Early Detection of Post Stroke Depression: psychometric properties of the Signs of Depression Scale

Nursing Home

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SUMMARY

Title: Early detection of Post Stroke Depression: psychometric properties of the Signs of Depression Scale

Background Post stroke depression (PSD) is a common consequence after stroke. Depression has been negatively associated with functional outcome, length of stay in hospital, cognitive impairment, and social activities. One third of the patients post stroke suffer from communicative impairments. For assessing PSD, irrespective of the fact that patients have communicative impairments, an observational screening tool could be useful. Of the available tools the Signs of Depression Scale is adapted. This revised version (SODS-R) needs validation.

Aim and research question(s) This study evaluates the internal consistency, interrater and intrarater reliability, criterion validity against the nine-items Patient Health Questionnaire (PHQ-9), construct validity against the Barthel Index (BI), diagnostic accuracy and clinical utility of the SODS-R.

Method A quantitative, observational, cross-sectional cohort study in a Dutch nursing home from April 2013 till June 2013.

Results 18 residents, 14 proxies and 23 nurses were included. 4 residents had a major depression. Cronbach's alpha for internal consistency was 0.91, ICC for interrater and intrarater reliability was 0.96 (95% CI 0.87 – 0.98) and 0.88 (95% CI 0.70 – 0.96), respectively. Correlation between SODS-R and the PHQ-9 and BI, respectively, was r_p = 0.25, p 0.344 and -0.18, p 0.474.The area under the curve for diagnostic performance of SODS-R was 0.68 (95% CI 0.32-1.00), and the optimum cut-off point was 5. Sensitivity and specificity were 75% and 69%, respectively. The positive and negative predicted value was 0.43 and 0.90, respectively.

Conclusion Although the sample size of this study is too small to provide evidence for psychometric of the SODS-R, the tool seems to be reliable and accurate and useful, but should be further validated.

Key words: PSD, observational screening, sensibility, specificity, utility

Dutch summary

Titel: Vroegsignalering van depressie na een beroerte: psychometrische eigenschappen van de Symptomen van Depressie Schaal

Achtergrond Een depressie is een veel voorkomende complicatie na een beroerte. Een depressie heeft een negatieve invloed op onder andere revalidatie, cognitie en sociale activiteiten. Ook afasie komt vaak voor na een stroke (33%). Om een depressie te kunnen herkennen, ook bij patienten met een afasie, zou een observatie-instrument goed bruikbaar kunnen zijn. Hiervoor zijn instrumenten ontwikkeld, maar nog niet voldoende gevalideerd. Voor dit onderzoek is de Symptomen van Depressie Schaal aangepast en vertaald en deze herziene versie (SODS-R) wordt gevalideerd.

Doel Dit onderzoek evalueert de interne consistentie, interbeoordelaarsbetrouwbaarheid, intrabeoordelaarsbetrouwbaarheid, criteriumvaliditeit ten opzichte van de 9-item Patient Health Questionnaire (PHQ-9), constructvaliditeit ten opzichte van de Barthel Index (BI), de diagnostische waarde en de bruikbaarheid van de SODS-R.

Methode Een kwantitatief, observationeel, cross-sectioneel cohort Onderzoek, in een verpleeghuis in Nederland, vanaf april 2013 tot en met juni 2013.

Resultaten 18 patienten, 14 naasten and 23 verpleegkundigen/verzorgenden hebben geparticipeerd. 4 patienten hadden een depressie volgens de PHQ-9. Cronbach's alpha voor interne consistentie was 0.914, ICC voor interbeoordelaarsbetrouwbaarheid en intrabeoordelaarsbetrouwbaarheid was respectievelijk 0.96 (95% CI 0.87 – 0.98) en 0.88 (95% CI 0.70 – 0.96). Correlatie tussen SODS-R en de PHQ-9 en BI was r_p = 0.25, p 0.344 en -0.18, p 0.474, respectievelijk. De "area under the curve" voor de diagnostische waarde van de SODS-R was 0.68 (95% CI 0.32-1.00), de optimale afkapwaarde was 5. De sensitiviteit en specificiteit hierbij waren respectievelijk 75% en 69%, de positieve and negatieve voorspelde waarde respectievelijk 0.43 en 0.90.

