

**nosca** development and validation of the nurses' observation scale for cognitive abilities **Anke Persoon**



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**DEVELOPMENT AND VALIDATION OF THE  
NURSES' OBSERVATION SCALE  
FOR COGNITIVE ABILITIES - NOSCA**

Anke Persoon

A. Persoon

Development and validation of the Nurse Observation Scale for Cognitive Abilities –  
NOSCA

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The studies presented in this thesis have been performed at the Department of Geriatric Medicine and the Scientific Institute for Quality of Healthcare (IQ healthcare), both situated at the Radboud University Nijmegen Medical Centre. IQ healthcare is part of the Nijmegen Centre for Evidence Based Practice (NCEBP), one of the approved research institutes of the Radboud University Nijmegen.

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# **DEVELOPMENT AND VALIDATION OF THE NURSES' OBSERVATION SCALE FOR COGNITIVE ABILITIES - NOSCA**

een wetenschappelijke proeve  
op het gebied van de Medische Wetenschappen

## **Proefschrift**

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Johanna Wilhelmina Barbara Persoon

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**Promotores:** Prof. dr. M.G.M. Olde Rikkert  
Prof. dr. T. van Achterberg

**Copromotores:** Mw. dr. L. Schoonhoven  
Dhr. dr. R.J.F. Melis

**Manuscriptcommissie:** Prof. dr. J. Prins  
Prof. dr. R. Koopmans  
Prof. dr. M. Schuurmans (Universiteit Utrecht)

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# Prologue

A nurse supporting Mrs. Janssen in her self care meanwhile observes her cognitive abilities because of clues that point to possible cognitive decline. Mrs. Janssen (aged 82) has been admitted to the geriatric unit of an acute care hospital. She has been there for four days due to diagnostic analysis of severe malnutrition and functional decline. As an example of the opportunities offered by nursing observations, we describe below a short episode of daily care and the cognitive observations linked to this episode.

At the start of this care episode, Mrs. Janssen is alone in a two-bed hospital room and still in bed after a good night's rest. The nurse has not met Mrs. Janssen before. She introduces herself and starts with some small talk. The nurse then suggests to Mrs. Janssen that she should get up and wash and dress herself.

*30 minuten observatie van mevrouw Janssen en de verpleegkundige door een onderzoeker-observator:*

De verpleegkundige vraagt wat mevrouw nodig heeft om zich te kunnen douchen. Mevrouw noemt de kledingstukken op, tegelijkertijd pakt ze deze uit haar kast. Mevrouw loopt uit zichzelf de gang op. Ze kijkt in het rond maar weet de douche niet te vinden. De verpleegkundige wijst haar de weg en loopt mee. In de douche gaat mevrouw zich uitkleden. Ze doet dit staande, zo nodig staat ze op één been. Ze is lenig en blijft in balans. Ze vraagt meerdere keren of ze kan gaan zitten op de douchestoel. De verpleegkundige bevestigt dit ook meerdere keren. Mevrouw weet niet hoe de mengkraan werkt. De verpleegkundige doet het haar voor en geeft er een uitleg bij. Mevrouw pakt het washandje en gaat haar gezicht wassen, bovenlijf, onderlijf benen, alles heel systematisch. Mevrouw praat niet tijdens het douchen, ze concentreert zich op het wassen. De verpleegkundige maakt zo nu en dan een losse opmerking maar mevrouw reageert daar niet op. Het enige wat mevrouw zegt, is dat ze de verpleegkundige niet kent.

Mevrouw droogt zich uitgebreid, meerdere keren wrijft ze zich over de armen en onder de oksels. De verpleegkundige laat haar haar gang gaan. De voeten van mevrouw worden na het afdrogen weer nat omdat de vloer nog nat is. Mevrouw reageert hier niet op. Ze laat de verpleegkundige haar voeten nogmaals afdrogen en op een droge handdoek plaatsen. Mevrouw kan de plakstrip van het incontinentiemateriaal niet loskrijgen. De verpleegkundige vraagt of ze een bril draagt en ondertussen plakt ze het incontinentiemateriaal in het broekje. Mevrouw zegt dat ze de strip niet goed kon zien. Ze kleedt zich verder aan, past de goede volgorde toe en trekt alles op juiste wijze aan.

Terugkomend uit de douche, zegt mevrouw dat ze de weg niet weet. Ze kijkt zoekend rond en loopt vervolgens de verkeerde kant op. De verpleegkundige vertelt haar het kamernummer en mevrouw kiest nu de goede kamer uit. Terug op haar kamer legt mevrouw haar spullen terug. Ze gaat uit zichzelf haar haren kammen, zeer



zorgvuldig. Daarna poetst ze haar tanden. Pakt een handdoek, legt deze over haar schouders en gaat haren kammen. Ze doet dit weer uiterst zorgvuldig. Ze kijkt rond en zegt dat ze haar bril zoekt. Intussen trekt ze staand haar sloffen uit en haar schoenen aan. Ze draait zich om naar de wastafel. Ze kamt weer haar haren. Ze ruimt alles rond de toilettafel op en loopt om het bed heen op zoek naar haar bril. Ze zet hem op. Al die tijd spreekt mevrouw niet. De verpleegkundige evenmin, ze laat mevrouw haar gang gaan. Die trekt inmiddels haar vest aan. Het zit rommelig, de mouwen van haar jurk zitten opgestroopt tot onder haar oksels. Mevrouw lijkt dit niet op te merken. Ze laat geduldig de verpleegkundige de mouwen goed trekken. Dan zoekt ze in haar vest naar haar zakdoek en vindt die daar ook. Ze kijkt op en kijkt de verpleegkundige voor het eerst aan: 'Zo, ik ben klaar'. De verpleegkundige kijkt haar ook aan, glimlacht en vraagt of ze een ontbijt wil.

Nurses are in an advantageous position to unobtrusively observe patients' behaviour and activities. The above description of Mrs. Janssen is an example of how informative naturally-occurring contact between a nurse and a patient can be, and how many clues for cognitive deficits are present during even a short period of observation. However, neither the description of this observation nor the observation itself was structured or standardised. No observation instrument was used because no valid observation scale was available. The nurse was observing specific activities of daily living, those which she knew pertained to the theoretical concept of cognitive functioning. She restrained herself from interfering with the patient in order to observe Mrs. Janssen's unique and unmodified cognitive behaviour. However, questions arise about the conclusion of this observation. Which cognitive abilities and limitations were noticed by the nurse? The nurse will report her observations in free text in the nursing file. What will she document and how will she do this? Which information is meaningful for determining Mrs. Janssen's cognitive status and the development of her care plan?

The nurse was doubtful about what to report in the nursing file. She considered an extensive qualitative description similar to the one above but decided to make a short statement such as: 'Mrs. Janssen was somewhat confused and required only a few instructions whilst washing and dressing'.

The short case description above clearly illustrates the reasons for starting this study into daily nursing observations of patients' cognitive functioning. It was brought about by critical remarks made by the geriatric nurses on our unit. They indicated that their observations of patients were neither standardised nor reliable. They felt that this jeopardised the collaboration with geriatricians and neuropsychologists and diminished the effectiveness of the interventions carried out by nurses and other carers. In conclusion, after several rounds of discussion we started to study nurses' observations of patients' cognitive capacities, and worked on standardisation of this process.

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# Introduction

As is widely known, our society's population is aging rapidly. As of this year, 2009, 2.5 million Dutch people are over 65, which is 15% of the population. This proportion of the population is expected to run as high as 25% in 2050.<sup>1</sup> An increase of octogenarians from 4% in 2007 to 9% in 2050 is expected: a total of 1.5 million.<sup>1</sup> Large percentages of older adults live actively and productively in their later years. People aged 65 and over will enjoy on average another ten years in good health.<sup>1</sup> Only 5% of people over 65, and 20% of those aged 80 and over, live in nursing homes.<sup>2</sup>

However, ageing is the main risk factor for frailty, functional decline, diseases and disorders. Multimorbidity, defined as two or more diseases, is present in 69% of people over 65.<sup>2</sup> In the Dutch general hospital population the percentage of people aged 65 and over is as high as 45%.<sup>3</sup> Consequently, a substantial number of the patients admitted to hospital wards are suffering from several geriatric syndromes simultaneously.<sup>4</sup> The organisation and staff of Dutch hospitals are not yet sufficiently equipped and trained to deliver efficient care for this frail population.<sup>3</sup>

## *Cognitive functioning*

Cognition is highly valued in our society. It suggests that we have reason, that we are rational people with the ability to think and make decisions, in contrary to animals. Therefore, deterioration of cognitive function is generally experienced as a deep loss, both by the individual as well as by his or her partner, family and friends.

However, cognition is an artificial construct, it is not an organ we can look at and we cannot draw pictures or take blood of our 'cognitive function-organ', though we can have brain images and analyse brain fluid (cerebrospinal fluid). Consequently, there are no clear-cut diagnostic facilities to assess cognitive function. Brain function has been the subject of numerous studies that examine the brain at the molecular level. The relationship between brain function and cognitive function in daily life is complicated since only moderate correlation between cerebral atrophy and cognitive loss has been noted.<sup>5</sup> Neither novel imaging techniques nor serum or cerebrospinal fluid biomarkers are yet able to predict the whole range of cognitive functioning. Neuropsychological examination is the main key to the assessment of cognitive impairment. During such examinations psychologists or neuropsychologists carry out several neuropsychological tests, often in a test situation in an artificial environment such as pen and pencil tests in a test room. Paradoxically, although cognition is an artificial construct, cognitive functioning is clearly demonstrated in our behaviour in daily life. Thus, observing someone's behaviour is a valuable way of validly assessing cognitive functioning.

Definitions of the theoretical construct “cognitive function” vary, although the overall idea is that it addresses a wide area of human information processing. It covers the processes by which an individual perceives, registers, stores, retrieves and uses information.<sup>6</sup> Cognition is conceptualised by defining several distinct cognitive domains that pinpoint specific areas of this process, such as memory, orientation, praxis and perception.

In healthy persons, there is a clear age-related decline in cognitive functioning. Longitudinal studies of cognitive function in older adults reveal a decline in performance for memory function, information retrieval time, time for learning and processing new information, executive functioning, cognitive speed tasks, concentration, reaction time, word-finding and verbal fluency.<sup>7-9</sup> In a healthy Dutch population of people aged 65 and over, cognitive disability, determined by an Mini Mental State Examination score below 23, was estimated as 10%. In a healthy group of people aged 85-94 years, 33% of people had an MMSE score below 23.<sup>10</sup> Apart from age, cognitive decline has also been associated with many physiological and psychosocial variables. Associations between cognitive functioning and physiological variables are found for blood pressure, body mass index, sex, visual and auditory acuity, peak expiratory flow rate, and grip strength. Associations between cognitive functioning and psychosocial variables are found for lower levels of education, external locus of control, and the absence of positive affect.<sup>9,11</sup>

A more rapid deterioration of cognitive functioning in older people may be a sign of pathological conditions such as dementia, depression, delirium or brain injury. In the Netherlands, the number of people with dementia living at home is estimated to be around 200,000, and there are 30,000 people with dementia living in nursing homes.<sup>1</sup> The number of people with brain injury was estimated to be 220,000 in 2003.<sup>1</sup> In Dutch hospitals 100,000 to 150,000 patients develop a delirium.<sup>3</sup> Of the surgical and medical patients, 10-40% have an episode of delirium.<sup>3</sup> In an acutely admitted population at a Dutch general internal medicine department, 47% of patients demonstrated cognitive problems as measured with the MMSE.<sup>4</sup>

Thus, in patients currently hospitalised one often needs to answer questions such as whether there is cognitive decline, how serious the impairments are, and whether these interfere with the diagnostic procedures and treatment aimed for. Furthermore, the quest in search of the causes of cognitive decline must be undertaken with care.

### *Assessment of cognitive functioning*

This thesis focuses on cognitively mediated functional abilities in older adults. The International Classification of Functioning, Disability and Health (ICF) distinguishes the components of functioning: body functions and structure, activities and participation.<sup>12</sup> The negative terms of dysfunction are described here as: impairment in body functions and structure, limitations in activities, and

restrictions in participation. Dysfunction may well be related to a disorder or disease, although not necessarily. For example: not showing up for a sister's birthday celebration is a limitation in activities; this may be the result of impaired memory function (forgetting birthdays) and may possibly lead to a restriction in participation within the family, while all of this might be induced by Alzheimer's disease.

Testing cognitive functioning is carried out differently at the three levels of dysfunction (impairment, limitations and restrictions). The level of impairment is assessed by neuropsychological testing varying from short screening tests to extended neuropsychological examination. Numerous screening tests and test batteries are available, each addressing cognitive function and cognitive domains from a different angle. At the level of limitations and restrictions, cognitive functioning can be gauged by the assessment of the individual's behaviour. There are three generally accepted methods of measuring an individual's behaviour: by means of self-report, informant-report and observation.<sup>13</sup> The information stems from the patient herself, from significant others, or from trained raters and professional care providers, respectively. Many behavioural rating scales have been developed to assess cognitive functioning in the form of observation scales, clinical rating scales, questionnaires and interviews. Often the scales screen for possible underlying diseases or disorders, in particular for dementia, delirium and brain injury. Some scales focus specifically on cognitive functioning itself.

#### *Observational assessment of cognitive functioning*

One method of observation of a patient's performance is based on direct observation of the patient's behaviour during daily life. Nurses on geriatric wards gather information about a patient's cognitive status by means of direct observation. Daily observation of the patient covers 24 hours a day and may last for several days. Direct observations are based on informal interactions between the patient and the nurse, e.g. when taking a bath, having breakfast and during transfers, or when interacting with other patients. The observation is not threatening, burdensome or stressful for patients. The patient's co-operation is not necessary and observation can be conducted even when patients are too ill for neuropsychological testing. Furthermore, observation fits very well into nursing practice because information is directly accessible during patient care encounters.

Direct observation of behaviour during daily life is often employed by nurses because they spend relatively long periods of time with the patient. They are in a position to unobtrusively observe the behaviour and activities of patients and their families.<sup>14</sup> Observation of patients is a main characteristic of nursing. Nurses integrate observations in their daily encounters with the patient to recognise improvements or deterioration in the patient's status and vital signs.<sup>15</sup> According to the professional profile of geriatric nurses published by the Dutch Nurses' Association (V&VN), a nurse's main role is to observe the patient and

recognise any problems. Competencies required to fulfil this role have been comprehensively described.<sup>16</sup> More experienced nurses, as well as other professionals, are able to assess a situation with minimal cues. Benner defined this as 'clinical intuition'<sup>17</sup>; in Dutch the word 'klinische blik' has the same intention. Although clinical intuition is a necessary and valuable tool for professional practice,<sup>17, 18</sup> it is most important that nurses standardise their observations in an unequivocal and reproducible manner, in order to improve clinical decision-making. Important aspects of a cognitive domain are less likely to be missed when assessment is standardised. In addition, communication between disciplines is facilitated when summary scores of measurements provide brief, meaningful information about a person's function.<sup>19, 20</sup> Direct observation can be conducted in an unstructured manner when focusing on the patient's general health, but requires a structured method either when assessing a specific problem, e.g. cognitive decline, or in the case of research. Well-validated observation scales are indispensable in nursing assessment, especially in geriatrics.<sup>20, 21</sup>

## **PROBLEM STATEMENT OF THE THESIS**

The main problem we encountered was that geriatric nurses did not carry out their observations in a standardised way. No valid observation scale was used to assess cognitive functioning in patients and a research of the literature revealed that for nurses in daily practice there was not a scale available which allows assessment of cognitive functioning in a sufficiently comprehensive way (study results in Chapter 1).

## **AIMS OF THE THESIS**

The overall aim of the studies is the standardisation of nurses' observations of patients' cognitive capacities. In this thesis we aimed to achieve the following objectives:

- to present an overview of direct observation scales that focus on cognitive functioning.
- to learn how nurses assess patients' cognitive function through observation of daily activities.
- to develop and validate a nursing observation scale for the assessment of cognitive abilities: the Nurses' Observation Scale for Cognitive Abilities (NOSCA).

## **OUTLINE OF THE THESIS**

*Chapter 1* reviews the literature on observation scales for cognitive functioning available in the Dutch language. (The review of international papers is described in Chapter 6).

*Chapter 2* evaluates why and how geriatric nurses observe their patients' cognitive abilities. Qualitative data were collected from almost a hundred nurses, who reported their reasons for observing cognition as well as the cognitive domains included in their assessment.

*Chapter 3* summarises the methods used by geriatric nurses to observe patients. Geriatric nursing experts, often nurse specialists, were interviewed about the methods used by their bedside-colleagues for observational assessment. This study addresses how long the observation period takes, which cognitive domains are included and how they are reported.

*Chapter 4* describes the inter-rater agreement between nurses in observing cognition. Sixty patients were assessed for their cognitive abilities, each patient by two nurses.

*Chapter 5* compares the results of two types of cognitive assessment, namely neuropsychological tests and a behavioural observation scale. Memory function was selected as an example of a cognitive domain. Results of four neuropsychological memory tests were compared with the results of the memory subscale of the nurses' Behavioural Rating scale for Geriatric Inpatients (GIP).

*Chapter 6* presents the content validity of the NOSCA. It reports the development of the comprehensive observational measurement instrument for the assessment of cognitive functioning by nurses. Since no theoretical framework for classifying cognitive domains was dominant, we used the ICF and a Delphi technique to reach agreement between multidisciplinary experts in this field.

*Chapter 7* addresses the NOSCA's psychometric properties. Reliability and construct validity of the overall scale and its subscales were tested. Fifty patients from two geriatric hospital units were assessed during daily observations by means of the NOSCA and a neuropsychological test battery.

Finally, *Chapter 8* summarises and discusses the results and presents the overall conclusions and implications arising from this thesis.

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## **CHAPTER 1**

# **DUTCH-LANGUAGE OBSERVATION SCALES FOR STUDYING COGNITIVE FUNCTIONING IN THE ELDERLY**

A. Persoon, L. Joosten, W. van de Vrie, M.G.M. Olde Rikkert, T. van Achterberg

BASED ON:

**NEDERLANDSTALIGE OBSERVATIESCHALEN VOOR ONDERZOEK VAN COGNITIEF  
FUNCTIONEREN VAN OUDEREN**

*Tijdschr Gerontol Geriatr 2006 (37): 184-194*

## **ABSTRACT**

Assessment of complex geriatric health problems by nurses is important for diagnosis, especially assessment of cognitive functioning through daily observations. However, it is unclear which Dutch observation scales are available to assess cognitive abilities. In this study, we present an overview of these scales. A systematic review was performed. Beforehand we determined criteria for inclusion of scales and we searched through Dutch and English databases up until May 2005.

Thirteen behavioural observation scales were found. The number of domains of cognitive functioning assessed in the scales varied greatly, from two to eight in number. Memory and psychomotor behaviour were nearly always included; consciousness and thinking were frequently included, while alertness, perception, executive functions and language were least included. Extensive assessment of cognitive functioning is highly relevant for a geriatric hospital ward in which patients are admitted for diagnosis. Of all scales that we traced, the A-ONE is the most extensive: eight cognitive domains are included. Little is known about the potential for using the A-one scale in nursing practice; further exploration is indicated. For now, nurses should become acquainted with the different domains of cognitive functioning and start to integrate observations in these domains in their reporting.

Keywords: cognition, observation scale, review, geriatrics, nurse

## INTRODUCTION

Geriatric patients are generally admitted to hospital because they are suffering from several health problems simultaneously. Geriatric assessment focuses on issues such as the separation of somatic and psychiatric disorders and social problems. Observation by nurses of their patients' daily activities provides a clear picture with respect to cognitive disorders, mood problems and behavioural problems. Such observations also allow nurses to contribute to the diagnosis. Adequate diagnosis is a prerequisite to setting up a responsible treatment plan and starting the discharge policy. The degree of cognitive (dys)function in a patient influences the nurse's approach regarding the amount of responsibility that their patient can handle and the patient's abilities to learn new tasks or behaviour. However, observation of cognitive functioning usually takes place in a non-structured manner, without using a specific observation scale. Systematics, clarity and objectivity are often missing. A standardised observation scale is therefore required both by nurses and the collaborating disciplines. The aim of this study is to provide a review of the Dutch-language scales that assess cognitive functioning of patients by means of observation.

### *Observation*

In theory, the observation of patients is 'a systematic, focused and objective examination' and therefore the exact opposite of an examination that is subject to selectivity and interpretation.<sup>1-3</sup> Observation provides specific patient data that complements other diagnostic methods such as physical examinations, interviews, neuropsychological tests and instrumental examinations. The observation of patients during their daily activities offers a number of advantages over other methods of diagnosis<sup>4-8</sup>:

- active patient participation is not required;
- behaviour can be observed in the patient's natural environment, there is no specially created moment for a test or interview;
- small changes can be observed over the course of a day or during a specific situation (visiting hours, noisy times of the day);
- observation can be applied during acute stages of illness when patients are too ill to undergo (neuro) psychological interviews and tests;
- repeated observation can be used to assess the effects of therapy, without the problems of learning as a result of repeated testing;
- observation neither disturbs nor intimidates the patient.

In addition to such advantages in patient care, the nursing profession would benefit greatly from an observation scale that provides them with a method that can be used for structured observation. Standardisation and clarification of observations would not only contribute to the professionalization of nurses but also improve multidisciplinary collaboration.

### *Cognitive functioning*

Cognitive functioning is a term that has been in use for decades and is much used in the fields of geriatrics, neurology and psychiatry. In daily practice it would appear

that there is consensus regarding its meaning. Cognitive functioning is generally defined as follows: 'The process whereby an individual perceives, registers, stores, retrieves and uses information as and when necessary'.<sup>9</sup> However, once cognitive functioning is made operational by division into different functional domains, it appears that there is only limited agreement as to the number of different domains and their meaning.<sup>10-15</sup> 'Memory' is the only domain that is always present, while the domains orientation, visual perception, reasoning capacity, thinking, mood, behaviour, language and executive functions are combined differently; some fall within a component of another domain and others are not included at all. What constitutes a domain, therefore, also differs. This is mainly explained by the fact that the different domains are related to each other and influence each other.<sup>10</sup> At present, the allocation of the different components of cognitive functioning appears to be somewhat arbitrary.

## METHODS

### *Data collection*

In our systematic review we searched for Dutch-language observation scales that assess cognitive functioning. We operationalised the term cognitive functioning by adopting the DSM-IV criteria for dementia and delirium to exclude the dimensions mood and behaviour, which are defined here as non-cognitive functions.<sup>16</sup> We further followed the classification described in 'Assessing cognitive function', the nursing protocol derived from the study conducted by Foreman *et al.*<sup>17</sup> Our study encompasses seven dimensions of cognitive functioning, namely: consciousness, alertness, perception, memory/orientation, thinking, psychomotor behaviour (ADL and IADL) and executive functions (insight and judgement). We expanded the classification to include language since this domain is mentioned by many different authors.

The adopted inclusion criteria are as follows:

- a) the scale assesses cognitive functioning;
- b) the scale assesses at least two domains (in order to emphasise the multifactorial aspect of cognitive functioning);
- c) the scale constitutes a behavioural observation scale;
- d) the observations are focused on the daily activities of a patient;
- e) at least one article has been published regarding its application in the Netherlands and
- f) at least one study has been done describing the scale's psychometric quality.

The type of caregiver carrying out the observation was not a selection criterion. We also included scales that have at least one subscale for assessing cognitive functioning.

In addition to the above-mentioned inclusion criteria, we excluded the following (see Box 1 for abbreviations):

- a) scales that assess aspects other than cognitive functioning (such as the BOP that measures patient needs, or the NOSIE-30 for the evaluation of psychiatric patients);
- b) scales that assess just one domain, such as ADL-lists;

- c) scales that test rather than assess cognitive functioning (such as the MMSE or the ONO);
- d) scales that are carried out during an interview or standardised test situation (such as the CAM, the CDR, the GDS, the DRS-R-98);
- e) scales that have been translated by an individual researcher but of which to our knowledge no publications exist that are applicable in Dutch clinical practice (such as the CBRs);
- f) scales for which no known validation studies have been carried out (such as the HBSH, for which the Cognition subscale was unfortunately validated at a higher level of abstraction).

We searched both Dutch-language databases (Zorgportaal, Ouderenpsychiatrie, Zorgvernieuwing, Trimbos-instituut, Databank Zorgvernieuwing, INVERT) and English-language databases (Medline, Cinahl and PsycInfo) in the period from 1985 until May 2005. The search was limited to English and Dutch articles concerning elderly people above the age of 65 years. The search terms used were *behav\**, *obs\**, *cogn\**, *scale* or *measurement*, and *assessment*. Since each database has its own construction and keyword specification, the search terms were further specified for each database. The search delivered a total of 1541 articles. All abstracts were read through and the descriptions of the scales reviewed to assess whether or not the scale met the inclusion criteria. These traced studies were used to search backwards (screening references using the snowballing method) and forwards where possible (using the Citation Index).

### *Data analysis*

The scales we included were described according to target group, aim, setting, observer, observation period and the number and type of domains. The quality of each validation study and of different studies combined was assessed according to criteria of the *Dutch Institute for Healthcare Improvement* (CBO) for evidence for diagnostic research, see Table 1. The psychometric results for each study were then summarised for reliability (internal consistency, test-retest and inter-rater reliability, responsiveness) and validity (content validity, validity with respect to the Mini Mental State Examination (MMSE), other cognitive tests and tests that assess partial aspects, predictive validity and discriminatory power) whereby a norm was determined beforehand to assess the scales included, see Table 1.

## **RESULTS**

### *Description of scales included*

We traced 12 observation scales that assess cognitive functioning and meet the inclusion criteria, see Table 2. Seven of the 12 scales are for more general behavioural observations (related to mood, problematic behaviour or dependence, for example) but do include subscales that assess cognitive functioning which were also included. The 12 (sub) scales are targeted at psychogeriatric patients (n=6), patients with non-congenital brain disorders (n=2), patients with possible delirium (n=3) and residents of nursing homes (n=1). The scales were developed for different settings that vary from the doctor's surgery to hospital wards. The type of observer

also differs, from family doctor, nursing attendant, nurse, specialised occupational therapist to family member. The observations are aimed at either screening (n=3) or monitoring cognitive functioning (n=9).

The number of items is different for each scale, see Table 3. The most compact scale is the Cognitive Performance Scale/CPS (4 items), the most extensive is the Arnadottir OTADL Neurobehavioral Evaluation/A-ONE (73 items).<sup>19</sup> The latter includes all eight domains. Two scales assess only two domains, namely the Nurses' Observation Scale for Geriatric Patients/NOSGER (domains psychomotor behaviour and memory) and the Bedford Alzheimer Nursing Severity scale/BANS-s (domains psychomotor behaviour and language).<sup>20-21</sup> With the exception of the BANS-s, all scales assess the domains memory/orientation and psychomotor behaviour. The remaining domains such as alertness, perception, executive functions and language were included less frequently.

### *Quality of the studies*

At least one validation study has been published for each observation scale, with a total of 33, see Table 4. For five studies the quality of the study design is rated at level A2, i.e. cut-off points were determined prior to the study and the observation list and the reference test were assessed independently of each other. However, for most of the studies the study design is rated at level B (n=16), i.e. the comparison of the observation scale with a reference test was not carried out under strict conditions. In the remaining studies (n=12) the results were not compared to a reference test at all (level C).

The validation studies found one observation scale to have the highest conclusion level, namely level 1 for the NEECHAM Confusion Scale.<sup>22-23</sup> This means that the results of these studies are of greater value. For one third of the scales the designs used were found to have conclusion level 2, i.e. the totality of the study designs was of a reasonable level, but that additional research into their quality is necessary (BANS-s, NOSGER, CPS, Delirium Observation Screening/DOS<sup>27</sup>). For the remaining scales the designs used suggest that the results may not be dependable (conclusion level 3).

### *Reliability*

Internal consistency was tested for eleven of the thirteen scales. This was found to be good in five of the scales (DOS, NEECHAM, Delirium-O-Meter<sup>25</sup>, Observation list for Early Signs of Dementia/OLD, and the subscale of the *Beoordelingschaal voor Psychische en Sociale Problemen*/BPS<sup>26</sup>).

A striking observation is that for four of the observation scales the level of agreement between two or more observers is not known (inter-rater reliability). Such agreement was found to be good for the NEECHAM and the A-ONE in two studies, for the CPS and the subscales of the Behavioural Observation Scale Geriatrics/GOS-G<sup>27</sup> in just one study. Agreement between assessors is fair for four scales (NOSGER, Delirium-O-Meter, Behaviour Rating Scale for Psychogeriatric Inpatients/GIP<sup>28</sup> and the subscale Working group Cardiovascular research the Netherlands/WCN<sup>29</sup>, for the DOS it is poor.

The scales have also not been extensively tested for test-retest reliability. It is found to be good in four scales, namely the A-one, the CPS, the subscales of the NOSGER and the GOS-G.

For those scales that monitor the course of cognitive functioning over time, their sensitivity to change should be known. We find that the BANS-s, NOSGER and Delirium-O-Meter are indeed sensitive to change, whereas the A-ONE and the BPS are only moderately sensitive. For the other scales this is not known.

### *Validity*

Different researchers have investigated the correlation between their own observation scales and the MMSE. The three subscales of the NOSGER are the only ones that correlate well with the MMSE score in both studies. The NEECHAM and the Delirium-O-Meter correlate well in one study. The remaining scales show only mediocre correlation with the MMSE score; the OLD has a low correlation with the MMSE score. The correlation with cognitive tests has been studied to a limited extent. The Delirium-O-Meter and the NEECHAM correlate well with the DRS-98 and DSM-III-R criteria for delirium, respectively. The remaining observation scales included in this review show only moderate correlation with scales such as the CST, BANS-s, IQCODE, Alzheimer's Disease Assessment Scale-Cognitive Subscale/ADAS-cog, and the DSM-III criteria for dementia. Finally, the OLD and DOS scales show little correlation with the IQCODE-N.

