

**Measuring care dependency with the
Care Dependency Scale
(CDS)**

A manual

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Eurecare

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Manual Care Dependency Scale

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Introduction

This manual gathers together research findings about the Care Dependency Scale (CDS), which are important when using the scale in community care and in clinical settings like hospitals as well as in residences for the learning disabled, nursing homes, and residential homes.

The initial driver behind this research was the lack of an instrument, especially in Dutch nursing homes, to measure patients' needs and care dependency, so in 1994 a research project was undertaken to create an assessment scale to determine care dependency. The main aim was to develop an easy and short assessment tool that could give a reliable and validated judgement about the patients' needs and dependency status.

In 1997 an international widening of the Dutch research project took place. In the same year the European research group in healthcare (EURECARE) was established to foster international co-operation around the Care Dependency Scale development. The main aim was to form an international and interdisciplinary network with colleagues from across Europe for continuing professional development in healthcare, and to further the care for short and long term conditions in individual countries as well as the wider community. From 2005 not only European researchers, but also researchers from non-European countries have become involved in the further development and utilisation of the CDS.

The purpose of publishing this manual is fourfold. Firstly, the manual provides information about the concept and description of care dependency. Secondly, the basic psychometric properties of the instrument will be mentioned. Thirdly, in this manual instructions are given on how the questionnaire should be scored and used in both research and practice. Fourthly, the manual will enable future users who wish to use a different instrument, or who decide to develop a new one, to make a well-considered choice.

As the CDS is being used in new studies, additional information will continuously be generated, e.g. concerning reliability and validity. Furthermore, an instrument may need to be adapted to new insights. The users of the CDS will be kept informed of any new developments regarding the CDS. Whenever important supplementary information emerges, a revised edition of this manual will be published.

Finally, users should take notice of the following. The rules should be observed when using the CDS presented not only in this manual, but all available versions. We request you to carefully read the 'Permission for use of the CDS' on page 22.

Leeuwarden, autumn 2006

Ate Dijkstra

1 The concept of care dependency

1.1 Concept analysis

What does care dependency mean? To answer this question the multistep procedure of Waltz, Strickland and Lenz (1991) has been used in analysing the concept of care dependency for use in acute and chronic health care. Concept analysis is a process used to determine similarities and differences between concepts, and to create a tentative operational definition.

1.2 Care dependency

Dependency is a much used term in pedagogy, social psychology, psychiatry, medical science and nursing. When it concerns patients with diseases and/or disabilities ‘dependency always includes a negative evaluation of a situation or set of characteristics of an individual and/or people in the person’s environment’ (Van den Heuvel, 1976).

Dependency can be placed within the frame of common human relationship; care dependency is placed within the frame of professional and formal care assistance. Here *care* is the key term related to the health professional as well as attributable to the patient, whereas *dependency* is the patient-related key term. Based on the review of dictionaries and relevant professional literature, care dependency has been described as: ‘The professional support to a patient whose self-care abilities have decreased and whose care demands make him/her to a certain degree dependent. The aim of the support is to restore the patient’s independency in performing self-care (Dijkstra et al., 1998a)’.

1.3 Concept operationalisation

After describing what care dependency is, concept operationalisation has been used to delineate what the concept of care dependency means and how it can be measured. Therefore first a framework must be determined which is useful in specifying the variable properties of the concept of care dependency. For the following reasons, Virginia Henderson’s framework has been chosen as starting-point to specify the variable aspects of the concept of care dependency (Henderson, 1966; 1978; 1985).

Henderson believes that health is basic to all human functioning and equates with independence on a continuum that has illness equated with dependency. From this point of view, the desired outcome of care is the patient’s independency. Henderson describes 14 human needs, which help professional carers move the patient from a state of dependence to a state of independence (Fitzpatrick & Whall, 1989).

Henderson speaks about fundamental human needs, which appear in every patient-carer relationship, independent of the patient’s age and/or type of care setting.

Her ideas are frequently applied in practice and in the curriculum of nursing students.

According to Challis, Carpenter and Traske (1996), it is widely agreed that the best way to address the patient’s care needs is by thorough and systematic assessment. As care dependency can be seen as variable in intensity, it was decided to develop an assessment scale and to measure each of the 15 dimensions of care dependency on a five-point Likert-scale, ranging from 1 (completely care dependent) to 5 (almost independent) (Dijkstra et al., 1998a).

2 Description of Care Dependency Scale (CDS)

2.1 Content of the CDS

Content of the CDS

The items comprising the CDS are given in Figure 1.

Figure 1 The 15 items of the CDS

A	Eating and drinking	I	Avoidance of danger
B	Continence	J	Communications
C	Body posture	K	Contact with others
D	Mobility	L	Sense of rules and values
E	Day/night pattern	M	Daily activities
F	Getting dressed and undressed	N	Recreational activities
G	Body temperature	O	Learning activities
H	Hygiene		

Scale categories

All categories are marked using a 5-point Likert-type scale. Responses range from being ‘1 = completely dependent’ to ‘5 = almost independent’. Persons who fill in the CDS assess all 15 items by selecting one point from the five-point scale. On the measurement form an example is given to demonstrate how to complete the scale. The items, item-descriptions and answer categories (five-point Likert-scale) of the English versions of the CDS are included in the Appendix B and C. To use the CDS please refer to Dijkstra (1998) (see References) and/or this manual.

2.2 Use in clinical practice

Experienced care dependency

In quality of life questionnaires the experience of impairments, dysfunction or social handicaps can be formulated either in the actual mode (e.g. is the patient incontinent) or from the experienced burden perspective (e.g. to what extent is the patient able to control the discharge of urine and faeces voluntarily). In the CDS the level of care dependency is formulated from the experienced burden perspective. The person who fills in the CDS is asked to what extent the patient is able to perform activities.