Conclusie Hoewel de steekproef te klein is voor sterk bewijs voor psychometrische warden voor de SODS-R, lijkt dit onderzoek toch een betrouwbaar, accuraat en bruikbaar instrument om PSD op te sporen. Verdere validatie in een grotere groep is echter nodig om dit met meer zekerheid te zeggen.

Sleutelwoorden: PSD, observationele screening, sensibiliteit, specificiteit, bruikbaarheid

Background

Post-stroke Depression (PSD) is a common occurrence after stroke [1,2]. A depressive disorder is the consistent presence of five or more of nine symptoms of depression according to the DSM-IV [3], over a two-week period representing a change from previous functioning. One of the symptoms should be depressed mood or loss of interest [3]. Although there is no generally accepted definition for PSD, the DSM criteria are generally used [1].
The described prevalence of PSD at any time after stroke varies from 5% to 61% [1,4], due to methodological differences between studies. A combination of prevalence numbers indicates the prevalence of PSD at any time after stroke is 33% [5]. The average prevalence of PSD at three to six months is around 30% [5], and declines after 12 months to 16–25% [6,7,8]. Long-term prevalence after three years is reported to be 29% [6]. PSD is associated with decreased quality of life [9,9], recovery [10], functional outcome [11], social outcomes [12] and mortality [13,14,15].

Another common consequence of stroke is aphasia. Approximately one third of stroke survivors have aphasia at onset [16,17], and 15% remain aphasic in the long term [18]. Aphasia is defined as the disability to communicate by language expression and comprehension and can affect speaking, reading or writing [19]. Aphasia is associated with more severe disability, less recovery of social activities [20], and may result in a higher rate of depression [21].
In the Netherlands, 30% of all stroke patients are admitted to a nursing home after being discharged from the hospital [22]. Convincingly, due to the association of PSD with functional outcome and aphasia, the prevalence of PSD among stroke-survivors living in a nursing home will be relatively high.

In spite of the high prevalence and consequences, PSD is often under-recognized, underdiagnosed and undertreated [23,24,25]. Nurses reported that PSD is an important problem in stroke patients, and needs more attention [26]. However, they find it difficult to evaluate patients psychological condition, and measurement instruments are rarely used[24-26]. A routinely used screening instrument should increase the recognition of depression by nurses [23,25,26].

For assessing PSD, irrespective of the fact that patients have communicative impairments, an observational screening tool could be useful. Existing screening tools are the Stroke Aphasic Depression Questionnaire (SADQ-H) [27], the Aphasic Depression Rating Scale (ADRS) [28], the Visual Analogue Mood Scales (VAMS) [29], and the Signs of Depression Scale (SODS) [30]. However, these instruments need more validation [31].
The SODS is the most promising instrument. It is developed for use by nurses in daily care with patients [30], is easy and quick to administer, and no training is needed [30,32]. In this study, the SODS is validated in stroke-survivors living in a nursing home.

The original SODS in a dichotomous scale and developed for medically ill patients in hospital setting. Evaluation studies in this setting and in post stroke setting showed correlation with other depression measures of 0.22 - 0.79, and sensitivity 64%-86%, and specificity 38%-93% [30-33].

This rather poor psychometric properties may be due to the dichotomous scale of the original SODS. This is less appropriate for assessing attitudes and behaviour because of their continuity; behaviour depend on circumstances and changes in time of day [34]. When comparing to a reference test with more variation in response possibilities, psychometric properties of the SODS may improve when more various responses can be given. Therefore in this study, for the first time, the SODS in a Likert scale response format is investigated.

