g., altered living arrangements, illness of a caregiver) may well affect the level of support needs, thereby requiring reassessment.

Use all sources of information available

When endorsing items on the Needs Checklist and making a classification for the Support Level, take into account not only what has been endorsed by the respondent, but also all other sources of information. Sometimes these will conflict with each other. In that case, take the information judged to be more valid. For example, if the respondent/informant says no support is needed for mobility, but recent entries in the medical file indicate that the person is unsafe using stairs because of mobility problems, then the information from the medical file is probably more reliable to use for the purpose of making a CANS rating.

Support need versus support received

The CANS levels represent a clinical judgement regarding support needed (rather than support received). Some examples of the distinction between care and support needs and level of support actually received are as follows:

(a) It may be the case that the level of support actually received is misleading and does not represent the appropriate need for support for that person. The amount of care and support actually received may be more than is needed. For example, an overprotective family may provide more support than is needed due to their cultural beliefs and practices (cf. Cavallo & Saucedo, 1995; Tate, Strettles & Osoteo, 2003).

(b) By contrast, the level of support actually received may be less than is needed. Reasons for receiving less support than needed include (but are not restricted to) the following:

- support services are not available
- the person is unable to access the supports
- the person rejects supports that are offered
- the person or family does not recognise the need for supports

Met versus unmet need

The issue of whether needs are being met or not met is complex. On the CANS, a rating is made if a person has a need, irrespective of whether the need is met or unmet. Thus, if a person has a need in an area (e.g., shopping) then it is endorsed as a need. Although the need may be met (e.g., the wife does the shopping) it is still a need.

Using the CANS with adolescents

As noted, a paediatric version of the CANS is under development and suitable for those aged 5 to 15 years. It is recognised that the period 16 to 18 years is a transition phase to adult roles and responsibilities. Depending on circumstances, either the CANS or PCANS could be used with these age groups, but developmental level should be taken into account when allocating a Support Level.

For example, if a 16 year-old adolescent has left school and is working, then the CANS is a suitable instrument. Yet many older adolescents still have needs in the informational and emotional areas, and these items are included on the Needs Checklist. In determining whether the adolescent has a need in those areas, clinical judgement should be used to evaluate whether the need is above and beyond that which all adolescents have in the informational/emotional domains.
Conversely, a 17 year-old adolescent may have severe disability arising from his/her brain injury, and function at a level well below his/her chronological age. In this situation, the clinician may decide that the (more extensive) 97-item PCANS may be a more suitable instrument to document support needs.

**Using the CANS with people with pre-existing/co-morbid conditions**

It is not recommended to try to partial those support needs that are due to the brain injury and those that are due to other health conditions. CANS Support Levels relate to the sum total of support that is needed, irrespective of the reason such support is required. For people with pre-existing or co-morbid conditions support needs may well be a mix of brain injury-related needs and other-related needs.

On the CANS recording form there is an “other” response space for each broad grouping of the Needs Checklist. Clinicians are encouraged to write in any notes that may assist in identifying that needs are due to presence of another condition (e.g., pre-existing substance abuse; co-morbid orthopaedic injuries, medical conditions etc). For example, medical conditions, such as post-traumatic epilepsy, may impact upon support needs and if so will require documentation in the appropriate Group reflecting extent/frequency of support. If the epilepsy was uncontrolled it may require Group A level of support versus if its management presented less severe difficulties then a less intense support need would be indicated.

**Rating the CANS within the person’s context**

Lifestyle choices: In some circumstances, particularly those involving lifestyle choices, it can be difficult to determine a support need. For example, if a mother always did the housework and prepared meals (cf. the domestic item from the Needs Checklist) for her (adult) son, who now has a brain injury, clinical judgement would be required to classify the domestic item: a need (e.g., the son is very disabled and so is unable to do any domestic tasks independently and needs his mother to prepare meals etc) not a need (e.g., the son does not do any domestic tasks but this is lifestyle choice by mother and son and is not related to the injury).