Populations

The CDS can be used in different health care settings (community care, home care and institutional care), populations (e.g. patients admitted on different wards in a hospital, nursing homes, residences for the learning disabled), and age groups¹.

¹ At present a modification of the scale for use on children is being developed. Until these results are presented, the care dependency of children should be judged in relation to the normal dependency of the respective stage of development.

Use in the caring process

The CDS is intended to be used in the first stage of the caring or nursing process as a case-finding and needs assessment tool. The scale gives no direct answers, but indicates directions so that nurses and other health carers can focus on care needs amenable to nursing or caring diagnoses. The CDS is a scale derived from observed behaviour, so the accuracy of the assessment depends on the degree to which the health carer is familiar with the daily functioning, care demands and needs of the patient. Therefore, practising nurses or health carers are in the best position to assess patients, especially in situations where the latter are unable to communicate or have limited communication capabilities.

The CDS is an aid to assessing patient's needs and the degree of professional assistance required to meet these needs. This knowledge may enable health carers to develop a draft care plan, which they may discuss in a multidisciplinary consultation. The aim of this consultation would be to determine joint diagnoses, objectives and interventions that specify the input of different professionals to patient care. Repeated assessments with the CDS provide data for monitoring change in patient status and, potentially, assessing the success of interventions in decreasing patient's dependency.

2.3 Scoring and analysis

Time frame

In general, the time frame for both self-report and assessment by proxy covers 'the last week'. This time span can easily be remembered in case of self-report. Regarding assessment by proxy the time frame depends on the period that the respondent is able to determine the patient's care dependency. The decision to opt for a longer period or repeated assessment can be based on the wish to assess more fully the abilities of the patient.

'Self-report' and 'Proxy'

There are two versions of the CDS: a self-report and a proxy measurement. Both assess the degree to which a person is care dependent on another person (informal or professional carer). Preferably, the first time a patient completes the CDS they should be assisted so as to ensure that they understand the questions. This might be done by the (research) nurse or another health carer. If so, it is still essential that the patient fills in the CDS him/herself whenever possible.

Sometimes patients asked for advice, for example from partners, when answering the questions posed. This must be avoided as much as possible. It is advisable to give clear instructions in the introduction of the assessment to prevent this from happening.

Some patients are unable to complete the CDS. This may be the result of 'forgetting spectacles', inability to read, cognitive impairment or a severe disease state. Where the patients cannot read, the questions have to be read by another person and the patient can still give the answer. In cases where the patient is unable to answer questions at all, then the questions may be asked of others, 'proxies'. In this case, the proxy version of the CDS will be given to the respondent.

It is important to note that the answers of these proxies are likely to be different from the ones patients would have given. Therefore, when using the scale for research - if at all possible - it is advisable to ask the patient as well as the proxy to complete independent assessments so that the original discrepancy can serve as a starting-point for understanding bias in later measurements.

Time needed

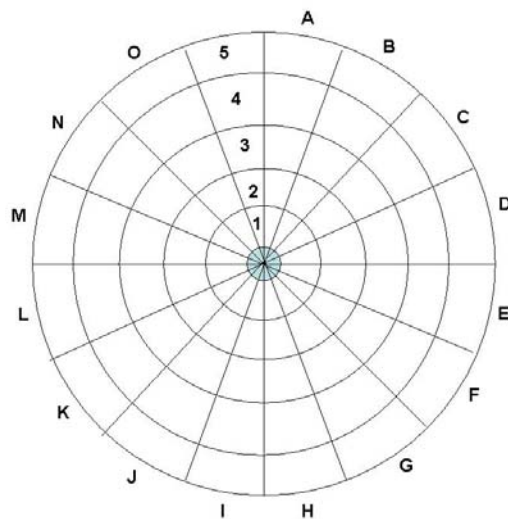
The CDS is easy to use and quick to complete, normally taking less than 5 minutes. Patients take, on average, 15 minutes to complete the CDS.

Instruction

For completion of the CDS the following guidelines must be observed:

1. In case of use by professional health carers, the CDS should be filled in by the nurse or other health carer who is most familiar with the daily care of the patient
2. The scale consists of 15 items, each of which has 5 item-criteria relating to the aspect of dependency being rated.
3. For each item an assessment should be made of the patient’s level of dependency and the item-criterion that best describes the patient’s should be circled. Only one of the 5 item-criteria should be selected.

Figure 2 CDS scoring chart



- A = Eating and drinking ...
- B = Continence ...
- C = Body posture ...
- D = Mobility ...
- E = Day/night pattern ...
- F = Getting dressed and undressed ...
- G = Body temperature ...
- H = Hygiene ...
- I = Avoidance of danger ...
- J = Communications ...
- K = Contact with others ...
- L = Sense of rules and values ...
- M = Daily activities ...
- N = Recreational activities ...
- O = Learning ability ...

- 1 = Completely care dependent
(Missing all initiative to act, therefore care and assistance is always necessary)
- 2 = To a great extent care dependent
(Many restrictions to act independently, therefore, to a great extent dependent on care and assistance)
- 3 = Partially care dependent
(There are restrictions to act independently, therefore, partially dependent on care and assistance)
- 4 = To a limited extent care dependent
(Few restrictions to act independently, therefore, only to a limited extent dependent on care and assistance)
- 5 = Almost independent
(Almost everything can be done without assistance)

CDS sum score: ...