A number of studies looked at how well certain cognitive domains correlate with specific scales, for example the correlation between items that assess the psychomotor behaviour domain and the Katz scale. This correlation is almost always positive,

The CPS is the only scale that has a good predictive validity for cognitive disorders. The NEECHAM's predictive value for delirium is good to fair. The DOS and Delirium-O-Meter have a fair predictive value and finally the WCN has a poor predictive value for cognitive disorders.

Finally, a good discriminatory power was seen for different scales when distinguishing groups of patients with cognitive disorders from groups of healthy people (A-one, NOSGER), depressed patients (OLD and NEECHAM), patients with neuropsychological diseases (BANS-S) or non-delirious patients (DOS and Delirium-O-Meter).

## **DISCUSSION**

The aim of this study was to provide an overview of translated and original Dutch-language (sub)scales that assess cognitive functioning in elderly patients. The study was motivated by the need expressed by nursing staff at geriatric hospital wards for a standardised observation scale. Our review of the literature found 13 scales. With regard to content, the traced scales vary greatly in the number of domains assessed, from two to eight domains. Memory and psychomotor behaviour are nearly always included, consciousness and thinking are frequently included, while alertness, perception, executive functions and language are least included. The scales we found have been specifically developed for certain groups of patients,



namely those suffering from delirium, dementia or trauma. The scales have been developed for different observers, namely nurses, nursing attendants, family members, family doctors and occupational therapists.

The A-ONE is the most extensive scale for assessing cognitive functioning; all eight domains are included. This is of interest for a geriatric hospital ward, since patients often show some cognitive problems but it is unknown to what degree how these affect daily activities. The A-one has been developed by occupational therapists and requires extra training that will limit the extent to which it can be applied in clinical nursing practice. The A-ONE, however, is widely used in the Netherlands, mostly for trauma patients. The A-ONE scores fairly well on the validity tests although such tests are usually carried out by the study group that developed the scale. Further exploration is required to see whether or not the A-one can be made applicable for use by nurses at a geriatrics ward.

The scope of cognitive functioning assessed by the DOS and the Delirium-O-Meter is fairly broad; they include six or seven domains. These scales have been specifically developed for screening for risk of delirium (and for documenting its course). For a geriatric hospital ward such scales are certainly relevant for identifying delirium. The distinction between dementia and delirium is easily made in a group setting, but requires further specification in a clinical setting. Both scales achieve scores of fair to good in the validation studies but both require further testing.

The remaining scales traced assess cognitive functioning only partially. These scales are certainly valuable but in a setting outside the geriatrics ward. For other hospital wards the NOSGER scale may well be of interest. By screening two domains this scale gives an impression of cognitive functioning. At the time, this scale was developed for psychiatric patients and scores very well in the validation studies. The WCN is a frequently applied scale during patient rehabilitation but it would appear that its validity has barely been studied. The single study that has been done shows that the WCN has poor validity and reliability. The CPS and the BANS-s are compact scales aimed at determining the severity of dementia; the BANS-s was even developed for following the course of a severe form of dementia over time. Both scales have been fairly well tested and have been found to be valid. The BPS and GOS-G have also been developed to monitor the course of dementia and cover four domains of cognitive functioning. Both instruments were developed in the 1980s and were not validated extensively, although preliminary results regarding the GOS-G are positive.

Of particular interest to our study was the issue regarding the reliability of the scales when cognitive functioning is assessed by different observers. Nurses work in a team, which means that it is very important that their assessments correlate well with one another. Surprisingly, not all scales have been tested for inter-rater reliability. However, four scales did score well in this respect and they demonstrate that correlation is certainly possible for observation scales.

## CONCLUSION

At present, nurses do not have a ready-made observation scale that assesses all aspects of cognitive functioning in patients with dementia, i.e. in all eight domains; at least not a scale available in the Dutch language, which is what this review was aimed at. As a follow up to our study it would now be wise to look for international observation scales that assess, for example, at least five domains of cognitive functioning. Finally, it is important that nurses in a clinical setting increase their theoretical knowledge of cognitive functioning. This will help to shed light on the different domains of neuropsychology and the connections between them. Although observations by nursing staff cannot yet be registered using standardised scales, for the time being they can be listed in a structured manner by keeping to the eight domains. For now, reporting will have to take place in free text. This will at least be an initial improvement on the current situation, where observations and reporting take place in an unstructured manner.

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**Kader 1: Excluded scales Abbreviations**

AMPS	Assessment Motor and Process Skills
BOP	Beoordelingsschaal Oudere Patiënten
CAM	Confusion Assessment Method
CBRS	Cognitive Behaviour Rating Scale
CDR	Clinical Dementia Rating
DRS-R-98	Delirium Rating Scale Revised
GDS	Global Deterioration Scale-Reisburg
HBSH	Hoensbroekse Beperkingen Schaal Hersenletsel
MMSE	Mini Mental State Examination
NOSIE-30	Nurses' Observation Scale for Inpatient Evaluation
ONO	Oriënterend Neuropsychologische Onderzoek

**Table 1: Norms to study included papers**

<b>Evidence per study</b> (www.cbo.nl): A1 = Comparative research into the effects of diagnostics on clinical outcome or research whereby decisional models or multivariate analyses are used to assess the new information in the test under study with respect to a reference test. A2 = Comparative research with predetermined criteria for the test under study and for a reference test, with a description of the clinical population being studied; the research involves a series of sufficient size of successive patients, with predetermined cut-off points and independent assessment of the results of the test and the 'golden standard'. B = Comparison with a reference test, description of the test studied and of the studied population, but not with all the aspects mentioned in A. C = Non-comparative research. D = Expert opinion.
<b>Level of proof in the conclusion</b> (www.cbo.nl): 1 = Systematic review of at least two independently conducted studies of level A. 2 = At least two independently conducted studies of level B. 3 = At least one study of level A2, B or C. 4 = Expert opinion.
<b>Internal consistency:</b> - Cronbach's $\alpha \geq 0.8 = +$ ; $0.6 \leq \alpha < 0.8 = \pm$ , $\alpha < 0.6 = -$ .
<b>Test-retest and inter-rater reliability:</b> - Cohen's $\kappa \geq 0.4 = +$ , $\kappa < 0.4 = -$ . - Pearson's $r \geq 0.9 = +$ , $0.7 \leq r < 0.9 = \pm$ , $r < 0.7 = -$ . - Intra-class correlation coefficient $ICC \geq 0.7 = +$ , $ICC < 0.7 = -$ . An average was calculated from several studies and the figure rounded down.
<b>Responsiveness:</b> Hypotheses tested with a positive result = +; hypotheses tested with a negative result = -. No hypotheses tested, results interpreted as positive = $\pm$ .
<b>Validity with respect to MMSE and other cognitive tests:</b> Correlation coefficient $r \geq 0.8 = +$ ; $0.5 \leq r < 0.8 = \pm$ ; $r \leq 0.5 = -$ . An average was calculated from several studies and the figure rounded down.
<b>Validity with respect to cognition components:</b> Correlation coefficient $r \geq 0.3 = +$ , $r < 0.3 = -$ . An average was calculated from several studies and the figure rounded down.
<b>Predictive validity:</b> Sensitivity (Se) $\geq 90\%$ and Specificity (Sp) $\geq 80\% = +$ ; Se $< 90\%$ or Sp $< 80\% = \pm$ ; Se $< 90\%$ and Sp $< 80\% = -$ . An average was calculated from several studies and the figure rounded down.
<b>Discriminating capacity:</b> Correlation coefficient $r \leq 0.3 = +$ .

**Table 2: Observation scales for cognitively mediated activities of daily living (n=13)**

Name 1) and authors	Patient population 2)	Aim: 3)	Setting 4)	Observer 5)	Observation period 6)
A-ONE <sup>19,33-34</sup>	T	M	rehab/hosp	occ	Test moment
BANS-s <sup>21,35-36</sup>	P	M	nh	nurse	?
BPS <sup>29</sup> ; -1 subscale out of 3	hfe	M	hfe	n-ass	4 weeks
CPS <sup>18,37-38</sup>	P	M	nh	n-ass	7 days
Delier-O-meter <sup>28</sup>	D	M	hosp	nurse	8 hours
DOS <sup>27,43</sup>	D	S	hosp	nurse	1 day
GIP and en GIP-28 <sup>24,31,44-46</sup> -4 subscales out of 15	P	M	nh/hosp/hfe	nurse	2 weeks
GOS-G <sup>30,47-48</sup> -3 subscales out of 9	P	M	nh/hosp-ps	nurse/n-ass	1 week
NEECHAM <sup>22-23,40-42</sup>	D	S	hosp	nurse	8 hours
NOSGER <sup>20,49-51</sup> 3 -3 subscales out of 6	P	M	hosp	nurse/fam	2 weeks
OLD <sup>39</sup>	P	S	GP	GP	consultation
WCN <sup>32,52</sup> -1 subscale out of 2	T	M	rehab/hosp	md	1 week

## 1) Abbreviations observation scales:

- A-ONE: Arnadottir OTADL Neurobehavioral Evaluation; Arnadottir, 1988.
- BANS-s: Bedford Alzheimer Nursing Severity scale; Volicer et al., 1987.
- BPS: *Beoordelingsschaal voor Psychische en Sociale Problemen*; van Loveren et al. 1988; subscale Cognition.
- CPS: Cognitive Performance Scale. Part of the Minimum Data Set and Resident Assessment Instrument; Gerritsen et al., 2004.
- Delier-O-meter: Delier-O-meter; de Jonghe et al., 2005
- DOS: Delirium Observation Screening; Schuurmans et al., 2003.
- GIP en GIP-28: Behaviour Rating Scale for Psychogeriatric Inpatients; Verstraten, 1988; De Jongh et al., 1997. Subscales Impairments in consciousness, memory, orientation; impairment, Incoherent behavior, restless behaviour.
- GOS-G: Behavioural Observation Scale Geriatrics; Gorissen, 1994. Subscales Cognition, Disoriented Behaviour and ADL.
- NEECHAM: NEECHAM Confusion Scale; Neelon et al., 1996.
- NOSGER: Nurses' Observation Scale for Geriatric Patients; Spiegel et al., 1991. Three subscales: memory, IADL and Self Care.
- OLD: Observation list for Early Signs of Dementia; Hopman-Rock et al., 2001.
- WCN: Working group Cardiovascular research the Netherlands (Werkgroep CVA Nederland), 1998; subscale Cognition.

## 2) Patient population: T=trauma= T; D=possible delirium; P=psycho geriatric; hfe: living in home for the elderly.

## 3) Objective scale: M=monitoring; S= screening.

## 4) Setting: rehab=rehabilitation; hosp=hospital; hosp-ps=psychiatric hospital; GP=general practitioner; nh=nursing home; hfe=home for the elderly.

## 5) Observer: occ=occupation therapist; nurse=nurse, nurse-ass=nurse assistant; fam=family member; GP=general practitioners; md=multi disciplinary

## 6) Observatieperiode: handling=gedurende uitvoeren van een handling; consult=gedurende consult.

**Tabel 3: Observatieschalen inventariseren domeinen van het cognitief functioneren**

<b>Name</b>	<b>Number of items</b>	<b>Consciousness, alert</b>	<b>Attention, concentration</b>	<b>Perception</b>	<b>Memory, orientation</b>	<b>Thinking</b>	<b>Higher cognitive functions</b>	<b>Psycho motor</b>	<b>Language</b>	<b>Number of domains</b>
A-ONE	73	X	X	X	X	X	X	X	X	<b>8</b>
BANS-s	7 <sup>1)</sup>							X	X	<b>2</b>
CPS	4	X			X		X	X		<b>4</b>
Delier-O-meter	12	X	X	X	X	X	X	X		<b>7</b>
DOS	13	X	X	X	X	X		X		<b>6</b>
NEECHAM	12 <sup>2)</sup>	X			X			X	X	<b>4</b>
OLD	12 <sup>2)</sup>				X	X		X	X	<b>4</b>
BPS sub-scale	11/36	X			X	X	X		X	<b>5</b>
GIP sub-scales	29/82	X			X	X		X		<b>4</b>
GOS-G sub-scales	12/34		X		X	X		X		<b>4</b>
NOSGER sub-scales	15/30				X			X		<b>2</b>
WCN sub-scale	25/30	X		X	X			X		<b>4</b>
<b>TOTAL</b>		<b>8</b>	<b>4</b>	<b>4</b>	<b>11</b>	<b>7</b>		<b>11</b>	<b>5</b>	

**Tabel 4: Psychometrische aspecten van gedragsobservatieschalen gericht op cognitief functioneren.** <sup>1)</sup>

Observation scale	Study	Setting 2)	Sample	Evidence study	Level of proof in conclusion	Internal consistency	Test- rest reliability	Inter rater reliability	Responsiveness	Content validity	Validity against MMSE	Validity against psychological tests	Other construct validity	Predictive validity	Discriminant validity
A-one	Arnadottir, 1990 <sup>19</sup> Steultjes, 1998 <sup>30</sup> Gardarsdottir ea, 2002 <sup>31</sup>	zkh zkh zkh	n=10 – 89 n=60 n=42	C B C	3	± ± ±	+	+	±	+	±		+		+
BANS-S	Volicer ea, 1994 <sup>21</sup> Bellelli ea, 1997 <sup>32</sup>	vph vph	n=74 n=99	B B	2	±			+		- ±		+		+
CPS	Morris ea, 1994 <sup>34</sup> Hartmaier ea, 1995 <sup>35</sup> Gruber-Baldini ea, 2000 <sup>50</sup> Gerritsen ea, 2004 <sup>19</sup>	BL: vph BL: vph BL: vph vph	n=142 + 8.835 n=200 n=1939 n = 227 199?	B A2 B B	2	± ± +	+	+		+	± + ± ±	±		+	+
Delier-O-meter	De Jonghe ea, 2005 <sup>25</sup>	vph	n=92	B	3	+		±	+	+	+	+	+	±	+
DOS	Schuurmans, 2001 <sup>27</sup> van Gemert, 2003 <sup>36</sup>	zkh zkh	n=6-92 n=98	B A2	2	+		-		+	±	-	±	±	+
Neecham	Neelon ea, 1996 <sup>23</sup> Csokasy, 1999 <sup>37</sup> Cacchione, 2002 <sup>38</sup> Johansson ea, 2002 <sup>39</sup> van Gemert, 2003 <sup>36</sup> Milissen, 2005 <sup>22</sup>	BL: zkh BL: zkh BL: vph BL: zkh zkh zkh	n=168 en 258 n=19 n=74 n= 73 n=98 n=54	B B A2 C A2 B	1	+		+		+	+	± ± ±		± +	+
OLD	Hopman-Rock ea 2001 <sup>40</sup>	ha-pr	n = 60	B	3	+				+		-	±		+
subschaal BPS*	van Loveren ea, 1988 <sup>26</sup>	vzh	n=60-300	C	3	+			±	+			+		
subschalen GIP*	Verstraten, 1988 <sup>28</sup> De Jonghe ea, 1994 <sup>41</sup> De Jonghe ea, 1995 <sup>6</sup> De Jonghe, 1996 <sup>42</sup>	vph, db pz pz pz, vph	n=567 n=195 n=212 n=2845	C B B C	3	± +		±		+		±			
subschalen GIP-28*	De Jonghe ea, 1997 <sup>49</sup>	vp, pz, db	2082	C						+		±			
subschalen GOS-G*	Gorissen, 1986 <sup>43</sup> Gorissen, 1994 <sup>27</sup> Habraken ea, 1995 <sup>44</sup>	vph vph vzh	n=31 n=205 n = 71	C C B	3	± ±	+	+		+		±	+		+
subschalen Nosger *	Spiegel, 1991 <sup>20</sup> Tremmel, 1993 <sup>45</sup> Wahle, 1996 <sup>46</sup>	BL: vph BL: thuis BL: vph	n=32-370 n=60 n=125	B A2 C	2		+	±	+	+	+		+		+
subschaal WCN *	Beenackers, 1999 <sup>48</sup> Altmann, 2000 <sup>29</sup>	zkh rev.c.	n=9 n=7	C C	3			± -						-	

1) See Table 1. Setting: BL=outside the Netherlands; vph=nursing home, vzh=home for the elderly; zkh=hospital; poli=out patient clinic; ha-pr=general practitioner; rev.c=rehab

\*) Data extracted from results subscales.





## CHAPTER 2

# **Daily observation of cognitive functioning in hospitalised patients on acute geriatric wards**

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A. Persoon, L. Joosten-Weyn Banningh, W. van de Vrie, M.G.M. Olde Rikkert, T. van Achterberg

## **ABSTRACT**

### *Background*

Daily observation by nurses of the cognitive function of the patients is of high ecological validity because cognitive functioning is observed in a natural setting around the clock.

### *Aim*

To evaluate why and how geriatric nurses observe the cognitive functioning of their patients.

### *Methods*

A self-developed questionnaire was administered to a purposeful sample of nurses working on geriatric wards of seven acute care hospitals. The questions were open-ended. Data were analysed through content analysis.

### *Results*

The questionnaire was filled in by 97 nurses (response rate 77%). Categorization of the many objectives reported by the nurses revealed four themes: to tailor nursing interventions (51%), to determine discharge arrangements (46%), to support medical diagnosis and therapy (43%) and to map specific elements of functional capacity (34%). The nurses reported also many different domains to observe (mode=2; range 0-7), only 73% of which were actual cognitive domains. The most commonly mentioned cognitive domain was psychomotor behaviour (63%), followed by executive functions (48%), language (37%), attention (33%), thinking (25%) and consciousness (20%).

### *Conclusions*

Geriatric nurses not only made daily observations of their patients' cognitive functioning to support medical diagnoses, but also to guide nursing interventions and to determine discharge arrangements. The assessment domains varied fairly widely, because the participants' understanding of the concept cognitive functioning was vague, incomplete and often incorrect.

### *Relevance to clinical practice*

This is the first study that investigated why geriatric nurses make daily observations of their patients' cognitive functioning. In addition, we explored their understanding of the concept of cognitive functioning. Based on the fact that the content of an assessment is determined by its aim, the objectives to perform daily observations have to be clear and stated explicitly. To observe patients in an unambiguous way, it will be necessary to develop a validated observation scale.

## INTRODUCTION

Determination of a patient's cognitive status is important because the findings affect the process and outcomes of illness and treatment (Foreman et al. 2003). This is especially relevant on acute geriatric hospital wards where patients are admitted because of multiple health problems: combinations of somatic, psychological and social complaints. Most of the patients have some degree of cognitive impairment due to dementia, delirium, or depression.

The term "cognition" has many interpretations. Often, the definition refers to the work by Lezak et al. (2004). They defined it as an information-handling process that covers the whole process of an individual's capacity to perceive, register, store, retrieve and use information (Foreman et al. 2003; Lezak et al. 2004). Comprehensive assessment of cognitive status encompasses physical and neurological examination, medical history, functional status assessment and cognitive testing (Langley 2000). Many instruments have been developed to assess and evaluate cognitive functioning in patients. In these instruments, cognition is commonly broken down into domains that pinpoint specific areas of impairment (Langley 2000). There is no uniform way to classify the domains, so various authors organized the domains in different ways (Dellasega 1998, Foreman et al. 2003, Gazzaniga et al. 2002, Langley 2000, Lezak et al. 2004). Instruments to assess cognitive functioning range from full-scale test batteries that need to be evaluated by neuropsychologists, to instruments that can be used at the bedside by nurses or doctors. Some of the inventories focus on one domain, e.g. orientation, whereas others assess a spectrum of domains (Foreman et al. 2003).

One way to gather information about a patient's cognitive status is by means of daily observation by nurses. These observations are made around the clock over a period of several days and are based on interactions that occur naturally between the patient and nurse. The patients' cognitive abilities are observed in a natural setting, e.g. when taking a bath, having breakfast, meeting other patients, dining with other patients, receiving visitors and resting during the night. This type of information is of high ecological validity, i.e. the findings are generalisable to other settings (Haynes, 2001) because cognitive functioning is observed in a natural setting in contrast with a created test moment. A patient's actual performance is assessed, which completes the information on their cognitive abilities gathered during interviews and neuropsychological tests (Milisen et al. 2006). Daily observation of cognitive functioning is highly valued by nurses and geriatricians and it forms a major task in geriatric nursing. Multiple observations do not form a burden on the patients, they are in no way threatening and they are also a useful means to assess someone who can no longer understand test instructions, or cannot communicate effectively, or is uncooperative (Langley 2000).

Remarkably, although there are some observation scales that provide a quick screening of one or two domains of cognitive functioning (Helses et al. 1987, Morris et al. 1994, Spiegel et al. 1991), no comprehensive scale is available for nurses to observe the severity of cognitive problems in elderly patients. In the nursing guideline 'Assessing Cognitive Function' from the Hartford Institute, the authors pointed out that in contrast with the many neuropsychological tests that are available, daily observation of cognitive functioning is not standardized and the interpretation of behaviour is variable (Foreman et al. 2003). In daily practice, this means that individual nurses observe in their own way and report in free text, without the structure of a printed assessment form. This

procedure is ambiguous and undermines the reliability and validity of the information nurses obtain. Therefore, we examined the level of agreement between two nurses in 60 patients (Persoon et al. 2007). The weighted level of agreement was not very satisfactory: agreement was fair to good in five domains (attention, orientation, thinking, judgment and language) but poor in four domains (consciousness, perception, insight and ADL).

## **AIMS**

The aim of this study was to gain insight into how and why geriatric nurses in the Netherlands observe the daily cognitive functioning of their patients. The following research questions were addressed:

- a) What reasons do geriatric nurses have to observe cognitive functioning?
- b) Which domains of cognitive functioning do geriatric nurses observe?
- c) Do geriatric nurses feel the need to use a standardized assessment form?

## **METHODS**

### *Setting*

Dutch geriatric wards in the acute hospital setting were invited to participate. These wards have an average of 16 to 24 beds and the mean duration of hospitalization is reported to be 17 to 24 days (Huijsman & Zanen 2005). The staff mainly comprises registered nurses, with some nursing assistants. Many of the nurses are qualified clinical geriatric nurses. However, their training does include assessment of their patient's cognitive abilities through tests and interviews, but not through daily observations.

### *Sample and study procedure*

In 2007, the registered nurses working on the geriatric wards at seven hospitals eligible were for inclusion. These seven hospitals (out of 25 hospitals with a geriatric ward in the Netherlands) were selected as a purposeful sample to represent the variety of geriatric departments in acute care in the Netherlands, namely: different parts of the Netherlands, two university hospitals and five teaching hospitals and experience in delirium assessment (two hospitals with completed delirium projects, five with no extra delirium projects). The head nurse invited all the nurses to participate in the study, with the exception of nurses on holiday, nurses on duty (and thus not able to attend the special meeting) and those absent due to sick leave. We found that 127 nurses were eligible. A meeting was organized by the head nurse in which all the present nurses filled out the questionnaire.

### *Data gathering and data analysis*

To obtain information, we developed our own questionnaire. All the questions, except for one, were open ended. Data were analyzed by content analysis, which is a procedure to quantify communication material according to emerging themes and concepts (Polit & Beck 2004). As the nurses were encouraged to give more than one answer, the total number of objectives could exceed the total number of respondents.

#### *a) objectives*

The reasons why the nurse made daily observations of the cognitive functioning of their patients (objectives) were listed. No coding scheme was developed beforehand. Then, data were examined separately by two researchers and units of contents were developed in an iterative process (1<sup>st</sup> and 5<sup>th</sup> author). In this way a coding scheme emerged and quantification became possible (Polit & Beck, 2004).

#### *b) domains of cognitive functioning*

The respondents were asked to describe in their own words the domains of cognitive functioning that they focused on. However, in Dutch geriatric nursing, the term 'domain' is not in common use. Therefore we gave a description of the domain memory/orientation as example in our questionnaire. The domains reported by the nurses, were listed and after that categorised according to an adapted version of 'Assessing cognitive functioning' devised by Foreman et al. (2003). This model is based on the work by Lezak et al. and this is the only guideline for nurses on the cognitive functioning of geriatric patients (2003). The guideline describes the assessment of cognitive functioning within the context of nursing and it excludes aspects such as emotions and behaviour, which is in accordance with the Diagnostic and Statistical Manual of mental disorders/ DSM (APA 2000). In the original guideline, cognitive functioning was divided into the following seven domains: consciousness, attention, perception, memory, thinking, higher cognitive functioning and psychomotor behaviour. We changed the name of the domain 'higher cognitive functioning' into the more prevailing term 'executive functions' and added the domain 'language', because it is perceived as a cognitive function (see for example the DSM classification) (APA 2000).

Listing and classification of the nurses' responses were performed by two researchers (1<sup>st</sup> and 2<sup>nd</sup> author). After that, data were quantified. However, items which could not be categorized into the scheme of cognitive domains were listed and classified into emerging themes.

Furthermore, relations between the number of correctly described domains and background variables: hospital variations (type, nursing care system and number of staff) and variations between the nurses (experience, education and primary nurse) were explored using Pearson's correlation.

#### *c) standardized assessment form*

Question 3 on whether the nurses felt the need for a standardized assessment form for the daily observation of cognitive functioning, was dealt with by means of a dichotomous item.

## **RESULTS**

#### *Sample characteristics*

A total of 97 nurses completed our self-developed questionnaire (response rate 77%). About two thirds of them were licensed practical nurses (63%) and one third were registered nurses (34%). Slightly less than half of the respondents had five years of experience on a geriatric ward (49%), while the others were less experienced. A fairly large proportion of the nurses had specialized in geriatric care (43%), another subgroup had not taken an advanced course in geriatric nursing (49%) and the rest were still in

geriatric nursing training (8%). The nurses were employed at university centres (31%) or general hospitals (69%). More than half of the nurses (56%) were providing care according to the model of primary nursing care (four hospitals), while the others were following a functional nursing model (three hospitals). Three quarters of the nurses working within the primary nursing system were actually primary nurses (n=42). Per hospital, the number of nurses varied from 0.52 to 1.52 full-time equivalents per bed.

#### *a) Objectives*

There were several concurrent reasons why the nurses observed the daily cognitive functioning of their geriatric patients. The four most commonly mentioned reasons were: to determine the setting needed after hospitalization (34%), to guide behavioural interventions and approaches (27%), to inform and educate family members (26%) and to help make a diagnosis (25%) (see Table 1, column 2). After categorization of all the reasons, four themes emerged (see Table 1, column 3). Three out of the four themes focused on the consequences of the level of cognitive functioning on the medical and nursing care. The first theme focused on nursing interventions (51%): 27% intended to incorporate the results of the daily observation into the individual nursing care plan and especially into the behavioural interventions, while 26% intended to use the findings to inform, educate and support family members. The second theme focused on discharge arrangements (46%): 34% of the nurses made judgements about the setting and care requirements, while 20% made judgements about the nursing care requirements after discharge. The third theme focused on the medical diagnosis and therapy (43%): 25% of the nurses aimed to differentiate between types of dementia, while 22% aimed to help determine the therapy.

The fourth theme focused on functional abilities in specific areas: a patient's decision-making ability, insight into their illness and functioning, ability to learn new tasks or new behaviour, autonomy and legal competence (34%).

#### *b) Domains of cognitive functioning*

The respondents were asked to describe, in their own words, which domains they considered to be aspects of cognitive functioning. A total of 420 answers were given that ranged from 0 to 10 domains per nurse. We found that 307 descriptions could be classified into one of the cognitive domains of the adapted framework of Foreman et al. (73%), as shown in Table 2. The other 113 descriptions did not fit into the adapted framework (27%), see Table 3.

The nurses mentioned 0 to 6 cognitive domains (mean=2.5; mode=2), with the exclusion of the domain memory, because this was the example given in the questionnaire. Two thirds of the nurses observed aspects of the domain psychomotor behaviour, especially the activities of daily living and apraxia (62%). Half of the nurses observed aspects of executive functioning, such as insight, judgement, organizing and planning in general (48%). One third of the nurses observed language, namely language expression (37%), attention, in particular concentration and performing two tasks at once (33%) and perception (31%). Thinking was observed by one quarter of the respondents, with items such as reasoning, logical or abstract thinking and delusions (25%).

The comprehensiveness of the cognitive observation was only statistically significantly related to the nursing model: the nurses involved in primary nursing systems

assessed cognitive functioning in more detail than the nurses working in accordance with a functional model ( $p < 0.05$ ).

The respondents also mentioned 113 issues or items that could not be classified into the cognitive domains of the adapted framework of Foreman et al. For example (Table 3): behavioural problems (30%), emotions (15%), specific disorders related to cognitive functioning (such as loss of control, loss of decorum, 10%), social behaviour (9%), physical complaints (6%), diseases and disorders (5%), more general functioning (such as coping, 5%) and biological clock (5%).

### *c) standardized assessment form*

The vast majority of the respondents (89%) indicated that they would prefer to use a standardized assessment form to observe daily cognitive functioning.

## **DISCUSSION**

The aim of this study was to gain insight into the daily observation of cognitive functioning by geriatric nurses in the Netherlands. To our knowledge, this is the first study that investigated nurses' objectives and the cognitive domains they target.

It appeared that geriatric nurses' reasons to observe cognitive functioning were not simple, but two-fold and sometimes even four-fold (question a). The most common reasons were to settle discharge arrangements, to determine behavioural interventions, to inform and educate relatives and to support the diagnosis. Categorization of the reasons revealed four themes: to guide nursing interventions, to organize discharge arrangements, to support the medical diagnosis and therapy, and to map specific elements of functional capacity. The theme 'to support the medical diagnosis', has been mentioned in the literature, but then the nurses used (simple) neuropsychological tools to test the patients. (Dellasega 1998, Flaherty et al. 2003, Foreman et al. 1996; Foreman & Vermeersch 1996, Lang 2001, Langley 2000, Maas 2001, Matteson et al. 1997). Only Foreman et al. and Milisen et al. have drawn attention to assessment by daily observation as a means to support the diagnosis (2003, 2006). In their reports, they spoke of the importance of 'informal' assessments and defined these as structured observations of the interactions between the nurse and the patient. They probably used the term 'informal' because the observations were not made on the basis of a valid observation scale. Our study demonstrated clearly that the objectives of many of the nurses were as well to tailor nursing interventions and to settle discharge arrangements. The literature mentions that mapping of the patient's remaining cognitive abilities will help towards the comprehension of his/her behaviour so that it can be explained or clarified to the patient's relatives (Milisen et al. 2006). Knowledge of a patient's (remaining) cognitive abilities makes it possible to develop individualized and appropriate plans of care (Dellasega 1998, Flaherty et al. 2003, Foreman et al. 2003, Langley 2000, Milisen et al. 2006), to offer environments and programmes that promote safety and maximize function (Maas 2001) and to settle discharge arrangements ((Dellasega 1998, Langley 2000, Milisen et al. 2006). Our findings confirmed the focus of attention on these aspects of nursing practice, but only by half of the nurses.