Items that are not applicable: In other circumstances, the checklist item is not applicable and in these cases it would be classified as not a need. For example, in people with poor interpersonal skills arising from the brain injury, which in the past had adversely affected their parenting skills, but now their children have grown up. In this situation, the parenting item is no longer applicable and hence is not endorsed as an area of need.

Opportunity: This factor may need to be taken into account. For example, in people whose disabilities are so severe that work is not a reasonable expectation, the employment item may be classified as not a need (and in such a scenario, the leisure/recreation item takes on added importance in terms of meaningful occupation; see below). Another example may be a person who is not able to drive a car, but is fully independent in using public transport. In this case, the transport item may be classified as not a need.

The special case of employment: Needs in this area are often difficult to determine. Our position is that if the person is of working age and they are not working, then they have employment needs (Tate et al., 2003). A clinical decision will need to be made in individual cases, such as those who have had multiple failed attempts at resuming work, or others whose injuries occurred so many years previously that work may not be feasible, and so forth. In all the foregoing and similar scenarios, however, if a person is not working and work is not a feasible option, then such people ought to have a structured program of meaningful occupational activity in lieu of work. If they do not have such a program, then they have recreation/leisure needs.

**Role of equipment and aids in determining support needs on the CANS**

The focus of the CANS is on supports provided by other people. It is recognised that equipment and aids are, in some situations, essential supports to facilitate functioning, but these are not included in making a rating decision on the CANS. For example, a person may require aids and modifications for mobility (e.g., rails, ramps, walking stick). But if that person was able to use these aids safely and independently, then the mobility item would not be endorsed as an area of need. However, if, in spite of using the aids, the person required the
presence of another person for observation to ensure safety (e.g., on stairs), then mobility would be classified as an area of need.

Experience in using the CANS suggests that in cases where there is a need for equipment and aids (e.g., rails in the toilet) then in the absence of such aids another person is usually required to physically assist and/or supervise, and the need is therefore captured. Thus, with the provision of such aids the person may well not have a need (e.g., independent in toileting), but without such aids then another person is required for functional/safety reasons, and there is a support need.
Illustrative case descriptions

The following fictitious examples are provided to demonstrate application of the CANS.

Level 7: Cannot be left alone: needs nursing care, assistance, and/or surveillance 24 hours per day

Adam sustained severe brain injury at age 20 as the result of a motor vehicle accident. At the time of his injury he was married with children, and was employed as a labourer. Duration of post-traumatic amnesia was 90 days. Adam was hospitalised for 80 days in the acute hospital and had many months of rehabilitation. His tetraplegia and behavioural disturbances made it difficult to find a suitable residential facility. His impairments were such that it was not possible for his family to manage him at home. At admission to a residential facility, Adam was totally dependent in all activities of daily living and mobility. He had limited head control and required another person for bed mobility. At rehabilitation discharge, he was classified as Severe Disability on the Glasgow Outcome Scale.

In terms of the CANS (see checklist of items below), Adam requires virtually the full range of supports. He requires another person to turn him in bed to prevent pressure sores, he has difficulty communicating his basic needs because of phonation problems, and is totally dependent in all basic and instrumental activities of daily living. His challenging behaviours adversely affect his ability to relate with his wife and children. Because of the severity of his disability, employment was not regarded an area of need, although occupational activity in terms of leisure and recreation options are highly relevant.

CANS activity checklist

Group A: CANS Levels 7, 6, 5 or 4: Requires nursing care, surveillance for severe behavioural/cognitive disabilities, and/or assistance with very basic ADLs:
- ☐ tracheostomy management
- ☐ nasogastric/PEG feeding
- ☒ bed mobility (e.g., turning)
- ☐ wanders/gets lost
- ☒ exhibits behaviours (including emotional distress) that have the potential to cause harm to self or others
- ☒ has difficulty in communicating basic needs due to language impairments

Physical/standby assistance or supervision for:
- ☒ toileting/continence
- ☒ feeding
- ☒ transfers/mobility (including stairs and indoor surfaces)