Each of the 15 Care Dependency Scale items should be assessed. Please complete every item. Should any doubt arise in choosing between 2 criteria, an estimate should be made. For example, when the patient can perform an activity only with the assistance of a certain aid (for example in case of mobility a self-propelled or electric wheelchair), the item criteria should be selected indicating that the patient can perform this activity.

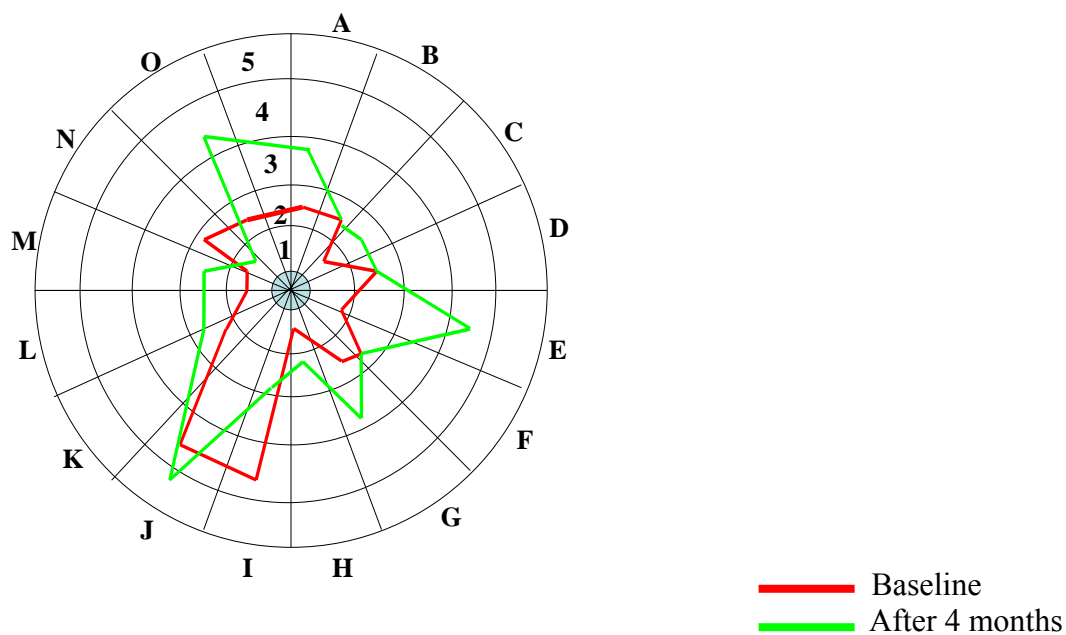
Scoring of items

The CDS sum score can be computed by adding the outcome of each of the 15 items of care dependency. Low sum scores on the CDS indicate that the patient is dependent on care from others. On the other hand, a high sum score means that the patient is almost independent of care. By using the CDS scoring chart (see Figure 2) the CDS score on each separate item can be seen.

Practical application of the CDS

In practice, the CDS is intended to be used in the first stage of the nursing process as a case-finding and needs assessment tool. The CDS is an aid to assessing patients' need and the degree of professional assistance required meeting these needs. This knowledge may enable carers to develop a draft care plan, which they may discuss in a multidisciplinary consultation. The aim of this consultation would be to determine joint diagnoses, objectives and interventions that specify the input of different professionals to patient care. Repeated assessments with the CDS provide data for monitoring change in patient status and, potentially, assessing the success of interventions in decreasing patient dependency (See as example Figure 3). In addition, the CDS sum score is useful to generate management information on a population level.

Figure 3 CDS scoring chart of a stroke patient of which the CDS data was collected in the first week after admission in the hospital and four months after the stroke



Case detection

The CDS has been validated in establishing care dependency and a cut off score for care dependency must be chosen to indicate the presence or absence of ‘needs’. As can be expected, different papers will report different cut off scores based on the sample size, setting and dependency status as well as the diagnostic criteria used. Most recently hospital patients with various care needs with a CDS sum score ≤ 68 (rule-out cut-off point) were classified as care dependent, all others as independent. The prevalence in the sample study was very high (84%). The area under the receiver operating characteristics curve for the Care Dependency Scale was 0.81, which indicates moderate diagnostic accuracy. The determination of the appropriate cut-off point was based on sensitivity (0.85) and positive predictive valued (0.90) (Dijkstra et al., 2005).

2.4. Research use*Research application of the CDS*

The CDS can also be used in scientific research to measure care dependency.

If necessary, a summary item can be added to the scale (item 16) where an assessment should be made of the patient’s overall level of dependency. With this item a subjective judgement has been made of the degree of the patient’s care dependency. The score on this item can be considered as ‘gold standard’ or ‘defining indicator’ of the degree of care dependency on all 15 items. This item has the following structure (see Figure 4).

Missing values

As scales are constructed in such a way that items belonging to a scale have a high inter-correlation, it is possible to substitute values for missing data. An accepted way of handling missing values in the CDS is the insertion of the personal scale mean of the respondent on a missing value. This procedure can be followed when the respondent has filled in at least 50% of the items. In other words, because the CDS has an uneven number of items, half of the numbers plus one should have been filled in. If the respondent has completed fewer items, s/he is considered a missing case for that particular scale.

Alternative options regarding the handling for missing data have been suggested in literature (e.g. Zwinderman, 1992; Hopwood et al., 1994). Therefore, it is important that researchers state clearly what they have done when presenting results.