This study illustrated that the nurses' conception of cognitive functioning was vague, incomplete and sometimes incorrect (research question b). Only three quarters of the issues they described could be classified into the cognitive domains of the adapted



framework proposed by Foreman et al. The others were examples of non-cognitive issues, such as physical or emotional functioning. Each cognitive domain was mentioned by 20 to 62% of the nurses. Most of the nurses mentioned only two (out of the seven) domains and were thus missing important elements. This study confirmed the multiform interpretation of the concept of cognitive functioning described in the Introduction and showed that it also applies to geriatric nurses. The diversity of conceptions among geriatric nurses may be due to the nonuniformity of definitions in the literature.

Almost all the nurses indicated that they would like to use a standardized assessment form to observe cognitive functioning (question c). This was hardly surprising in view of the above-described results. We are confident that it indicates awareness of too much inter-observer variability between nurses (Persoon et al. 2007).

The use of open questions in our questionnaire was a strong point in the methodology of our study although we might have missed answers which the nurses just forgot to mention by themselves. However, the open questions decreased the chance of obtaining socially desirable answers and we presume it increased the validity of the data concerning the objectives of the nurses and the cognitive domains they assessed. As the study sample was representative and sufficiently large, we believe that our results can be generalized to all nurses on geriatric hospital wards in the Netherlands. A limitation of the study was that although we performed content analysis on the answers to the questionnaires, we did not analyse any practical aspects, e.g. the contents of the patient files.

In summary, the geriatric nurses not only observed daily cognitive functioning to support medical diagnoses, but also and more importantly to guide nursing interventions and settle discharge arrangements. Their understanding of the concept of cognitive functioning was vague, incomplete and sometimes incorrect. There was wide variation in the reasons why the nurses observed their patients and in their conceptualization of cognition.

## **RELEVANCE TO CLINICAL PRACTICE**

‘Nurses play a pivotal role in the recognition, diagnosis and care of cognitive decline in elderly people because they have significantly, more frequent and continuous contact with the elderly and their relatives. They are the obvious persons to gather information about the cognitive and social functioning of their patients and to compare relevant details.’ (Milisen et al. 2006, p. 16). To fulfil the role of daily observer in a professional way, the assessments must be performed systematically, unambiguously, purposefully, objectively and free from individual interpretation. In our study, we identified flaws in the purposefulness and unambiguously of the assessment methods. The quality of the daily observations can be expected to improve after the ambiguity has been removed. And the use of an observation scale will contribute to the profession of geriatric nursing and increase the input of nurses within the multidisciplinary setting. This leads to the following two recommendations.

Firstly, the objectives of the daily observation have to be stated clearly and explicitly by the nursing profession because the content of an assessment is determined by its aim (Haynes 2001). We found that these objectives had four themes: to tailor nursing interventions, to determine discharge arrangements, to support medical diagnosis and therapy, and to map specific elements of functional capacity.

Secondly, it is necessary to develop an observation scale. Its use can be expected to increase the level of agreement between nurses and help them to meet their objectives more effectively. In view of the multiple purposes of cognitive assessment, a comprehensive multidimensional observation scale is required (Foreman et al. 2003, Haynes 2001). The question is how far should the standardization go? At present, we can see two possibilities: fairly rough standardization by asking the nurses to describe their observations per domain in free text or strict standardization by giving detailed descriptions of the items in each domain.

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**Table 1. Nurses' objectives to observe the cognitive functioning of geriatric in-patients (n=97) categorized under four emerging themes**

Objectives	Objectives %*	Themes %**
<b>ON A MEDICAL AND NURSING LEVEL</b>		
<i>1) Focus on nursing interventions</i>		51
To guide behavioural interventions, how to approach a patient	27	
To inform, educate or support family members	26	
To support and coach patients	8	
To prevent health problems	4	
<i>2) Focus on settling discharge arrangements</i>		46
To determine setting needed after discharge	34	
To determine nursing care needed after discharge	20	
<i>3) Focus on medical diagnosis and therapy</i>		43
To diagnose disease and type of dementia	25	
To determine therapy	22	
To monitor course of disease and evaluate treatment	7	
<b>ON A PATIENT LEVEL</b>		
<i>4) Focus on functional capacity</i>		34
To assess independence	18	
To assess insight, decision-making capacity, legal competence	10	
To understand patient's behaviour	8	
To assess learning abilities	5	
To assess what can be expected	5	

\* Respondents formulated a maximum of three objectives; therefore the total percentage of objectives could exceed 100%.

\*\* Objectives reported in free text were categorized under four emerging themes. As the respondents often formulated more than one objective that fell within the same theme, the total percentage of nurses per theme was lower than the sum of the separate objectives.

**Table 2. Cognitive items (307) described by the geriatric nurses (n=97) categorized in cognitive domains according to the adapted guideline of Foreman *et al.***

<b>Domains *</b>	<b>Number mentioned</b>	<b>Nurses (%) **</b>
<i>Psychomotor behaviour:</i> Plan, organize, coordinate and perform ADL; apraxia; psychomotor disorders	72	62
<i>Executive functions:</i> Insight into problems, illness and daily functioning; judgment; organizing, structuring and planning in general; initiative and repetition	77	48
<i>Language:</i> Language expression: speaking, talking,, writing; reading; difficulties finding the right words; express feelings	41	37
<i>Attention and concentration:</i> Concentration; perform 2 tasks at once	38	33
<i>Perception:</i> Recognizing objects; agnosias; visual hallucinations	32	31
<i>Thinking and reasoning:</i> Reasoning; logical and abstract thinking; coherent thinking; problem solving; intellect; illusions; paranoia; obsessions	28	25
<i>Consciousness:</i> Alertness; drowsiness	19	20

\* The domain Memory and orientation was given as an example in the questionnaire and therefore not reported by the nurses.

\*\* Respondents formulated a maximum of six cognitive domains. Therefore the total percentage over the seven domains could exceed 100%.

**Table 3. Miscellaneous issues (n=113) described by the geriatric nurses (n=97) categorized under 9 emerging themes**

<b>Non-cognitive items</b>	<b>Number mentioned</b>	<b>Nurses (%) *</b>
<i>Behavioural problems:</i> Confusion, restlessness, disinhibition, agitation at night, attention seeking, correction and regulation intolerance, behavioural disorders	36	30
<i>Emotions:</i> Agitation, aggression, apathy, fear, feeling lonely, sadness	17	15
<i>Specific behaviour due to cognitive disorders:</i> Loss of decorum, loss of control, confabulation, disguise, changes in character	12	10
<i>Social behaviour:</i> Empathy, social abilities, interacting with environment	10	9
<i>Physical complaints:</i> Pain, incontinence, dehydration	6	6
<i>Diseases, disorders:</i> Delirium, cerebrovascular accident, depression, personality disorders, psychosocial disorders	8	5
<i>General functioning:</i> Coping, ability to adapt, empathy, autonomous functioning	6	5
<i>Biological clock:</i> Disorders in day and night rhythm	5	5
<u><i>Others</i></u>	13	10





## CHAPTER 3

# **Agreement between the assessments of cognitive functioning of hospitalised geriatric patients by nurses on acute geriatric wards**

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A. Persoon, L. Joosten-Weyn Banningh, W. van de Vrie, M.G.M. Olde Rikkert, T. van Achterberg



## **ABSTRACT**

### *Objectives*

To determine the agreement between assessments of cognitive functioning of hospitalized geriatric patients by nurses on geriatric wards.

### *Methods*

Survey. 84 nurses from 7 hospitals made daily assessments of 60 patients. Measurement instruments: a self-developed 10-item scale with 10 cognitive domains and the Clinical Dementia Rating scale.

### *Results*

Percentage of simple agreement between the 10 items of cognitive functioning: 20% to 56%; when one difference in category was accepted: 61% to 90%. Weighted kappas were between 0.17 and 0.76. Agreement between the 6 items of the CDR was higher (simple: 42-65%;  $\pm 1$  difference: 82-90%;  $K_w$ : 0.60 - 0.74).

### *Conclusion*

Agreement between nurses' assessments of cognitive functioning was poor to fairly good. Improvements should be made to the cognitive assessment abilities of geriatric nurses. Special training program and a valid observation scale are necessary.

Keywords: geriatrics, nursing, cognitive functioning, agreement, interrater reliability

## INTRODUCTION

Elderly patients are generally admitted to geriatric hospital wards because they are suffering from several health problems simultaneously. All are old (>65 yrs); most are very old (>80 yrs). Their frailty comprises a combination of somatic, psychiatric and social problems. Geriatric assessment focuses on issues such as disentanglement of somatic and psychiatric disorders and cognitive functioning. Determination of an individual's cognitive status is extremely important, because it affects the process and outcomes of illness and treatment.

Cognition is the term currently used to address the wide area of information handling. Cognitive functioning covers the whole process by which an individual perceives, registers, stores, retrieves and uses information.<sup>(1;2)</sup> Various domains that pinpoint specific areas of this process conceptualize cognition. Impairment of cognitive abilities can be present in separate domains or in different combinations.<sup>(3)</sup> However, there is no uniform way to classify the domains, as various authors have used different categories.<sup>(1-5)</sup> This is reflected in the many instruments that can be employed to assess and evaluate cognitive functioning. These vary from full-scale test batteries for neuropsychologists, to instruments that can be used by nurses or doctors at the bedside. Nurses contribute to geriatric assessment by making valuable daily observations of the patient that cover 24 hours a day and last for several days. This provides the unique opportunity to improve the reliability of cognitive assessment by recording serial measurements and assessing patients' intra-individual changes in cognitive functioning. Moreover, these observations are ecological: the patients are observed in a fairly natural setting during their daily activities, e.g. bathing, dressing, using the toilet, meeting other patients and visitors, etcetera.

The nursing protocol 'Assessing Cognitive Function'<sup>(1)</sup> encompasses the following cognitive domains: consciousness, attention, perception, memory, thinking, psychomotor behaviour, insight and judgment. It enables formal assessment by means of standardized tests that can be applied at one single moment and informal assessment by means of observation of a patient's behaviour over several days. Foreman et al. pointed out that this daily observation protocol is not standardized and the interpretation of behaviour is variable. Therefore, the reliability and validity of the daily assessments are unknown.<sup>(1)</sup> As far as we know, no comprehensive measurement instrument is available to assess cognitive functioning of elderly patients by means of by daily observation.<sup>(1-3;6)</sup> Nurses are free to choose their own style of observation and report in free text, and without the structure of a printed form. Therefore, the process from observation to weighing of the cognitive abilities is unclear and the validity and reliability of daily observation can be questioned. Our study addressed the reliability of daily observation to assess the cognitive functioning of the geriatric patients: 'What is the agreement between the assessments made by Dutch nurses on acute geriatric wards?' The aim was to gain greater insight into the interrater reliability of the daily assessments made by nurses who had not received any specific training in this field and who did not use any type of formal instrument.

## METHODS

### *Subjects and setting*

Nurses working on the geriatric wards of seven hospitals formed our purposeful sample. These seven hospitals (out of 25 hospitals with a geriatric ward in the Netherlands) were

considered to represent the variety of geriatric acute care departments in the Netherlands, i.e. different regions of the Netherlands, university and teaching hospitals (two and five, respectively) and experience with delirium assessment (two hospitals with completed delirium projects and five with any extra delirium projects).

On average, Dutch geriatric wards have 16 to 24 beds, while the usual duration of hospitalization is 17 to 24 days.<sup>(7)</sup> Licensed practical nurses and registered nurses care for the geriatric patients. Many nurses had followed an advanced course in clinical geriatric nursing; but this did not include special training in cognitive ability assessment.

The nurses working at the two hospitals with completed delirium projects had received training to recognize specific signs of dysfunction associated with delirium. Nurses were recruited for the study by the head nurse, who organized a special meeting on their ward. After exclusion of the nurses on holiday, nurses on duty and nurses absent due to illness, 127 nurses were eligible to participate. All of them were asked to give verbal informed consent. Patients were included in our study if their cognitive functioning had been observed in the week prior to data collection. Each nurse was asked to report on two patients who they had observed in the past week. The patients were assessed by two or more nurses.

Data were collected anonymously and no patient identifiers were communicated between the respondents and the researchers.

#### *Measurement instruments*

A self-developed 10-items scale was used to the patients' level of patients' level of cognitive functioning. Each item addressed a cognitive domain: consciousness, attention/concentration, perception, orientation, memory, insight, thinking, judgment, activity of daily living (ADL) and language. Items were not further described or illustrated. A score (no impairment, questionable, mild, moderate, severe impairment) was assigned to each item on a 5-point Likert type scale to score the level of impairment. The ten domains were derived from the American nurses' guideline 'Assessing cognitive function', developed by the John A. Hartford Foundation Institute for Geriatric Nursing.<sup>(1)</sup>

To measure the level of agreement between the nurses' scores on a well validated scale, the Clinical Dementia Rating (CDR) was also completed.<sup>(8)</sup> The CDR scale is a widely to stage dementia. It comprises six items ( memory, orientation, judgment and problem solving, community affairs, home and hobbies, and personal care) that can be scored on a 5-point Likert type scale.<sup>(8)</sup> In contrast with the above-mentioned self-developed scale, five answer categories are described in detail for each item to indicate the level of impairment, but fewer cognitive domains are investigated. The CDR takes the form of a semi-structured interview: it incorporates information from the patient and other informants. Agreement in ratings between trained raters and a golden standard is known to be moderate fair to good.<sup>(9-11)</sup>

Data were obtained on several background variables: the type of nursing care system, type of hospital, previous delirium project, workload and the degree of familiarity with the patient; all the variables were dichotomized.

#### *Analysis*

To measure the agreement in scores between nurses, we made three computations: the percentage of simple agreement, the percentage of agreement when one difference in category was accepted and weighted kappa agreement (Kw). Simple agreement was defined as the percentage of agreement between two observers according to a categorical scale of measurement with several categories.<sup>(12)</sup> Weighted kappa is the chance-corrected agreement (kappa) that gives a partial credit for responses that differ

by only one or two categories (the weighting).(12) We employed a correction of 1 point for one category of disagreement between the nurses and 0 points for more than 1 category of disagreement. When more than two nurses had rated a patient, we randomly selected two raters. The following interpretations were applied: poor agreement:  $K_w < .4$ ; fair to good:  $.4 \leq K_w \leq .75$ ; excellent:  $K_w > .75$ .(13) Correlations between the kappas and the background variables were explored using the sign test, which is a non-parametric analysis to compare the means between two groups.(14) Statistics were calculated using SAS.

## RESULTS

A total of 98 nurses participated in the study (77% response rate). Assessments from 84 nurses could be used to make agreement computations on the basis of the availability of two or more reports on the same patients. The remaining 14 nurses were excluded, because only one assessment had been made of their patients. In the group of 84 nurses, 55 were licensed nurses (65%) and 29 were registered nurses (35%); 35 of them received advanced education in clinical geriatric nursing (40%); 67 had more than two years of experience in geriatric nursing (80%).

A total of 60 patients had been assessed by two to six nurses.

### *Agreement*

The percentage of simple agreement between the respondents on the ten items of cognitive functioning varied from 20% to 57%, with an average of 41%, as is shown in Table 1. When one difference in category was accepted, agreement ranged from 61% to 90%, with an average of 75%. Weighted kappas were between 0.17 and 0.76, which means that in four domains (consciousness, perception, insight and ADL) agreement was poor, in five domains (attention, orientation, thinking, judgment and language) was fair to good agreement and in one domain (memory) agreement was excellent.

Agreement between the nurses' assessments of the six items of the CDR was higher than the agreement on the 10 cognitive domains, see Table 1. Simple agreement varied from 42 to 65%, with an average of 54%. When 1 difference in category was accepted, agreement varied between 82 and 90%, with an average of 87%. Weighted kappas were between 0.60 and 0.74, which means that agreement was fair to good on all six items.

There was a significant correlation in the level of agreement between the nurses' assessments on one out of the five background variables: agreement was higher between the nurses working in a primary nursing system than between the nurses working in accordance with a functional model ( $p=0.02$ ). Higher average percentages of agreement were found when the nurses had a lighter workload, were more familiar with a patient, were working at university hospitals and hospitals with completed delirium projects, but the differences were not statistically significant.

## DISCUSSION

To determine the agreement between nurses' assessments of cognitive functioning in geriatric patients, ten domains were scored by means of daily observation. In half of the domains, the weighted Cohen's kappas were in half of the domains fair to good, but in the other they were only poor. Based on the ample weighting involved in accepting 1 difference in category as complete agreement between the assessments of two nurses,

we had expected a higher agreement level than the average of 75%. This result implies that about one quarter of the pairs of cognitive functioning assessments differed by two categories or more on a 5 point Likert-type scale. In contrast, when the nurses used the well-validated CDR scale the agreement in all six domains the agreement was fair to good. This suggests that nurses are able to make reliable assessments of their patients' cognitive abilities, but that the level of reliability depends on the type of instrument used and the cognitive domains assessed. Use of reliable and validated scale can be expected to improve the agreement between assessments.

The type of nursing system was the only background variable found to be significantly related to the level of agreement: cognitive functioning assessments from the nurses working in a primary nursing care system showed higher interrater agreement than nurses working in a functional system. This result confirms that primary nursing care is an excellent care model for elderly people, as it emphasizes continuity, coordination and accountability.<sup>(15)</sup> The background variable of familiarity with the patient did not show any statistically significant difference in agreement between more familiarity and less familiarity with the patient. Thus, even when the nurses only knew the patient "slightly", this was sufficient for them to make adequate assessments of cognitive functioning.

A limitation of the study was that we asked the nurses to make their assessments during a special meeting without access to the nursing records. Therefore, the nurses had to score the level of cognitive functioning from memory. It is likely that the level of agreement would have been higher if the assessments had been made during working hours and with the use of the nursing records. We believe that our results can be generalized to all nurses on geriatric hospital wards in the Netherlands, because the sample was representative and the response rate was sufficiently high. However, the degree to which our results can be generalized internationally depends on the target population and the care setting. To enable comparisons, we have presented clear descriptions of our setting and sample.

In our opinion, intrarater reliability should be examined more closely and this also applies to validity of the cognitive assessments made by nurses on the basis of daily observation. Especially the construct validity is important, i.e. the degree to which the items of an instrument measure the object under investigation. When no golden standard is available, several well-defined underlying factors (constructs) need to be examined.<sup>(12)</sup> The validity of measuring cognitive functioning by means of daily observation should be evaluated with more specific instruments that validate aspects of cognitive functioning, i.e. the domains.

The aim of our study was to gain greater insight into the interrater reliability of nurses' assessments of patients' cognitive functioning in daily practice. Given the importance and vulnerability of cognitive functioning in frail elderly patients, nurses' assessments of these processes are essential.<sup>(1)</sup> Sufficient reliability of the geriatric assessment is an important first precondition for good quality. To our knowledge, this is the first study that investigated the level of agreement between nurses' assessments of cognitive functioning in geriatric patients. Our results showed that agreement was moderate, but that special training and the availability of a valid observation scale are necessary.

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**Table 1 Agreement between pairs of assessments of cognitive functioning in the same patient;  
84 nurses assessed 60 patients**

<b>Cognitive functioning in 10 domains</b>	<b>N</b>	<b>Simple agreement (%)</b>	<b>Agreement <math>\pm 1</math> (%)</b>	<b>Cohen's <math>K_w</math></b>
Consciousness	57	37	61	0.17
Attention/concentration	55	38	73	0.44
Perception	45	38	66	0.31
Orientation	51	47	76	0.51
Memory	49	57	90	0.76
Insight	49	35	67	0.26
Thinking	42	40	83	0.64
Judgment	42	48	86	0.67
Activity daily living	50	20	72	0.38
Language	54	46	78	0.45
<i>Total 10 domains</i>	---	41	75	---
<b>CDR</b>				
Memory	48	42	85	0.68
Orientation	51	47	82	0.60
Judgment and problem solving	46	52	87	0.70
Community affairs	40	58	90	0.74
Home and hobbies	37	65	86	0.67
Personal care	50	60	90	0.69
<i>Total CDR</i>	---	54	87	---







## CHAPTER 4

# **How older people nurses assess cognitive functioning through daily observation**

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A. Persoon, M. van der Crujsen, N. Schlattmann, F. Simmes, T. van Achterberg.

## **ABSTRACT**

### *Background:*

In case of cognitive decline not due to delirium, daily observation of cognitive functioning by nurses has not been standardized at hospital wards specialized in the care for older people.

### *Aim:*

To obtain knowledge and insight into how older people nurses observe the cognitive functioning of their patients.

### *Design:*

A qualitative study with purposive sampling and semi-structured interviews.

### *Methods:*

Data were obtained by interviewing 10 Dutch nursing experts in the field of cognitive functioning in older patients. The interviews were recorded, transcribed and analysed by two independent researchers.

### *Results:*

All the respondents stated that daily observation of cognitive functioning yields valuable information. The concept of cognitive functioning was operationalised differently per institute and per nurse. Observation and reporting methods varied, as well as the goals set by the nurses. Nurses reported using many days of observation to reach final judgements.

### *Conclusions:*

Observation of cognitive functioning should comprise several cognitive domains, restricted to few days of observation and aiming for contributing to medical diagnosis and guiding nursing interventions.

### *Relevance to clinical practice:*

Until a valid instrument becomes available, nursing staff will have to standardise the daily observations themselves. This paper describes input to achieve this.

## BACKGROUND

Patients are admitted to a ward specialized in older people in acute hospitals because of multiple health problems concurrently which complicate medical diagnoses. Many patients demonstrate some cognitive impairment due a combination of factors like the unusual situation of being admitted to the hospital, serious somatic illness or psychiatric syndromes such as delirium, dementia and depression. Nursing staff is always alert for delirium because of the high incidence rate and the need of immediate treatment. At Dutch older people wards, screening for delirium is common and standardized by means of using validated screening tools such as Confusion Assessment Method (CAM), Delirium Observation Screening Scale (DOS), and Delirium-O-Meter (DOM).

In case of cognitive decline, but in the absence of delirium as symptoms are lacking or have faded, further cognitive diagnostics are executed to recognize other brain dysfunction, such as dementia or brain injury. Comprehensive assessment of cognitive status encompasses physical and neurological examination, medical history, functional status assessment, neuroimaging, and neuropsychological testing. One additional way of gathering information is through direct observations by nurses. Information can be gathered directly by the nurse during the natural opportunities that arise in patient care activities, such as bathing, at meal times or during transfers. As patients are observed in a fairly natural setting during their daily activities (Langley, 2000), the assessment of cognitive abilities are of high ecological validity. This means that the results of the observation of the cognitive abilities are strongly related to the daily practice (Tupper & Cicerone, 1990). Foreman *et al.* and Milisen *et al.* explicitly stressed the importance of observing patients in their natural environment as a method to complete the cognitive assessment as it adds different pieces to the overall picture of the patient (1996; 2006; respectively). Daily observation of patient's behaviour is a major part of nursing (Lekan-Rutledge, 1997). Yet, several standardized problem focused observation scales are used to assess agitation, pain, depression, and delirium (such as the Cohen-Mansfield Agitation Inventory/CMAI, Pain Assessment in Advanced Dementia/ PAINAD, Cornell Scale for Depression in Dementia, Confusion Assessment Method/CAM).

Assessment of cognitive functioning by nurses is mentioned in the context of contributing to the medical diagnoses of brain dysfunction (brain injuries and dementia's) and thus to initiate the correct treatment (Dellasega 1998, Flaherty *et al.* 2003, Gerdner & Hall 2001). At the same time, several authors mentioned that nurses assess the patients' cognitive functioning because their cognitive abilities steer nursing care. Goals are to gain a greater understanding of the patient, to enable better communication with the patient, to be able to explain the patient's behaviour to relatives, to be aware of interference of cognitive dysfunction with other nursing problems (e.g. pain) and to plan discharge policy (Flaherty *et al.* 2003, Foreman *et al.* 2003, Langley 2000, Milisen *et al.* 2006). This was confirmed in our study in 90 older people nurses: nurses assessed cognitive functioning to support medical diagnosis, to guide nursing interventions and to determine discharge arrangements (Persoon *et al.* 2009).

This same study showed that no standardized observation scale was used by nurses to assess cognitively mediated activities. In the protocols handbook edited by the Hartford Foundation, we found one protocol, 'Assessing cognition' in which the authors described nurses' observation as an 'informal part'. They labelled it as an informal observation because it is not standardized and the interpretation of behaviour can vary (Foreman *et al.*, 2004). The next edition of this handbook did not even mention this protocol anymore (Braes *et al.*, 2008). We searched the literature for a comprehensive observation tool comprising a wide range of cognitive domains (Persoon *et al.*, 2006).

Although several observation scales were traced, not all cognitive domains were included, or other elements than cognitive functioning were included, such as mood or behavioural problems. Later on, in 2007, the BATCH is described as a valid tool for comprehensive observation of cognitive functioning. Yet, as far as we know, the BATCH is not used in Europe or United States. This means that nurses do not use a standardized scale, and observe cognitive functioning in their own way.

## AIMS

As no validated scale is used, nurses in daily practice choose their own way of observing cognitive functioning and record in free text. We were interested into the actual method of assessing cognitive function by older people nurses: the aim of this study was to gain insight into their methods. Therefore, we interviewed nurse specialists concerning the following research questions:

- (1) Which cognitive domains are observed by older people bedside nurses?
- (2) What do they record during the observations and to what extent do they interpret their findings?
- (3) Which bottlenecks do older people nurses currently encounter in their observations of cognitive functioning in patients admitted to geriatric hospital wards?
- (4) What are the opinions of experienced older people nurses about the preconditions and need for a formal observation instrument to assess cognitive functioning?

In our study, we defined cognition as an information-handling aspect and cognitive functioning covers the process by which an individual perceives, registers, stores, retrieves and uses information (Lezak *et al.*, 2004).

## METHODS

### *Design*

As we wanted to gain insight into the actual processes to assess cognitive functioning, a qualitative approach was most appropriate. Data were obtained through purposive sampling; ten experienced older people nurses were interviewed by means of semi-structured interviews.

### *Study participants*

A purposive sample was drawn by selecting Dutch older people nursing experts. Inclusion criteria were clinical experience of at least five years, active within the Dutch Association of Geriatric Nurses, published (inter)national or be renowned as an expert in the recognition of cognitive problems. We aimed to achieve variation in the participants regarding geographic spread, setting and job function. A total of 12 experts were approached; ten of them agreed to participate, while two refused. One of the nurses refused due to lack of time and the other refused because she currently had less contact with the older people bedside nurses. It was decided to interview these 10 participants first and then judge whether data saturation occurred. After 10 interviews, no new points were brought up, so the number of experts remained at 10. The duration of the study was eight months. The experts were advanced nurse practitioners and some team leaders; see Table 1 for their characteristics.

### *Setting*

About one quarter of the acute care hospitals in the Netherlands have an older people ward (n=25 wards). Patients are admitted because they have multiple health problems and most of them have some degree of cognitive impairment due to dementia, delirium or depression. In general, the wards have an average of 16 to 24 beds and the mean duration of hospitalization is reported to be 17 to 24 days (Huijsman & Zanen, 2005). The nursing staff is highly educated: many registered nurses (bachelor level training) have a specialty in older people (twelve weeks full time training) and they are supported by an advanced nurse.

### *Interviews*

The interviewees were invited to tell us about the methods used by bedside nurses at the older people ward in their hospital in the assessment of cognitive functioning by daily observation. To design the semi-structured interview, a topic list was drawn up on the basis of a literature review. Important subjects that resulted from the literature review were: the concept of cognitive functioning, observation methods used by nurses and barriers in the observations. During the interviews, the continued questioning method was used. The interviews were held alternately by one of the two researchers (2<sup>nd</sup> and 4<sup>th</sup> author) at the hospital of the interviewee and took an average of one hour. Eight of the interviews were tape-recorded and transcribed verbatim. Two interviews were not tape recorded but recorded in writing because of technical problems. Immediately after these two interviews, the notes were transcribed into a report.

### *Data analysis*

The analysis of the ten manuscripts took place in several stages as described by Schmidt (2008). Each manuscript was analyzed before the following interview took place. Firstly, the manuscripts were read intensively and repeatedly by two researchers. Fragments of text were marked that were relevant to answer the four research questions. Secondly, the key points of each fragment were summarized and labelled by the two researchers independently. The aim was to note, for every single interview, the topics that occur and individual aspects of these which can be related. Thirdly, all the manuscripts were coded conform the categories emerged. Particular fragments of the manuscripts were related to one category, similarities and differences between the interviews were articulated.

Apparently, interviewees reported cognitive domains which were observed regularly by older people nurses. Those domains mentioned were categorized and quantified in accordance with the parameters published by Foreman *et al.*: consciousness, attention, memory, thinking, perception, psychomotor behaviour, executive functions (2003).

### *Reliability and validity*

The interviews were conducted by two researchers (2<sup>nd</sup> and 4<sup>th</sup> authors). To ensure that their interview techniques were as similar as possible, the two researchers observed each other during the first three interviews. Each interview was heard and transcribed independently by the two researchers. The transcribed texts were always read by the corresponding interviewee to ensure that the contents of the interview had been expressed correctly. Reliability was increased because the two researchers performed the total analysis step by step independently of each other: transcription of the interview, marking the fragments, marking fragments and assigning labels to fragments (Silverman, 2008). The last step of formulating categories was done by the two researchers together. Use was made of peer debriefing by having a third researcher (3<sup>rd</sup> author) listen in during

two interviews. The labelling and the formulation of the categories were checked by the third and fourth authors.

Seven out of the 10 nursing experts granted the researchers access to existing documents to support the interview. These comprised nursing plans, self-developed observation lists, tuition programs and reports. In this way, information from the interview could be expanded more objectively.