Group B: CANS Level 4: Requires assistance, supervision, direction and/or cueing for basic ADLs:
- ☒ personal hygiene/toileting
- ☒ bathing/dressing
- ☒ simple food preparation

Group C: CANS Levels 4, 3, 2 or 1: Requires assistance, supervision, direction and/or cueing for instrumental ADLs and/or social participation:
- ☐ shopping
- ☒ domestic
- ☒ medication use
- ☒ money management
- ☒ everyday devices (e.g., telephone, television)
- ☒ transport and outdoor surfaces
- ☒ parenting skills
- ☒ interpersonal relationships
- ☒ leisure and recreation/play
- ☐ employment/school

Group D: CANS Levels 3, 2 or 1: Requires supports:
- ☐ informational supports (e.g., advice)
- ☒ emotional supports

Group E: CANS Level 0: Fully independent:
- ☐ Lives fully independently, with or without physical or other aids (e.g., hand rails, diary notebooks), and allowing for the usual kinds of informational and emotional supports the average person uses in everyday living.
Level 4: Can be left alone for part of the day and overnight: needs a person each day (up to 11 hours) for assistance, supervision, direction and/or cueing for occupational activities, interpersonal relationships, and/or living skills

Sue sustained severe brain injury at age 19 as the result of a fall. At the time of her injury she was single and unemployed. Her duration of post-traumatic amnesia was 134 days and was hospitalised for 240 days (80 days in acute hospital and 160 days in rehabilitation). Sue had significant cognitive impairments at rehabilitation discharge, however she had no neurophysical disability. At rehabilitation discharge, she was classified in the Moderate Disability group on the Glasgow Outcome Scale.

At 5 years post-trauma, Sue was still single and living with her parents. She was incapacitated for competitive work, but successfully worked in a sheltered workshop. In terms of the CANS (see checklist of items below), Sue needs supervision for some basic activities of daily living (food preparation, bathing/dressing) and assistance in a number of instrumental activities of daily living (shopping, housework, money management, transport). Sue also requires assistance in social participation as well as informational and emotional supports.

CANS activity checklist

**Group A: CANS Levels 7, 6, 5 or 4:** Requires nursing care, surveillance for severe behavioural/cognitive disabilities, and/or assistance with very basic ADLs:
- ☐ tracheostomy management
- ☐ nasogastric/PEG feeding
- ☐ bed mobility (e.g., turning)
- ☐ wanders/gets lost
- ☐ exhibits behaviours (including emotional distress) that have the potential to cause harm to self or others
- ☐ has difficulty in communicating basic needs due to language impairments

Physical/standby assistance or supervision for:
- ☐ toileting/continence
- ☐ feeding
- ☐ transfers/mobility (including stairs and indoor surfaces)

**Group B: CANS Level 4:** Requires assistance, supervision, direction and/or cueing for basic ADLs:
- ☐ personal hygiene/toileting
- ☑ bathing/dressing
- ☑ simple food preparation

**Group C: CANS Levels 4, 3, 2 or 1:** Requires assistance, supervision, direction and/or cueing for instrumental ADLs and/or social participation:
- ☑ shopping
- ☑ domestic
- ☐ medication use
- ☑ money management
- ☐ everyday devices (e.g., telephone, television)
- ☑ transport and outdoor surfaces
- ☐ parenting skills
- ☐ interpersonal relationships
- ☑ leisure and recreation/play
- ☐ employment/school

**Group D: CANS Levels 3, 2 or 1:** Requires supports:
- ☑ informational supports (e.g., advice)
- ☑ emotional supports

**Group E: CANS Level 0:** Fully independent:
- ☐ Lives fully independently, with or without physical or other aids (e.g., hand rails, diary notebooks), and allowing for the usual kinds of informational and emotional supports the average person uses in everyday living.
Level 1: Can live alone, but needs intermittent (i.e. less than weekly) contact for occupational activities, interpersonal relationships, living skills or emotional support

Bob sustained severe brain injury at age 39 as the result of a motor vehicle accident. At the time of his injury he was married with children and employed as a labourer. His duration of post-traumatic amnesia was 80 days and he was hospitalised for 170 days (50 days in acute hospital and 120 days in rehabilitation). Although he was making a good recovery in neurophysical terms, he exhibited marked executive impairments, and these contributed to the breakdown of his marriage. At rehabilitation discharge he was functionally independent, but continued to have significant neuropsychological impairments. He was classified in the Moderate Disability group on the Glasgow Outcome Scale.