Figure 4 CDS summary sheet (item 16)

P	Summary sheet
	Finally, indicate which definition of care dependency applies to the patient
①	Patient is completely dependent on care from others
②	Patient is to a great extent dependent on care from others
③	Patient is partially dependent on care from others
④	Patient is only to a limited extent dependent on care from others
⑤	Patient is almost independent on care from others

3 Study population, descriptive data

3.1. Research projects in which the CDS is used

The data in this manual has been collected from the research projects outlined in Figure 5. Because data from research project A in the Netherlands were gathered from patients with DSM-IV Classification ‘Delirium, Dementia, and Amnesic and Other Cognitive Disorders’ (American Psychiatric Association, 1994), the same selection criteria was used for inclusion in the Canadian, Italian, and Norwegian sub-samples. The rationale for the difference in the composition of the Finnish, Spanish and UK samples arises from the country-specific structures of the health care systems regarding the institutional care of older patients and those with dementia. As far as available, sample characteristics are given in Table 1.

Figure 5 Brief description of the research projects where the CDS data is used in this manual

- | | |
|---|--|
| a | Dijkstra, Buist, Brown, Haven, Romoren, Zanotti, Dassen, Heuvel van den (2000). International research regarding psychometric testing of the Care Dependency Scale with data gathered in: <ol style="list-style-type: none"> 1. Canada: 116 nursing home patients; 2. Italy: 80 non-institutionalized patients with dementia; 3. The Netherlands: 211 nursing home patients from one study (Dijkstra, Sipsma & Dassen, 1998b) and 153 nursing home patients from another study (Dijkstra, Buist & Dassen, 1996); 4. Norway: 176 nursing home patients. |
| b | Dijkstra, Coleman, Tomas, Välimäki, Dassen (2003). International research regarding psychometric testing of the Care Dependency Scale with data gathered in: <ol style="list-style-type: none"> 1. Finland: 136 non-institutionalized older patients; 2. Spain: 109 hospital inpatients with dementia; 3. United Kingdom: 136 older hospital inpatients. |
| c | Lohrmann (2003). Research regarding psychometric testing of the Care Dependency Scale with data gathered in: <ol style="list-style-type: none"> 1. Germany: 359 nursing home patients |
-

3.2. Translation procedures

The translation of the original Dutch CDS version into the country-specific versions sought equal familiarity and spelling in both source and target languages and included items common to both cultures (Chapman & Carter, 1979). The most common and highly recommended procedure for verifying the translation of an instrument is back translation (Jones, 1987). The Language Centre of the University of Groningen did the initial forward translation and back translation from the original Dutch CDS version into the English version. The Dutch authors together with a visiting professor from the United States discussed the clarity of each item of the first English-USA version. Some item descriptions and criteria were modified to reach a greater degree of familiarity in both languages. Together with researchers from the

UK the clarity of each item had been discussed. The English-UK version was also presented to a group of nurses in the UK to assess the clarity and appropriateness for clinical settings. Some item descriptions and criteria were subsequently modified to obtain a greater degree of clarity. The translation process of the Finnish version started with a translation from English to Finnish and back from Finnish to English. Following backward translation, a native English-speaking person compared the original and backward translated English version of the instrument, making changes to the item descriptions and criteria. An expert in Finnish language checked the grammar and structure of the instrument. Finally, a group of Finnish nurses evaluated that the content of the items were relevant to the Finnish health care system. The German version is directly translated from the Dutch into German. In Italy, two project assistants translated the English-USA version of the CDS straightforward into an Italian version. The definitive Italian version was determined after comparing both versions. For use in Norway, the local project leader translated the CDS directly from the English-USA version, without back translation. The Language Centre of the University of Groningen also performed the initial forward and backward translation for the Spanish version. Dutch and Spanish researchers discussed the clarity of each item.

3.3. Mean and standard deviation of the CDS

In each country the summary item (item 16) was added to the scale.² With this item an assessment has been made of the patient's overall level of dependency by asking the respondent to give a subjective judgement of the degree of the patient's care dependency based on the score of the 15 foregoing items.

Table 2 gives an overview of the CDS item score on each of the five care-dependency categories. The strong difference in the distribution of the Italian data is notable in comparison with the rest of the countries. This difference can also be found in the mean score on this item 16. Pearson correlation coefficient shows between the five care-dependency categories and the CDS score on item 16 a significant and strong relationship. However, for the Italian data this relation is less strong. Research in each country showed that as the care dependency decreases, the mean item score increases. According to one-way analysis of variance ($\alpha=0.05$), the mean CDS score on item 16 differs - both for each separate country and combined -with the exception of Italy.

² In Canada data of item 16 was only available from a limited number of patients.

Manual Care Dependency Scale**Eurecare****Table 1 Sample characteristics**

Country	Canada	Finland	Germany	Italy	Netherlands	Norway	Spain	UK	Total
Males %	37.1	33.8	35.9	38.8	22.3	25.6	45.9	31.6	32.8
Age:									
Mean (SD)	81.4(8.9)	82.0(7.0)	64.2(29.0)	81.4(8.6)	82.2(7.2)	84.6(6.9)	80.7(8.7)	79.7(8.3)	77.1(18.3)
Range	46-96	67-99	1-102	43-98	50-97	60-105	35-66	45-100	1-105
Mean CDS sumscore (and SD):									
Males	28.5(12.5)	39.5(15.1)	53.5(19.7)	29.7(12.9)	40.1(15.8)	31.5(11.7)	49.3(15.9)	31.3(9.3)	41.4(18.5)
Female	36.4(13.8)	42.2(18.7)	43.8(19.3)	30.2(13.3)	37.5(18.1)	33.5(14.2)	40.4(17.5)	26.6(11.6)	37.5(17.6)
Total	33.5(13.8)	41.3(17.6)	47.3(20.0)	30.0(13.1)	38.1(17.6)	33.0(13.6)	44.5(17.3)	28.1(11.1)	38.8(18.0)
(N)	(116)	(133)	(359)	(80)	(211)	(176)	(109)	(136)	(1320)

