

Original Research

Routines and Structure in the Assessment of Visuospatial Neglect in Rehabilitation Facilities: Current Practice in the Netherlands and the United Kingdom

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Abstract

Visuospatial neglect (VSN) adversely impacts both the length of rehabilitation and activities of daily living (ADL) of patients after stroke and can reduce their participation in community activities. Therefore, it is important to assess VSN after stroke in neurorehabilitation facilities. The process of assessing VSN comprehensively in current geriatric rehabilitation



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remains unclear. This study examined the process of VSN in post-stroke assessment emphasizing the details of the (systematic) routines and structure of VSN assessment in current geriatric rehabilitation facilities in the Netherlands and rehabilitation facilities in the United Kingdom (UK). Health care professionals in geriatric rehabilitation facilities in the Netherlands (n = 6) and in stroke and neurorehabilitation facilities in the UK (n = 6) were interviewed. VSN was not routinely assessed in any of the geriatric rehabilitation facilities in the Netherlands, and in half of the neurorehabilitation facilities in the UK. Healthcare teams in the Netherlands detected no patients with VSN over a two month period. Several VSN assessment tools were employed. Neuropsychological tests were most frequently used. Nine interviewees indicated the need to improve the process of VSN assessment in actual practice. The suggestions focused on improving the process of assessing VSN and knowledge development and training. This study showed that in current rehabilitation practice, VSN was not always assessed in a routine (every stroke patient) and structured (who, when, and, which tests) manner. VSN was not routinely assessed with more than one test (neuropsychological and during daily activities), contrary to best practice recommendations. VSN remains probably underrecognized, especially in geriatric rehabilitation facilities. It is important to improve the current process, including selecting the most appropriate tools for assessing VSN.

Keywords

Stroke; visuospatial neglect; neglect; rehabilitation; geriatric; assessment

1. Introduction

Stroke patients with visuospatial neglect (VSN) report problems in reporting, responding or orienting to visual stimuli in the contralesional hemispace that could not be attributed to sensory or motor impairments [1]. With an incidence of 20-82%, VSN post-stroke is a very common and disabling cognitive disorder [2]. Huge variation in reported incidence may largely be due to the selection of different factors, including the time of post-stroke onset, population sample, stroke location, and number and types of tests/tools used for assessment [2]. VSN could easily develop into a chronic disorder, persisting for at least one year post-stroke in half of the patients with VSN [3].

VSN has a negative impact on patients' independence and performance during activities of daily living (ADL) [4-7]. Stroke patients with VSN can experience more problems during community participation compared to non- VSN patients, and VSN can increase caregiver burden [7]. Advanced age also increases the risk of VSN, and a right hemispheric stroke is associated with more severe VSN [8, 9]. Therefore, it is important to systematically and carefully assess the presence and severity of VSN, especially during (geriatric) rehabilitation.

Several instruments are employed to examine VSN post- stroke [10-13]. It is recommended and/or generally accepted to assess VSN with more than one assessment tool: a neuropsychological test (i.e., pen-and-paper test), assessment during ADL, and an assessment with regard to participation in the community [7]. Numerous tests and their combinations are used [12,

13]. Checketts et al. [12] recently gave an important overview of the clinical instruments for VSN assessment across professions for different countries with an essential focus on the underlying decision-making processes for clinical assessment. The most important findings showed that decision-making processes were largely autonomous and essentially neuropsychological. Additionally, VSN assessment was largely multidisciplinary (i.e., occupational therapists, psychologists, physicians, physiotherapists, etc.), irrespective of clinical settings (i.e., inpatient, outpatient, member, or non-member of the community). Checketts et al. [12] did not report the type of rehabilitation facility, so it remains unknown whether there are differences between (academic) medical centers, rehabilitation centers, stroke/neurorehabilitation facilities and geriatric rehabilitation facilities. Given the significant differences noticed between facilities, the objective of the current study was to further explore these findings by (1) focusing specifically on the geriatric rehabilitation facilities in the Netherlands and compare those findings to stroke/neurorehabilitation in the United Kingdom (UK), (2) emphasizing the details of the (systematic) routines and structure of VSN assessment. To obtain more in-depth information and details on VSN, semi-structured interviews were conducted.