## RESULTS

### *1) cognitive domains observed*

The respondents indicated that during the admission procedure or shortly afterwards, agreements were made about whether or not the patient's cognitive functioning should be observed. Observations by nurses alone were not considered to be sufficient to fully map the cognitive functioning of the patient. The respondents emphasized the importance of information from family members, as well as observations by other disciplines.

In answer to the question *'Which domains do you and your colleagues observe?'*, the respondents mentioned that the nurses at the ward each observe different items. In total, many domains are mentioned (see Table 2). Within the domains, various aspects were observed. A few respondents mentioned aspects that are not part of cognitive functioning as defined by Foreman *et al.*, such as mood, behavioural problems and disturbed day-night rhythm (1996). The respondents felt that there was coherence or a relationship between the domains, but they all had different ideas. For instance, there could be overlap or similarity. Remarks were made such as:

*'Orientation is definitely a form of memory.'*

or:

*'If one domain deteriorates, then the other deteriorates too'.*

Even the hierarchy within the domains was discussed in one case:

*'If the patient isn't very alert, it is difficult to assess cognition. There is a sort of hierarchy: people need to be alert in order to pay attention. And if their attention is poor, then you soon see that cognition is affected. There seems to be some sort of order to things'.*

In contrast, it was mentioned that it is often difficult to assess the relationship between the domains.

According to the respondents, observation comprised of observing activities of daily living (ADL), communication and behaviours in the living room or similar area. The nurses not only observed all sorts of activities, but they also listened to the patients. They observed the patient for longer or shorter periods of the day: sometimes during ADL, sometimes during meals and conversations. This depended to a large extent on how much time they had. The respondents held the view that the first impression is extremely important.

*'Right from the start of admission to the ward, you take notice of how patients introduce themselves, whether they are conscious of themselves and how much they depend on their partner or children'.*

The observation method depended partly on the knowledge and experience of the nurse. Knowledge of the concept of cognitive functioning was considered to be very important. Opinions differed regarding the importance of experience. Some of them felt that experienced nurses were more likely to interpret their observations.

*'Experienced nurses might see everything, but that doesn't mean that they write it all down'.*



## 2) Record

Reports concerning the observed cognitive functioning were written in the patient's hospital file during the shift or at the end of a shift. This was usually described with referring to some cognitive domains, but to the nurses' own discretion. Under these headings, the nurses wrote in free text. The nurses decided what and how much to write. One nurse mentioned that it is instinct to know what to describe. Although they reported on concrete behaviour as much as possible, there were also signs of interpretation. The degree to which this occurred differed per nurse and per situation. One of the respondents said:

*'Within every observation and report there is a bit of interpretation; that is inherent to observing'.*

Another respondent said:

*'You wouldn't be able to keep on describing concrete behaviour week after week. After a few days, the nurses start to make their reports in general terms'.*

One comment about the length of the reports was:

*'Nurses write the most, but it is difficult to know whether it is actually effective'.*

At all ten hospitals and institutes, the nurses made weekly summaries of the reports in preparation for the multidisciplinary meeting. Interpretation sometimes played a role in this process:

*'Sometimes the nurse mainly writes her personal experience with the patient on that morning, even when that is the only time she has seen the patient.'*

## 3) Barriers

According to the majority of respondents, the present methods of observation are useful because they produce information that contributes to the medical and nursing diagnosis and the choice of interventions. However, nine out of the ten respondents mentioned the lack of uniformity in the observation of cognitive functioning. This applied to the contents as well as to the observation method.

On ward level, no agreements had been made about the definition of cognitive functioning. In addition, the policy was not clear about how many days the observation should cover. Several different comments were made on this issue, such as:

*'Sometimes observations are made for weeks on end without any final judgment being made';*

or:

*'Realistically, observations are made throughout the period of admission; it would be short-sighted to draw conclusions after only three day.'*

Comments about stopping the observations included:

*"It sometimes happens that a conclusion is drawn (usually in terms of medical diagnosis) but the observations go on; or that the observations stop but there is no final judgment".*

Another barrier was emphasized by five out of the ten respondents that it was not possible to make good interpretations of the observations, because the starting situation of the patient and the timing of the observations can be of influence.

Comments were also made about the amount of time available to make the observations and the attitude of the nurses towards actual observation:



*"The working pressure of the nurse means that she is often called away from the patient and that she has to work fast, so the observations are not as good"*

#### 4) Observation instrument

All the respondents were of the opinion that an observation instrument would be useful. It would probably solve some of the above-mentioned barriers. Important arguments in favour included the increase in uniformity and the reduction in interpretations by the nurses.

The respondents were in agreement about the feasibility of use: low work-load and simple to use. However, the opinions differed widely about the contents of such an instrument. For some of the respondents, a simple mnemonic would suffice, e.g. in the form of a pocket-size card containing the domains of cognitive functioning. Others would prefer to score the presence or absent of particular type of behaviour. Several times we heard the comment:

*"But you mustn't interview the patient; it has to be about spontaneous behaviour".*

Some of the nurses felt that such instrument should be used three times per day, whereas others said that three times per week would be sufficient. One of the respondents stated that the goal of the observation must be made clear first before it can be decided what the instrument should look like:

*"If the list provides valid and reliable information on which to base a diagnosis or differential diagnosis, then that is sufficient. But for other objectives (nursing interventions), the list might be too concise".*

## CONCLUSION

The aim of our study was to gain insight into the actual method used by nurses to assess cognitive functioning by daily observation, in case delirium is excluded or its symptoms have faded. From the data of the interviewed experts can be concluded that daily observation of cognitive functioning was non-uniform, non-systematic and no final conclusions were drawn after the observation period. When and for how long cognitive functioning was observed generally depended on factors such as the individual knowledge of the nurse and the amount of time available. At the ward level, the concept cognitive functioning was not uniformly operationalized. Many cognitive domains were thought of but no consensus was found on the number and type of cognitive domains. This variety is also seen in other literature: there is no uniform way to classify domains and therefore, various authors organized cognitive domains in different ways (Burns *et al.*, 2004; Dellasega, 1998, Foreman *et al.*, 2003, Gazzaniga *et al.*, 2002, Langley, 2000; Lezak *et al.*, 2004). When using a classification system, it appeared that the variety in cognitive domains mentioned by the 10 experts was almost similar as the variety reported by nurses in a former study (n=90): most often activities related to memory, orientation, executive functions and psychomotor behaviour were observed; less often the language, perception, attention, consciousness (Persoon *et al.*, 2009).

The records on daily observations varied from short to very long. In many cases, concrete behaviour was reported, but also interpretations as made by the nurse. This unequivocal way of observation will be the cause of the moderate agreement between nurses concerning patient's cognitive abilities which was found in a previous study (Persoon *et al.*, 2007). The agreement appeared to be fair to good in half of the cognitive domains, but only poor in the other domains.

The risk of individual interpretations by care providers as well as the need to interpret information is described by Polit and Beck (2004). The difference between two antagonists as objective observable behaviour and interpretation of the behaviour is not as simple as it may look like. The two ways of observing are like two antagonists on one continuous line, changing gradually towards each other. The need to cut down the registration in free text in the nursing files of the patient's behaviour into a summary, leads inevitable to interpretation of the patients' behaviour by nurses. The alternative is to structure observations by a rating scale that requires observers to rate a phenomenon along a descriptive continuum that is typically bipolar (Polit & Beck, 2004).

Furthermore, to observe for an ongoing period as was the situation in most hospitals, is not very efficient. The phenomenon that no conclusions are drawn was quite remarkable. A nurse should only gather information that is relevant (Lekan-Rutledge, 1997). It seems quite easy to overcome this time-consuming behaviour to plan beforehand just a certain time for the observation.

Although the respondents felt that the present observation methods yield important information, in view of the above mentioned shortcomings it cannot be expected that the objectives of the assessment will be easily achieved. An important prerequisite of attributing to diagnoses and guiding nursing care is an standardized unequivocal valid observation.

The conclusions from this study can probably be generalized to all older people wards in the Netherlands. We interviewed 10 nursing experts in the employ of 10 out of the 25 hospitals with a older people ward. During the last few interviews, no new insights emerged. The degree to which our findings can be transferred internationally depends on the patient population in geriatric wards or units. Hence, to enable comparisons, in the paragraph Methods we have presented clear descriptions of our study participants and setting. A limitation of our study was that the description of how nurses observe cognitive functioning was based on interviews and not on practical observations while interviewing might have provoked socially desirable answers. However, our respondents were critical towards themselves and their own practice. Although the study has several limitations, our study has provided a great deal of insight into how nurses currently observe cognitive functioning in older patients.

## **RELEVANCE TO CLINICAL PRACTICE**

On basis of the shortcomings in the daily observation method, we'd like to make two recommendations to improve its quality. Firstly, as all the respondents indicated, there is a need for a standardized observation instrument. With such an instrument, it will be possible to observe systematically and without interpretation (Streiner & Norman, 2003). The instrument has to contribute to the nursing and medical diagnosis and to guide nursing interventions. This requires a fairly precise and extensive observation list, which means that as many domains as possible should be mapped. The most objective observation systems are those that yield the shortest reports with the fewest individual interpretations. Good examples of instruments with very concrete behavioural observations and a simple rating along a descriptive continuum are the Confusion Assessment Method (CAM), Cohen-Mansfield Agitation Inventory (CMAI), the Delirium Observation Screening Scale (DOS) and the Nurses' Observation Scale for Geriatric Patients (NOSGER) (Inouye *et al.*, 1990; Schuurmans *et al.*, 2003; Cohen-Mansfield, 1986; Spiegel *et al.*, 1991, respectively). However, many care providers feel that it is particularly these systems that detract from reality because they are too artificial (Langley, 2000). So,

how detailed the observation instrument must become requires further discussion within the professional groups.

Secondly, until a standardized observation instrument becomes available, wards will have to standardize the daily observations themselves. Agreements have to be made about the objectives of the observation, which domains to observe, the observation method, the reporting method and when final judgments must to be made. With this article, we hope to have provided input to fill these gaps. Consultation with other disciplines about the observation method will undoubtedly form an enrichment for all the relevant professional groups.

Another point of importance is that it will be important to explore more in-depth how exactly nurses tailor their interventions to the patient's cognitive abilities. Up to now, because the assessment of the specific cognitive domains hamper, the approach could not to be planned into detail. However, through the assessment of (dys)function of certain cognitive domains, the nurses have the opportunity to tailor their approach more explicitly to the patient's abilities and to integrate the approach into the nursing care plan. For example, in case of memory problems, information is repeated or written down; but in case of problems in sustaining attention, a quiet environment is offered; and in case of executive problems, information is kept simple.

A final remark concerns the nurse as professional. In contrast with doctors, psychologists and occupational therapists, nurses work as a team: this means that if the team members make their daily observations in a non-systematic manner and achieve different results, this will be noticeable to other disciplines. It is not difficult to imagine that this will put such teamwork under pressure.

## **IMPLICATIONS FOR PRACTICE**

- Daily observation is a major part of nursing.
- Standardization of daily observation for cognitive functioning should include: statement which cognitive domains to assess, objective observable behavioural symptoms, number of day days to observe, standardized form to record and a final conclusion.
- In this way, daily observation for cognitive functioning in the older patients can contribute to medical and nursing diagnoses and steer nursing interventions.

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**Table 1: Characteristics of the experts**

No	Sex	Age	Education (1)	Job title (2)	Setting (3)	Experience (years)	Active	Publications
1	F	> 45	GN	GN	Univ	5-10		
2	M	30-45	MA	NP	TH	> 10	+	
3	F	< 30	NS	NS	TH	5-10	+	
4	M	> 45	MA	NS	TH	> 10	+	+
5	F	30-45	GN	TL	TH	> 10	+	
6	V	30-45	NS	NS	TH	> 10	+	
7	M	30-45	GN	TL	Univ	5-10		
8	M	> 45	NS	NP	Psych.	> 10		+
9	F	30-45	NS	NS	TH	5-10		
10	F	30-45	MA	teacher	HS	> 10	+	+

- 1) Education is the highest education level: RN/GN=registered nurse with geriatric education; NS = nurse specialist; MA = Master of Arts.
- 2) Job title: GN=geriatric nurse; NP-Nurse Practitioner; TL=geriatric nurse and team leader/senior nurse.
- 3) Setting: Univ=university hospital; TH=teaching hospital; Psych=psychiatric institute; HS=higher education college.
- 4) Active= Active within professional association.

**Table 2: Experts' opinions (n=10) about the domains of cognitive functioning observed**

Domain	No. of times mentioned
Memory	10
Executive functions *	10
Orientation	9
Psychomotor behaviour	9
Language	8
Perception	4
Attention/alertness	3
Consciousness	3

\* Executive functions: all mentioned one or more executive functions, such as thinking, higher cognitive functions, insight, judgment, initiative, decision making, organizing.





## CHAPTER 5

# **Assessment of memory function: the relation between daily observation and neuropsychological tests performance**

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A. Persoon, R.P.C. Kessels, L. Joosten-Weyn Banningh, J. Verkoelen, T. van Achterberg, M.G.M. Olde Rikkert



## **ABSTRACT**

### *Background*

The aim of the study was to explore the value of a daily observation scale in the assessment of patients' memory function by nurses on a geriatric ward.

### *Methods*

An observational study of 50 geriatric inpatients. The relationship between the memory items of the Nurses' Behavioral Rating Scale for Geriatric Inpatients (GIP) and four types of neuropsychological memory tests was examined: visual paired-associate learning (Visual Association Test, VAT), word-list learning (Eight Word Test, 8WT from the Amsterdam Dementia Screening, ADS), and the subtests Route Recall and Story Recall from the Rivermead Behavioural Memory Test, RBMT. Correlations with the overall measures assessing level of dementia such as MMSE, CDR and GDS-15 were examined as well.

### *Results*

The Pearson's correlation coefficients between GIP and the four memory tests were between 0.45 and 0.71 ( $p < 0.01$ ). The GIP correlations with the MMSE and CDR were 0.63 and 0.46, respectively ( $p < 0.01$ ). No significant correlation was found with the GDS-15. Statistically significant differences in GIP memory scores between groups with dementia and non-demented patients were found ( $p < 0.01$ ).

### *Conclusion*

Results indicate that an observation scale of memory function may have value for providing information about the underlying memory impairment. The results of nurses' observations may be used in triage contributing to diagnostic process by selecting patients for requiring further neuropsychological assessment.

## BACKGROUND

Behavioral observation in an inpatient setting has been claimed to contribute to cognitive assessment, supplementing information obtained from medical history and cognitive testing (Dellasega, 1998; Langley, 2000; Foreman *et al.*, 2003; Spiegel *et al.*, 1991; Bouwens *et al.*, 2008; Inouye *et al.*, 2001). The level and nature of everyday cognitive functioning can provide valid information for medical diagnoses, nursing interventions, interpretation of neuropsychological tests, discharge arrangements and placement (Langley, 2000; Marson & Herbert, 2006). In nursing, daily practice involves observing admitted patients' behavior around the clock during patient-care activities, such as assisting with personal care, transfers or meal times. It has been claimed that reliable and valid assessment of cognitive functioning through daily observation is problematic, because overt behavioral deficits and disabilities may not be directly linked to a specific underlying neurocognitive impairment (Lezak *et al.*, 2004). For instance, observed "forgetting" may be the result of memory impairment, or it may also be due to cognitive deficits in other domains (e.g., impaired attention) or psychiatric symptoms (such as depression). In daily practice, however, monitoring of patients' behavior can provide a basis for initial screening for cognitive decline.

In this study, we focused on the validity of daily observation of memory function by means of a standardized observation scale in relation to neuropsychological memory tests. Although many behavioral scales include items addressing memory function, observation scales including a specific memory subscale are limited in number. Examples of memory (sub)scales are the Cognitive Problem Scale (CPS), part of the Resident Assessment Instrument (RAI; Morris *et al.*, 1994) and the Disoriented Behaviour subscale of the Multidimensional Observation Scale for Elderly Subjects (MOSES; Helmes *et al.*, 1987). Furthermore, memory (sub)scales are typically validated against nonspecific cognitive measures, such as the Mini Mental State Examination. Only the Nurses' Observation Scale for Geriatric Patients (NOSGER) memory subscale has been additionally validated against several specific neuropsychological memory tests (Wahle *et al.*, 1996; Spiegel *et al.*, 1991), demonstrating satisfying concurrent validity. As we are interested in the value of observation scales as a way to assess memory function, we'd like to explore the value of other observation scales as well. In the present study, we examined the construct validity of the memory subscale of the Nurses' Behavioural Rating Scale for Geriatric InPatients (GIP) (Verstralen, 1988). In Dutch nursing homes, the GIP is widely used in the geriatric clinical practice and its psychometric qualities have been studied extensively (De Jonghe *et al.*, 1996; De Jonghe *et al.*, 1994; De Jonghe *et al.*, 1995). The GIP memory subscale focuses on geriatric inpatients as well as the NOSGER, but the subscale items differ (see Table 1).

## METHODS

### *Sample and setting*

Consecutive patients admitted to the geriatric ward of the Radboud University Nijmegen Medical Centre from July to December 2007 were recruited if they fulfilled the inclusion criteria of understanding simple instructions, and being able to complete the 45-minute neuropsychological test battery. Further, exclusion criteria were applied screening for delirium (Delirium Observation Scale/DOS < 3; Schuurmans *et al.*, 2003), being bedridden, severe dementia (Clinical Dementia Rating Scale/CDR = 3; Hughes *et al.*, 1982), severe hallucinations, and not being able to complete the 45-minute neuropsychological test

battery. All nurses participating in the study were registered nurses (n=25), and some were qualified clinical geriatric nurses with a two-year specialist training (n=15).

### *GIP*

As memory observation scale, we used the 6 items from the Memory subscale from the GIP (range 0 to 3; lower scores indicating more memory problems). The GIP contains 82 items in total, subdivided into 14 subscales on a 4-point Likert scale, covering aspects of cognitive and non-cognitive functioning in geriatric patients. The content validity of the total GIP has been assessed; the construct validity showed satisfactory correlation with the Cognitive Screening Test<sup>5</sup> (De Jonghe *et al.*, 1996). The internal consistency was good (Cronbach's  $\alpha$ : 0.86), while the interrater reliability of the memory subscale was fair to moderate ( $\kappa$  = 0.47). Furthermore, the memory subscale ratings were highly related to clinical diagnosis: mean scores in patient groups with dementia, psychosis, depression were 9.54, 3.61 and 1.72, respectively. In our study, the nurse observed the patient in routine clinical care during an 8-hour shift. The memory subscale was filled in during day and evening shifts for three consecutive days, revealing six assessments per patient. The GIP memory score was calculated by computing the mean of the 6 items per observation period, and then computing the mean of the six observation periods, resulting in a score between 0 and 3, low scores indicating more memory problems.

### *Data gathering and analysis*

In a 45-minute neuropsychological test battery, four different types of memory tasks were conducted: visual paired-associate learning, word-list learning, and story recall and spatial memory. The following tests were selected that are valid and reliable measures of different aspects of memory function and widely used in Dutch clinical geriatric practice: Visual Association Test (VAT; Lindeboom *et al.*, 2002), the Eight-Word Verbal Learning Test (8WT, from the Amsterdam Dementia Screening; ADS; Van der Pol & Liem, 1992), and the subtests Route Recall and Story Recall from the Rivermead Behavioural Memory Test (RBMT; Wilson *et al.*, 1985), respectively. The VAT is a brief visual associative learning task based on imagery mnemonics (range 0-12). The 8WT measures the quality of learning a list of words in several rounds (range 12-55). The Route Recall (range 0-16) and Story Recall (range 0-42) subtests of the RBMT provide ecologically valid measures of spatial memory and verbal memory respectively (Lezak *et al.*, 2004). All tests were administered by a trained junior psychologist who was blind to the memory GIP observation ratings, on one of the three days of the GIP observation period.

Additionally, we determined the global cognitive status using the MMSE (Folstein *et al.*, 1975), and screened for depressive symptoms through the Geriatric Depression Scale (GDS-15; Yesahava *et al.*, 1982) both administered together with the neuropsychological tests. Severity of dementia was determined by means of CDR at the day of discharge. Co-morbidity was measured through the Cumulative Illness Rating Scale-Geriatric (CIRS-G; range 0 – 52; higher scores indicate higher level of co-morbidity; Miller *et al.*, 1992).

Pearson's correlation coefficients were computed to determine the correlation between the scores on the memory subscale and the four neuropsychological test performances. Statistically significant coefficients higher than 0.4 were considered as meaningful correlations (Slick, 2006). We expected no significant correlation between the memory observation score and the depression scale. Differences in GIP memory scores in groups without dementia (CDR=0) and with dementia (CDR=1 or 2), in groups with different level of memory impairment (MMSE>23, MMSE=18-23; and MMSE<18) and in

groups with and without depressive symptoms ( $GDS > 5$ ,  $GDS \leq 5$ ) were analyzed by means of t-test and ANOVA test.

### *Sample*

129 patients were admitted to the geriatric ward during the study period, 63 of whom fulfilled the inclusion criteria. For 13 patients, it was not possible to collect data because of early discharge or logistic reasons, resulting in a total of 50 patients who completed the full test battery. 64% of the participants were female; the mean age was 83 ( $sd=6.7$ , range 72-97). The lowest level of education was primary school, 30%, and the highest level was university education, 10%. The mean number of different drugs per day was 4.6 ( $sd=2.5$ , range 0-10).

## **RESULTS**

The mean GIP memory score was 2.3; minimum score 1.4, maximum score 2.9, standard deviation 0.42 (range 0-3, lower scores indicating more memory problems) ( $n=50$ ). The intraclass correlation between the six measurement moments was 0.59. The mean severity score of co-morbidity was 14 ( $sd=5.4$ , range: 3-28) on the CIRS-G scale, reflecting considerably disease burden. According to the CDR criteria, 36% of the respondents had no dementia ( $CDR=0$ ), 30% had questionable or mild dementia ( $CDR=0.5$  or 1), and 30% moderate dementia ( $CDR=2$ ). 25% of the patients reported significant depressive symptoms on the GDS-15 ( $GDS > 5$ ). Based on the MMSE 38% of the respondents had no or mild indications for cognitive impairment ( $MMSE \geq 24$ ), 32% had moderate impairment ( $MMSE 18-23$ ) and 30% had severe cognitive impairment ( $MMSE \leq 17$ ).

Analyses revealed that the correlation between the results on the memory observation scale and the performance on four neuropsychological memory tests were statistically significant and higher than 0.4, namely between 0.45 and 0.71, as shown in Table 2. The correlations among the four memory tests themselves varied between 0.51 and 0.80 ( $p < 0.05$ ). Furthermore, the correlation with the MMSE was 0.63, and with the dementia severity scale CDR -0.46, both statistically significant ( $p < 0.01$ ). No significant correlation was found between the memory observation scale and depression score GDS-15 ( $p > 0.05$ ).

The mean GIP memory scores differed statistically significant ( $p < 0.01$ ) between patients with dementia and non-demented patients: 2.0 and 2.4, respectively. The mean GIP memory scores also differed statistically significant ( $p < 0.5$ ) between different groups of memory impairment: 2.6, 2.4 en 1.9 respectively. The mean GIP memory scores in the group with or without depressive symptoms did not differ: 2.3 and 2.4, respectively.

## **CONCLUSION**

This study is one of the first studies to explore the value of an observation scale for daily memory function. Correlations between the daily observation scale scores and neuropsychological tests performances were all in the fair to moderate range. The correlations between GIP and the neuropsychological tests were of similar strength as the correlations among the four memory tests, suggesting that the daily observation may be a valid way to assess memory function. This is in line with the NOSGER study in which results of observation items were correlated with results of neuropsychological tests (Wahle *et al.*, 1996; Spiegel *et al.*, 1991). However, the correlations between observation scores and measures for global cognitive decline (MMSE and CDR) were moderate as well. This may suggest that the observation scale may be tapping into global cognitive status

rather than specific memory impairment. To examine this more in-depth, we recommend comparing the results of the observation scale with neuropsychological tests examining other cognitive domains (such as attention or executive function).

Strength of the observation scale was that no correlation was found with the depression scores. As differentiation between memory impairment and depression is rather complicated in clinical practice, this finding is an important added value.

Overall, the results of our study are in line with the results of the NOSGER validation study that an observation scale for memory function may have value for providing information on underlying memory impairment. The bedside nurses needed no extra education to fill out the GIP-form and they reached fair to moderate levels of correlations with neuropsychological tests. The results of our study can be generalized to geriatric in patients with considerable variety in severity of cognitive decline and overall disease burden. We recommend further research for the validity of observation scales in other settings of elderly care (psychiatric hospital, home care, nursing homes, and homes for the elderly, outpatient clinic).

A valid and reliable assessment of cognitive function by nurses is important because nurses tailor their interventions to the patient's cognitive abilities, and are often asked to contribute to the diagnostic process as well. The observational results may be used in triage contributing to diagnosis by pointing the need for neuropsychological assessment. Daily observation is an easy, inexpensive and highly feasible assessment procedure for nurses and can be conducted continuously during the daily care. It is not burdensome to the patient and can even be performed in very ill patients. Therefore, memory observation scales have significant potential to contribute to the quality of care for the increasing populations of older patients.

## DESCRIPTION OF AUTHOR'S ROLES

Anke Persoon, Roy Kessels and Liesbeth and Joosten-Weyn Banningh designed the study. Jill Verkoelen collected the data and analysed the data together with Anke Persoon. Anke Persoon en Roy Kessels wrote the paper. Marcel Olde Rikkert and Theo van Achterberg reviewed the design and the manuscript critically.

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**Table 1: NOSGER and Gip memory subscales**

<b>NOSGER memory scale (community and geriatric institution setting)</b>
<p>The patient:</p> <ul style="list-style-type: none"><li>• .. remembers a point in conversation after interruption.</li><li>• .. repeats the same point in conversation over and over.</li><li>• .. remembers names of close friends.</li><li>• .. remembers where clothes and other things are placed.</li><li>• .. confuses the identity of some people with others.</li></ul>
<b>GIP memory subscale (geriatric institution setting)</b>
<p>The patient:</p> <ul style="list-style-type: none"><li>• .. knows other patients by name.</li><li>• .. knows close family members by name.</li><li>• .. remembers what has been said or asked.</li><li>• .. forgets that he/she is admitted/ institutionalized (and not paying a visit).</li><li>• .. knows his/her own name.</li><li>• .. appears to forget his/her current activity.</li><li>• .. appears to recognize staff members.</li></ul>

**Table 2: Correlations between daily observation, four neuropsychological memory tests, MMSE, CDR and GDS-15**

<i>theme</i>	Scale ( <i>range</i> )	n	x (sd)	daily observation	neuropsychological tests			
				GIP	VAT	8WT	RBMT -route	RBMT -story
<i>memory impairment</i>	visual learning/VAT (0-12)	49	6.6 (4.4)	0.76**	--	--	--	--
	word learning/8WT (12-55)	47	33.3 (11.2)	0.60**	0.80**	--	--	--
	route recall/RBMT (0-16)	48	6.8 (4.0)	0.52**	0.51**	0.54**	--	--
	story recall/RBMT (0-42)	50	8.0 (8.1)	0.51**	0.59**	0.66**	0.65**	--
<i>cognitive function</i>	MMSE (0-30)	48	21.3 (5.8)	0.64**	0.72**	0.67**	0.56**	0.56**
<i>severity of dementia</i>	CDR (0-3)	40	1.0 (0.8)	-0.47**	0.57**	0.51**	-0.43*	-0.50**
<i>depression</i>	GDS-15 (0-15)	48	4.2 (2.4)	-0.08	-0.15	0.39**	-0.29	-0.30*

\*\* Correlation is significant at the 0.01 level (2-tailed)

\* Correlation is significant at the 0.05 level (2-tailed)





## CHAPTER 6

# **Development of the Nurses' Observation Scale of Cognitive Abilities (Nosca)**

*Submitted for publication*

A. Persoon, L. Joosten-Weyn Banningh, W. van de Vrie, M.G.M. Olde Rikkert, T. van Achterberg

## **ABSTRACT**

### *Background*

To assess a patient's cognitive functioning is an important issue because nurses tailor their nursing interventions to the patient's cognitive abilities. In addition, the assessment contributes to the medical diagnosis or it facilitates further neuropsychological examination. Daily observation at the bedside is a way of screening that fits very well into the nursing practice. Although some observation scales exist concerning one or more cognitive domains, so far, no scale has been available which assesses cognitive functioning in a comprehensive way.

### *Objective*

To develop an observation scale with an accepted level of content validity and which assesses elderly patients' cognitive functioning in a comprehensive way.

### *Methods*

Delphi technique, a multidisciplinary panel of 16 experts developed the scale by consensus through four Delphi rounds (>70% agreement). The International Classification of Functioning/ICF was used as a theoretical framework. Preliminary items were mainly derived from existing related observation scales.

### *Results*

After the first two Delphi rounds, the panel reached consensus about 8 cognitive domains and 17 sub domains. One other domain, Consciousness (consisting of two sub domains), was seen as a prerequisite of a cognitive functioning. After two other rounds, 39 items were selected, divided over 8 domains and 17 sub domains. These were preceded by 4 items for the domain Consciousness.

### *Discussion*

The Nurses' Observation Scale Cognitive Abilities (NOSCA) was successfully designed. The content validity of the scale is high because the scale sufficiently represents the concept of cognitive functioning: the experts reached a consensus of 70% or higher on all domains and items included; and no domains or items were lacking. As a next research step, the psychometric qualities of the NOSCA will have to be tested.

## BACKGROUND

In this paper, we describe the development of an observation scale for the assessment of cognitive functioning in elderly patients admitted to hospital wards. The Nurses' Observation Scale of Cognitive Abilities (NOSCA) structures the way nurses observe geriatric patients' cognitive abilities at the bedside in a comprehensive way. The scale focuses on patients with possible brain dysfunction due to dementia or brain injury.