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Table 2 The degree of care dependency on CDS-item 16, mean item score (and SD)

Country	Canada	Finland	Germany	Italy	Netherlands	Norway	Spain	UK	Total
CDS item 16:									
1. completely dependent	19.1(4.4) (N=14)	30.0(11.4) (N=73)	26.2(9.7) (N=126)	22.6(7.1) (N=18)	20.7(6.7) (N=71)	25.5(7.9) (N=109)	19.1(3.9) (N=22)	22.9(6.6) (N=96)	24.6(8.9) (N=529)
2. to a great extent dependent	39.0(11.9) (N=9)	43.0(8.6) (N=21)	41.9(10.1) (N=61)	29.1(9.1) (N=14)	32.6(8.1) (N=54)	38.8(10.1) (N=42)	35.5(8.2) (N=19)	36.5(6.5) (N=30)	37.5(9.9) (N=250)
3. partially dependent	50.5(8.5) (N=4)	52.2(9.0) (N=13)	58.6(9.7) (N=66)	29.3(14.1) (N=10)	49.2(7.5) (N=49)	51.3(5.9) (N=14)	47.5(7.9) (N=33)	49.4(4.2) (N=7)	51.4(10.9) (N=196)
4. to a limited extent dependent	48.0(14.1) (N=2)	66.3(5.1) (N=20)	66.9(5.2) (N=66)	32.8(15.1) (N=16)	62.3(4.8) (N=25)	60.8(6.4) (N=10)	60.3(6.0) (N=23)	59.0(5.7) (N=2)	61.2(12.0) (N=164)
5. almost independent	- -	68.0(8.0) (N=6)	70.8(8.0) (N=40)	34.8(15.1) (N=22)	69.2(2.3) (N=12)	63.0(0.0) (N=1)	66.8(3.5) (N=12)	63.0(0.0) (N=1)	61.3(17.8) (N=94)
Mean(SD)	1.8(0.9)	2.0(1.3)	2.5(1.4)	3.1(1.5)	2.3(1.2)	1.6(0.9)	2.9(1.3)	1.4(0.7)	2.2(1.3)
Pearson correlation (p=0.01, 2-tailed)	0.79	0.82	0.87	0.34	0.92	0.80	0.92	0.81	0.79
One-way anova ($\alpha=0.05$)	<0.001	<0.001	<0.001	n.s.	<0.001	<0.001	<0.001	<0.001	<0.001
(N)	(29)	(133)	(359)	(80)	(211)	(176)	(109)	(136)	(1233)

4 Reliability

4.1 Internal consistency

Cronbach's alpha, a widely used reliability index, was calculated at scale level for each of the country-related data sets as well as for the whole sample (Table 3). In terms of internal consistency high Cronbach's alpha were found, indicating an excellent level of reliability. This means that the reliability of the CDS is good enough for assessment purposes, both at group and individual level, in each country (Polit et al., 2004). The mean high inter-item correlations possibly point to a homogeneous population.

Table 3 Internal consistency (Cronbach's alpha) and inter-item correlation

Country	Canada	Finland	Germany	Italy	Netherlands	Norway	Spain	UK	Total
Cronbach's alpha	0.95	0.96	0.97	0.95	0.97	0.95	0.97	0.94	0.97
Inter-item correlation	0.54	0.62	0.71	0.54	0.71	0.57	0.65	0.50	0.66
(N)	(116)	(133)	(359)	(80)	(211)	(176)	(109)	(136)	(1320)

4.2 Inter-rater reliability and test-retest reliability

As the CDS is an instrument for application on an individual level in clinical practice the reliability has been investigated. Cohen's Kappa was used to calculate the inter-rater reliability (two raters independently administered the CDS for the same patient and at the same time) and the test-retest reliability (one of the raters filled in the CDS for the same patient at two points in time with a two weeks time interval) (Cohen, 1960). The verbal descriptions for different ranges of Kappa statistics, as described by Landis and Koch (1977) are slight (<0.20), fair (0.21-0.40), moderate (0.41-0.60), substantial (0.61-0.80), and almost perfect (>0.80).

For this analysis Finnish data were not available and only a limited amount of Canadian data was available. The lower *N* on the test-retest reliability can be explained because the only data used was where the health of the patient did not change dramatically in the period between the first and second measurement. As Table 4 depicts, most of the items revealed moderate to substantial reliability.

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Table 4 Interrater reliability (IRR) and test-retest reliability (TRR)