Problem Statement

For adequate recognizing and diagnosing depression in stroke patients living in a nursing home, an observational screening tool is needed. Of all available tools the SODS is the most promising. However psychometric properties of the SODS are rather poor. A revised SODS with a four-point Likert scale response format is not validated yet.

Aim

The aim of this study is to determine the reliability, validity, diagnostic accuracy and utility of a four point rated SODS (SODS-R), when used by nurses in the daily care of patients after stroke with or without communicative impairments, living in a nursing home. With a reliable, valid, accurate, and useful instrument, nurses will be enabled to identify PSD in stroke survivors living in a nursing home, which is the first step in an adequate treatment of PSD.

Research questions

- What is the criterion validity of the SODS-R when completed by nurses in identifying depression in patients following a stroke compared with the Patient Health Questionnaire (PHQ-9) [35]?
- What is the construct validity compared with the Barthel Index (BI) [36], an instrument that represents a construct correlated with PSD?
- What is the internal consistency, the interrater reliability and the intrarater reliability of the SODS-R when rated by nurses?
- What is the diagnostic accuracy of the SODS-R in identifying depression in patients following a stroke compared with the PHQ-9?

- What is the clinical utility of the SODS-R when applied by nurses in identifying depression in patients following a stroke?

Methods

Design

A quantitative, observational, cross-sectional cohort study is conducted in a Dutch nursing home from April 2013 till June 2013. This design is appropriate for a descriptive, psychometric study[37].

Ethical aspects

The study was approved by the medical ethical committee of the University Medical Center Utrecht. Patients and their closed relatives were asked by a psychologist of the nursing for permission to the researcher to inform them about the study. After that, the researcher informed all patients and their relative about the study and obtained their informed consent.

Participants

The target population is patients after stroke with or without communicative impairments, and their proxies as well as the nurses responsible for the care of the participating residents. Study population is a convenience sample of patients recruited in three revalidation units and three somatic units of a Dutch nursing home.

Inclusion criteria for patients were: Dutch as mother language, diagnosed with stroke, not too ill for participation (according to judgement of nurse or researcher), no severe psychiatric disorder and no diagnosed depression before stroke noted in medical file.

Inclusion criteria for proxies were: ≥ 18 years of age, related to the patient (spouse, child, friend, sibling), in contact with patient at least once a week.

Inclusion criteria for nurses were: educated at the Dutch nursing education level 3, 4 or 5; ≥ 18 years; if student nurse: minimal one month active on the ward and in second year education.

The minimum sample size for this study is assumed 50 patients with their proxies and nurses [38]. About a third of nursing home residents have had a stroke in their past. The six units had a capacity of 96 patients, and on the revalidation ward patients left within six weeks. It was expected that in three months about 48 possible eligible patients could be found in this population.

Measures

Index test SODS-R

The index test is the Signs of Depression Scale-Revised (SODS-R). The SODS-R is a six-item observer-rated screening scale. Items of the SODS are: looking sad, cry or seem weepy,

agitated/restless/anxious, lethargic/reluctant to mobilize, needing a lot of encouragement, and seeming withdrawn. The items are rated using a 4-point Likert scale with item scores ranging from 0 (symptom not present) to 3 (symptom present nearly every day). Psychometric properties of the SODS in its original form were rather poor [31-33]. The four-point Likert scale response format should be more suitable for screening behaviour and improve properties of the SODS.

Reference test PHQ-9

Although there is no generally accepted diagnostic definition of post-stroke depression, the DSM criteria are generally used, which needs a standardized psychiatric interview. However, because this was not part of the usual care, and should be a burden to the patients, this was not possible in this study. Therefore, the Patient Health Questionnaire (PHQ-9) [35] was used as a reference test and was conducted by the researcher. It is an instrument that uses the Diagnostic and Statistical Manual of Mental Disorders (DSM-IV) criteria to evaluate depression.
The PHQ-9 has good psychometric properties when used in clinical stroke patients without communicative impairments and conducted by nurses [39]. The inter-rater and test-retest reliability were good (ICC=0.98, 95% CI 0.96-0.99, respectively ρSp=0.75, p<.001). Internal consistency was good (Cronbach's α=0.79). The concurrent validity was moderate for the PHQ-9, with a Pearson's correlation of 0.7 (p<.001) [25]. The optimum cut-off point of the PHQ-9 for major depression was is (sensitivity, 80%; specificity, 78%; positive predicted value, 34%; negative predicted value, 97%) [39].