The frailty of elderly hospital patients is most often comprised of somatic, psychological and social problems simultaneously, which may result in problems in cognitive functioning, mood, behavior, activities of daily life, and thus quality of life. The determination of the individual's specific cognitive status is important for two reasons. First, the choices of nursing interventions are substantially influenced by the patient's cognitive abilities. The patient's cognitive abilities guides the nursing care considerably because they influence communication, support to be given in daily life activities, recognition and treatment of other nursing problems (e.g. pain, behavioral problems), and the discharge policy (Flaherty et al., 2003; Foreman et al., 2003; Langley, 2000; Milisen et al., 2006; Persoon et al., 2009). The nurse's approach of individual patients is even influenced by the type of cognitive problem. In case of memory problems, for example, information is repeated or written down; in case of problems in sustaining attention, a quiet environment is offered; and in case of executive problems, information is kept simple. Second, to contribute to the medical diagnosis is another reason to determine the cognitive status. Neuropsychiatric disorders often show specific types of cognitive dysfunctioning. For example, memory problems are often the first sign of Alzheimer's disease, loss of awareness in frontotemporal dementia, and hallucinations in delirium and Dementia with Lewy Bodies.

### *The concept of cognitive functioning*

Cognitive functioning is a term currently used to address the wide area of handling information. It covers the whole process through which an individual perceives, registers, stores, retrieves and uses information (Lezak *et al.*, 2004). The concept of cognitive functioning is operationalized by breaking it down into several cognitive domains. Unfortunately, there is no uniform way to classify the domains; different authors organize the cognitive domains in different ways (Dellasega, 1998; Foreman et al., 2003; Gazzaniga et al., 2002; Langley, 2000; Lezak et al, 2004). Although all agree that memory is a cognitive domain, problems in orientation are sometimes included or might be perceived as a separate autonomous domain. Consciousness, orientation, language, mood, behavior, executive functions, perception, thinking and higher cognitive functioning are interpreted as autonomous domains, as part of one another's, as a condition for cognitive functioning or as no cognitive domain at all. Of course, the multiple interpretations of the concept of cognitive functions are explained by the fact that all cognitive domains are interdependent and influence one another. In daily practice however, this leads to misunderstanding among caregivers in understanding the patient's cognitive abilities (Langley, 2000).

### *Observation of cognitive functioning*

In acute hospitals, elderly patients are often admitted because of co-morbidity. Therefore, diagnoses are complex. Depression, delirium and dementia might occur in combination with serious somatic health problems. Recognition of delirium is important because of its high incidence rate and reversible character. Several valid delirium observation scales, such as the Confusion Assessment Method (CAM; Inouye et al., 1990) and Delirium Observation Scale (DOS; Schuurmans et al., 1997) exist. However, comprehensive cognitive assessment has to be carried out as other types of brain dysfunction, such as dementia or brain injury, could occur. This requires collaboration of geriatricians, psychiatrists, neuropsychologists, nurses and occupational therapists. A possible diagnosis is then based on medical history, neurological assessment, neuropsychological assessment, and neuroimaging. These various assessment types complement one another. The neuropsychological examination ranges from full-scale test batteries to instruments that can be used at the bedside by nurses or doctors. Some of the instruments focus on just one domain, e.g. memory, whereas others assess a spectrum of domains (Burns *et al.*, 2004; Dellasega, 1998; Flaherty et al., 2003; Lezak et al., 2004).

Direct observation of the patient's cognitive abilities complements the cognitive assessment (Bouwens et al., 2008; Milisen et al., 2006). Nurses at geriatric wards gather information about a patient's cognitive status by means of direct observation. Daily observation of the patient covers 24 hours a day and may last for several days. Direct observations are based on informal interactions between the patient and nurse, e.g. when taking a bath, having breakfast, during transfers or when interacting with other patients. The observation is not threatening, burdensome or stressful for patients. A patient's co-operation is not necessary and observation can be conducted even when patients are too ill for neuropsychological testing. Other than testing, which assesses cognitive abilities under optimal experimental conditions, direct observation assesses a person's cognitive abilities in daily life. Therefore, results from daily observation are of high ecological validity as it is linked to the natural setting of daily life and does not depend on one specific test moment (Bouwens et al., 2008) (Tupper & Cicerone, 1990). Observation may improve the reliability of cognitive assessment by recording serial observations on several consecutive days. Furthermore, observation fits very well into nurses' practice, because information is directly accessible during patient care encounters.

One problem with direct observation is its standardization (Langley, 2000). The use of well-validated observation scales is a necessary condition for good quality care (Streiner & Norman, 2003). Yet, well-validated observation scales are rather scarce, although some good examples exist in geriatrics, e.g. for depression (Cornell Scale for Depression in Dementia), pain (Pain Assessment in Advanced Dementia/PAINAD), aggression (Cohen's Mansfield Agitation Scale/CMAI), and as mentioned above, for delirium (Alexopoulos et al., 1988; Warden et al., 2003; Cohen-Mansfield, 1986). We searched literature up to 2007 for observation scales for cognition, however excluding the delirium screening instruments. The scales identified through this search are presented in Table 1. We found instruments which assess the cognitive functioning in a limited way (not divided into subscales of cognitive domains), facilitate just one or two cognitive domains, are too specific for nurses (the A-one), and many were combined with issues such as mood. We

concluded that not one valid observation scale for the comprehensive assessment of cognitive functioning in relations to possible dementia or brain injury was available for nurses (Persoon et al., 2006). However, there was one protocol which was meant as a general approach to the assessment of cognitive functioning within the context of nursing (Foreman et al., 2003). This protocol distinguishes two ways of assessment: one formal way by means of standardized validated tests and one informal way by means of structured observation of a patient's behavior over several days. The authors pointed out that the latter one is not standardized or validated and the interpretation of behavior may vary.

In daily practice, this means that individual nurses observe cognitive functioning in patients in a non-methodological way. This undermines the reliability and validity of the information obtained, as we demonstrated in two studies on Dutch geriatric hospital wards (Persoon et al., 2007; Persoon et al., 2009). Nurses in these studies assessed different cognitive domains per patient, aimed at different goals and only a moderate agreement was reached between nurses.

## **OBJECTIVES**

The aim of this study was to develop an observation scale with an accepted level of content validity which assesses elderly patients' cognitive functioning in a comprehensive way, including a wide range of cognitive domains. The scale to be developed should fulfill certain preconditions:

1. it should be fit to apply in the population of geriatric patients admitted in acute care hospitals;
2. it should structure around-the-clock-observations by nurses and possibly include all interactions that naturally occur between patient and nurse, during moments such as bathing, meal times or transfers;
3. it should serve the goals that are important in daily practice: enable tailoring an individual (nursing) care plan and contribute to the diagnostic process.

## **METHODS**

### *Content validity*

The work of Haynes (2001), Polit & Beck (2004) Streiner & Norman (2003), and Foreman et al. (2003) about the development of measurement (cognitive) scales was used as a basis. All suggested that we should explicitly decide on the aim and context of the measurement instrument to be developed. Most important in designing a measurement instrument is maximizing the content validity. Content validity concerns the conceptualization of the concept and the degree in which the scale represents the concept. Thus, content validity is the degree to which an instrument has an appropriate number of items for the construct being measured (Polit & Beck, 2004). As no uniform way to classify the domains was found in literature, we used a panel of experts to evaluate and document the content validity of the scale developed (Polit & Beck, 2004). We obtained a written judgment from the experts concerning their opinion on the construct and the items of the scale by means of the Delphi technique. In several rounds, during which experts' preferences were integrated, we tried to achieve consensus

concerning the construct of the scale, which was operationalized by the cognitive domains (phase 1), and its items (phase 2). In phase 3, we conducted a preliminary test of its feasibility.

#### *Theoretical framework*

We departed from the definition of cognitive function as cited by the only nursing protocol found in literature (Foreman et al., 2003) and which was based on the work of Lezak: 'Cognitive functioning encompasses the processes by which an individual perceives, registers, stores, retrieves and uses information' (Lezak et al., 2004). As the scale had to ground on a firm theoretical basis and no consensus was found in the geriatric, psychiatric or neuropsychological field, we selected the more general health based ICF, the International Classification of Functioning (WHO, 2001). The ICF includes a classification system of functions, in which Chapter 1 states the Mental Functions. Some of these mental functions relate to cognitive functions.

To enhance reliability, items had to be written in observable patient activities or behavior, noticeable for all observers, so that bias by interpretation of the observer would be minimized. As the patient's cognitive functioning varies on the moment of the day, type of activity or interaction with others, we preferred more than one observation. We hypothesized that observation should take place during three consecutive days in order to obtain sufficiently reliable outcome and address inter-daily variation. To improve reliability, the scale had to be filled out at the end of every shift.

We have taken notice of the work by colleagues who have already accomplished much in observation scales. Thus, items could be derived from other related cognitive scales (see Table 1) if adjustable to our criteria.

#### *Multidisciplinary panel*

The multidisciplinary panel consisted of 16 experts and was composed of geriatric nurses (2x), advanced nurses in geriatrics (5x), nurse lecturer in geriatrics (1x), geriatricians (3x), neuropsychologists (4x) and one occupational therapist (1x), see Table 2. All of them were experts in cognition in older people and had many years of clinical practice experience. Of the advanced nurses, two had additional experience in developing a measurement instrument for elderly people, two nurses were familiar with the ICF and four of them had published (internationally) about cognitive functioning. Three out of the four neuropsychologists had experience in developing a measurement instrument and had published in international journals. Geriatricians were selected because of their clinical expertise and the research done. Of the originally invited experts, only one refused because the Delphi rounds would be too time-consuming. All the experts received information about the objective of the observation scale, the setting and the theoretical framework.

#### *Phase 1: domains included*

In this phase, the construction of the scale was established by means of the 1<sup>st</sup> and 2<sup>nd</sup> Delphi rounds. The aim was to determine the cognitive domains to be included in the scale. In the 1<sup>st</sup> Delphi round, nine cognitive domains from chapter 1 Mental Status from the ICF were presented to the panel for possible inclusion in the observation scale. This included the ICF definition of the cognitive domain and 19 ICF sub domains. Furthermore,

all functions as described in this chapter were presented, so experts were able to judge the representativeness of the nine domains proposed. The experts had to respond in the following way:

- Is the domain relevant for the concept of cognitive functioning, with a view to the objective and setting in which the observation scale will be used? Are the ICF label and ICF definition well-formulated?
- Is the sub domain relevant for the domain? Are the ICF label and ICF definition well-formulated?
- Do all domains taken together sufficiently represent the concept of cognitive functioning? Are any domains lacking?

At least 70% of the experts had to agree with a proposed domain. Suggestions from the individual expert for rephrasing or adjustments were presented to the panel for judgment in the second round, as well as new (sub) domains suggested. Then too, a 70% consensus was required before being accepted in the new scale.

### *Phase 2: item selection*

In this phase, the items of the scale were determined by means of the 3<sup>rd</sup> and 4<sup>th</sup> Delphi rounds. Central in this phase was the question whether an item was relevant to a (sub) domain and whether the items sufficiently represented the domain. The items presented to the panel were mainly derived from other observation scales (see Table 1), although some came from a separate study in which nurses described in their own words in which way they observed cognitive domains (n=97). In total, this resulted in 173 items. All the items were reformulated into the same sentence structure, for example: 'The patient is able to locate his/her own bed'. Furthermore, we placed the items into matching domains and sub domains. Beforehand, we estimated that a number of six items per cognitive domain was reasonable to reach reliability.

In the 3<sup>rd</sup> round, we presented the panel the 173 items, divided into the (sub) domains. The experts had to answer the following questions:

- Is the item relevant to the (sub) domain, with a view to the objective and setting in which the observation scale will be used?
- Which of the items are most relevant for the (sub) domain?
- Do the items represent the sub domain? Are items lacking?

Items which were relevant according to 70% of the panel were listed. Then, we checked whether the items approved were independent of each other. When we had to choose between too many approved items, we selected the best observable behavior or activity. After this, we checked whether the approved items of a cognitive domain differentiated from items in the other cognitive domains. If not, we selected the item which seemed to be most appropriate for a certain domain. Finally, we added the suggestions made by the experts concerning rephrasing of items or new suggested items.

In the 4<sup>th</sup> Delphi round, items which were still under discussion, newly proposed or located in another (sub) domain were re-evaluated by the experts.

### *Phase 3: pretest*

In this phase, the feasibility of the observation scale was tested in a small study. First of all, an instruction was written, stating that the items of the scale had to be read carefully at the beginning of the shift, and had to be filled out at the end of the shift. Over a period



of two weeks, consecutive nurses from one geriatric ward were asked to fill out the observation scale based on their observation of one patient during their shift. Nurses were asked for comments on instruction or on the observation scale and those were processed, if necessary. After seven nurses had given their comments, no further suggestions for adjustments arose. The following questions were posed:

- Was the instruction clear?
- Were the items unambiguous? Was it easy to fill out the items?
- Show me how you filled out the observation scale for this particular patient and account you're your score.
- How long did it take?

## RESULTS

### *Phase 1: domains included*

In the first two Delphi rounds, the response by the 16 panel members was 100%. In Table 3, an overview of the panel's acceptance of the (sub) domains and their suggestions is given. After the 1<sup>st</sup> Delphi round, all nine proposed domains were accepted (>80% agreement), as well as 16 out of the 19 proposed sub domains. Nine suggestions for including new sub domains were made. The response on the Consciousness domain showed insufficient consensus: although 81% of the experts saw this domain as part of the cognitive function scale, several experts also suggested rephrasing because consciousness is only a prerequisite for cognitive functioning and should therefore have another position in the observation scale compared to the other cognitive domains. We presented this suggestion to the panel in the second Delphi round.

After the 2<sup>nd</sup> Delphi round, five out of the nine newly suggested sub domains were accepted by the panel (>80% agreement). 81% Out of the panel agreed that Consciousness should have a distinct place in the observation scale. Some controversy arose around two sub domains. First, the sub domain Dividing attention was perceived as relevant in the first round (75%) but in the second round only 56% of the panel agreed to include this sub domain. Next, the sub domain Content of thoughts was, as suggested by experts in the first round, added to the 2<sup>nd</sup> round and although 81% of the panel agreed to include this sub domain, 64% wished to rephrase. So, the panel was consulted by email as to the question whether these two sub domains should (not) be included. Thirteen out of the 16 experts responded and the conclusion was that the sub domain Dividing attention should not be included (56% agreed) while the reformulation of the sub domain Content of thoughts was agreed on (85%).

In sum, after two Delphi rounds and one follow-up mail, the panel reached consensus on the construct of cognitive function by means of 8 domains and 17 sub domains, see Table 4. Besides, the domain of Consciousness (consisting of two sub domains) was seen as something to be assessed beforehand as a prerequisite to cognitive functioning.

### *Phase 2: item selection*

In the 3<sup>rd</sup> and 4<sup>th</sup> Delphi rounds, 15 and 16 out of the 16 panel members responded, respectively. After the 3<sup>rd</sup> round, it turned out that 58 from the 173 items were judged relevant (>70% agreement). From these 58, we checked whether those were independent

of each other, which resulted in a selection of 42 items. Although these 42 items were accepted for the observation scale, the experts suggested rephrasing of seven items and relocating one item into another domain. Three new items were suggested. All in all, in the 4<sup>th</sup> round, 45 items were presented to the panel of which eleven were to be judged again on relevance, rephrasing or representativeness. After the 4<sup>th</sup> round, the panel accepted nine out of the eleven items as being relevant to the new observation scale and well-formulated (>70% agreement).

In sum, after the 3<sup>rd</sup> and 4<sup>th</sup> round, the observation scale consisted of 39 items, divided over 8 domains and 17 sub domains, preceded by 4 items for the domain Consciousness as a condition of cognitive functioning, see *ADDENDUM*.

### *Phase 3: pretest*

The feasibility of the concept of the observation scale was consecutively tested seven times. Five times improvements were made for the sake of clarity; the last two tests gave no rise for adjustments. In general, nurses responded that it was easy to fill out the form and that it took only several minutes per patient per shift. The instruction was changed several times to result in a compact and clear text. The layout of the items was improved, so it contributed to a concise and clear overview. One item was still expressed in a negative style, so we adjusted this sentence. One answer category was added to all items, namely 'don't know', as sometimes the nurse had no opportunity to carefully observe the patient's behavior or activity during the shift.

## **DISCUSSION**

The objective of this study was to develop, with an accepted level of content validity, an observation scale in which cognitive functioning is assessed in a comprehensive way. We succeeded in designing the Nurses' Observation Scale Cognitive Abilities (NOSCA), in which cognitive functioning is classified into eight domains, 17 sub domains and 39 items, preceded by 4 items of the domain Consciousness. The content validity of the NOSCA, as a measurement of the degree in which the scale represents the concept of cognitive functioning, is high for two reasons. First, the minimal agreement between the panel members was 70% and often higher in all domains and items. Second, after the fourth Delphi round, consensus was reached that no domains or items were lacking. In the preceding Delphi rounds, indeed, new suggestions for including domains and items were made by the panel and some were accepted in the next Delphi round. Strength of our procedure was that the panel members represented four disciplines (nursing, neuropsychology, geriatrics and speech therapy). Thus, the quality of the panel was enhanced because each discipline with its specific focus and knowledge on the concept of cognitive functioning provided input in the observation scale.

An equally strong point of the NOSCA and its development is that the scale is based on the ICF's theoretical framework. Although the ICF is not a cognitive concept but a general classification of functioning, it worked out very well, and probably will increase acceptability in the field.

A limitation of the method used is that in designing the NOSCA, due to lack of consensus about the concept of cognitive functioning in literature, we had to develop consensus through the Delphi technique. The disadvantage of this technique is that

consensus depends on the current state of the art within the professional disciplines and that through the years, the state of art will further develop. Especially due to the new technique of neuroimaging, it is expected that knowledge about the functioning of the brains will expand the coming years, as a result of which the observation scale may have to be revised after some time.

After having described the content validity, next the psychometric qualities of the NOSCA have to be tested. Internal consistency, inter rater reliability and intra rater reliability will be examined, as well as construct validity. For the latter, results of the NOSCA will be related to clinical diagnoses, severity of dementia and results of neuropsychological tests. Discriminant validity will be studied through comparing the results of the NOSCA with scores on depression.

In case of positive results on the psychometric qualities, we are convinced that the implications of the NOSCA in nursing practice are important. Nurses will be better equipped to tailor interventions to patients' cognitive abilities. Furthermore, nurses will be able to recognize needs for further neuropsychological examination, which is an important factor for improving clinical efficiency. In geriatric patients, several methods to assess the cognitive functioning have to be combined, and daily observation of cognitive functioning is one important way because of the high ecological value. We presume that the NOSCA will be useful at medical and surgical wards as well, because the items all cover behavior which is easy to observe, and thus the scoring does not require specific geriatric expertise or knowledge. In addition, at other settings like home care and homes for the elderly, it will be useful to assess cognitive functioning. For those different settings, separate validation studies will be necessary.

For the time being, we recommend that nurses closely observe the elderly patient and report the cognitive (dys)functioning and connected behavior. Improving the systematic observations will enhance the ability of nurses to truly tailor to patients' abilities when caring, informing, supporting and educating them. The NOSCA is a promising tool to back up nurses in the challenging observations of cognitive functioning, which may turn out to be useful in the fast growing number of older patients.

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**Table 1: Scales with a focus on direct observation of cognitive function (delirium screening scales excluded), up to 2007**

Scale <sup>1)</sup>	Authors	Setting	Population	Sub-scales concerning cognition <sup>2)</sup>	Cognitive domains <sup>3)</sup> (n)
A-one	Arnadottir, 1990	Hospital	Trauma	motor apraxia, ideational apraxia, body neglect, somatoagnosia, spatial neglect, abnormal tone, perseveration, organization, sequencing, sensory and expressive aphasia, dysarthria, jargon aphasia, paraphasia, perseveration, anomia	5
Bans-S	Volicer et al., 1987	Nursing home	Dementia	speech	1
CPS (MDS/RAI)	Morris et al., 1991	Nursing home	Dementia	comatose, short term memory, decision making, understood by others	4
GIP	Verstraten & Van Eekelen, 1988	Nursing home	Elderly	consciousness, incoherence, memory disorders, disoriented behavior, aimless repetitive behavior, suspiciousness	5
MOSES	Helmes et al., 1987	Nursing home	Elderly	disorientated behavior	1
NOSGER	Spiegel et al., 1991	Hospital	Elderly	memory	1
OLD	Hopman et al., 2001	General practice	Dementia	forgetting, repeating, language, understanding, orientation.	5

1) Scales:

A-one: Árnadóttir OT-ADL Neurobehavioral Evaluation

Bans-S: Bedford Alzheimer Nursing Scale

CPS: Cognitive Problem Scale, subscale from Minium Data Set (MDS) and part of the National Residential assessment Instrument for nursing homes RAI

GIP: Nurses' Behavioural Rating Scale for Geriatric Inpatients

MOSES: Multidimensional Observation Scale for Elderly subjects

NOSGER: Nurses' observations scale for geriatric patients.

OLD: Observation List for early signs of Dementia

2) Titles of the cognitive sub scales. The non-cognitive sub scales are not listed.

3) Cognitive domains of the sub-scales classified by the seven domains as described by Foreman (2003): alertness/consciousness, attention, memory, thinking, perception, psychomotor behavior, higher cognitive functions.

**Table 2: Characteristics of experts in the panel (n=16)**

expert	discipline <sup>1)</sup>	education <sup>2)</sup>	field	setting <sup>3)</sup>	publications <sup>4)</sup>
1	N	RN	geriatrics	UH	--
2	N	MScN	rehabilitation	UH	D
3	N	PhD, MScN	geriatrics	Univ	I
4	N	MANP	psychiatry	Psy	D
5	N	RN	ger	TH	--
6	N	MScN	psychiatry	UH	I
7	N	MScN	Geriatrics	TH	D
8	N	MScN	Geriatrics	TH	D
9	NP	PhD	geriatrics	TH	I
10	NP	PhD	rehabilitation	Univ	I
11	NP	PhD	geriatrics	Univ	I
12	NP	PhD	geriatrics	Univ	I
13	M	MD	geriatrics	UH	--
14	M	MD	psychiatry	Psy	--
15	M	MD	geriatrics	TH	I
16	OCC	Occ	rehabilitation	Reh	-

1) Discipline: N=nursing, NP=neuropsychology; M=medicine, Occ=occupational therapy.

2) Education: GN=geriatric registered nurse, PhD=doctor of philosophy, MScN=master of science in nursing, MANP=NP=master of advanced nursing, MD= medical doctor.

4) Setting: UH=university hospital, Univ=University, Psy=psychiatric hospital, TH=teaching hospital, Rev=rehabilitation centre.

5) Publications: D=Dutch publications, I=international publications.

**Table 3: The construct of cognitive functioning organized into domains as judged by experts (n=16)**

1 <sup>st</sup> DELPHI ROUND					2 <sup>nd</sup> DELPHI ROUND			Inclusion
Proposed domains	Acc. <sup>1)</sup> (%)	Proposed sub domain	Acc. (%)	Formu- lation appr.(%) <sup>2)</sup>	Proposed (sub) domains + rephrasing	Acc. (%)	Formu- lation appr.(%)	Accepted
<b>Consciousness (b110)<sup>3)</sup></b>	82	Quality of consciousn. (b1102)	63	31	deleted			no
					State of conscious. (b1100)	81	70	Yes <sup>1)</sup>
					Continuity of conscious. (b1101)	81	46	Yes <sup>1)</sup>
<b>Attention (b140)</b>	82	Sustaining attention (b1400)	94	67				Yes
		Shifting to attention b1401)	88	79				Yes
		Dividing attention (b1402)	75	75		56		no
<b>Perception (b156)</b>	88	(b1561)	88	79				yes
					(b1560)	56	78	no
					(b1565)	44	58	no
<b>Orientation (b114)</b>	100	Orientation to time (b1140)	100	94				yes
		Orientation to place (b1141)	100	100				yes
		Orientation to person (b1142)	100	94				yes
<b>Memory (b144)</b>	100	Short-term memory (b1440)	88	57	Working memory			yes
		Long-term memory (b1441)	94	73				yes
					Retrieval of old information (b1442.0)	62	80	no
					Storage and retrieval of new information (b1442.1)	56	89	no
<b>Thoughts (b160)</b>	94	Pace of thought (b1600)	82	85				yes
		Form of thought (b1601)	75	92				yes
		Control of thought (b1603)	44	100	Deleted			no
					Content of thoughts (b1602)	88	64	yes
<b>Higher level of cognitive function (b164)</b>	82	Cognitive flexibility (b1643)	63	70	deleted			no
					Organization and Planning (b1641)	94	100	yes
		Insight (b1644)	75	71				yes
		Judgment (b1645)	82	71	deleted			no
					Self regulation (b1648)	75	92	yes
<b>Language (b167)</b>	100	Reception of language (b1670)	88	67				yes
		Expression of language (b1671)	94	75				yes
<b>Mental function of sequencing complex movement (b176)</b>	88	--	--	45	label rephrased: Praxis	88	70	yes

<sup>1)</sup> Acc=domains are accepted; <sup>2)</sup> Appr=Formulation approved; <sup>3)</sup> Consciousness is perceived as a prerequisite of cognitive functioning and therefore should have another position in the observation scale.

**Table 4: Construct and number of items of the NOSCA**

Domain	ICF code	Sub domain	ICF code	N items	N items
<i>Consciousness<sup>1)</sup></i>	<i>b110</i>	<i>State of consciousness</i>	<i>b1100</i>	4	2
		<i>Continuity of consciousn.</i>	<i>b1101</i>		2
Attention	b140	Sustaining attention	b1440	4	2
		Shifting attention	b1401		2
Perception	b156	Visual perception	b1561	2	2
Orientation	b114	Orientation to person	b1142	6	2
		Orientation to place	b1141		2
		Orientation to time	b1140		2
Memory	b144	Short-term memory	b1440	6	3
		Long-term memory	b1441		3
Thoughts	b160	Pace of thought	b1600	5	1
		Form of thought	b1601		2
		Content of thought	b1602		2
Higher cognitive function	b164	Organization and planning	b1641	7	2
		Insight	b1644		3
		Self regulation	b1648		2
Language	b167	Reception of language	b1670	6	2
		Expression of language	b1671		4
Praxis	b176	Praxis	b176	3	3

1) Consciousness is a prerequisite, in such that it is no part of the observation scale, but a condition to be assessed before the observation scale is applied.





# NURSES' OBSERVATION SCALE FOR COGNITIVE ABILITIES (NOSCA)

VERSION 1, AUGUST 2009

## **PLEASE READ THE FOLLOWING INFORMATION ABOUT THE NOSCA:**

### **Aim**

- With this observation list, nurses can gain an impression of whether a patient has cognitive problems and if so, in which domains.
- These observations will be used to a) contribute to the diagnostics at the multidisciplinary meeting and b) to help determine the nursing interventions (approach form, information, family education).

### **Instructions**

- Before starting your shift, read the NOSCA items so that you can make targeted observations and if necessary, induce behaviour (e.g. start a conversation, read a text, get dressed, etc.).
- Create the most optimal conditions for the patient (glasses on, hearing aid working).
- Make observations over a period of two consecutive days, in the day shifts and evening shifts. This will lead to four completed forms per patients. Research has shown that more than four observation periods do not lead to better information.
- Record the observations per shift, so that the report is as reliable as possible.

### **Filling in the form**

- Put a circle around the correct answer in accordance with your observations during one shift. "never" means that the behaviour did not occur during your whole shift. "Repeatedly" means that the behaviour occurred repeatedly during your shift.
- Put a circle around the question mark '?' if the behaviour could not be observed because the situation did not arise (e.g. because the patient did not read anything). Also put a circle around the question mark '?' if the patient could not display certain behaviour (e.g. the patient could not put on his/her clothes in the correct order, because he/she cannot dress independently due to a physical disability).

### **Drawing a conclusion**

- The observations over four shifts lead to one conclusion. Calculate the average score per subscale, representing a cognitive domain, and note it on the summary sheet (range 0-3 points). The NOSCA overall score is calculated by the sum of the eight domains (range 0-24 points).
- Norm values of the subscales: lower scores indicate less cognitive abilities:
  - 3 means that no problems were observed;
  - 2 means that problems sometimes arose;
  - 1 means that problems usually arose;
  - 0 means that problems arose repeatedly.

### CONSCIOUSNESS ICF-code b110

The patient ..	1	0
A .. responds to being spoken to during the day.	Yes	No
B .. has to be shaken awake during the day or evening if you want to communicate with him/her.	No	Yes
C .. falls asleep when no activities are going on.	No	Yes
D .. dozes off during a conversation or activity	No	Yes

**Total Consciousness:** .... points/number of answers = ..... points.

Note: if any of the above items are scored in the right-hand column, then the results of the observations below must be interpreted with caution, because the outcomes might change when consciousness is restored.

### ATTENTION ICF-code b140

The patient ..	3	2	1	0	-
1 .. loses the thread of the conversation (e.g. when giving long answers).	Never	Sometimes	Usually	Repeatedly	?
2 .. stops with the current activity if someone walks by or if he/she hears another voice.	Never	Sometimes	Usually	Repeatedly	?
3 .. can easily switch to a different topic of conversation.	Repeatedly	Usually	Sometimes	Never	?
4 .. can easily switch to a different activity.	Repeatedly	Usually	Sometimes	Never	?

**Total Attention:** .... points/number of answers = ..... points.

### VISUAL PERCEPTION ICF-code b156

The patient ..	3	2	1	0	-
5 .. recognizes an object and knows what it is (e.g. a comb to comb his/her hair, a toilet to relieve him/herself).	Repeatedly	Usually	Sometimes	Never	?
6 .. mistakes an object for something else (e.g. pattern in the curtains for an animal).	Never	Sometimes	Usually	Repeatedly	?

**Total Visual Perception:** .... points/number of answers = ..... points.

### ORIENTATION ICF-code b114

The patient ..	3	2	1	0	-
7 .. is able to locate his/her own bed.	Repeatedly	Usually	Sometimes	Never	?
8 .. thinks that he/she is at home or somewhere else.	Never	Sometimes	Usually	Repeatedly	?
9 ..recognizes other patients and/or staff..	Repeatedly	Usually	Sometimes	Never	?