An earlier study showed that 38% of stroke patients in an acute phase (hospital) were assessed, with standardized tests used for 13% of the patients [14]. Other studies in acute stroke care showed that 56% of VSN was not detected by routine care [15] and 61% of VSN remained undocumented [16]. The professionals declared that they recognized VSN in 80% of stroke patients, but only 27% used standard assessment tools [17]. Chen et al. evaluated the documentation and estimation of VSN among inpatient rehabilitation facilities in the United States and showed that patients (mean age 68.6 years; standard deviation ± 15.4) with VSN were underrecognized [18]. Yet, it remains unclear how the process of VSN assessment is performed (structured and routinely) in current geriatric rehabilitation facilities in the Netherlands and neurorehabilitation facilities in the UK.

The organization of geriatric inpatient rehabilitation post-stroke in the Netherlands and the UK has important commonalities though differing in other aspects. In both facilities, the rehabilitation process is based on a multidisciplinary team [19], and both facilities have specific neurorehabilitation units/teams. Stroke patients in the UK requiring rehabilitation, regardless of age, may receive such care at home or inpatient rehabilitation units, usually specialized in stroke. This is in contrast to the Netherlands where if further inpatient rehabilitation is needed after the initial hospital stay, younger patients usually continue their recovery in Medical Rehabilitation Centers (MRC) while geriatric stroke patients continue their inpatient rehabilitation program in geriatric rehabilitation (GR) facilities that usually have specialized neurorehabilitation units and are organized within nursing home organizations.

GR can be defined as an evaluative, diagnostic, and therapeutic intervention to restore functional and cognitive ability or enhance residual functional capability in older people with disabling impairments [20].

It is important to investigate VSN assessment in current GR by evaluating the possible impact of VSN, the higher risk of VSN by increased age, and the uncertainty about the process of VSN assessment in everyday practice, especially by older adults. Therefore, the study objective was to examine the process of VSN assessment after stroke emphasizing the details of the (systematic) routines and structure of VSN assessment in current (geriatric) rehabilitation facilities in the Netherlands and the UK.

2. Materials and Methods

2.1 Setting and Participants

This study was conducted in the Netherlands and the UK from March 2018 through November 2018. In the Netherlands, geriatric inpatient rehabilitation facilities affiliated with the University Network for the Care sector South Holland (UNC-ZH) were approached [19]. In the UK, the researchers approached neurorehabilitation units in the East Midlands region. In both countries, one contact person (health care professional) within each facility was approached to participate in the interviews.

2.2 Procedure

Following the objectives of the study, a topic list for the interviews regarding the process of VSN assessment in the multidisciplinary team of the interviewees was prepared. This list formed the fundamental basis for the questions that were used during the interviews and included the patient population, process of assessment, involved health care professionals, VSN assessment tools, documentation of VSN (test results), and suggestions for improving VSN assessment. To frame the questions, a range from broad (organizational level) to narrow (suggestions) was used [21]. The questions were formulated in the Dutch language by the first author and verified by the other three authors (MC, TN, and WA). The researchers who conducted the semi-structured interviews (MB, JB, and LE) discussed the questions until an agreement was reached for their phrasing in English (see *Appendix*). In the Netherlands, the interviewees were asked about the total number of admissions as well as the number of stroke patients with VSN. The data of the number of VSN patients in the stroke population in the UK was not collected since this would have required a review of paper notes (digital databases of diagnoses and symptoms are not widespread in UK practice) which would have been time-consuming and would make it more difficult for interviewees to participate.

2.3 Procedure of Data Collection and Extraction

The interviews were conducted by three researchers (MB, JB, and LE), and each interview took 15-20 min. The female interviewers were all researchers and working in (geriatric) rehabilitation facilities, as physiotherapists, speech and language therapists, and/or physicians. A standard excel template was used to record the answers to the questions. When no new comments or clusters (axial coding) about the process of VSN assessment (point of data saturation) occurred, the data collection was stopped [22].