For nursing home residents, the PHQ-9 has acceptable psychometric properties, included for residents with cognitive impairments [40]. Agreement between PHQ-9 reference and a DSM-III semi-structured interview was very good (weighted κ = 0.69, 95% CI = 0.61-0.76) [40].
In residents with severe cognitive impairment, PHQ correlations with the criterion standard Cornell Scale were 0.63 [40].

The Barthel Index

The Barthel Index (BI) [36] will be used as an external validator. Depression is associated by physical disability, often assessed with the BI [36,41-43]. The SODS-R should correlate with the BI negatively, if it measures depression (construct validity).
The BI is a 10 item scale. The highest total score is 20. Higher score means more independency. Reliability and interrater reliability are shown to be high (r = 0.71-0.99) and the criterion validity is good [44,45].

Caregiver Strain Index

The Caregiver Strain Index (CSI) is a validated 13-item tool that measures the level of strain or burden experienced by caregivers with a yes/no response format [46]. Scores can range from 0 to 13 with higher values indicating a greater degree of strain.

The Questionnaire Practicality of an assessment tool

The clinical utility of the SODS is assessed by a questionnaire constructed according to the criteria of practicality of an assessment tool [25]. All six items, except for the item concerning the time needed to fill in the SODS-R, have a dichotomous answer scale (yes/no).

Procedure

The researcher approached all patients whose names she got from the psychologist. After informed consent from the patient (or informed assent from the proxy in case of severe communicative impairment of the patient), the researcher checked the inclusion criteria using information of the medical record to include the patients.

After inclusion, communicative ability was assessed and if no communicative impairment was found, cognitive ability was assessed too. The researcher assessed patients without significant communicative and/or cognitive impairments and, if available, proxies of the patients. Demographic characteristics of patient and proxy are collected, and clinical details of patients are collected, see Table 1. The researcher completed a BI by asking the patient or, when communicative impaired, by asking the nurse. A CSI was completed by the researcher by interviewing the proxy. The researcher provided a diagnosis of depression for each patient. Proxies also rated the same scale for depression in the patient. If they were not able to do this rating verbally to the researcher, forms were left in the patients room for the proxy to take home and fill it out. They returned it in a closed envelope, so nurses were blinded for this rating. Two nurses, responsible for each patient's care independently, rated the patient's mood using the SODS-R, which was presented to them by researcher. This was repeated within a week time. It is assumed that the situation concerning patients mood is not changed (diagnosis is based on presence of symptoms over two weeks' time), and nurses do not remember what they filled out last time. The researcher assessed patients' mood before she handed out the SODS-R and did not tell the nurses about her findings. When possible, the researcher handed out the SODS-R to two nurses in different working shifts on the same day. They were explained to complete the SODS-R without consulting each other. With these procedure nurses and researcher were blind to each other's ratings.

To access clinical utility of the SODS-R, the Questionnaire Practicality of an assessment tool was handed out by the researcher to the nurses each time they complete the SODS. Figure 1 represents an overview of the process.

Data analysis

IBM SPSS version 21[47] was used to analyse the data. Descriptive statistics were used to summarise demographic data. Cronbach's *α* coefficient was calculated for internal consistency of the total scale. An α of 0.70-0.90 indicates a good internal consistency. For interrater and intrarater reliability the Intra-Class Correlation Coefficient (ICC) is calculated. The one way model is used, because of each subject is assessed by different randomly selected raters. An ICC > 0.70 indicates good agreement [38]. Pearson's correlation coefficients were calculated to examine the relation between the SODS-R and the PHQ-9 and BI, respectively. A paired – sample T-test is performed to detect differences between patient- and proxy-rated PHQ-9 scores. If there is significant difference, possible confounders in the will be identified by performing linear regression between all PHQ-9 ratings with CSI-score, relationship of proxy with the patient, age, and aphasia.