10	..recognizes family and/or friends..	Repeatedly	Usually	Sometimes	Never	?
11	.. knows whether it is morning, evening or night.	Repeatedly	Usually	Sometimes	Never	?
12	.. knows what time it is.	Repeatedly	Usually	Sometimes	Never	?

**Total Orientation:** .... points/number of answers = ..... points.

#### MEMORY ICF-code b144

The patient ..	3	2	1	0	-
13 .. cannot remember what has just been said.	Never	Sometimes	Usually	Repeatedly	?
14 .. cannot remember where he/she has just left something.	Never	Sometimes	Usually	Repeatedly	?
15 .. can remember the task or instruction during the ADL activities.	Repeatedly	Usually	Sometimes	Never	?
16 .. can remember appointments made today or yesterday.	Repeatedly	Usually	Sometimes	Never	?
17 .. is able to find an object or piece of clothing that he/she has tidied up.	Repeatedly	Usually	Sometimes	Never	?
18 .. knows whether or not objects belong to him/her.	Repeatedly	Usually	Sometimes	Never	?

**Total Memory:** .... points/number of answers = ..... points.

#### THOUGHTS ICF-code b160

The patient ..	3	2	1	0	-
19 .. responds very slowly to a question and/or instruction.	Never	Sometimes	Usually	Repeatedly	?
20 .. gives answers that are relevant to the question.	Repeatedly	Usually	Sometimes	Never	?
21 .. switches from one subject to another.	Never	Sometimes	Usually	Repeatedly	?
22 .. has unrealistic thoughts (e.g. says that he/she does not have any money or clothes, but does really).	Never	Sometimes	Usually	Repeatedly	?
23 .. is distrustful of others (e.g. does not dare to take his/her medicine; says that people are 'listening', etc.).	Never	Sometimes	Usually	Repeatedly	?

**Total Thoughts:** .... points/number of answers = ..... points.

#### HIGHER COGNITIVE FUNCTIONS ICF-code b164

The patient...	3	2	1	0	-
24 .. can oversee where to start an activity (e.g. collects all the necessary articles together before going to wash)	Repeatedly	Usually	Sometimes	Never	?
25 .. works efficiently and systematically.	Repeatedly	Usually	Sometimes	Never	?
26 .. asks questions about his/her illness.	Never	Sometimes	Usually	Repeatedly	?

27	.. says that he/she is able to do something although it is clear that they cannot (e.g. walk without the rollator).	Never	Sometimes	Usually	Repeatedly	?
28	.. says that there is nothing wrong with him/her although there clearly is.	Repeatedly	Usually	Sometimes	Never	?
29	.. undertakes activities on his/her own initiative (e.g. starting a conversation, going for a walk)	Repeatedly	Usually	Sometimes	Never	?
30	..keeps on repeating an action that is not necessary (e.g. keeps on spreading a slice of bread, keeps on drying his/her arm).	Never	Sometimes	Usually	Repeatedly	?

**Total Thoughts: .... points/number of answers = ..... points.**

<b>LANGUAGE</b> <small>ICF-code b167</small>						
The patient...		3	2	1	0	-
31	.. understands directions and/or instructions.	Repeatedly	Usually	Sometimes	Never	?
32	.. reads something and can show that he/she has understood what is says (e.g. a wrapper, a folder).	Repeatedly	Usually	Sometimes	Never	?
33	.. has to search for words.	Never	Sometimes	Usually	Repeatedly	?
34	.. uses vague terms in conversation (e.g. 'You know', or 'thingy').	Never	Sometimes	Usually	Repeatedly	?
35	.. calls something by the wrong name (e.g. says vase instead of bread, lamp instead of table).	Never	Sometimes	Usually	Repeatedly	?
36	.. is able to make clear what he/she wants.	Repeatedly	Usually	Sometimes	Never	?

**Total Language: .... points/number of answers = ..... points.**

<b>PRAXIS</b> <small>ICF-code b176</small>						
The patient ..		3	2	1	0	-
37	.. does the ADL activities in the correct order (e.g. first takes off pyjamas, then gets dressed; first wets the flannel, than washes face).	Repeatedly	Usually	Sometimes	Never	?
38	.. puts on clothes in the correct manner (e.g. not back-to-front, or inside-out).	Repeatedly	Usually	Sometimes	Never	?
39	.. uses the items in the correct manner (e.g. is able to comb his/her hair with a comb, is able to eat with a fork).	Repeatedly	Usually	Sometimes	Never	?

**Total Praxis: .... points/number of answers = ..... points.**





## CHAPTER 7

# **Validation of the NOSCA - Nurses' Observation Scale for Cognitive Abilities**

*Submitted for publication*

A.Persoon, L. Schoonhoven, R.J.F. Melis, T. van Achterberg, R.P.C. Kessels, M.G.M. Olde Rikkert



## **ABSTRACT**

### *Introduction*

The Nurses' Observation Scale for Cognitive Abilities (NOSCA) is a behavioral rating scale comprising 8 subscales which represent different cognitive domains. The aim of this study was to examine its psychometric properties.

### *Design*

Observational study.

### *Setting and population*

A sample of 50 patients from two geriatric wards in acute care hospitals.

### *Measurements*

Reliability was examined via internal consistency and inter-rater reliability. Construct validity of the NOSCA and its subscales were explored by means of convergent and divergent validity and the known-groups technique.

### *Results*

The Cronbach's alphas of the total NOSCA and its subscales were 0.98 and 0.66-0.93, respectively. The item-total correlations were satisfactory (overall >0.4). The intra-class coefficients were good (37 of 39 items >0.4). The convergent validity of the NOSCA against cognitive ratings (MMSE, NOSGER) and severity of dementia (CDR) demonstrated satisfactory correlations (0.59-0.70,  $p < 0.01$ ), except for IQCODE (0.30,  $p > 0.05$ ). The divergent validity of the NOSCA against depressive symptoms was low (0.12,  $p > 0.05$ ). The construct validity of the NOSCA subscales against 13 specific neuropsychological tests showed correlations varying from poor to fair (0.18-0.74; 10 of 13 correlations  $p < 0.05$ ).

### *Discussion*

The validity and reliability of the total NOSCA are excellent. The correlations between the NOSCA subscales and standard neuropsychological tests were moderate. More conclusive results may be found if the NOSCA subscales were to be validated using more ecologically valid tests and in a patient population with less cognitive impairment. Nonetheless, our results demonstrated that the use of the NOSCA yields standardized, reliable and valid information about patient's cognitive behavior in daily practice.

## INTRODUCTION

The Nurses' Observation Scale for Cognitive Abilities (NOSCA) is a behavioral rating scale that structures nurses' observations of geriatric patients' cognitive functioning. It was designed specifically for the assessment of patients admitted to geriatric units in acute care hospitals.

The primary aim of the NOSCA is to aid in the development of interventions that are tailored to, and considerate of, patients' specific cognitive needs. Interventions must take patients' cognitive abilities and possible decline into account as cognitive abilities can influence communication, support needs in daily life activities, medical and nursing treatment, discharge policy and post-discharge compliance. Further, awareness of cognitive abilities on the part of nurses is imperative to the provision of good quality care. For example, if a patient has attention-related difficulties, nurses should seek to provide that patient with a quiet environment.

The secondary aim of the NOSCA is to support clinical diagnoses. In particular, the NOSCA can help to identify and distinguish specific types of dementia by assessing cognitive problems on several cognitive domains. For example, loss of disease insight as the first sign of cognitive deterioration is considered to potentially reflect frontotemporal dementia. Prior to developing the NOSCA, a literature search for behavioral rating scales that comprehensively assess cognitive functioning (excluding the specific delirium screening instruments) was conducted.<sup>1</sup> We found that, although some scales measure one or, at most, two cognitive domains (for example the NOSGER),<sup>2</sup> prior to the NOSCA, no observation scale assessed several cognitive domains. Essentially, in daily practice, nurses simply employ their own unique style of observation and registration, and determine their own priorities in selecting cognitive domains.<sup>3</sup> Consequently, agreement regarding patients' cognitive functioning among nurses varies from poor to fair at best.<sup>4</sup>

The NOSCA, which is described in detail elsewhere (submitted data), was developed using the Delphi technique. A multidisciplinary panel of 16 experts reached consensus through four Delphi rounds (>70% agreement). The eight cognitive domains selected were based on the International Classification of Functioning (ICF) and include attention, visual perception, orientation, memory, thoughts, higher cognitive thinking, language and praxis.<sup>5</sup> In addition, consciousness was considered a prerequisite for cognitive functioning. The scale comprises 39 items (2-7 items per cognitive domain), which are preceded by 4 items that measure domain consciousness (see Appendix 1). The items are scored on a four-point Likert scale and have to be rated twice a day on two consecutive days. The content validity of the NOSCA has been established based on expert opinion. It proved to sufficiently reflect the professional's concept of cognitive functioning and no cognitive domains or items were considered lacking.

The purpose of the present study was to evaluate the psychometric properties of the NOSCA and to answer the following questions: a) Is the NOSCA reliable?; b) Is the total NOSCA valid in the assessment of cognitive functioning?; and c) Are the NOSCA subscales for the specific cognitive domains valid?

## METHODS

### *Setting and population*

Patients hospitalized in geriatric units at either an academic centre or a general hospital were included. The average length of stay in the academic centre was 16 days. At the general hospital, the average length of stay was 20 days. At both sites, a multidisciplinary team was available, a geriatric environment was present (walking circuit, living room) and nursing staff consisted of mainly registered nurses, most of whom were qualified clinical geriatric nurses (350-hour program). All patients admitted were eligible for participation unless they met one of the following exclusion criteria: being bedridden, inability to communicate in Dutch, the presence of delirium symptoms (Delirium Observation Scale/DOS  $\geq 3$ )<sup>6</sup> or severe dementia (CDR=3),<sup>7</sup> inability to hear or read or inability to sufficiently cooperate with neuropsychological testing. Of the 100 patients who were admitted and screened, 50 did not meet the exclusion criteria and were included in the study.

### *Measures*

The NOSCA total score can range from 0-117 (39 items, scored 0-3; higher scores reflect more cognitive abilities). Reliability was measured (*research question 1*) via internal consistency and inter-rater reliability.

The validity of the total NOSCA was assessed (*question 2*) with construct validity, given the lack of a gold standard for exploring the criterion validity of a behavioral rating scale that assesses cognitive functioning. The construct validity of the NOSCA was investigated via convergent validity, divergent validity and the known-groups technique. Convergent validity was examined by correlating the results of the total NOSCA with three other instruments that assess global cognitive function, namely the Mini Mental State Examination (MMSE),<sup>8</sup> three cognitive subscales of the Nurses Observation Scale for Geriatric Inpatients (NOSGER)<sup>2</sup> and the Informant Questionnaire on Cognitive Decline in the Elderly (IQCODE).<sup>9</sup> Convergent correlations with the severity of dementia (Clinical Dementia Rating scale/CDR)<sup>7</sup> and activities of daily living (Barthel Index/BI)<sup>10</sup> were also expected. Divergent validity was studied by correlating the NOSCA with depressive symptoms (Geriatric Depression Scale Short Form/GDS-15).<sup>11</sup> The known-groups technique was applied by comparing the mean score of the NOSCA across relevant subject groups, namely groups that vary with respect to the severity of their dementia, the severity of their cognitive impairment, and the severity of their depressive symptoms. In order to do this, we created groups using mean scores for the CDR (three groups: possible dementia: CDR=0.5; mild dementia: CDR=1; and moderate dementia: CDR=2), the MMSE (four groups: MMSE is 30, 23-29; 18-22; 17 or lower) and the GDS-15 (no depressive symptoms: GDS-15  $\leq 5$ ; depressive symptoms: GDS15  $\geq 6$ ).

The construct validity of the NOSCA subscales (*question 3*) was explored as well, namely with convergent validity. The cognitive domain subscale results were correlated with scores on neuropsychological tests. One or more neuropsychological test per NOSCA subscale was selected. Tests were selected on the basis of their acceptance in clinical geriatric practice and their fit with the content of the designated NOSCA subscale. Table 3 displays the selected tests. All tests are described in Lezak *et al.*,<sup>12</sup> with the exception of the VAT and the praxis test which are reported in Lindeboom *et al.* and Heilman & Gonzalez Rothi, respectively.<sup>13, 14</sup> All tests were at interval level. Additionally, we

calculated correlations between each neuropsychological test and all other subscales, expecting to find lower correlation coefficients in these analyses than when the test was correlated with its designated NOSCA subscale.

Background variables measured included age, sex, education level and co-morbidity (by means of the Cumulative Illness Rating Scale-Geriatric/CIRS-G).<sup>15</sup>

#### *Data collection / Study procedure*

Patients were enrolled in the study on the day they were admitted. Nurses observed the patient in their normal daily interactions with the patient. The NOSCA was completed four times, i.e. twice on two consecutive days. The four assessments were performed by four different nurses who were on duty on the two consecutive days. Nurses reviewed the NOSCA items at the beginning of their shift so they could focus on observing the corresponding behaviors during patient care. On the third day, the activities of daily living rating (Barthel Index) and a general rating of cognitive symptoms (NOSGER) was completed by a nurse. The neuropsychological tests were administered by a trained psychologist who was blind to the NOSCA observation ratings within three days of the final NOSCA assessment. The CDR and CIRS-G were rated by a geriatrician and confirmed at a multidisciplinary meeting prior to discharge. The IQCODE was completed by the patient caregiver, often a family member. The study was registered and approved by the medical ethics committee (CMO Arnhem-Nijmegen) and written informed consent was provided by the patient and caregiver.

#### *Data analyses*

The total NOSCA score was calculated as the mean of the four assessments. Scores on the NOSCA subscales were calculated as the average of subscale items on the four assessments. Impaired performance on neuropsychological tests was defined as having a score more than 1.5 standard deviations below the age- and education-corrected normative mean. Impaired performance in a cognitive domain was defined as one or more incidents of impaired performance on a neuropsychological test within one domain.

Internal consistency was analyzed by calculating Cronbach's alpha and the item-total correlation. Intra-class coefficients for absolute agreement were viewed as a measure for inter-rater reliability between two groups of four nurses. Pearson's correlation coefficients were calculated to examine the construct validities. ANOVA and t-tests were applied for the known-groups analyses. The alpha was set at 0.05 and statistically significant coefficients higher than 0.4 were regarded as meaningful.<sup>16</sup>

## **RESULTS**

#### *Population characteristics*

On average, the patients included in this study were older persons with moderate dysfunction in activities of daily living, extensive co-morbidity, mild cognitive impairment according to the MMSE and considerable cognitive impairment on several cognitive domains as measured by several neuropsychological tests (on average, impairment on four to five of seven cognitive domains, see Table 1).

### *Reliability of the NOSCA*

Cronbach's alpha for the total NOSCA was 0.98. Cronbach's alphas for the most of the eight subscales were above 0.8. Two exceptions were the subscales 'thinking' and 'visual perception' for which the alphas were 0.78 and 0.66, respectively (see Table 3). All 39 item-total correlations were higher than 0.4. Removing any single item did not improve the overall Cronbach's alpha. The item-total correlations within the NOSCA subscales were all higher than 0.4, except for one (item 30, see Appendix). In general, removing items from subscales did not improve the Cronbach's alphas. Exceptions were four items (10, 20, 30 and 35) in four different subscales.

The intra-class coefficients for absolute agreement were excellent (above 0.7) for 24 items, fair to good (between 0.4 and 0.7) for 13 items and poor (below 0.4) for 2 items (6 and 28).

### *Construct validity of the NOSCA*

*Convergent validity.* The correlations between the NOSCA and the cognitive ratings from the MMSE and NOSGER were as expected ( $r=0.69$  and  $0.59$ , respectively,  $p<0.01$ ). No significant correlation was found between the NOSCA and the IQCODE (see Table 2). The correlation between the NOSCA and the severity of dementia scale was  $0.70$  ( $p<0.01$ ) and the correlation between the NOSCA and the BI was  $0.51$  ( $p<0.01$ ).

*Divergent validity.* No significant correlation was found between the NOSCA and depressive symptoms (GDS-15).

*Known-groups technique.* The difference in total NOSCA scores between the groups that were created on the basis of cognitive impairment and severity of dementia differed significantly (see Table 2). The differences in scores for the groups with and without depressive symptoms did not differ significantly.

### *Construct validity of the NOSCA subscales*

*Convergent validity:* Pearson's correlations between the NOSCA subscales and the neuropsychological tests ranged between  $0.18$  and  $0.74$ . Most correlations were around  $0.4$ . Four were below  $0.4$  (see Table 3). In all, 10 of the 13 correlations were statistically significant ( $p<0.05$ ). Each NOSCA subscale correlated significantly with at least one neuropsychological test.

The correlation coefficients between each neuropsychological test and all subscales other than the designated subscale were between  $0.24$  and  $0.71$  (see Table 3). These correlation coefficients were, surprisingly, slightly higher than the correlation coefficients found between the tests and their designated subscale (compare the results of the last two columns in Table 3). Among these correlations, 11 of 13 were statistically significant ( $p<0.05$ ).

## **DISCUSSION**

This is the first validation study addressing the reliability and construct validity of the NOSCA and its subscales. The NOSCA is a behavioral rating scale that can be employed by nurses to assess the cognitive functioning of patients admitted to geriatric wards. We found that the reliability and construct validity of the NOSCA as a whole to be satisfactory. The correlations between the NOSCA subscales and a number of neuropsychological tests were poor to fair.

The Cronbach's alphas for the NOSCA were good, even in subscales comprising only a few items. The item-total correlations were acceptable as well, except for item 30 in the subscale 'higher cognitive thinking'. This item focused on repetitiveness and, although this behavior is characteristic to this cognitive domain, it is likely that repetitiveness was not highly prevalent in our study sample. Removing four different items from four different subscales increased the Cronbach's alpha for those subscales slightly. However, as the alphas for the subscales were already (very) high (0.78-0.93), we do not recommend removing these items from the scale. The intra-class coefficients for the items were excellent, thus suggesting that if another set of four nurses were to observe a patient, similar scores for the patient's cognitive functions would be assigned by all four nurses. Only items 6 and 28 scored relatively low. This is likely attributable to a lack of variation in the sample included in this study.

The construct validity of the NOSCA as a tool for assessing overall cognitive functioning was satisfactory, even when compared to a neuropsychological assessment which is generally administered very differently than daily observation. The NOSCA correlated well with cognitive impairment as measured by the MMSE and also with the severity of dementia as measured by the CDR. Further, the NOSCA and the NOSGER, which is an observational scale, correlated adequately. The only correlation that was lower than expected was the correlation between the NOSCA and the IQCODE. In the IQCODE, family members are required to score the relative deterioration of the patient over a period of ten years. A period of that length is not covered by the NOSCA and this may possibly account for the lower correlation. The correlation between the NOSCA and activities of daily living was reasonable as expected. The fact that no statistically significant correlation was found between the NOSCA and depressive symptoms is promising. In clinical practice, the differentiation between cognitive impairment and depression is a complicated endeavor. The fact that no significant correlation was found between the NOSCA and depression may thus have important diagnostic implications.

The validation results for the NOSCA subscales are less conclusive than the results for the total scale. Although most correlations between the NOSCA subscales and neuropsychological tests were statistically significant, the correlations were poor to fair. However, poor correlations between a given test and a NOSCA subscale were always accompanied by a fair correlation between the same NOSCA subscale and another neuropsychological test. Given that the correlations between the neuropsychological tests and their designated NOSCA subscale were, surprisingly, in a number of cases, lower than the correlations between the tests and other NOSCA subscales, we must conclude that, it is not clear whether the NOSCA is able to discriminate between cognitive domains.

The selection of the neuropsychological tests was complicated as numerous tests are available. In a previous validation study, we examined the correlation between a rating scale that observed the patient memory function in daily practice and four neuropsychological memory tests (unpublished). The correlations varied between 0.45 and 0.70. There are two possible explanations for this. The first pertains to the focus of the neuropsychological tests. The selected tests in this study were considered good matches because their focus corresponded with the focus of the NOSCA subscales. For example, the six-item NOSCA subscale 'higher cognitive thinking' includes the ICF sub-domains 'organization and planning', 'insight' and 'self regulation'. We selected the TMT-B and the key search task from the BADS as the best match, despite having to ignore three of the six observation items concerning insight and self regulation. Given that the

selection of neuropsychological tests was more complicated than expected, it is possible that we have not yet succeeded in selecting tests with a sufficiently similar focus to the focus of the NOSCA subscales.

The second explanation pertains to the ecological validity of the tests. It is possible that neuropsychological tests conducted in controlled experimental conditions yield different results than tests conducted in everyday life situations.<sup>17</sup> It could be argued that most neuropsychological tests measure cognitive functioning at the level of impairment, whereas the NOSCA assesses cognitive functioning at the activity level. The ecological validity of neuropsychological tests has not been studied extensively but, in the studies conducted, moderate associations between the test and everyday function were found.<sup>18-20</sup> This may very well have inhibited the effective validation of the NOSCA subscales. We thus suggest additional attempts to validate the subscales. Furthermore, we recommend that the NOSCA be validated explicitly against instruments with good ecological validity. The Arnadottir OT-ADL Neurobehavioral Evaluation (A-ONE) might be interesting in this respect.<sup>21</sup>

Furthermore, it is likely that certain characteristics of the study sample impacted the correlation coefficients between the tests and the subscales. The sample employed in this study had considerable cognitive impairment. In fact, an average participant experienced cognitive impairment in four to five cognitive domains (see Table 1). Clearly, this may have made it difficult to discriminate between the domains. This contention is supported by additional analyses in which correlation coefficients between all neuropsychological tests were calculated. The results showed a lack of distinction between the cognitive domains tested. The broad range of cognitive impairment manifestations found on the neuropsychological tests was unexpected. Although we included all possible patients even those with no apparent cognitive dysfunction, it is possible that selection bias occurred. We, therefore, recommend replicating this study with a larger sample that explicitly includes patients without cognitive deficits.

## **CONCLUSION**

In a group of older patients hospitalized in a geriatric unit, the reliability of the NOSCA was found to be excellent and the construct validity of the total NOSCA satisfactory. The NOSCA can contribute to clinical diagnoses by providing standardized, reliable and valid information about the patient's overall cognitive functioning in daily practice. Whether the NOSCA is a valid instrument for discrimination between cognitive domains is not yet clear. Considering our results, we recommend, first and foremost, the replication of our study in a less impaired patient population and in groups with distinct neuropsychiatric diagnoses whereby only a few cognitive domains are affected. We also recommend that the NOSCA subscales be compared to more ecologically valid tests. Because our findings have demonstrated that the NOSCA can add value to standardized observations of overall cognitive functioning, we advocate, for the time being, the implementation of the NOSCA both in research and in clinical practice.

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**Table 1: Patient characteristics**

Patient characteristic	N	Measure	Outcome
Age	50	mean $\pm$ sd	83 $\pm$ 6
Female	50	n (%)	33 (66)
Education	45	Primary school or less, n (%)	14 (31)
		More than primary school, n (%)	31 (69)
Co-morbidity	36	CIRS-G (0-54) <sup>a</sup> , mean $\pm$ sd	13 $\pm$ 4
Activities of daily	48	Barthel Index (0-20) <sup>b</sup> , mean $\pm$ sd	14 $\pm$ 4
Delirium	44	No delirium during admission (DOS <3) <sup>c</sup>	36
Depressive	48	GDS-15 (0-15) <sup>d</sup> , mean $\pm$ sd	5 $\pm$ 3
Mental state	49	MMSE (0-30) <sup>e</sup> , mean $\pm$ sd	24 $\pm$ 5
No dementia	23	CDR=0 <sup>f</sup> , n (%)	21 (45)
Cognitive symptoms	45	NOSGER (15-75) <sup>g</sup> , mean $\pm$ sd	35 $\pm$ 13
	50	NOSCA (0-117) <sup>h</sup> , mean $\pm$ sd	97 $\pm$ 17
Cognitive impairment	40	Not impaired in any cognitive domain <sup>i</sup> , n (%)	0 (0)
	40	Number impaired cognitive domains (0-7), mean $\pm$ sd	4.7 (1.8)

a) CIRS-G: Cumulative Illness Rating Scale-Geriatric; higher scores indicate more co-morbidity.

b) Barthel Index: higher scores indicate less daily activities.

c) DOS: Delirium Observation Scale: higher scores indicate more delirium symptoms.

d) GDS-15: Geriatric Depression Scale: higher scores indicate more depressive symptoms.

e) MMSE: Mini Mental State Examination: higher scores indicate less cognitive impairment.

f) CDR: Clinical Dementia Rating: higher scores indicate a more severe stage of dementia

g) NOSGER: Nurses' Observation Scale for Geriatric Inpatients: higher scores indicate more impairment.

h) NOSCA: Nurses' Observation Scale for Cognitive Abilities: higher scores indicate more cognitive abilities

Based on seven cognitive domains and assessed by performance(s) on neuropsychological tests: attention (TMT-A); perception (Silhouettes VSOP), memory (digit span WAIS-III and VAT), thoughts (similarities WAIS-III and digit symbol test WAIS-III), higher cognitive thinking (key search BADS and TMT-B), language (verbal fluency profession naming and animal naming), praxis (apraxia test; Heilman & Valenstein). See Table 3 for abbreviations of neuropsychological tests.

**Table 2: Construct validity of the NOSCA (n=50)**

Construct validity	Construct	Instrument <sup>a)</sup>	N	NOSCA correlation (Pearson's r)	
<b>Convergent validity</b>	<b>Cognitive ratings</b>	<b>MMSE</b>	48	0.687**	
		<b>IQCODE</b>	35	- 0.297	
		<b>NOSGER</b>	45	- 0.594**	
	<b>Severity of dementia</b>	<b>CDR (CDR&gt;0)</b>	26	- 0.703**	
	<b>Activities of daily living</b>	<b>BI</b>	48	0.511**	
<b>Divergent validity</b>	<b>Depressive symptoms</b>	<b>GDS-15</b>	48	0.120	
Known-groups technique	Grouping characteristic	Grouping criteria	N	Group test for differences	NOSCA <sup>b)</sup> mean ± sd
	<b>Cognitive impairment</b>	<b>No: MMSE=30</b>	6	F (3, 45) = 19,644, p<0.001	116
		<b>Mild: MMSE 23-29</b>	10		102 ± 10.0
		<b>Moderate: MMSE 18-22</b>	32		101 ± 12.8
		<b>Severe: MMSE&lt;18</b>	1		65 ± 13.9
	<b>Dementia</b>	<b>Possible: CDR=0,5</b>	13	F (2, 23) = 11.258, p<0.001	103 ± 8.0
		<b>Mild: CDR=1</b>	8		94 ± 5.0
		<b>Moderate CDR=2</b>	5		77 ± 4.5
	<b>Depressive symptoms</b>	<b>No: GDS-15≤5</b>	30	t = 0.405, p=0.53, df= 1	99 ± 18
		<b>Yes: GDS-15&gt;5</b>	18		95 ± 17

a) Instrument: MMSE: Mini Mental State Examination; IQCODE: Informant Questionnaire on Cognitive Decline in the Elderly; NOSGER: Nurses' Observation Scale for Geriatric Patients; CDR: Clinical Dementia Rating; BI: Barthel Index; GDS: Geriatric Depression Scale

b) NOSCA: lower scores indicate less cognitive abilities.

**Table 3: Internal consistency and construct validity of the NOSCA subscales (n=50)**

Subscales NOSCA / ICF code <sup>a</sup>	NOSCA items	Cronbach's alpha	NOSCA subscore <sup>b</sup> mean $\pm$ sd	Neuropsychological test <sup>c</sup>	n	Correlations NP test <sup>d</sup> and designated NOSCA subscale	Correlations NP test <sup>d</sup> and all other subscales
Attention <i>ICF b140</i>	1-4	0.889	2.3 $\pm$ 0.5	TMT-A	50	-0.40*	-0.59**
Visual perception <i>ICF b156</i>	5-6	0.661	2.9 $\pm$ 0.2	Silhouettes VOSP	49	0.33*	0.54**
Orientation <i>ICF b114</i>	7-12	0.919	2.6 $\pm$ 0.5	Orientation items MMSE	49	0.66**	0.65**
Memory <i>ICF b144</i>	13-18	0.955	2.3 $\pm$ 0.6	Digit Span WAIS-III (forward and backward) VAT	50 47	0.42** 0.74**	0.45** 0.71**
Thoughts functioning <i>ICF b160</i>	19-23	0.784	2.7 $\pm$ 0.4	Similarities WAIS-III Digit symbol test WAIS-III	47 42	0.18 0.44**	0.39** 0.58**
Higher cognitive thinking <i>ICF b164</i>	24-30	0.825	2.2 $\pm$ 0.5	Key search BADS TMT-B	48 44	0.44** -0.28	0.36* -0.24
Language <i>ICF b167</i>	31-36	0.888	2.6 $\pm$ 0.4	Fluency (profession naming) Fluency (animal naming) Token test (short form)	48 48 23	0.18 0.36* 0.48*	0.35* 0.51** 0.50*
Praxis <i>ICF b176</i>	37-39	0.933	2.6 $\pm$ 0.6	Apraxia test Heilman & Gonzales Rothi	48	0.57**	0.61**

a) ICF: International classification of functioning

b) NOSCA subscale score: range 0-3, higher scores indicate more cognitive abilities

c) Neuropsychological tests: TMT: Trail Making Test; VOSP: Visual Object and Space Perception Battery; MMSE: Mini Mental State Examination; WAIS : Wechsler Adult Intelligence Scale; VAT: Visual Association Test; BADS Behavioral Assessment Of Dysexecutive Syndrome; CAMCOG-R: Revised Cambridge Cognitive Examination.

d) NP test: neuropsychological test

\* statistically significant  $p < 0.05$

\*\* statistically significant  $p < 0.01$

## Epilogue

Let's get back to the geriatric nurse described in the Prologue of this thesis: the nurse who observed the cognitively mediated activities of Mrs. Janssen. Mrs. Janssen was the lady 'who was somewhat confused and required only a few instructions whilst washing and dressing', as the nurse wrote down in the nursing file. But now, the multidisciplinary team members had decided to speak the same language related to cognitive functioning and selected the jargon of the ICF. Extra educational sessions were dedicated to the concept of cognitive functioning and its cognitive domains included. Besides the screening instruments already in use, the nurses have decided to additionally employ the NOSCA. From now on, the nurse will focus the observation on activities, which relate to attention, perception, memory, orientation, thoughts, higher cognitive thinking, praxis and language.