At 10 years post-trauma, Bob’s support needs were evaluated with the CANS. He was living alone in a Department of Housing flat and had not worked competitively since his injury. He did not engage in much of the way of structured occupational activity in lieu of work, although he occasionally worked in a casual capacity at a garage. From time to time, Bob requires some assistance with money management, and given his age and ability would benefit from having someone to review his occupational activity. Occasionally he needs emotional supports (eg. at the time of the death of his mother) and has frequent episodes of mild to moderate degrees of depression. Although in the earlier post-trauma stages he required supports for parenting skills, his children are now grown adults and this is no longer an area of need.

CANS activity checklist

Group A: CANS Levels 7, 6, 5 or 4: Requires nursing care, surveillance for severe behavioural/cognitive disabilities, and/or assistance with very basic ADLs:
- tracheostomy management
- nasogastric/PEG feeding
- bed mobility (e.g., turning)
- wanders/gets lost
- exhibits behaviours (including emotional distress) that have the potential to cause harm to self or others
- has difficulty in communicating basic needs due to language impairments

Physical/standby assistance or supervision for:
- toileting/continence
- feeding
- transfers/mobility (including stairs and indoor surfaces)

Group B: CANS Level 4: Requires assistance, supervision, direction and/or cueing for basic ADLs:
- personal hygiene/toileting
- bathing/dressing
- simple food preparation

Group C: CANS Levels 4, 3, 2 or 1: Requires assistance, supervision, direction and/or cueing for instrumental ADLs and/or social participation:
- shopping
- domestic
- medication use
- money management
- everyday devices (e.g., telephone, television)
- transport and outdoor surfaces
- parenting skills
- interpersonal relationships
- leisure and recreation/play
- employment/school

Group D: CANS Levels 3, 2 or 1: Requires supports:
- informational supports (e.g., advice)
- emotional supports

Group E: CANS Level 0: Fully independent:
- Lives fully independently, with or without physical or other aids (e.g., hand rails, diary notebooks), and allowing for the usual kinds of informational and emotional supports the average person uses in everyday living.
The CANS has now been subject to thorough psychometric examination with excellent results.

Reliability studies have been reported in Soo et al. (2007) in two independent samples from two brain injury rehabilitation units:

- in a sample of 30 community clients, there was excellent inter-rater reliability between ratings made by different members of a multidisciplinary team (ICC=0.93-0.96)
- as well as in a second independent sample of 40 community clients from a second brain injury rehabilitation unit. Ratings of a multidisciplinary team (based on their knowledge of the person with brain injury) were compared with a clinical researcher who made clinical judgments based on both the ratings by the multidisciplinary team and interview of a relative (ICC=0.92)
- 1-week test-retest reliability in the first sample (n=30) was also excellent (ICC=0.98)
- Proxy ratings were examined in the second sample (n=40): coefficients between clinicians and a relative were fair to good (ICC=0.59-0.72)
- as expected patient-proxy coefficients were substantially lower between clients and either their relatives (ICC=0.49) or clinicians (ICC=0.37-0.52).

Validity studies were first reported by Tate (2004) and further work from a multi-centre study with more representative samples was reported by Soo et al. (2010).