Receiver Operating Characteristics (ROC) curves are used to determine the Area Under the Curve (AUC) and the optimal cut-off point for the SODS-R to optimize its diagnostic accuracy for screening for depression. An AUC > 0.80 means a good ability to discriminate between positives and negatives. Sensitivity, specificity, positive predictive value and negative predictive value are calculated by comparing outcomes of the SODS-R to the PHQ-9 using formulas (sensitivity: true positives/(true positives + false negatives), specificity: true negatives/(true negatives + false positives), positive predictive value: true positives/(true positives + false positives), negative predictive value: true negatives /(false negatives + true negatives)).

Results

Of all patients living in a nursing home on a revalidation or somatic ward, with an intracerebral haemorrhage or ischemic infarction in their past, 25 patients had given permission for getting informed about the study. Two of them decided not to participate, three did not meet the criteria for inclusion and two left to home before the informed consent. Finally,18 patients, 14 proxies and 23 nurses were included. 7 patients were aphasic.

For each patient two nurses completed a SODS and clinical utility form. A retest was done to 16 patients, 2 SODS missed due to long-term illness of a nurse. For two patients with aphasia, no PHQ-9 could be completed, because no proxy was available. For two patients without aphasia, only a patient-rated PHQ-9 was completed. No proxy-rated PHQ-9 could be obtained. BI was completed for all patients.
For an overview, see Figure 1.

Demographic characteristics of the sample
Mean age of the patients was 67.4 years, 50% was female. According to the PHQ-9 four patients had a major depression. Mean age of the proxies was 52.3 years, 50% was a child of the patient, 28% was the partner. Mean age of the nurses was 44 years, 42% was student nurse. The demographic characteristics of the participants are summarized in Table 2.

Validity
For calculating correlations between the SODS and PHQ-9 and BI, respectively, total scores of the PHQ-9 were used from the patients when they had no communicative impairments (n=12) and proxy-based when there were communicative impairments with the patients (n=5). Mean of proxy-rated PHQ-9 (6.3) and patient-rated PHQ-9 (4.6) did not differ significantly from each other (-3.67 – 0.27 CI). Measures of the PHQ-9 were not confounded significantly. Most strong influence came from the score on the CSI (β coefficient 0.38 (95% CI -0.437- 1.18), but was not significant. Therefore proxy-based PHQ-9 scores isn't corrected for further calculations.
Correlation between SODS-R and the PHQ-9 and BI, respectively, was r_p = 0.245, p 0.344 and -0.180, p 0.474.

Reliability
Nurses (n = 23) provided baseline and follow-up data for the reliability analyses. The physical condition of the residents was seemingly stable over the observational period according to the medical file, no special incidents occurred.
Internal consistency of the total scale, calculated with the data from the first assessment with the SODS-R (n=18), was good (α = 0.914). Because this is a very high value, further calculations are performed. Inter-item correlation is 0.638, and especially item 4 and 5 are highly correlated (0.93)
ICC value for the intrarater reliability for the SODS-R (n=16) was 0.955 (95% CI 0.874 – 0.984) and for the interrater reliability (n=18) 0.883 (95% CI 0.695 – 0.956).

Diagnostic accuracy

The area under the curve (AUC) for diagnostic performance of SODS-R (n=16) was 0.68 (95% CI 0.32-1.00), and the optimum cut-off point was 5. The sensitivity and specificity were 75%, and 69%, respectively (Fig 2). The positive and negative predicted value was 0.43 and 0.90, respectively.