Country	Canada		Germany		Italy		The Netherlands		Norway		Spain		UK		Total	
	IRR	TRR	IRR	TRR	IRR	TRR	IRR	TRR	IRR	TRR	IRR	TRR	IRR	TRR	IRR	TRR
CDS-items																
Eating/drinking	.58	.65	.63	.49	.75	.70	.59	.66	.50	.66	.89	.97	.51	.45	.64	.66
Continenence	.51	.74	.71	.84	.82	.67	.56	.65	.64	.69	.91	.96	.50	.62	.71	.76
Body posture	.40	.66	.52	.59	.75	.74	.48	.61	.46	.62	.82	.90	.36	.52	.54	.67
Mobility	.63	.69	.66	.72	.83	.78	.58	.62	.56	.70	.85	.87	.53	.77	.66	.76
Day/night pattern	.27	.50	.50	.58	.76	.66	.39	.56	.35	.50	.78	.95	.31	.50	.51	.61
Getting (un)dressed	.80	.69	.67	.69	.71	.49	.52	.72	.54	.65	.88	.93	.56	.76	.70	.72
Body temperature	.49	.60	.52	.51	.74	.72	.54	.60	.39	.55	.78	.93	.36	.56	.55	.65
Hygiene	.44	.70	.64	.59	.70	.76	.59	.61	.49	.64	.79	.94	.43	.74	.64	.75
Avoidance of danger	.37	.60	.59	.66	.73	.65	.51	.61	.43	.56	.87	.96	.47	.53	.60	.67
Communication	.42	.60	.56	.65	.74	.63	.42	.55	.45	.47	.70	.88	.38	.48	.56	.61
Contact with others	.45	.57	.51	.64	.63	.67	.47	.55	.38	.53	.79	.90	.39	.46	.54	.63
Sense of rules/values	.34	.60	.57	.72	.64	.69	.48	.70	.42	.61	.91	.98	.36	.61	.59	.71
Daily activities	.35	.59	.61	.61	.64	.75	.50	.61	.46	.65	.88	.96	.45	.71	.63	.74
Recreational activities	.33	.68	.66	.73	.78	.71	.42	.47	.33	.42	.86	.94	.32	.47	.67	.71
Learning ability	.71	.64	.63	.66	.59	.61	.39	.58	.53	.66	.81	.96	.41	.64	.65	.72
(N)	(55)	(116)	(358)	(93)	(80)	(80)	(153)	(153)	(176)	(176)	(109)	(106)	(136)	(116)	(914)	(687)

5 Validity

5.1. Content validity

Content validity constitutes an essential part of the development of an assessment scale. The content validity of the CDS was established by 44 experts in a Delphi survey with the aim to reach consensus on significant indicators of care dependency (Dijkstra et al., 1996). Based on the judgements of the panellists, Henderson's 14 human needs appeared to be useful for measuring care dependency and this supplied a basis for the ultimate model of the assessment scale to determine the patient's state of care dependency. In general, the panellist's comments are consistent with the literature on Henderson's original list of human needs. Panellists concluded that the CDS item list and item descriptions are clear, comprehensible and representative regarding the patient's care dependency. Based on the panellist's suggestions one item 'breathing normal' was withdrawn, while another item 'move and maintain desirable posture' was split, and a new item 'communication' was added to the list. Further, some textual alterations were done with regard to the item description and item criteria.

5.2. Construct validity

Factor analysis procedure was used to identify cultural similarities between the countries regarding the underlying concept of the CDS: care dependency. Factor analysis is essentially a method for identifying clusters of related variables (Polit et al., 2004). In extracting factors, principal component analysis was used to identify the number of factors to which the 15 care dependency items can sensibly be reduced.

Factor analysis resulted in a one-factor solution both for each country and for all data sets combined. The analysis did indicate the possibility of a second factor consisting of the item: 'mobility'. However, according to the principle of discontinuity (Polit et al., 2004), the sharp drop in the percentage of explained variance between the first and second factors in the (sub)samples, indicates that an appropriate termination point has been specified making it advisable to extract only the first factor. The high factor loadings for the individual countries prove that all items were affected by the same underlying care dependency concept. It can be concluded that the psychometric properties regarding construct validity were acceptable and showed strong similarities across the countries.

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Table 5 Factor loadings, eigenvalue, and % variance of the CDS

Country	Canada		Finland		Germany		Italy		Nether-lands		Norway		Spain		UK		Total	
	F1	F2	F1	F2	F1	F2	F1	F2	F1	F2	F1	F2	F1	F2	F1	F2	F1	F2
CDS-items:																		
Eating/drinking	.68	.18	.79	-.05	.82	.14	.81	.15	.84	.00	.64	-.04	.84	.31	.59	.33	.79	.09
Continenence	.76	.36	.84	-.21	.87	.04	.78	.28	.83	.00	.80	-.31	.83	.08	.74	.16	.84	.17
Body posture	.73	.48	.80	-.36	.79	.44	.74	.53	.80	.00	.80	-.40	.82	.33	.62	.62	.77	.45
Mobility	.58	.69	.73	-.54	.68	.64	.63	.66	.78	.00	.71	-.49	.77	.44	.58	.69	.64	.66
Day/night pattern	.61	-.20	.77	.18	.85	-.14	.70	.06	.79	.00	.76	.04	.63	.43	.68	-.08	.78	-.05
Getting (un)dressed	.83	.17	.88	-.31	.89	.23	.78	.31	.92	.00	.86	-.18	.88	.10	.83	.10	.89	.18
Body temperature	.85	.02	.90	-.07	.89	-.08	.78	-.22	.93	.00	.87	-.03	.87	-.10	.83	-.05	.89	-.06
Hygiene	.83	.08	.88	-.17	.90	.14	.75	-.09	.94	.00	.80	.17	.89	-.03	.83	-.02	.90	.06
Avoidance of danger	.81	-.05	.88	.02	.92	-.14	.84	-.11	.91	.00	.85	.05	.83	.13	.82	-.04	.90	-.06
Communication	.78	-.28	.71	.42	.79	-.23	.74	-.32	.89	.00	.68	-.13	.77	-.40	.84	-.20	.75	-.31
Contact with others	.82	-.38	.74	.54	.88	-.30	.66	-.44	.86	.00	.80	-.03	.83	-.34	.67	-.25	.85	-.32
Sense of rules/values	.76	-.32	.77	.43	.88	-.26	.81	-.36	.89	.00	.79	.15	.80	-.08	.73	-.32	.85	-.27
Daily activities	.78	-.07	.91	-.10	.91	-.02	.83	-.06	.73	.00	.76	.46	.89	-.16	.86	-.17	.83	.06
Recreational activities	.69	-.27	.74	.06	.89	-.11	.77	-.08	.86	.00	.63	.54	.75	-.44	.65	-.24	.83	-.17
Learning ability	.79	-.26	.81	.28	.89	-.18	.69	-.26	.86	.00	.82	.20	.89	-.17	.70	-.24	.86	-.24
Eigenvalues	8.6	1.4	9.9	1.4	11.0	1.0	8.6	1.5	11.0	0.8	9.0	1.1	10.2	1.2	8.2	1.4	10.2	1.1
% variance	57.5	9.5	66.1	9.2	73.6	6.7	57.1	9.9	73.3	5.5	60.1	7.6	67.7	7.7	54.3	9.1	68.3	7.1
(N)	(116)		(133)		(359)		(80)		(211)		(176)		(109)		(136)		(1320)	