There is good evidence of concurrent validity between the CANS and other instruments assessing handicaps and community participation. Tate (2004) studied a sample of 67 people who sustained severe traumatic brain injury, on average 23 years previously. The CANS was compared with the Supervision Rating Scale (SRS; Boake, 1996), the Craig Handicap Assessment and Reporting Technique (CHART; Whiteneck et al., 1992), and the Sydney Psychosocial Reintegration Scale (SPRS; Tate et al., 1999). The CANS showed strong correlation with the SRS, as well as CHART and SPRS subscales, as shown in Table 2.

<table>
<thead>
<tr>
<th>Table 2: Spearman correlation coefficients between the CANS and other measures of functional disability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supervision Rating Scale</td>
</tr>
<tr>
<td>Craig Handicap and Assessment Reporting Technique</td>
</tr>
<tr>
<td>- Physical</td>
</tr>
<tr>
<td>- Mobility</td>
</tr>
<tr>
<td>- Cognitive</td>
</tr>
<tr>
<td>- Occupational</td>
</tr>
<tr>
<td>- Social</td>
</tr>
<tr>
<td>Sydney Psychosocial Reintegration Scale</td>
</tr>
<tr>
<td>- Total</td>
</tr>
<tr>
<td>- Occupational Activities</td>
</tr>
<tr>
<td>- Interpersonal Relationships</td>
</tr>
<tr>
<td>- Living Skills</td>
</tr>
</tbody>
</table>

The CANS also showed a good spread across all categories, as shown in Figure 1. In this series, 28% did not have support needs, 46% had needs on less than a daily basis, and the remaining 25% had support needs on a daily basis.
There is also evidence of construct validity. Tate (2004) found that the CANS was able to distinguish among subgroups in terms of functional independence in (i) mobility and basic activities of daily living (ADL) and (ii) domains of the original categorical version of the SPRS (Tate et al., 1989). Levels of mobility and basic ADL were classified as Independent, Assistance (supervision, aids, or standby) and Dependent. Comparisons were made between (1) Independent versus Assistance and (2) Assistance versus Dependent. Levels of the SPRS comprised Good, Limited and Poor for each of the domains of Occupational Activities, Interpersonal Relationships and Living Skills, as well as the Total Score.

Comparisons were made between (1) Good versus Limited and (2) Limited versus Poor. As shown in Table 3, results of Kruskal-Wallis analyses were significant at $p<0.001$ level, for both functional independence and SPRS. Post-hoc Mann-Whitney U tests showed significant differences for both comparisons on functional independence. For the SPRS, all comparisons were significant except that for Occupational Activity between Limited versus Poor.
Table 3: Descriptive data for CANS subgroups for functional independence in mobility/ADL and SPRS, along with results of Kruskal-Wallis one-way analyses of variance and post-hoc Mann-Whitney U tests

<table>
<thead>
<tr>
<th>Functional independence</th>
<th>Median (range)</th>
<th>Median (range)</th>
<th>Median (range)</th>
<th>Kruskal-Wallis ($\chi^2$)</th>
<th>$p$</th>
<th>Mann-Whitney U ($z$)</th>
<th>$p$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total score</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1v2: -2.4</td>
<td>0.019</td>
</tr>
<tr>
<td></td>
<td>Independent (1)</td>
<td>Assistance (2)</td>
<td>Dependent (3)</td>
<td></td>
<td></td>
<td>2v3: -2.3</td>
<td>0.018</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Categorical version of Sydney Psychosocial Reintegration Scale</th>
<th>Median (range)</th>
<th>Median (range)</th>
<th>Median (range)</th>
<th>Kruskal-Wallis ($\chi^2$)</th>
<th>$p$</th>
<th>Mann-Whitney U ($z$)</th>
<th>$p$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Good (1)</td>
<td>0.0 (0-1)</td>
<td>1.0 (0-5)</td>
<td>4.0 (2-7)</td>
<td>44.6</td>
<td>0.000</td>
<td>1v2: -4.7</td>
<td>0.000</td>
</tr>
<tr>
<td>Limited (2)</td>
<td>2.0 (0-5)</td>
<td>2.0 (0-7)</td>
<td>5.0 (3-7)</td>
<td>31.6</td>
<td>0.000</td>
<td>2v3: -4.9</td>
<td>0.000</td>
</tr>
<tr>
<td>Poor (3)</td>
<td>5.0 (3-7)</td>
<td>5.0 (4-7)</td>
<td>5.0 (4-7)</td>
<td>51.3</td>
<td>0.000</td>
<td>1v2: -6.0</td>
<td>0.000</td>
</tr>
</tbody>
</table>