Data from the excel template were extracted by the first author. The tables were drawn for each question, answers were categorized, and the same answers were counted. Few answers were clustered. The answers about which VSN assessment tools were used were clustered in levels of the International Classification of Functioning, Disability and Health (ICF), namely on the level of body function and level of activity (Table 1) [23, 24].

Table 1 Process of assessing VSN.

Process of assessing VSN	The Netherlands (N = 6)	United Kingdom (N = 6)
VSN routinely assessed the first week after admission (every stroke patient)		
Yes	-	3
Involved disciplines when VSN is assessed		
<i>Occupational therapist</i>	5	6
<i>Psychologist</i>	4	1
<i>Physician</i>	2	1
<i>Nursing</i>	2	-
<i>Physiotherapist</i>	1	2
Measurements used		
<i>VSN test level of body function (total tests used/different tests used)</i>	7/4	12/9
Confrontation test	1	-
Star cancelation	2	3
Line bisection	3	2
Drawing task	-	1
Trail making	1	-
BORP	-	1
VOSP	-	1
RPA	-	1
Clock face	-	1
Pen and paper test	-	1
Oxford Cognitive scale	-	1
<i>VSN test of level of activity (total tests used/different tests used)</i>	3/2	3/2
A-one	2	-
CBS	1	-
Comb and Razor test	-	1
BIT	-	2
<i>Other tools used (total tests used/different tests used)</i>	6/3	3/1
Observations	2	3
Part of NPO	1	-

Scales mentioned but did not measured VSN (MMSE (N = 2), MoCa (N = 1))	3	-
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Process of assessment of VSN should be improved

yes	6	3
Unknown	-	2

Abbreviations: A-one, ADL-focused Occupation-based Neurobehavioral Evaluation; BIT, Behavioral Inattention Test; BORP, Birmingham Object Recognition Battery; CBS, Catherine Bergego scale; MMSE, Mini-Mental State Examination; MoCa, Montreal Cognitive Assessment; NPO, NeuroPsychological research; RPA, Rivermead Perceptual Assessment; VOSP, Visual Object and Space Perception Battery; WMS, Wechsler Memory Scale;

The answers regarding suggestions for improvement of VSN assessment made by the interviewees were subsequently clustered in two key points: improvement of the process of assessing VSN and knowledge development and training (Table 2). Another author checked the tables and clusters till the agreement was reached. Finally, the recorded answers were merged into three main points per country: (1) routine of VSN assessment, (2) process of VSN assessment (involvement, tools, and documentation), and (3) suggestions for improvement.

Table 2 Suggestions to improve the VSN assessment process.

Suggestions for improvement	The Netherlands (N = 6)	United Kingdom (N = 6)
<i>Improvements in the process of assessing VSN</i>		
Update the review sheet to include a prompt to check it has been assessed.	-	1
Improve accessibility to the assessments	-	1
Routine assessment of VSN (every stroke patient)	3	-
Unambiguous method for assessing VSN	1	-
More insight into the domains of VSN/neglect (near/far space)	2	-
Assessment of the severity of VSN and the consequences this has	1	-
Standard VSN in the plan of treatment after cognition analysis	1	-
Improvement in knowledge development and training		
More attention for VSN from the multidisciplinary team (MDT) would increase recognition	3	-
We have a good training package in place for new starters.	-	1
To engage the whole MDT in identifying and treating VSN	-	1
More knowledge in MDT	1	-

Abbreviations: VSN, Visuospatial Neglect

Owing to the heterogeneity of the stroke rehabilitation population in the UK and the Netherlands, the results are presented separately. This research followed the standard guidelines of the Consolidated criteria for Reporting Qualitative research (COREQ) checklist [25].