Clinical Utility

Nurses (n = 23) completed the clinical utility questionnaire 52 times in total. The mean time that was needed to administer the SODS-R was 9.3 minutes (SD=6.5), which was an acceptable time according to 96% of the nurses. 94% of the nurses thought the SODS-R is applicable in their daily work and that using this instrument was in benefit of the patients (96%). Most nurses (98%) found that the PHQ-9 gave relevant information for the multidisciplinary care of their patients. Items were clear to most nurses (92%), 12% had some difficulties to answer the questions. Two nurses had difficulties to choice between a “2” or a “3” score, one nurse had a problem with knowing an aphasic patients’ feelings. It was clear to 98% of the nurses what to do with the total scores, which were not difficult to conclude from the SODS-R form, according to 96%.

Discussion

This study presents the psychometric evaluation of the SODS-R rated by nurses to stroke patients living in a nursing home. The interrater reliability, intrarater reliability, and internal consistency of the SODS-R were good. Significant correlation of the SODS-R with the PHQ-9 could not be proved. Negative correlation with the BI was found, but not significant. The diagnostic accuracy of the SODS-R compared to the PHQ-9 was marginal. Nurses have evaluated the clinical utility of the SODS-R as good.

The internal consistency of the SODS-R was high. An α higher than 0.9 suggests that the items strongly interrelate and some of them may even be unnecessary. This was also confirmed by the mean inter-item correlation, which was above the ideal range of correlations (between 0.2 and 0.4) [34]. This is not in line with previous findings (0.53) [31]. However, because of the small sample size of this study, this has to be confirmed in larger groups before refining the scale.

Agreement of the SODS-R between raters and within raters was higher than previous findings [32,33]. This may be a result of adapting the response format into four-point Likert-scale. It may also be due to the different study population. In a nursing home, nurses know their patients longer, and therefore convincingly, better than in more acute settings, which may influence their agreement.

Correlation of the SODS-R with the reference test PHQ-9 was poor and not significant. This may be caused by several reasons. First sample size is too small to give evidence for this lack of correlation. The golden standard for diagnose depression is an interview based on the DSM-IV criteria. In this study this was not possible and the PHQ-9 was used. However this instrument is validated against the golden standard. Depression in patients with aphasia is rated with their proxies. Although linear regression did not gave an indication for caregiver's burden as a confounder for this score, it was notably that the SODS-R had better correlations with proxy-ratings than with patients ratings of the PHQ-9. May be the lack of correlation between the SODS-R and the PHQ-9 is not the instrument itself, but is it caused by the fact that observation of the patient and a close relationship to the patient does not give enough information for diagnosing depression. Further study is needed with more patients and using a golden standard for depression. Besides more knowledge is needed about the relationship between feeling depressive symptoms by patients and observed symptoms by others.

Correlation with the BI was negative, as expected, but significant. Again, the small sample size give not strong evidence for this. However it may also be due to the small range of BI-scores in this population, a wider range is needed to show correlation.

Diagnostic accuracy of the SODS-R was not better than the original SODS. Optimal cut-point was 5, which is quite in line with other studies (1/2) [31,32], when the wider range in total scores is taken into account.
This cut-point gives quite a few false positive outcomes. Since the SODS-R is a screening tool and is followed with a real assessment with the psychologist, this has not serious consequences. However this would be an unnecessary burden to these patients. So interpretation of the SODS-R score should be done carefully before they consult the psychologist.

Another thing has to be mentioned as it affects the generalizability of the results. Only data could be obtained from patients who gave permission to the psychologist for approaching by the researcher. Demographics of the group that was not participating couldn't be compared to the included patients.

Conclusion

The sample size of this study is too small to give evidence about the psychometric properties of the SODS-R. However it indicates that this revised SODS is a reliable, accurate and useful instrument for screening for PSD in nursing homes, irrespective of communicative impairments of the patient.