Soo et al. (2010) further examined the validity of the CANS in three samples (one inpatient; two community) from two brain injury rehabilitation units. Validating instruments included the SRS, Functional Independence Measure (FIM; Keith et al., 1987), SPRS and Disability Rating Scale (DRS; Rappaport et al., 1982). Convergent and divergent validity was examined with the Mini-Mental State Examination (MMSE; Folstein, et al., 1975), Shipley Institute of Living Scale (SILS; Zachary, 1996), and NEO Five Factor Inventory (NEO-FFI; Costa & McRae, 1992).

Results from these studies are summarised below:

- no significant ceiling (12%) or floor (0%) effects were found in the combined community samples (n=68)

- criterion (concurrent) validity in the combined community samples (n=68) was established with all instruments:
  - SRS: $rs=0.68$
  - FIM Total $rs=-0.59$ (Motor $rs=-0.55$; Cognitive $rs=-0.54$)
  - SPRS Total $rs=-0.54$ (Occupational $rs=-0.54$; Relationships $rs=-0.43$; Living Skills $rs=-0.58$)
  - DRS $rs=0.64$

- criterion (predictive) validity, examined in the inpatient sample (n=40), was also established between CANS ratings taken at rehabilitation discharge and validating measures taken at 6 months post-discharge follow-up:
  - SRS: $rs=0.43$
  - FIM Total $rs=-0.41$ (Motor $rs=-0.38$; Cognitive $rs=-0.40$)
  - SPRS Total $rs=-0.47$: (Occupational $rs=-0.47$; Relationships $rs=-0.42$; Living Skills $rs=-0.47$)
  - DRS: $rs=0.42$
  - Rehabilitation discharge CANS vs 6 months follow-up CANS: $rs=0.49$

- construct (discriminant) validity in the combined community samples was examined with respect to injury severity (duration of post-traumatic amnesia, PTA; < vs >1 month) and median splits on the FIM (at score 117) and DRS (at score 3). Statistically significant group differences were found on all variables (all $p<0.01$):
  - PTA: $z=-2.56$
  - FIM: $z=-3.73$
  - DRS: $z=-4.74$
• construct (convergent/divergent) validity was examined in one of the community samples (n=38). As hypothesised:
  • there were higher correlation coefficients with similar constructs: MMSE Total: rs=-0.38, Orientation: rs=-0.46
  • and lower correlation coefficients with dissimilar constructs: SILS: rs=-0.26, NEO range from Agreeableness: rs=0.07 to Extraversion: rs=0.16

• responsiveness was examined in the inpatient sample (n=40). There were significant differences (z=-4.56, p<0.01) between CANS Level at rehabilitation discharge (M=4.10, SD=1.69) and 6 months follow-up (M=2.45, SD=1.78), with a large effect size (d=0.95).
References


<table>
<thead>
<tr>
<th>Date:</th>
<th>Name:</th>
<th>Age:</th>
<th>MRN:</th>
<th>Assessed by:</th>
</tr>
</thead>
</table>

**Instructions: Tick any of the care and support needs that apply (section 1), then circle the number in level that corresponds to length of time that can be left alone (section 2)**