Therefore, in this case, after helping Mrs. Janssen with her self care, the nurse in future would write down in the file: 'It seems to be hard for Mrs. Janssen to sustain, shift and divide her attention. She repeats activities regularly. She had some problems with orientation in place; no problems were observed related to perception and praxis. No observations were possible related to thoughts or language'. The nurse fills out the NOSCA. The results of this first observation, out of the four to be made, are as follows:

NOSCA, 1 <sup>st</sup> observation period	Mean
Attention	0
Perception	3
Memory	2.5
Orientation	2
Thoughts	3
Higher cognitive thinking	2
Praxis	3
Language	3

Norms:

*3 = no problems were observed;*

*2 = problems sometimes arose;*

*1 = problems usually arose;*

*0 = problems arose repeatedly.*

*Half points are allowed as interposition.*

Comparing this information to the qualitative line used before, and taking into account the research carried out with the NOSCA, we may conclude that the quality of this nurse's observation and record is greatly enhanced. The observations are now structured into specific cognitive domains, and a valid observation scale is used. Moreover, the nurse is able to unequivocally communicate on the patient's problems with colleagues and geriatricians using these findings and she can primarily direct her interventions to the attention problem of Mrs. Janssen.



# Summary of results and Discussion

Many older people suffer from some level of cognitive decline, due to normal aging or pathological conditions. When older people make use of health care services it is important that health care providers are aware of their cognitive abilities, both for the diagnostic and treatment process and for nursing interventions. Nurses are in the unique position of being able to observe patients intensively and for long periods of time, and they therefore see the direct results of patients' cognitive abilities.

In the case presented in the Prologue of this thesis we described an unstructured method of assessing cognitive functioning by daily observation in geriatric patients. Because this unstructured method is not practical, not manageable, nor teachable, we felt the necessity to standardise such observations. This final chapter summarises and discusses the results of the studies described in this thesis.

## SUMMARY OF RESULTS

This summary gives a brief narrative outline of the results from the studies conducted. For a more quantitative summary we refer to the abstracts at the beginning of each chapter.

**Chapter 1** reviews the literature on valid and reliable Dutch-language behavioural rating scales that can be used to structure direct nursing observations. The intention was to implement the most appropriate scale in our daily practice in a geriatric unit of an acute hospital. The (sub) scales that were traced were discussed with regard to content, validity and reliability. Thirteen scales were found. There was great variety in the number of dimensions of cognitive domains assessed, from two to eight in number. Of all scales that we traced, the A-one is the most extensive: eight domains are included. However, this scale is developed for use by occupational therapists, who ask the patient to perform specific tasks, and it requires a specific test-room to conduct the observations. We concluded that there is no daily practice scale available for nurses, which allows for the assessment of patients' cognitive functioning in a sufficiently comprehensive way.

**Chapter 2** reports why and how geriatric nurses observe their patients' cognitive abilities. 84 nurses from seven Dutch hospitals described their reasons for assessing older patients' cognitive functioning in free text. We categorised their answers and this led to three main objectives for cognition observations: to guide nursing interventions, to determine discharge arrangements and to support medical diagnoses. The respondents also reported the cognitive domains they included in their daily observation in free text. After categorising these topics, it was demonstrated that many different domains were observed. This may explain the heterogeneity in the general use of the concept of cognitive functioning, which in turn leads to vague, incomplete or incorrect descriptions.

**Chapter 3** demonstrates the methodology used by geriatric nurses to observe patients. We invited ten geriatric nurse experts, often nurse specialists, for a semi-structured interview on the methodology of the observational assessment by their bedside colleagues. Firstly, all the respondents stated that daily observation of cognitive abilities yields valuable information. However, the concept of cognitive functioning was implemented differently for each ward, and by each nurse.

The data showed considerable variation not only in the cognitive domains included, but also with respect to the time of day for observation, the number of days, the goals to be achieved,

registration in the nursing files, summarising the information and drawing conclusions. Factors that contributed to the variation were the number of years of professional experience in geriatric nursing, the absence of written policy on behavioural observation on the ward, and high workload. Interpretation of the observed behaviour was difficult due to the fact that the pre-morbid condition is unknown. In conclusion: daily observation of cognitive functioning was conducted in a non-systematic way.

**Chapter 4** examines the agreement between nurses in their assessments of cognitive functioning in geriatric patients. A self-developed scale was used to measure the patient's level of cognitive functioning. We constructed a short 10-item questionnaire, each item addressing one cognitive domain to be scored on a 5-point Likert-type scale (from no problems to severe problems). Additionally, the Clinical Dementia Rating (CDR) scale was also employed as a well-validated scale to stage the severity of dementia symptoms. Sixty patients were assessed, each patient by two nurses. In total, 90 nurses participated in the study. The agreement between the nurses' assessments for the 10 self-developed items of cognitive functioning was poor to fairly good. However, the agreement regarding the severity of dementia symptoms on the well-validated CDR was much higher. We concluded that the agreement on the assessment of cognitive functioning should be improved and that a valid observation scale should be available.

**Chapter 5** explores the correlation between neuropsychological tests and an observational scale for the assessment of cognitive functioning. This relation is not to be taken for granted, because the neuropsychological tests measure cognitive functioning at the impairment level and observation scale measures cognition at the limitation level. In this pilot, we focused on memory function only and used the Memory subscale of the Nurses' Behavioural Rating scale for Geriatric Inpatients (GIP) as observation scale. The GIP is a comprehensive scale, consisting of 14 subscales, which assesses geriatric inpatients in general and includes a Memory subscale. Correlation coefficients were moderate to good for four neuropsychological memory tests and the GIP Memory subscale. The results indicate that an observation scale for memory function may be valuable in providing information about underlying memory impairment and that neuropsychological tests may be of importance for validating an observation scale.

**Chapter 6** presents the development of the Nurses' Observation Scale for Cognitive Abilities (NOSCA). Employment of the NOSCA aims to facilitate tailoring of (nursing) interventions to the patient's cognitive abilities (including discharge arrangements) and to support medical and neuropsychological diagnoses. The aim of this study was to develop a scale with an acceptable level of content validity. Since no specific theoretical conceptual framework for classifying cognitive domains was dominant, we based the scale on the International Classification of Functioning, Disability and Health (WHO, 2001). The preliminary items were mainly derived from existing related observation scales. A multidisciplinary panel of experts were asked to reach consensus on the cognitive domains and the items to be included (>70% agreement) and add any missing items. The result was an observation scale that comprises eight cognitive subscales, representing eight cognitive domains: attention, perception, memory, orientation, higher cognitive functions, thoughts, language and praxis. The scale consists of 39 items, divided over the eight subscales (varying from 2 to 7 items per subscale). The NOSCA should be administered four times, twice a day on two consecutive days.

**Chapter 7** examines the psychometric qualities of the NOSCA. The internal consistency and inter-rater reliability of the NOSCA overall scale (39 items) and the subscales were excellent. The construct validity of the overall NOSCA scale to assess overall cognitive functioning (39 items) was satisfactory: it showed good correlations with cognitive impairment, severity of dementia,

activities of daily living and geriatric symptoms. The overall NOSCA score did not correlate with a depression screening score, which is promising since differentiation between these two impairments is complicated in clinical practice. The validity of the NOSCA subscales in representing abilities in cognitive domains is less conclusive. NOSCA subscales showed poor to fair correlations with neuropsychological tests. Thus, the NOSCA subscales' ability to discriminate between cognitive domains is not yet sufficiently demonstrated. The results are probably influenced by the difficulty of selecting neuropsychological tests with the same focus as the NOSCA subscales, and the unknown value of the neuropsychological tests in assessing cognitive functions applied in daily life (i.e. ecological validity of neuropsychological tests). Also, the considerable cognitive impairment in the study population which resulted in multi-domain impairments in the patients included, led to fewer opportunities for discrimination between the results on the subscales. Our results showed that use of the NOSCA yields standardised, reliable and valid information about a patient's overall cognitive behaviour in daily practice.

## DISCUSSION

In this discussion, the two first sections describe the development of the NOSCA in a broader perspective, namely it addresses the NOSCA's contribution to all other existing rating scales and how the NOSCA relates to standardised nursing diagnoses. The other sections reflect on methodological issues in our studies and how the NOSCA can contribute to tailoring nursing interventions in the future. The thesis ends with recommendations for research, nursing practice and education.

### **Added value of a new behavioural rating scale**

'Reconsider your intention to develop a new measurement instrument', is a standard remark in the handbooks of clinimetrics (for example: Streiner & Norman, 2003). Apart from the practical consequences or the amount of work to be done, it is an ethical issue as well. Is it really worth spending time, money and involvement of patients on generating a new scale? The need for specific assessment tools seems to be enormous considering the numerous instruments already available. In the Prologue of this thesis we illustrated the need for clinical, standardised and valid observations. The need to structure daily observation was pressing. As described in Chapter 1 and Chapter 5, no scale for nurses which focuses on observing cognitively-mediated activities in a comprehensive and structured way could be found at that time. Although several scales were traced, they did not cover all the cognitive domains or they also included elements other than cognitive functioning, for example mood or behavioural problems.

To understand the context of the newly-developed NOSCA in the whole array of behavioural cognitive scales, it is important to distinguish two components of the scale. Firstly, the NOSCA is a scale on a continuum of cognitive scales, with neuropsychological tests at one end and performance-based scales at the other. Secondly, the NOSCA depends on information from the professional, instead of information from the patient him/herself or from an informant. Both aspects are addressed in more depth in the following two sections.

### *Continuum of cognitive scales from tests to performance-based scales*

We searched the literature on observation scales for cognitively-mediated activities and found several related scales, see Figure 1. We placed the neuropsychological tests which assess cognitive functioning in a test situation on the right hand side (see Figure 1, box E). On the left hand side we placed the scales for rating cognitively-mediated everyday activities in daily life (see Figure 1, box A). This type of scale is based on observations of behaviour occurring in everyday life. In between these two boxes we placed performance-based scales, some of which must be conducted in an artificial test situation (see box C; for example in a test-living room or a test-

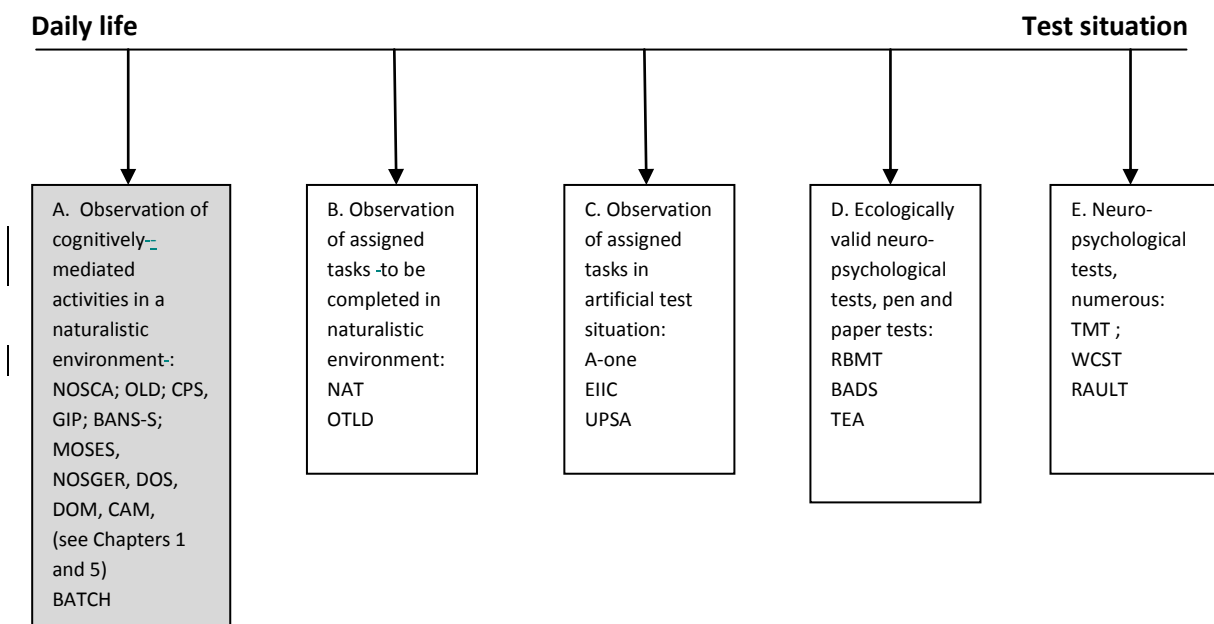


kitchen), some in the patient's own natural setting (see box B), but where the patient always has to fulfil certain assigned tasks which are described in detail by the testers beforehand.

Neuropsychological tests which are specifically developed in such a way that the cognitive demands resemble the cognitive demands in the everyday environment (Chaytor and Schmitter, 2003), are placed in box D. Such neuropsychological tests aim for ecological validity.

In this thesis, we were interested in a performance-based assessment of cognitively-mediated activities occurring in a naturalistic environment, box A. We performed a literature research on this type of scale, as described in Chapters 1 and 6, but found no valid nursing scale that focuses in a comprehensive way on cognitive functioning alone. After the literature search, the BATCH scale was published and described as a possible tool for comprehensive observation of cognitive functioning (Miller et al., 2007). However, this scale is developed for a psychiatric setting, thus focusing on another population. It is based on 10 functional and cognitive domains and the scale comprises 60 items. No information about item selection is given. The validity has been tested in a psychiatric setting (mean age 50 years) and the BATCH total showed good concurrent validity with cognitive tests. BATCH subscales presented statistically significant moderate correlations with the Neuropsychiatry Unit Cognitive Screening Tool (NUCOG), a cognitive screening test (around  $r=0.4-0.5$ ), but reliability is unknown. The BATCH may well be interesting if more data are collected on validity, reliability, distinction between the subscale scores and if the scale were to be applied in a geriatric patient group.

**Figure 1: Continuum of cognitive functioning scales: from cognitively-mediated activities to neuropsychological tests**



#### Abbreviations:

A-one	Arnadottir OT-ADL Neurobehavioral Evaluation (Arnadottir, 1990)
BADS	Behavioural Assessment of the Dysexecutive Syndrome (Wilson et al, 1996)
BANS-s	Bedford Alzheimer Nursing Scale-Severity (Volicer et al., 1994)
BATCH	Behavioural Assessment Tool for Cognition and Higher Function (Miller et al., 2007)
CAM	Confusion Assessment Method (Inouye et al., 1990)
CPS	Cognitive Problem Scale (subscale in MDS/RAI; Gerritsen, 2004).
DOM	Delirium-O-Meter (De Jonghe et al., 2005)
DOS	Delirium Observation Scale (Schuurmans et al., 2003)
EIIC	Everyday indicators of impaired cognition (Algase & Beel-Bates, 1993)
GIP	Nurses' Behavioural rating Scale for Geriatric Inpatients (Verstraten & Van Eekelen,

	1988)
MOSES	Multidementional Observation Scale for Elderly subjects (Helmes et al., 1987)
NAT	Naturalistic Action Test (Schwartz et al., 2003)
NOSCA	Nurses' Observation Scale for Cognitive Abilities (Persoon, this thesis)
NOSGER	Nurses' observation scale for geriatric patients (Spiegel et al., 1991)
OLD	Observation List for early signs of Dementia (Hopman et al., 2001)
OTLD	Observed Tasks of daily living (Diehl et al., 1995)
RAULT	Rey Auditory Verbal Learning Test (Rey, 1964; Taylor, 1959)
RBMT	Rivermead Behavioural Memory Test (Wilson et al., 1985)
TEA	Test of Everyday Attention (Robertson et al., 1996)
TMT	Trail Making Test (Reitan, 1955)
UPSA	UCSD Performance-based skills assessment (Patterson et al., 2001)
WCST	Wisconsin Card Sorting Test (Berg, 1948)

### *Types of behavioural rating scales*

In this section we will discuss the NOSCA observation scale as one of three of the following types of behavioural rating scales as well as the strengths and limitations of each type. Individuals' activities and behaviour can namely be measured by means of self-report, informant-report and observation of performances (Farias et al., 2008). This means that information stems either from the patient him- or herself, from significant others, or from professional care providers and trained raters respectively. The strengths and limitations of all three types follow below.

Assessment of behaviour and activities by means of self-report is conducted by interview or questionnaire. The validity of self-report for assessing cognitive functioning in mentally ill patients is questionable. Patients' self-reports may be influenced by their psychopathology, thereby distorting their actual cognitive functioning (Patterson et al., 2001).

Assessment of behaviour and activities through an informant is done by an informant interview or questionnaire. The information from the informant stems from observations of the patient's activities and it may concern the patient's current behaviour as well as changes in activities over the past few years. The latter is one of the strengths of informant-based reports. Informant information can cover a broad aspect of cognitive functions. A limitation of informant information is the validity due to the personal relation with the patient. Informant reports are prone to contamination by non-cognitive characteristics such as affective state and personality (Langley, 2000). This may explain the moderate correlations which are found with cognitive screeners. We found many informant scales in the literature, for example: the Informant Questionnaire for Cognitive Decline in the Elderly (IQCODE; Jorm, 2004), the Geriatric Evaluation by Relative's Rating Instrument (GERRI; Schwartz, 1983), the Cognitive Change Checklist (3CL; Schinka et al., 2009), the Frontal Lobe Behavioral Syndromes with Frontal Lobe Personality Scale (FLOPS; Grace et al., 1999), the comprehensive Cognitive Behavioural Rating Scale (CBRS; Williams et al., 1986) and the new Everyday Cognition (ECog; Farias et al., 2008).

The NOSCA corresponds with the third type of behavioural rating scale: observation of performances. Just like the informant-based scales, the NOSCA scale concerns observable behaviour but is restricted to the behaviour observed during contact between patient and nurse. This observational scale collects information prospectively, while the former two yield information that is more retrospectively focused. Advantages of observations made by professionals are the ability to assess actual performance in more detail, the ecological validity, and the limited observation bias as a result of the informant's knowledge or prejudice. In general, the limitations of behavioural observation scales are the lack of standardised tools, the interpretation of the behaviour by the observer and therefore the risk for poor reliability.

### **NOSCA and nursing diagnoses**

In this section we address the way in which the NOSCA relates to the concept of nursing diagnoses and the content of some standardised diagnoses related to cognition. 'A nursing

diagnosis is a clinical judgement about individual, family or community responses to actual or potential health problems / life processes' (NANDA International, 2009). The nursing diagnosis provides the basis for selection of nursing interventions to achieve outcomes for which the nurse is accountable (NANDA International, 2009). The NOSCA is a possible tool for supporting a nursing diagnosis: it provides information for making a better judgement about a patient's actual cognitive abilities.

The three components of nursing diagnoses are known in nursing throughout the world: label and definition, defining characteristics, risk and related factors. In the Netherlands, this is known as the PES structure: problem, etiology and signs & symptoms. The theoretical framework of the NOSCA is most similar to the components of nursing diagnoses: a label (cognitive abilities), a definition (the definition given by Lezak et al.) and defining characteristics (eight cognitive domains from the chapter on Mental Function from the International Classification of Functioning, Disability and Health (ICF)). The NOSCA does not assess the etiology of cognitive problems.

There are at least three international classifications of nursing diagnoses: the NANDA-I classification, Gordon's functional health patterns and the OMAHA system (Gordon, 2009; NANDA International, 2009; Martin & Scheet, 1992). The NANDA-I and Gordon's health system consist of several domains, or patterns, and the domain in focus in this research is called 'Perception/cognition' for which the diagnostic label states: 'The human information processing system including attention, orientation, sensation, perception, cognition and communication.' Within this domain a number of nursing diagnoses are described. Both NANDA-I and Gordon's health system include 14 diagnoses in this domain, although they differ slightly from each other. Examples of cognitively related diagnoses are: unilateral neglect, disturbed sensory perception, deficient knowledge, chronic confusion, acute confusion, impaired memory, and altered thought process (Gordon, 2009; NANDA International, 2009). All these diagnoses are, more or less comprehensively, described in PES terms. The nursing diagnoses of the NANDA-I and Gordon are of a varying level of abstractness (for example: Acute Confusion versus Deficient Knowledge). The defining characters described in the diagnoses do not always match the language of nurses and other professionals. The language in the defining characteristics is both too vague and too specific; for example: inaccurate interpretation of the environment, cognitive dissonance, distractibility, egocentricity, and hypervigilance.

The OMAHA system includes just one general domain regarding cognition which it defines as 'The act or process of knowing, perceiving or remembering'. The signs and symptoms are described in terms of diminished judgement, disorientation to time/place/person, limited recall of recent events, limited reasoning, impulsiveness and repetitious language (Martin & Scheet, 1992). The construction of the NOSCA is most similar to the OMAHA problem: they both comprise just one general statement about cognitive functioning and describe cognitive sub-domains in almost the same language as the ICF. Thus, the NOSCA gives information related to internationally accepted structure of nursing diagnoses, and its contents facilitates the OMAHA diagnoses Cognition best.

### **Methodological considerations**

Strength of our studies was the starting point: a survey that included 100 nurses in 7 hospitals, in which the daily practice concerning the assessment of cognitive functioning was evaluated using open questions. Open questions avoid socially desirable answers and therefore the results of the study showed high validity. Through this methodology the results of the study were accepted by the respondents more easily and this possibly explains why four geriatric units have already implemented the NOSCA.

### *Validation of the NOSCA*

The main obstacle standing in the way of standardisation of nurses' assessment of patients' cognitive abilities is the fact that an internationally acknowledged theory regarding cognitive functioning is lacking. The subject covers an overwhelmingly broad aspect of human functioning. In the literature, this leads to an array of different methods of concept operationalisation. This fact also underlines the importance of standardisation: despite the many ways of talking about cognition as professionals, we need to communicate in a clear and unequivocal manner. Therefore, simplification of the concept is necessarily and inevitable. We selected the ICF as the foundation of the NOSCA; this is a strong point of the study. The ICF is an international and multi-professional classification from the World Health Organisation. It consists of labels and definitions which provided unambiguous terminology for the construction of the NOSCA. The NOSCA was developed by means of a panel of experts, which is the best possible method since no cognitive theoretical framework was available. Another strength is the fact that this panel of experts was multidisciplinary, comprising a group of advanced geriatric nurses, geriatricians and neuropsychologists, most of whom had experience in developing rating scales. The experts were all Dutch. This may have led to some implicit Dutch approaches or preferences concerning the selected domains and items, although we could not pinpoint one. A further strength was that criteria for including domains and items were quantitative and stated beforehand (>70% agreement between the experts); a comprehensive account of the development process has been recorded (see Chapter 5). As a result, we may conclude that the content validity is satisfactory.

Exploring the construct validity of the NOSCA overall scale (39 items), good correlations were demonstrated between the NOSCA overall score and other cognitive measures (Chapter 7). It is promising that no correlation was found between the NOSCA overall score and a depression screening, since differentiation between these two impairments is complicated in clinical practice. The NOSCA may help to make this valuable distinction in practice.

Poor to fair correlations were found between NOSCA subscales scores and specifically assigned neuropsychological tests. We chose neuropsychological tests to validate the NOSCA although we had problems in selecting tests which had the same focus as the NOSCA subscales and information about the ecological validity of the tests was lacking. With hindsight, a validated performance-based scale would have been more appropriate for examining the construct validity of the NOSCA subscales (see Figure 1, boxes B and C) since this method of gathering data is more similar than the pen and paper cognitive tests we used.

This validation study showed no clear distinction between the eight cognitive domains as represented by the eight NOSCA subscales. However, a distinction between the cognitive domains was not found in the results of the assigned neuropsychological tests either. We concluded that the study was limited because the patient population was more impaired than we had expected beforehand, resulting in an average of five cognitive impairments per patient. Only a few patients had one or two impairments and therefore distinction between the cognitive domains became impossible.

### *Reliability of the NOSCA*

The question here is whether employing the NOSCA improves the reliability of the assessment of patients' cognitive functioning by nurses when compared to the previous unstructured method of assessment. We conclude that the reliability of the assessment is enhanced considerably for two main reasons.

Firstly, the assumption is that the reliability will be enhanced by using the NOSCA because the cognitive domains are assessed by subscales comprising several items, instead of a vague undefined concept of a cognitive domain. Furthermore, instead of a single rating (it was daily practice that the nurse in charge gave her opinion), four ratings are made, twice a day on two

consecutive days. Based on measurement theory this will lead to more reliable ratings, as the mean of a number of measurements gets closer to the 'true' value as the number of measurements increases.

Secondly, we compared the results from chapters 4 (using no validated scale) and 7 (using the NOSCA). We assume that the results of the study in Chapter 4, using a self-developed scale with one item per domain, came close to the results of the assessment in daily practice when no scale at all was used. To compare the results appropriately, the study populations have to be comparable since the reliability of a scale is dependent on the population that is measured. We assume that the study populations were similar because the participating hospitals did not change admittance policy, treatment or nursing staff policy and the patient characteristics in both studies are comparable. Direct comparison of the results between the two studies is not justified since the inter-rater reliabilities were expressed in different values (weighted kappa and ICC, chapters 4 and 7 respectively). The value of kappa is corrected for chance, so the kappa might be lower than the ICC (although not necessarily). However, a weighted kappa allows corrections for the degree of disagreement, which may raise the kappa. Moreover, kappas are known to be very sensitive for skewed distributions.

Instead of direct comparison between kappa and ICC values, we conducted a post-hoc re-analysis of ICC's calculated for the study presented in Chapter 4. We argue that, although the scale score in this study was ordinal (at the time, one of the reasons for choosing weighted kappas), the underlying cognitive functioning concept is considered as a continuum in patients' activities. The newly calculated results demonstrated ICC's between 0.18 and 0.58 per item (four were statistically significant), each item representing a cognitive domain. When applying the generally accepted norms which were also used for the results of the study in Chapter 7, the following results were found: four items demonstrated fair to good agreement (ICC between 0.4 and 0.7) and six items a poor agreement (ICC <0.4). The ICC's of the items in the NOSCA study were much higher (almost all items had an ICC > 0.4 (see Chapter 7). In summary, this post-hoc comparison supports the notion based on theoretical arguments that the inter-rater reliability has been considerably improved by employing the NOSCA.

### **Tailoring nursing interventions**

In this section, we would like to reflect on the possibilities of tailoring nursing intervention to the patient's cognitive abilities.

It is clear that care professionals adjust their interventions, approach and treatment to patients' cognitive abilities. However, the process of decision-making regarding the way in which interventions should be tailored to the patient is still vague. One reason for this is the frequent lack of thorough understanding of the patient's cognitive problems. In patient files we find superficial reports such as 'Some cognitive problems are present'. It is impossible to tailor adequate interventions when the precise cognitive problem is unknown. Some experienced nurses have an 'intuitive' understanding of the patient situation and have a patient-centred approach: one which best fits the needs of the patient (Benner, 2001). However, a more precise analysis of the type of cognitive problem will allow more nurses to be able to focus more quickly on specific adjusted interventions.

In this section, we will provide a short overview of nursing interventions relating to cognitive problems. Nursing interventions are divided roughly among three patient-related aims: interventions focusing on rehabilitation, on maximising independence or on creating comfort. These main goals are derived from the cause of the cognitive decline (trauma or degenerative process) and the stage of the dysfunction (normal age-related cognitive decline, mild or severe dementia). In neurorehabilitation the focus is on restoration of the deficit and the road to this is

training, drilling and exercising. For instance, with memory problems the accent will be on lengthy repetition of memory tasks or on strategies to remember or retrieve information, such as mnemonic techniques (Berg & Schmidt, 2002). In the case of early degenerative syndromes, the focus of interventions will be on psycho-education or cognitive stimulation therapy. As neurodegenerative processes progress, the focus of care will gradually change to maximise the patient's independence. In case of memory problems, external aids are provided, such as written information and also, if necessary, verbal information by professionals or family members. If the dementia develops to a severe stage, the interventions progress from controlling the environment to physical guidance and assistance. At this stage, the first aim of nursing becomes creating comfort.

Apart from the severity of the disease, the aims of the patient and the nursing interventions also depend on the number of cognitive domains that have declined. If the problem is only focused within one or two cognitive domains, interventions can pinpoint those domains. Therefore, analysis of the problems is important since the nurse can then adjust the approach precisely. For instance: problems in focusing attention can be compensated by offering a quiet environment, yet problems in sustaining attention can be compensated by asking patients to repeat information. When more cognitive domains are involved and interfere with each other, a precise simple intervention becomes less useful as the scope of the single intervention becomes too narrow. Answering the needs of such patients requires the development of more overall approaches, such as validation, emotion-oriented care, reminiscence and multi-sensory stimulation. These overall approaches always have to be tailored to specific individual needs, which also demands more precise assessment.

We assume that a better understanding of the concept of cognitive functioning and a more detailed analysis of cognitive decline by nurses will lead to more tailored interventions. Next, we hypothesise that when nursing interventions are more tailored, they are more likely to help achieve patient goals.

### **Recommendations for future research**

For future employment of the NOSCA, two lines of research are important. First, we need to study the validity of the NOSCA in groups and settings other than those studied so far. Second, we need to study the goals nurses aim for when employing the NOSCA.

#### *Research concerning the quality of the NOSCA in other groups and other settings*

As a follow-up to the conducted reliability tests for the NOSCA, a next step is to study the sensitivity to changes over time. If this is positive, the NOSCA can for example be applied to people in nursing homes, where a regular three month evaluation of the residents is common.

A next step is to carry out a more in-depth analysis of the validity of the NOSCA subscales in distinguishing the different cognitive domains. This should be studied in a population less impaired than in our study (involving outpatients for example), because in our population too many cognitive domains appeared to be impaired. This resulted in interference between the cognitive domains, which made a distinction between the separate cognitive domains impossible. We assume that the psychometric properties herein described will be applicable to the targeted hospital population. Additionally, instead of using neuropsychological tests as a measure of construct validity, performance-based observation scales should be selected because of the more similar method of gathering data (see Figure 1, boxes C and D). Furthermore, it is interesting to explore the possibilities of creating cognitive NOSCA profiles, as has recently and frequently been done in distinguishing between the phenotypes of dementia subgroups (e.g. disinhibition versus apathy in frontal lobe dementia). This is probably also valuable for guiding the nursing interventions to the cognitive profile.