3. Results

3.1 Participants and Setting

In the Netherlands, eight health care professionals working in eight geriatric rehabilitation facilities were approached, of whom seven agreed to participate. One participant was approached several times but remained unreachable both by email and telephone. Finally, six health care professionals from six facilities participated. The professions of the six interviewees differed. There were two occupational therapists, one program leader in neurorehabilitation, one psychologist, one physician, and one physiotherapist.

In the UK, health care professionals of eight stroke/neurorehabilitation units were approached. Two persons did not respond. Health care professionals comprising three physicians and three occupational therapists from six facilities agreed to participate.

The geriatric rehabilitation facilities in the Netherlands recruited approximately 125 stroke patients in two months. This number was a little lower than expected due to admissions being limited for a period due to a norovirus outbreak in two facilities and understaffing in one facility. In neurorehabilitation facilities in the UK, around 92-104 stroke patients were admitted in two months.

3.2 Assessing VSN Post- stroke in Geriatric Rehabilitation Facilities in the Netherlands

3.2.1 Routine VSN Assessment

None of the six geriatric rehabilitation facilities routinely assessed stroke patients for VSN in the first week after admission or in any later phase of geriatric rehabilitation (Table 1). When the interviewees were asked about the frequency of VSN, they found no stroke patients with VSN assessed by their multidisciplinary team (MDT) in patients' files within the last two months.

One participant reported that VSN had been diagnosed in three of their inpatients during their stay in the acute hospital.

One interviewee said:

"There were some subtests in other tests, which are related to VSN, but these are not mentioned specifically".

Another participant remarked:

"There used to be a whole test battery to assess VSN, but unfortunately, this procedure gradually disappeared".

In one setting, VSN was discussed in an MDT meeting when, due to staff observations, problems regarding VSN were suspected. Generally, VSN was assessed when it was mentioned in the acute hospital referral (n = 2) or by suspicion of VSN mentioned in an MDT meeting (n = 3).

3.2.2 Process of VSN Assessment (Involvement, Tools, and Documentation)

The interviewees reported that a variety of professions could be involved in assessing VSN post-stroke. The occupational therapist would be most involved (n = 5) in combination with other disciplines (Table 1). Mostly, it remained unclear who took the lead in the assessment and documentation of the VSN patients. Several measurement tools were used to assess VSN, either alone or in combination (Table 1). Neuropsychological tests were most frequently (seven times) mentioned. Four different tests were used. All, except the confrontation test, were pen and paper tests [26, 27]. The line bisection (n = 3) and star cancellation (n = 2) were most mentioned [28, 29]. VSN assessments based on ADL tasks, the A-one (n = 2) and the Catherine Bergego Scale (CBS) (n = 1) were less frequently employed [30-33].

The diagnosis of VSN or the VSN assessment results could not always be found in the electronic records of the patient. The participants remarked that VSN would only be in the patient files when: (sub)tests were performed (n = 3), VSN was diagnosed in a hospital setting (n = 2), there was suspicion for VSN (n = 2) or it was in the weekly report of the physician (n = 1).

VSN was mentioned in the multidisciplinary treatment plan when the following conditions were met:

- It disturbed independent functioning or returning home (n = 2),
- Tests were provided (n = 1), or
- VSN was determined in a hospital setting (n = 1).

3.2.3 Suggestions for Improvement

All of the interviewees highlighted the significance of improving the current practice of VSN assessment (Table 1). Suggestions for improvement were categorized into two key points:

- ✚ to improve the VSN assessment process (n = 8), and
- ✚ knowledge development and training, especially with more attention from the MDT (n = 4) (Table 2).

Regarding the process of assessing VSN, the emphasis was laid on routinely assessing every stroke patient during rehabilitation (n = 3). Participants underlined the significance of improving the VSN assessment because this offered better insight into the problems of patients caused by VSN, earlier initiation of VSN-related therapy and guidance, and the identification of stroke patients with mild VSN who otherwise would be missed.

One participant remarked:

"It would be of added value to append the cognitive screening standard in the plan of treatment. So, the measurement tool and results cannot be forgotten and will be discussed in a meeting".