### Section 1: Type of care and support needed

<table>
<thead>
<tr>
<th>Group A: CANS Levels 7, 6, 5 or 4: Requires nursing care, surveillance for severe behavioral/cognitive disabilities and/or assistance with or supervision for very basic ADLs:</th>
</tr>
</thead>
<tbody>
<tr>
<td>✓ tracheostomy management</td>
</tr>
<tr>
<td>✓ nasogastric/PEG feeding</td>
</tr>
<tr>
<td>✓ bed mobility (e.g., turning)</td>
</tr>
<tr>
<td>✓ wanders/gets lost</td>
</tr>
<tr>
<td>✓ exhibits behaviors that have the potential to cause harm to self or others</td>
</tr>
<tr>
<td>✓ has difficulty in communicating basic needs due to language impairments</td>
</tr>
<tr>
<td>✓ continence</td>
</tr>
<tr>
<td>✓ feeding</td>
</tr>
<tr>
<td>✓ transfers/mobility (including stairs and indoor surfaces)</td>
</tr>
<tr>
<td>✓ other: ______________________________________________________</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Group B: CANS Level 4: Requires assistance, supervision, direction and/or cueing for basic ADLs:</th>
</tr>
</thead>
<tbody>
<tr>
<td>✓ personal hygiene/toileting</td>
</tr>
<tr>
<td>✓ bathing/dressing</td>
</tr>
<tr>
<td>✓ simple food preparation</td>
</tr>
<tr>
<td>✓ other: ______________________________________________________</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Group C: CANS Levels 4, 3, 2 or 1: Requires assistance, supervision, direction and/or cueing for instrumental ADLs and/or social participation:</th>
</tr>
</thead>
<tbody>
<tr>
<td>✓ shopping</td>
</tr>
<tr>
<td>✓ domestic</td>
</tr>
<tr>
<td>✓ medication use</td>
</tr>
<tr>
<td>✓ money management</td>
</tr>
<tr>
<td>✓ everyday devices (e.g., telephone, television)</td>
</tr>
<tr>
<td>✓ transport and outdoor surfaces</td>
</tr>
<tr>
<td>✓ parenting skills</td>
</tr>
<tr>
<td>✓ interpersonal relationships</td>
</tr>
<tr>
<td>✓ leisure and recreation/play</td>
</tr>
<tr>
<td>✓ employment/school</td>
</tr>
<tr>
<td>✓ other: ______________________________________________________</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Group D: CANS Levels 3, 2 or 1: Requires supports:</th>
</tr>
</thead>
<tbody>
<tr>
<td>✓ informational supports (e.g., advice)</td>
</tr>
<tr>
<td>✓ emotional supports</td>
</tr>
<tr>
<td>✓ other: ______________________________________________________</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Group E: CANS Level 0: Fully independent:</th>
</tr>
</thead>
<tbody>
<tr>
<td>✓ Lives fully independently, with or without physical or other aids (e.g., hand rails, diary notebooks), allowing for the usual kinds of informational and emotional supports the average person uses in everyday living</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Section 2: Length of time that can be left alone</th>
</tr>
</thead>
<tbody>
<tr>
<td>7 Cannot be left alone</td>
</tr>
<tr>
<td>6 Can be left alone for a few hours</td>
</tr>
<tr>
<td>5 Can be left alone for part of the day, but not overnight</td>
</tr>
<tr>
<td>4 Can be left alone for part of the day and overnight</td>
</tr>
<tr>
<td>4 Can be left alone for the day and overnight</td>
</tr>
<tr>
<td>3 Can be left alone for almost all week</td>
</tr>
<tr>
<td>2 Can be left alone for almost all week</td>
</tr>
<tr>
<td>1 Can live alone, but needs intermittent (i.e., less than weekly) contact for occupational activities, interpersonal relationships, living skills or emotional support</td>
</tr>
<tr>
<td>3 Can be left alone for a few days a week</td>
</tr>
<tr>
<td>2 Can be left alone for a few days a week</td>
</tr>
<tr>
<td>1 Can live alone, but needs intermittent (i.e., less than weekly) contact for occupational activities, interpersonal relationships, living skills or emotional support</td>
</tr>
<tr>
<td>0 Can live in the community, totally independently</td>
</tr>
</tbody>
</table>

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Manual for the Care and Needs Scale | Revised version 1 – June 2011 | Appendix: Care And Needs Scale