Tables and Figures

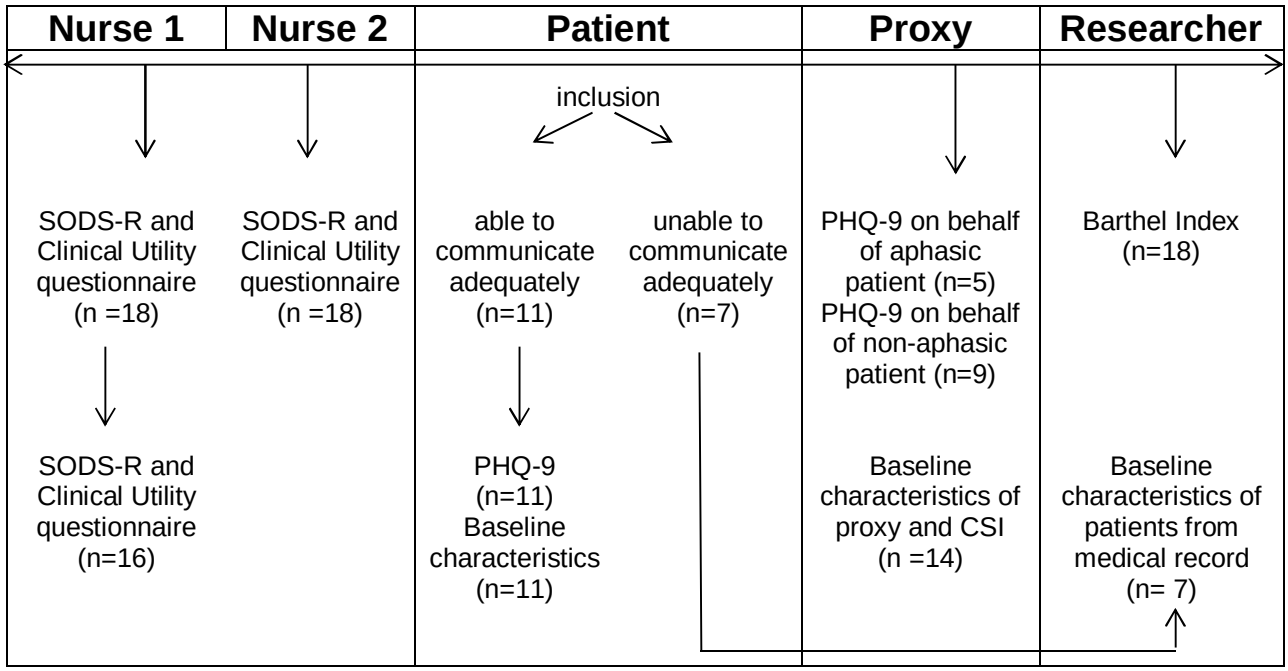

Figure 1. Process of data collection

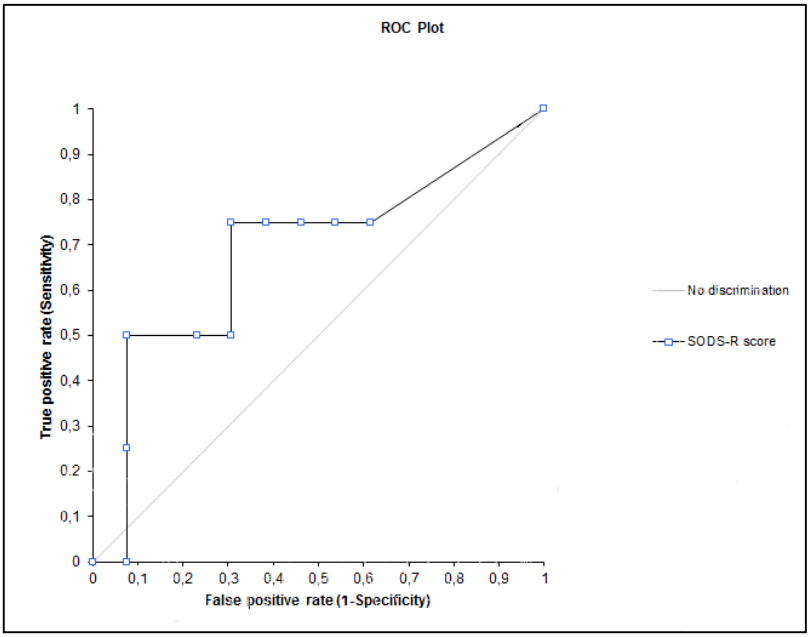

Figure 2. ROC-curve of the SODS-R against the PHQ-9

SODS-R (Positive test >= cut-off)	Sensitivity (*95% Confidence Interval*)	Specificity (*95% Confidence Interval*)	Positive predicted value (+)	Negative predicted value (-)	True positives	True negatives	False positives	False negatives
0	1.00 (*0.40-1.00*)	0.00 (*0.00-0.25*)	0.24	-	4	0	13	0
1	0.75 (*0.19-0.99*)	0.39 (*0.14-0.69*)	0.27	0.83	3	5	8	1
2	0.75 (*0.19-0.99*)	0.46 (*0.19-0.75*)	0.30	0.86	3	6	7	1
3	0.75 (*0.19-0.99*)	0.54 (*0.25-0.81*)	0.33	0.88	3	7	6	1
4	0.75 (*0.19-0.99*)	0.62 (*0.32-0.86*)	0.38	0.89	3	8	5	1
5	0.75 (*0.19-0.99*)	0.69 (*0.39-0.91*)	0.43	0.90	3	9	4	1
7	0.50 (*0.07-0.93*)	0.69 (*0.39-0.91*)	0.33	0.82	2	9	4	2
12	0.50 (*0.07-0.93*)	0.77 (*0.46-0.95*)	0.40	0.83	2	10	3	2
13	0.50 (*0.07-0.93*)	0.92 (*0.64-1.00*)	0.67	0.86	2	12	1	2

Table 1. Demographic characteristics of the participants

Patients N =18		
Sociodemographic variables:		
Age in years, mean (sd)	67.4	14.8
Female gender (%)	50%	
Education level	Low 7 Mid 5 High 4	
Smoking in last year (%)	17	
Using alcohol (%)		
- > 10 glasses a week	17	
- < 10 glasses a week	28	