6 Conclusion

Taking the results together, clearly in several studies analysis demonstrates that the CDS proved to be reliable in terms of internal consistency, equivalence and stability. In addition, psychometric properties regarding construct validity were acceptable and showed strong similarities across the countries. The aforementioned criteria showed that the CDS might be useful in measuring care dependency in each country as well as across the described countries on both group and individual levels. Furthermore, the CDS sum score can be used safely as an overall indicator of care dependency. In addition the CDS items have proven to be related to what Henderson (1966) calls *fundamental* human needs that appear in every patient-nurse relationship, independent from cultural background.

Although further research is ongoing, there is evidence that in research the CDS can be used for international comparisons and can contribute to the development of international standards for need assessment of patients. Regarding the application of the CDS in clinical practice, the CDS can be used in the first stage of the care process as a case-finding and needs assessment tool.

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- It is appreciated that data gathered with the CDS are made available for further validation: scores on the individual items of the CDS, if possible for different age, sex and diagnostic patients groups, scored by patients, proxies, nurses or other healthcare providers. These can be made available on electronic mail, coded as outlined in this manual.

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Appendix A

The available versions of the CDS

The Care Dependency Scale is available in the following languages:

- Arabic (Egyptian dialect)
- Dutch
- English (UK and USA)
- Finnish
- Frisian
- German
- Italian
- Japanese
- Norwegian
- Spanish
- Swedish
- Slovenian

The current English versions for assessment by self-report and proxy are given in Appendix B and C.

Appendix B

The English-UK versions of the CDS (self-report version)

A Eating and drinking

The extent to which I am able to satisfy my need for food and drink

- ① I am completely dependent on care from others
- ② I am to a great extent dependent on care from others
- ③ I am partially dependent on care from others
- ④ I am only to a limited extent dependent on care from others
- ⑤ I am almost independent on care from others

B Continence

The extent to which I am able to control the discharge of urine and faeces voluntarily

- ① I am completely dependent on care from others
- ② I am to a great extent dependent on care from others
- ③ I am partially dependent on care from others
- ④ I am only to a limited extent dependent on care from others
- ⑤ I am almost independent on care from others

C Body posture

The extent to which I am able to adopt a position appropriate to a certain activity

- ① I am completely dependent on care from others
- ② I am to a great extent dependent on care from others
- ③ I am partially dependent on care from others
- ④ I am only to a limited extent dependent on care from others
- ⑤ I am almost independent on care from others

D Mobility

The extent to which I am able to move about unaided

- ① I am completely dependent on care from others
- ② I am to a great extent dependent on care from others
- ③ I am partially dependent on care from others
- ④ I am only to a limited extent dependent on care from others
- ⑤ I am almost independent on care from others

E Day/night pattern

The extent to which I can maintain an appropriate day/night cycle unaided

- ① I am completely dependent on care from others
- ② I am to a great extent dependent on care from others
- ③ I am partially dependent on care from others
- ④ I am only to a limited extent dependent on care from others
- ⑤ I am almost independent on care from others

Manual Care Dependency Scale

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F Getting dressed and undressed

The extent to which I am able to get dressed and undressed unaided

- ① I am completely dependent on care from others
- ② I am to a great extent dependent on care from others
- ③ I am partially dependent on care from others
- ④ I am only to a limited extent dependent on care from others
- ⑤ I am almost independent on care from others

G Body temperature

The extent to which I am able to protect my body temperature against external influences unaided

- ① I am completely dependent on care from others
- ② I am to a great extent dependent on care from others
- ③ I am partially dependent on care from others
- ④ I am only to a limited extent dependent on care from others
- ⑤ I am almost independent on care from others

H Hygiene

The extent to which I am able to take care of my personal hygiene unaided

- ① I am completely dependent on care from others
- ② I am to a great extent dependent on care from others
- ③ I am partially dependent on care from others
- ④ I am only to a limited extent dependent on care from others
- ⑤ I am almost independent on care from others

I Avoidance of danger

The extent to which I am able to assure my own safety unaided

- ① I am completely dependent on care from others
- ② I am to a great extent dependent on care from others
- ③ I am partially dependent on care from others
- ④ I am only to a limited extent dependent on care from others
- ⑤ I am almost independent on care from others

J Communication

The extent to which I am able to communicate

- ① I am completely dependent on care from others
- ② I am to a great extent dependent on care from others
- ③ I am partially dependent on care from others
- ④ I am only to a limited extent dependent on care from others
- ⑤ I am almost independent on care from others

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K Contact with others

The extent to which I am able to appropriately make, maintain and end social contacts

- ① I am completely dependent on care from others
- ② I am to a great extent dependent on care from others
- ③ I am partially dependent on care from others
- ④ I am only to a limited extent dependent on care from others
- ⑤ I am almost independent on care from others

L Sense of rules and values

The extent to which I am able to observe rules by myself

- ① I am completely dependent on care from others
- ② I am to a great extent dependent on care from others
- ③ I am partially dependent on care from others
- ④ I am only to a limited extent dependent on care from others
- ⑤ I am almost independent on care from others