3.3 Assessing VSN Post-stroke in Neurorehabilitation in the UK

3.3.1 Routine VSN Assessment

Three interviewees confirmed that their MDT routinely assessed their stroke patients for VSN in the first week after admission. Two participants indicated that VSN was only investigated by the MDT when they suspected problems. A participant declared:

“We use an observational functional screening, sometimes a Behavioral Inattention Test (BIT) is done... often, it is not a priority so it can be missed.”

Some possible causes of not assessing VSN were noted, including a dip in skill level because of staff set/rotation or because of the experience of high work pressure.

3.3.2 Process of VSN Assessment (Involvement, Tools, and Documentation)

The occupational therapist was always involved when assessing VSN four participants stated that the occupational therapist led the assessment procedure.

Neuropsychological tests were most frequently (12 times) used for VSN assessment, alone or in combination. Nine different tests were used, most frequently the line bisection (n = 2) and star cancelation (n = 3) tests [28, 29]. There were fewer VSN tests mentioned based on ADL tasks (3 times) the Comb and razor test (n = 1) and BIT (n = 2)[28, 34] were used.

When patients were assessed for VSN, the presence and information of VSN could be found in the medical or patients' notes. Mostly paper patients' files were used. Two units used a separate sheet to fill in the assessment results.

An interviewee (as shown in Table 2) suggested:

“We could update the review sheet so that it includes a check box to check whether VSN had been assessed. That would be a reminder and could improve the VSN assessment procedure’.

3.3.3 Suggestions for Improvement

Half of the interviewees underlined the importance of improving the current practice of assessing VSN (Table 1). Suggestions for improvement were categorized into key points: improvement of the process of assessing (n = 2) and knowledge development and training (n = 2). To assess VSN, it was emphasized to improve the assessment sheets regarding a checkpoint and accessibility (n = 2).

One participant remarked as under:

“We could improve accessibility to the assessments to increase efficiency and provide a visual cue to help therapists choose the best assessments. Another improvement could be that we engage the whole MDT in identifying and treating VSN”.

4. Discussion

4.1 Routine of VSN Assessment

This study examined the assessment of VSN after stroke in current neurorehabilitation in the Netherlands and the UK facilities. The results showed that nine out of twelve rehabilitation facilities in the Netherlands and the UK did not routinely assess every stroke patient for VSN. This irregular manner of assessment was noticed in all the participating GR facilities in the Netherlands and half of the facilities in the UK. These data supported the findings in some studies [14-16] in the acute phase, and in a study in the United States by Chen et al. [18], who concluded that VSN is not always identified during routine care. The incidence of VSN after stroke assessed by their MDT in the Netherlands was 0%. There is a gap between data collected in science and actual practice. VSN appears to be under-recognized in current practice and maybe even more in a general geriatric rehabilitation environment such as in the Netherlands than in a more stroke-specific setting such

as in the UK. Some factors might have had an important influence on the current results of the process of VSN assessment. First, the need for more knowledge (development and training) of VSN possibly indicates inadequate knowledge about VSN and VSN assessment tools for proper diagnosis. Second, when no discipline is responsible for VSN assessment, there is perchance no control over the structured and routine process of VSN assessment. At last, GR aiming at treating geriatric patients and/or patients with more complex, multipurpose aims for rehabilitation and high comorbidity for whom conventional training is not always possible. Therefore, it is suggested to investigate the feasibility of VSN assessment in GR in future research.

4.2 Process of VSN Assessment (Involvement, Tools, and Documentation)

Different care professionals were involved in assessing VSN. In the UK, the occupational therapists were most frequently in the lead. In the Netherlands, this was unclear, and it could be an obstacle for assessing VSN in a structured way. On the other hand, a multidisciplinary or interdisciplinary approach for assessing VSN can add value. Most assessment tools do not declare specific care professionals. The professionals should recognize VSN independently and discuss their findings in the MDT meeting [18]. We highlight the importance of clearly delineating the responsibility of the assessor(s), involved care professionals and profession in lead.