Medical history		
No. of medications, mean (sd)	7.6	3.1
Antidepressant medication (%)	28	
Previous stroke (%)	11	
Diabetes mellitus	17	
Dyslipidaemia	28	
Hypertension	56	
Stroke characteristics:		
Lesion site		
– Right (%)	78.6%	
– Left (%)	17.3%	
Type		
– Ischemic (%)	66.7%	
– Haemorrhagic (%)	27.8%	
Time since stroke	< 1 year 7 > 4 year 5	
Post-stroke measures:		
Barthel Index, mean (sd)	8.7	4.7
mRS[1], mean (sd)	3.7	0.6
Aphasia according FAST-score (%)	39%	
Cognitive impairment when not aphasic according MMSE-score	0%	
PHQ-9, mean (sd)	6.3	3.7
Major depression n (%)	4 (22%)	
Proxies N=14		
Sociodemographic variables:		
Age in years, mean (sd)	52.3	15.0
Female gender (%)	50%	
Relation to patient:		
- Spouse	28	
- Child	50	
Education level, mean (sd)	3.0	0.7
Measures		
CSI, mean (sd)	6.9	3.3
Nurses N=23		
Age in years, mean (sd)	44	11.4
Education level		
- > Level 3 (%)	13	
- Student nurse (%)	43	
Work experience in stroke population in years, mean (sd)	11.4	10.8
FAST = Frenchay Aphasia Screening Test; cut-off value: age ≤60: ≥27, age ≥61: ≥25, MMSE = Mini Mental State Examination, PHQ-9 = 9 items Patient Health Questionnaire, CSI – Caregiver Strain Index		

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