Further research should also examine the validity of the NOSCA in patients receiving nursing care at home or in homes for the elderly. It is evident that a tool is needed in cases where a nurse aide or nurse suspects cognitive decline, but cannot pinpoint this exactly. This tool should be simple and valid to help the nurse or nurse aide communicate the results with the general practitioner. The NOSCA might be applicable in home care as a screening instrument for problems in cognitively-mediated activities and validity studies for this are necessary.

Finally, additional NOSCA validation studies that focus on patients admitted to general medical or surgical wards are also needed. Since the group of older people admitted to hospitals is growing, the assessment of cognitive abilities becomes extremely important. After a short cognitive screening has been done, a simple but more in-depth assessment is often necessary as a means of triage for further neuropsychological examination and for tailoring (nursing) interventions. Employing the NOSCA is probably an efficient and inexpensive method in such situations.

#### *Research concerning tailoring of nursing interventions*

Assessment of a patient's cognitive functioning is one of the aspects considered by nurses on acute geriatric units when tailoring nursing interventions, including the planning of discharge arrangements. At the moment, interventions by nurses are based mainly on clinical experience and logical reasoning. A thorough literature study of nursing interventions, which are adjusted to the patient's cognitive abilities, has yet to be carried out. Interventions to increase or retain the patient's cognitively-mediated abilities may best be searched in the literature on neurorehabilitation of trauma patients. Interventions that focus on retaining the abilities and maximising functioning in people with some cognitive decline due to aging or a degenerative process should be searched in the literature on psychogeriatrics. It would be very interesting to conduct such a comprehensive review of the literature and focus on interventions addressing just one single problem in one cognitive domain (e.g. memory training and available instruments) in comparison to middle-range theories approaching cognitive deterioration in general (e.g. validation, reminiscing therapy, Progressive Lowered Stress Threshold).

#### **Main conclusion**

Assessing older people's cognitive status is an extremely important prerequisite for providing good clinical care, as nursing care should be adjusted to patient's cognitive abilities. Nurses in geriatric units observe patients closely as part of standard geriatric nursing care, and assessment of the cognitive abilities is a main task in the Netherlands. Unfortunately, the daily observation of cognitively-mediated abilities is not carried out in a standardised way. The need for standardisation has been expressed by geriatric nurses, since the operationalisation of cognitive abilities into several cognitive domains varies widely among nurses and the agreement on cognitive assessment is poor to fair. When starting our studies, no valid comprehensive observation scale was found in the literature, although we did find several observation scales that focused only on one or two cognitive domains or that contained other elements, such as behavioural problems or mood.

The NOSCA has been developed to fill this gap: an observation scale for assessing cognitive abilities in older people by nurses. It is based on the ICF, developed by a multidisciplinary panel of experts and contains several items derived from other related observation scales. It consists of 8 cognitive subscales and 39 items. The reliability of the NOSCA was proven to be satisfactory. The construct validity study on the NOSCA overall scale demonstrated good correlations with related cognitive measurements and, most importantly, showed no correlation with a depression score. The validity of the subscales in discriminating cognitive functions in several cognitive domains has not yet been sufficiently demonstrated due to methodological limitations.

### **Recommendations for nursing practice and education**

Guiding nursing interventions to a patient's cognitive abilities is obviously indispensable for good clinical geriatric nursing care and a comprehensive assessment of the patient's abilities is therefore essential. Observation of cognitively-mediated activities is not threatening for patients, it can be conducted even when patients are too ill for neuropsychological testing, and it is efficient since observations are performed during regular nursing contact. The observation information contributes to medical diagnosis, nursing interventions, discharge arrangements or to further cognitive assessments. At the moment, nursing assessment is generally carried out in a non-standardised manner and agreement on the level of patients' cognitive abilities is only poor to fairly good. Therefore, we strongly recommend the use of the NOSCA as a tool which supplies uniformity in the types of cognitive domains and definitions of the domains, thus improving multidisciplinary communication and collaboration.

The NOSCA is a simple tool, the items consist of observable behaviour, it does not rely on interpretations or inferences, and it is easy to use, even for untrained raters. The tool is reliable when employed four times, two times on two consecutive days. The overall score of the NOSCA is valid compared to other (cognitive) measures but the NOSCA subscale scores should be interpreted cautiously, as they are not yet sufficiently validated. We have digitalised the NOSCA to facilitate calculation of the means per subscale. For further use, we recommend pilot studies on the feasibility and usefulness of the NOSCA in those settings where we aim to validate the NOSCA in the future: settings where nurse-patient contact is intensive, for instance in home care, care in nursing homes, and hospital care on medical and surgical wards. In all such settings it will at least help nurses and other professionals to unify communication on patients' cognitive disabilities. As a next step, nurses may be trained in using the NOSCA to tailor their interventions to specific cognitive deterioration. Nurses do already tailor their approach to the patients' cognitive abilities based on clinical experience and it is of great importance for the development of geriatric nursing that nurses reflect on the approach selected and the reasons for deciding on that specific approach. Thus, the NOSCA may improve the clinical expertise of nurses working in a broad range of settings, and may also open up new routes for interesting and valuable nursing research.

For nursing education, the NOSCA will be of help in disseminating the theoretical aspects of cognitive functioning. It will probably become easier to teach these theoretical aspects when the NOSCA is used as a common base for observing and discussing cognitive changes as reflected in patient behaviour. To understand the influence of cognitive deterioration in daily practice, student knowledge is required with respect to the cognition concept and its terminology. Students also need to be aware of the factors that influence the level of cognitive functioning, the influence of premorbid status, the decline in normal aging, symptoms of decline in the various psychiatric diseases, brain physiology, interpretation of neuropsychological tests and, of course, observable behaviour related to cognitive abilities. 'Before this part of nursing can be fully valued and expertise further deepened, we need a careful description of the different types of cognitive changes, similar to an ornithologist collecting details of birds by concentrated observation.

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## Het ontwikkelen en valideren van de NOSCA – de *Nurses' Observation Scale for Cognitive Abilities*

### Nederlandse samenvatting

De verpleegafdelingen Geriatrie in algemene en academische ziekenhuizen zijn diagnose- en behandelafdelingen, hetgeen voor de oudere patiënt betekent dat het zorgproces bij opname start met een breed geriatrisch onderzoek. Oudere mensen hebben immers vaak meerdere problemen tegelijk, waardoor diagnostiek een ingewikkelde aangelegenheid wordt. Voor het betrouwbaar stellen van de relevante diagnoses wordt daartoe een breed onderzoek uitgevoerd, waarbij gekeken wordt naar neurologische, psychiatrische en internistische problemen, en met specifieke kennis van de oudere patiënt en de geriatrische syndromen. Verpleegkundigen werkzaam op afdelingen Geriatrie hebben de rol om klachten en symptomen te signaleren die relevant zijn bij de verpleegkundige en medische diagnostiek. Enkele jaren geleden werd terecht de vraag gesteld hoe het cognitief functioneren van de bij ons opgenomen patiënten met verpleegkundige observaties goed in kaart gebracht kon worden. Er bleken wel reeds observatieschalen beschikbaar die de stemming van patiënten in kaart konden brengen, evenals gedragsproblemen. Voor het beschrijven van het cognitief functioneren op basis van verpleegkundige observatie was echter nog niets voor handen. Dat leidde tot de situatie zoals die in de Proloog beschreven: een flink aantal kenmerkende signalen werd door verpleegkundigen opgevangen, maar het was in de praktijk moeilijk om die symptomen op een heldere en objectieve manier te beschrijven. Kortom, dit vormde de directe aanleiding voor het uitvoeren van de studies die in dit proefschrift beschreven zijn.

De term cognitief functioneren wordt in de geriatrie, psychiatrie en neurologie veelvuldig gebruikt en verwijst naar het dagelijks functioneren van mensen dat gerelateerd is aan de werking van het zenuwstelsel. Een bekende, zij het abstracte, definitie is die van Lezak, die stelt dat het een proces is waarmee een individu informatie ontvangt, registreert, opslaat en vervolgens kan gebruiken wanneer dat nodig is. Ben van Cranenburgh beschrijft een alledaagse gebeurtenis als het in de stad op de fiets posten van een brief zo treffend in termen van cognitieve functies, dat duidelijk wordt hoe uitermate complex het dagelijks handelen is en wat er voor nodig is om het te volbrengen.

De cognitieve functies worden beïnvloed door veel factoren, zoals persoonlijkheid en intelligentie, maar ook door factoren die tijdelijk invloed op het cognitief functioneren hebben, zoals stress (door de drukte geen aandacht hebben voor ander verkeer), belangrijke gebeurtenissen (doordat je opgewonden bent, vergeet je je hand uit te steken) en stemming (doordat je depressief bent, heb je helemaal geen interesse meer om een brief te posten). Het is bekend dat bij een gemiddeld verouderingsproces de cognitieve functies, zoals bijvoorbeeld het geheugen, concentratie, reactiesnelheid en het vinden van woorden, langzaam verminderen. Cognitieve veranderingen kunnen in het geval van pathologische aandoeningen ook abnormaal versneld hun intrede doen, bijvoorbeeld ten gevolge van een delier, dementie, psychose of een CVA. In dit geval is het zaak om een juiste diagnose te stellen en te achterhalen waardoor de cognitieve veranderingen veroorzaakt worden om een adequate behandeling op te starten. Deze aandoeningen zijn deels van elkaar te onderscheiden door een verschil in klachten in het cognitief functioneren.

Het herkennen van cognitieve problemen bij oudere patiënten is, naast het belang van een goede diagnose, belangrijk voor de communicatie tussen professionals en patiënten. Onafhankelijk van de ziekenhuisafdeling waar een patiënt opgenomen is, staat bij diagnostiek en behandeling de communicatie met de patiënt centraal. We nemen gemakshalve als professionals vaak aan dat het klopt wat de patiënt zegt, dat wat hij of zij zegt een volledige weergave van de beschikbare gegevens is en bovendien dat de patiënt de informatie die wij geven begrijpt, onthoudt en zich houdt aan de behandelvoorschriften. Vaak blijkt dat echter niet zo te zijn. Er zijn dagelijks talrijke voorbeelden in de ziekenhuiszorg, waaruit blijkt dat we als professionals een verkeerd of onvolledig beeld hebben van de oudere, bijvoorbeeld omdat zijn of haar cognitieve problemen niet herkend zijn. De gevolgen kunnen zijn dat er geen of een verkeerde diagnose gesteld wordt en er dus geen adequate behandeling wordt gestart, resulterend in waardeverlies van de opname voor de patiënt en een eventuele langere ligduur. Het is evident dat de communicatie met en de benaderingswijze van de patiënt afgestemd moeten zijn op diens cognitief vermogen. Dat wil zeggen een communicatie die rekening houdt met eventuele vastgestelde cognitieve problemen bij een patiënt, zoals bijvoorbeeld aandachts- en concentratieproblemen, geheugenproblemen, de moeite om zich te kunnen uitdrukken, het gebrek aan ziekte-inzicht of het gebrek aan initiatief. Het herkennen van cognitieve problemen is een eerste vereiste om een patiëntvriendelijke en efficiënte behandelrelatie tussen professional en zieke ouderen op te kunnen bouwen.

Het overkoepelende doel van dit proefschrift is om de observaties die gericht zijn op het inventariseren van het cognitief vermogen van patiënten te standaardiseren. Drie concrete hiervan afgeleide doelen worden in de thesis behaald:

- Het presenteren van een overzicht van observatieschalen die elementen van cognitief functioneren bevatten.
- Het ontdekken waarom en hoe geriatrieverpleegkundigen het cognitief functioneren bij hun patiënten inventariseren.
- Het ontwikkelen en valideren van een observatieschaal die vanuit een breed perspectief het cognitief functioneren in kaart brengt.

**Hoofdstuk 1** geeft een beschrijving van het centrale thema, namelijk de inventarisatie van reeds bestaande observatieschalen die elementen van het cognitief functioneren bevatten. Het is immers een klassieke misser wanneer men start met het ontwikkelen van een nieuwe schaal, zonder dat men zich ervan heeft vergewist dat een dergelijk instrument nog niet bestaat. Het literatuuroverzicht wordt ingeleid met het beschrijven van de relevantie van het observeren van patiënten in het algemeen en meer specifiek van het observeren van het cognitief vermogen. Het was destijds onduidelijk welke (vertaalde) Nederlandstalige instrumenten beschikbaar waren, juist omdat het wemelt van observatieschalen die echter mengvormen zijn met interviews of testen en die al dan niet gecombineerd zijn met het inventariseren van andere kenmerken zoals stemmingsproblemen, gedragsproblemen of problemen in activiteiten van het dagelijks leven (ADL). We hebben een systematische literatuurstudie verricht, waarbij er vanaf 1985 tot mei 2005 in de literatuur gezocht is naar gevalideerde Nederlandstalige observatieschalen. (In hoofdstuk 6 is deze studie uitgebreid naar Engelstalige publicaties tot 2007.) De zoektocht leverde dertien (sub)schalen op. Inhoudelijk varieerden de schalen van het inventariseren van twee tot acht domeinen van het cognitief functioneren. Het geheugen en de psychomotoriek worden bijna altijd geobserveerd, het bewustzijn en het denken, c.q. begrijpen, minder vaak en de domeinen aandacht en concentratie, waarnemen, executieve functies en taal worden beduidend minder vaak opgenomen in de schalen. Het blijkt dat de A-one, een observatielijst voor ergotherapeuten, het meest uitgebreid is.

Dit hoofdstuk sluit af met de conclusie dat het belangrijk is dat onderzoekers en klinici zich een

mening gaan vormen over wat uiteindelijk de relevante cognitieve domeinen zijn om te inventariseren op een verpleegafdeling in het ziekenhuis en met welke diepgang.

Op alle geriatrie-afdelingen in Nederland wordt het cognitief vermogen van patiënten door verpleegkundigen geobserveerd. **Hoofdstuk 2** beschrijft hoe uitgebreid en waarom verpleegkundigen dit doen. Zeven ziekenhuizen met een verpleegafdeling Geriatrie zijn geselecteerd (o.a. naar hun spreiding over het hele land). Verpleegkundigen zijn eenmalig geënquêteerd met een door de onderzoekers voor dit doel ontwikkelde vragenlijst, voornamelijk bestaand uit open vragen. De redenen voor het observeren zijn geanalyseerd met behulp van inhoudsanalyse. De mate waarin het cognitief functioneren in kaart gebracht wordt, is geanalyseerd aan de hand van een aangepast protocol van Foreman e.a. zoals beschreven in Geriatric Nursing Protocols 2003. Uiteindelijk namen 97 verpleegkundigen deel aan de studie (respons 77%). De redenen om het cognitief functioneren in kaart te brengen blijken divers te zijn hoewel in vier hoofdgroepen in te delen: het draagt bij aan diagnostiek (43%), verpleegkundig handelen (51%), of ontslagbeleid (46%) en het geeft een beeld van het functionele vermogen van een oudere (zoals wilsbekwaamheid, 34%). De thema's die geobserveerd worden zijn in 73% inderdaad cognitieve domeinen, de overige thema's zijn anderszins (bijvoorbeeld stemming). Er worden 0 tot 6 domeinen geobserveerd (modus 2). Het meest geïnterviewde domein is psychomotoriek (63%), gevolgd door executieve functies (48%), taal (37%), aandacht (33%), denken en redeneren (25%) en bewustzijn (20%). Respondenten geven met een grote meerderheid aan dat zij behoeften hebben aan het standaardiseren van deze observaties (89%).

In **Hoofdstuk 3** is de mate van overeenkomst tussen geriatrieverpleegkundigen vergeleken voor wat betreft de inschatting van het cognitief functioneren van klinische patiënten. 84 verpleegkundigen van zeven ziekenhuizen beoordeelden gezamenlijk 60 patiënten die opgenomen waren op de verpleegafdeling. Elke patiënt werd door twee verpleegkundigen beoordeeld. De verpleegkundigen baseerden hun inschatting op hun observaties zoals die gewoonlijk tot stand kwamen, namelijk tijdens de reguliere momenten van contact in de zorgverlening en op een niet-gestandaardiseerde wijze. De beoordeling van het cognitief vermogen kon ingevuld worden op een door de onderzoekers ontwikkelde vragenlijst van tien vragen. Elke vraag vertegenwoordigde een cognitief domein op een vijf-punt Likert schaal. Daarnaast werd de Clinical Dementia Rating scale (CDR) ingevuld, een schaal voor de mate van dementie (variërend van geen dementie tot ernstige dementie). Het bleek dat de mate van overeenkomst tussen twee verpleegkundigen op de tien items tussen de 20 en 56% lag. Indien één verschil in antwoordcategorie geaccepteerd werd, was de overeenkomst 61 tot 90%. Gewogen kappa's lagen tussen de 0.17 en 0.76. De overeenkomst op de CDR was hoger (exacte overeenkomst: tussen 42-65%; acceptatie van één punt verschil in antwoordscore: 82-90%; gewogen kappa's: 0.60 - 0.74). De conclusie was dat de mate van overeenkomst tussen twee verpleegkundigen slecht tot redelijk goed was, maar redelijk goed tot goed bij het gebruik van een gevalideerde vragenlijst.

Vervolgens vindt in **Hoofdstuk 4** een verdieping plaats van de huidige methode waarmee geriatrieverpleegkundigen het cognitief functioneren van patiënten in kaart brengen. Dit was een kwalitatieve studie waarbij data werden verzameld door middel van tien semi-gestructureerde interviews met deskundigen op het gebied van cognitief functioneren bij geriatrische patiënten. De meeste deskundigen waren geriatrisch verpleegkundig consulenten met ruime ervaring op de verpleegafdeling en verschilden onder hen hadden gepubliceerd over dit onderwerp. De interviews zijn opgenomen, uitgewerkt en geanalyseerd door twee onderzoekers, onafhankelijk van elkaar. Geïnterviewden waren allen van mening dat observaties waardevolle informatie opleveren. Het blijkt echter dat het begrip cognitief functioneren per instelling en per

verpleegkundige verschillend geoperationaliseerd wordt. De manier van observeren en rapporteren verschilt, evenals de doelstellingen die nagestreefd worden. Doorgaans duurt het lang voordat er een afsluitende conclusie getrokken wordt. Divers genoemde knelpunten kunnen door het toepassen van een gestandaardiseerde observatieschaal opgelost worden. Over de inhoud van de gewenste observatieschaal lopen de meningen echter sterk uiteen. De conclusie was dat het onwaarschijnlijk lijkt dat met de gehanteerde werkwijze de beoogde doelen behaald worden, namelijk: het bijdragen aan de medische diagnose, het stellen van verpleegkundige diagnoses en interventies en het regelen van het ontslagbeleid. Zolang er geen valide instrument beschikbaar is, zullen geriatrie-afdelingen zelf de dagelijkse observatie moeten standaardiseren.

In **Hoofdstuk 5** is de waarde onderzocht van observatieschalen bij het inventariseren van cognitieve problemen bij patiënten die opgenomen zijn op een geriatrie-afdeling. Als pilot is voor het inventariseren van geheugenproblemen gekozen. De resultaten van verpleegkundige observaties werden vergeleken met de resultaten van vier geheugentests. Vier typen geheugentests werden door een onderzoeksassistent psychologie afgenomen: visueel gepaard-associatieleren (Visual Association Test, VAT), woordenlijsten (Acht woorden test, 8WT, van de Amsterdamse Dementie Screening) en Route en Verhaaltjes (Rivermead Behavioural Memory Test, RBMT). Correlaties met algemene maten zoals de MMSE, CDR en GDS-15 werden eveneens meegenomen. Voor het observeren van geheugenproblemen werd de 6-item subschaal Geheugen gebruikt van de gevalideerde Gedragsobservatieschaal voor de Intramurale Psychogeriatric (GIP). Deze werd door verpleegkundigen op drie achtereenvolgende dagen ingevuld, op het einde van dag- en avonddienst. 50 patiënten werden geïnccludeerd. De Pearson's correlatie tussen de GIP en de vier tests lagen tussen 0.45 en 0.71 ( $p < 0.01$ ). De correlatie tussen de GIP en MMSE was 0.63 en tussen GIP en CDR 0.46 (beide  $p < 0.01$ ). Geen significante correlatie werd gevonden tussen de GIP en de GDS-15. Tussen groepen met en zonder dementie werden statisch significante verschillen in de GIP resultaten gevonden ( $p < 0.01$ ). De conclusie is dat de observatieschaal bijdraagt aan het inventariseren van geheugenproblemen. De samenhang tussen observatieschaal en geheugentests blijkt wel afhankelijk te zijn van de gekozen geheugentest. De verpleegkundige observaties kunnen gebruikt worden in het diagnostisch proces, dienen als een triage-instrument voor uitgebreider neuropsychologisch onderzoek en zijn behulpzaam bij het bepalen van verpleegkundige interventies.

Het doel van de studie in **Hoofdstuk 6** is om duidelijk te maken hoe een observatie-instrument, gericht op klinische patiënten met beginnende tot matige cognitieve problemen, kan worden ontwikkeld. Het doel van de observatieschaal is het bijdragen aan medische en verpleegkundige diagnostiek op de afdeling en het afstemmen van de benaderingwijze op het cognitief functioneren van de patiënt. De ICF, een internationaal geaccepteerd systeem om het algemeen menselijk functioneren te classificeren, is als uitgangspunt gekozen voor het selecteren van de cognitieve domeinen van de schaal. Daarbij is de delphi-methode toegepast, d.w.z. een manier om een panel tot consensus te brengen over een bepaald thema. Het panel van 16 experts was samengesteld uit geriatrieverpleegkundigen ( $n=2$ ) met een mastersopleiding ( $n=6$ ), (neuro)psychologen ( $n=4$ ), klinisch geriaters ( $n=3$ ) en een ergotherapeut. Zij waren werkzaam in neurorevalidatie ( $n=3$ ), (ouderen)psychiatrie ( $n=4$ ) en geriatrie ( $n=9$ ). In vier rondes zijn concepten aan het panel ter beoordeling voorgelegd, waarbij er minstens 70% overeenstemming moest zijn over het behouden of toevoegen van een item. In de 1e Delphi-ronde zijn 9 domeinen en 19 subdomeinen uit de ICF aan het panel voorgelegd. Daarvan zijn alle domeinen en 14 subdomeinen goedgekeurd. In de 2e Delphi-ronde zijn opmerkingen uit de 1e ronde ter beoordeling voorgelegd. In de 3e Delphi-ronde zijn aanvullende observatie-items voorgelegd. De items waren een combinatie van items uit gevalideerde Nederlandstalige observatielijsten (zie Hoofdstuk 1), aangevuld met items uit Engelstalige gevalideerde instrumenten. Van de 173 voorgelegde items

werden 58 items goedgekeurd. In de 4e Delphi-ronde werden de items beoordeeld op hun samenhang. De uiteindelijke observatielijst bestaat 43 items die verdeeld zijn onder 9 domeinen, namelijk: bewustzijn, aandacht, perceptie, oriëntatie, geheugen, denken, hogere cognitieve functies, taal en praxis. De conclusie is dat op basis van de ICF is een observatielijst ontwikkeld is, de **Nurses' Observation Scale for Cognitive Abilities**, de NOSCA, die zich richt op het herkennen van cognitieve problemen bij geriatrische patiënten door middel van observaties. De NOSCA is toegevoegd aan dit hoofdstuk. Een voorbeeld van het toepassen van de NOSCA staat in de Epiloog beschreven.

In **Hoofdstuk 7** is de nieuw ontwikkelde observatieschaal gevalideerd op interne consistentie, interbeoordelaarsbetrouwbaarheid en construct validiteit. De steekproef bestond uit 50 patiënten afkomstig van twee geriatrie-afdelingen van respectievelijk een algemeen en academisch ziekenhuis. De Cronbach's alfa van de NOSCA is 0.98 en die van de NOSCA-subschalen variëren van 0.66-0.93. De item-totaal correlaties liggen ruim boven de 0.4. De intra class coefficients van 24 items zijn hoger dan 0.7, van 15 items liggen deze tussen 0.4 en 0.7. Convergerende validiteit van de NOSCA met cognitieve maten (MMSE en NOSGER) en de ernst van dementie (CDR) gaf correlaties tussen de 0.59-0.70 ( $p < 0.01$ ), de correlatie met de IQCODE was 0.30 ( $p > 0.05$ ). Divergente validiteit met depressieve symptomen (GDS-15) gaf een correlatie van 0.12 ( $p > 0.05$ ).

De concurrente construct validiteit van de subschalen van de NOSCA tegenover 13 neuropsychologische testen leverde 8 correlaties op die hoger of gelijk zijn aan 0.4 waren en 5 correlaties die lager waren dan 0.4 (10 van de 13:  $p < 0.05$ ).

Samenvattend kan gesteld worden dat de construct validiteit en de interbeoordelaars betrouwbaarheid van de gehele NOSCA uitstekend is. De validiteit van de NOSCA-subschalen ten opzichte van neuropsychologische testen, was matig. Van invloed hierop waren de onverwachte ernstige cognitieve stoornissen in de onderzoeksgroep. Het is voor het vervolg interessant om in een minder aangedane onderzoekspopulatie de studie te herhalen en daarbij meer zogenaamd, 'ecologisch valide' neuropsychologische testen te hanteren. Omdat de NOSCA bijdraagt aan gestandaardiseerde observaties adviseren we om de NOSCA toe te passen ten behoeve van diagnostiek en als triage instrument voorafgaand aan verder neuropsychologisch onderzoek.





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Lieve Marjon en Els, mooiere paranimfen kan ik me niet wensen. Al jarenlang zijn jullie vriendinnen van me met wie ik lief en leed kan delen. Juist níet over het onderzoek, maar lekker over de dagelijkse beslommeringen en filosofische drijfveren. Veel relativering en veel ontspanning. En zo nu en dan, een heel klein beetje, sport. Els heeft de afbeelding gemaakt die de voorkant van het proefschrift siert en daar ben ik hartstikke trots op. Harry, ik heb heel wat koffie-koppen-lang mogen klagen over het te verrichten gepieterpeuter, wat toch ook een onderdeel van promoveren is. Alle vrienden en kennissen wil ik bedanken voor de belangstelling en aanmoedigingen!

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En tot slot, mijn man George! 'He's quite a character' zouden de Witte Paters in Zambia zeggen. Oorspronkelijk, eigenzinnig en origineel. Wat ik zo heerlijk vind. Je stimuleert me altijd om te doen wat ik leuk of belangrijk vind. Zelfs als dat promoveren is. Je hebt vertrouwen in me en dat geeft me vleugels. Drieëntwintig jaar zijn we bij elkaar en dat is helemaal niet vanzelfsprekend. Lieve man, dank je wel.



# Curriculum Vitae

Anke Persoon is in 1957 geboren in De Meern. Na de HAVO volgde ze de verpleegkundige in-service opleiding A in het Hofpoort Ziekenhuis in Woerden. Ze werkte twee jaar in het Havenziekenhuis te Rotterdam waar ze de Tropenopleiding volgde. Na ook de tropencursus aan het Leopold Instituut te Antwerpen gevolgd te hebben, werkte ze ruim twee jaar als verpleegkundige in het Lubwe Mission Hospital in Zambia. In 1987 slaagde ze voor de opleiding Algemene Maatschappelijke Gezondheidszorg in Nijmegen. Ruim tien jaar werkte ze parttime als wijkverpleegkundige in Nijmegen en was ze bestuurslid van de VVVM, de Vereniging van Verpleegkundigen in de Maatschappelijk Gezondheidszorg (nu de afdeling Eerstelijns Verpleegkundigen van de V&VN). In die periode was ze vijf jaar redacteur bij Tijdschrift voor Verpleegkundigen (TVZ) en richtte ze in 2000 het Tijdschrift voor Wijkverpleegkundigen op. De opleiding van Master of Science in Nursing aan de Hogeschool Utrecht en University of Cardiff werd in 1992 succesvol afgesloten met een scriptie over het gebruik van verpleegplannen door wijkverpleegkundigen. Vanaf 1993 werkte ze vanuit Bureau Persoon freelance als onderzoeker en innovator voor o.a. diverse onderzoeksinstituten. Vanaf 1999 werkte ze voor de sectie Verplegingswetenschap aan de Universiteit Nijmegen. Vanaf eind 2003 tot heden werkt ze als verpleegkundig expert op de afdeling Geriatrie van het UMC St Radboud. De afgelopen vier jaar is ze lid van de Verpleegkundige en Paramedische Adviesraad (VAR). Momenteel is ze programmaleider van de implementatie van Easycare en betrokken bij de ontwikkeling en evaluatie van de Zorg Welzijnsstandaard (ZWS-2). Anke woont inmiddels 23 jaar samen met George Borm.

Anke Persoon was born in De Meern, the Netherlands in 1957. After completing secondary school (HAVO), she began her in-service nursing education at Hofpoort Hospital in Woerden in 1975. Following her graduation in 1979, she went on to follow the tropical disease course at Haven Hospital in Rotterdam and she completed the tropical disease training at Leopold Institute in Antwerp. Thereafter, she worked at Lubwe Mission Hospital in Zambia for more than two years. She graduated from the study for District Nurse in 1985 and worked as a district nurse in Nijmegen for ten years. During that time, she was a member of the editing board of the Journal of Nursing (TvZ) and a member of the board of the professional association of District Nurses. In 2000 she established the Journal of District Nurses. In 1992, she graduated with a Master of Science degree in nursing from Utrecht/Cardiff with a thesis on the use of nursing care plans in daily practice. Since 1993, she has worked as a free lance researcher and innovator in nursing care. In 1999 she began working for the section of Nursing Science in Nijmegen. As of 2003 she has been a 'nurse expert', a function that combines nursing with nursing research, at the department of Geriatrics at the UMC St Radboud in Nijmegen. She has been a member of the Nurses and Paramedics Advisory Board for four years. She is currently involved in the dissemination of Easycare and the development and evaluation of the hospital Care and Welfare Standard for frail elderly (ZWS-2). She has been living with her partner, George Borm, for 23 years.



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