There are many instruments to examine VSN after stroke [10, 11]. Several studies have shown the use of numerous instruments to assess VSN [7, 12]. This study confirmed the availability of ample tools for VSN assessment in clinical practice, which differ in different settings and countries. Neuropsychological tests are most frequently used in current practice. However, it is also important to assess VSN during activities to ensure that VSN will be measured more sensitively and will detect the problems experienced by patients in daily living. Therefore, it is important to assess VSN with more than one test: neuropsychological and during activities [7]. We highlight the need to build consensus for using a pen and paper task (e.g. line bisection or star cancellation) and a test based on ADL performance like CBS [11, 35, 36].

Importantly, the assessment of VSN becomes a standard part of current neurorehabilitation practice and recording in patient files. To achieve this, the facilities must adopt a structured method for assessing, reporting, and keep an overview of the progress of VSN.

4.3 Consequences and Recommendation

VSN can have negative consequences for the rehabilitation process [37, 38], stroke patient, and informal caregiver [5, 7, 37]. In addition to severe VSN, mild and moderate VSN can also have major consequences when patients return home. This study suggested that VSN remains under-recognized in clinical (geriatric) rehabilitation practice.

The first step would be to educate healthcare professionals about the negative impact of VSN on recovery in general, the negative influence of VSN on dependence during ADL, and knowledge of VSN assessment tools [3, 5, 7, 8, 39]. Subsequently, a neuropsychological pen-and-paper VSN screening and VSN assessment during basic ADL (e.g., CBS) should be implemented [28, 29, 32, 33]. This does not need to be very extensive. Simple tests, which can be scored without formal training and by several professions, can be used. When implemented in systematic and clinical routines, such assessments already shows a large improvement. In addition, the load resilience of the patients should always be considered.

Related and utterly important, one profession should lead the VSN assessment procedure. Based on the current semi-structured interviews as well as the more quantitative questionnaires of Checketts et al. [12], the nature of VSN professionals is insignificant. This may depend on the country or facility, but a profession responsible for the procedure of VSN assessment can lead to great improvement.

Furthermore, recent research has indicated that using novel methods or innovative technology might further improve VSN assessment, especially for mild VSN [40-42]. This would further improve assessment and potential training; the load resilience of especially the geriatric population might hamper the use of such technological advances or digitized tests. Future research should explore the feasibility and added value of such technology in this population. First studies are promising [41, 42] with (a subset of) included patients for training [42] or user-tests [41] admitted to geriatric rehabilitation.

4.4 Strength and Limitations

The strength of this research was the cooperation between the Netherlands and the UK. This ensured a broader vision about the process of assessing VSN after stroke in current practice and of the organization of neurorehabilitation facilities in its entirety. The findings should be considered in light of a first initial inventory, studying 12 exemplary rehabilitation facilities in the Netherlands and the UK. The included organizations were spread over different regions in two countries. The rehabilitation facilities were neither progressive nor lagging in development compared to other facilities. Another strength is that the current study has a wide participation by different health care professions in the interviews, which offered a broader view of the experiences in current practice and important findings for future practice.

5. Conclusions

Overall, this study showed that in current practice VSN was not always assessed in a routine (every stroke patient) and structured (who, when, and, which tests) manner. Contrary to the best practice guidelines, VSN was not routinely assessed with more than one test (neuropsychological and during daily activities). VSN was not routinely assessed with more than one test (neuropsychological and during daily activities), contrary to best practice recommendations. VSN remains probably underrecognized, especially in geriatric rehabilitation facilities. It is important to improve the current process, including selecting the most appropriate tools for assessing VSN.

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Author Contributions

Conceived the analysis: Martine S. Bosma; Design of the analysis (first version): Martine S. Bosma; Redesign of the analysis (later versions): Martine S. Bosma, Monique A.A. Caljouw, Jacqueline; Benfield, Laura Edwards, Tanja C.W. Nijboer and Wilco P. Achterberg; Collected the

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Competing Interests

The authors have declared that no competing interests exist.

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