M Daily activities

The extent to which I am able to structure daily activities within the facility unaided

- ① I am completely dependent on care from others
- ② I am to a great extent dependent on care from others
- ③ I am partially dependent on care from others
- ④ I am only to a limited extent dependent on care from others
- ⑤ I am almost independent on care from others

N Recreational activities

The extent to which I am able to participate in activities outside the facility unaided

- ① I am completely dependent on care from others
- ② I am to a great extent dependent on care from others
- ③ I am partially dependent on care from others
- ④ I am only to a limited extent dependent on care from others
- ⑤ I am almost independent on care from others

O Learning ability

The extent to which I am able to acquire knowledge and/or skills and/or to retain that which was previously learned unaided

- ① I am completely dependent on care from others
- ② I am to a great extent dependent on care from others
- ③ I am partially dependent on care from others
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- ⑤ I am almost independent on care from others

Would you please check whether you answered all questions?

Thank for your help.

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The English-UK versions of the CDS (proxy version)

A Eating and drinking

The extent to which the patient is able to satisfy his/her need for food and drink

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B Contenance

The extent to which the patient is able to control the discharge of urine and faeces voluntarily

- ① Patient is completely dependent on care from others
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The extent to which the patient is able to adopt a position appropriate to a certain activity

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The extent to which the patient is able to move about unaided

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The extent to which the patient can maintain an appropriate day/night cycle unaided

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Manual Care Dependency Scale

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Would you please check whether you answered all questions?

Thank for your help.

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Appendix C

The English-USA versions of the CDS (self-report version)

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The extent to which I am able to satisfy my need for food and drink

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B Continence

The extent to which I am able to control the discharge of urine and faeces voluntarily

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The extent to which I am able to move about unaided

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- ④ I am only to a limited extent dependent on care from others
- ⑤ I am almost independent on care from others

E Day/night pattern

The extent to which I can maintain an appropriate day/night cycle unaided

- ① I am completely dependent on care from others
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- ⑤ I am almost independent on care from others

Manual Care Dependency Scale

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F Getting dressed and undressed

The extent to which I am able to get dressed and undressed unaided

- ① I am completely dependent on care from others
- ② I am to a great extent dependent on care from others
- ③ I am partially dependent on care from others
- ④ I am only to a limited extent dependent on care from others
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The extent to which I am able to protect my body temperature against external influences unaided

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J Communication

The extent to which I am able to communicate

- ① I am completely dependent on care from others
- ② I am to a great extent dependent on care from others
- ③ I am partially dependent on care from others
- ④ I am only to a limited extent dependent on care from others
- ⑤ I am almost independent on care from others

Manual Care Dependency Scale

Eurecare

K Contact with others

The extent to which I am able to appropriately make, maintain and end social contacts

- ① I am completely dependent on care from others
- ② I am to a great extent dependent on care from others
- ③ I am partially dependent on care from others
- ④ I am only to a limited extent dependent on care from others
- ⑤ I am almost independent on care from others

L Sense of standards and values

The extent to which I am able to observe rules by myself

- ① I am completely dependent on care from others
- ② I am to a great extent dependent on care from others
- ③ I am partially dependent on care from others
- ④ I am only to a limited extent dependent on care from others
- ⑤ I am almost independent on care from others

M Daily activities

The extent to which I am able to structure daily activities within the facility unaided

- ① I am completely dependent on care from others
- ② I am to a great extent dependent on care from others
- ③ I am partially dependent on care from others
- ④ I am only to a limited extent dependent on care from others
- ⑤ I am almost independent on care from others

N Recreational activities

The extent to which I am able to participate in activities outside the facility unaided

- ① I am completely dependent on care from others
- ② I am to a great extent dependent on care from others
- ③ I am partially dependent on care from others
- ④ I am only to a limited extent dependent on care from others
- ⑤ I am almost independent on care from others

O Learning ability

The extent to which I am able to acquire knowledge and/or skills and/or to retain that which was previously learned unaided

- ① I am completely dependent on care from others
- ② I am to a great extent dependent on care from others
- ③ I am partially dependent on care from others
- ④ I am only to a limited extent dependent on care from others
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Would you please check whether you answered all questions?

Thank for your help.

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www.eurecare.nl.

The English-USA versions of the CDS (proxy version)

A Eating and drinking

The extent to which the patient is able to satisfy his/her need for food and drink

- ① Patient is completely dependent on care from others
- ② Patient is to a great extent dependent on care from others
- ③ Patient is partially dependent on care from others
- ④ Patient is only to a limited extent dependent on care from others
- ⑤ Patient is almost independent on care from others

B Contenance

The extent to which the patient is able to control the discharge of urine and faeces voluntarily

- ① Patient is completely dependent on care from others
- ② Patient is to a great extent dependent on care from others
- ③ Patient is partially dependent on care from others
- ④ Patient is only to a limited extent dependent on care from others
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C Body posture

The extent to which the patient is able to adopt a position appropriate to a certain activity

- ① Patient is completely dependent on care from others
- ② Patient is to a great extent dependent on care from others
- ③ Patient is partially dependent on care from others
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D Mobility

The extent to which the patient is able to move about unaided

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E Day/night pattern

The extent to which the patient can maintain an appropriate day/night cycle unaided

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Eurecare

F Getting dressed and undressed

The extent to which the patient is able to get dressed and undressed unaided

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G Body temperature

The extent to which the patient is able to protect his/her body temperature against external influences unaided

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H Hygiene

The extent to which the patient is able to take care of his/her personal hygiene unaided

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I Avoidance of danger

The extent to which the patient is able to assure his/her own safety unaided

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