Masters thesis

Nurses' clinical observation and interpretation of communication disorders in patients admitted with stroke

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Introduction

Stroke is a major health problem in the Netherlands; in 2011, approximately 26.000 people were diagnosed with stroke.[1] Worldwide, stroke is leading cause of adult disability and death.[2,3] Stroke, also known as cerebrovascular accident, is defined as cell death caused by poor blood flow to the brain. There are two main types of stroke: ischemic, which is due to lack of blood flow and hemorrhagic, which is due to bleeding. Treating patients in specialized stroke units in the first weeks after stroke reduces mortality and improves the functional outcome of patients.[4] Stroke often results in major changes in a patient's life. The most recognised impairment caused by stroke is motor impairment, which restricts in muscle movement or mobility. Other common impairments are loss of vision or sensory deficits. These impairments can negatively affects psychosocial well-being, social participation and independence.[5-7]

Communication disorders are also very common and a serious outcome of stroke. A communication disorder is any disorder that affects an individual's ability to communicate.[8] Communication disorders enhance motoric- (dysarthria), linguistic- (apraxia of speech and aphasia) and cognitive disorders.[8] Dysarthria is defined as impaired speech production due to articulation, phonation, resonance, prosody, and/or respiration deficits related to muscle weakness, abnormal tone, and/or incoordination. Apraxia of speech includes impaired planning and sequencing of muscle movements needed to produce speech sounds or sound sequences. Aphasia is defined as the loss or impairment of language caused by brain damage that affects some or all language modalities: expression and understanding of speech, reading and writing.[9,10] Up to approximately one-third of stroke survivors experience aphasia.[11] Poststroke aphasia has a range of negative consequences on communicative skills, mood and behaviour, the prevalence of depression, quality of life and affects long term social participation.[7,11-13] A cognitive disorder is also very common and affects up to two-thirds of stroke patients.[14] It causes communication disabilities because it is the category of mental health disorders that primarily affects learning, memory, perception, and problem solving.[15]

First step in the rehabilitation for stroke patient is to determine the presence of deficits to evaluate the need for treatment.[8] Early detection of communication disorders is highly important in the care for patients to enhance recovery.[16-18] After an early diagnose, intensive treatment can be started as soon as possible to optimize rehabilitation outcomes. The 24 hour care offers the opportunity to collect relevant information concerning patients'

communication impairments.[18] Nursing care has a key role within multidisciplinary rehabilitation to poststroke patients.[19] Nurses, among other things, monitor illness, provide medical care and identify functional deficits and needs.[20] Nurses give their clinical judgement about patients responses to actual or potential health problems such as impaired communication.[21] Nurses work in close collaboration with other disciplines and the input of nurses can support the direction for further examination and diagnosis in organised multidisciplinary stroke teams including speech-language therapists.[16]

However, because of the variability of communication disorders in poststroke patients, they may not always be obvious to nurses. It is known that undocumented communication disorders are common in stroke patients admitted in a hospital.[22] To optimize care and rehabilitation of stroke patient, it is important to gain insight if the nurses' clinical observation and interpretation of communication disorders is adequately. Little is known whether these clinical observation and interpretation is sufficient in accurately identifying a communication disorder. Therefore, the objective of this study is to evaluate the validity and reliability of the nurses' clinical observation and interpretation of communication disorders in comparison with validated screenings instruments in patients with stroke admitted in a hospital. These outcomes can be used to optimise early detection of communication disorders in poststroke patients and evaluate the need for implementing validated screening instruments for communication disorders by nurses in daily care.

Method

Design

A multicenter prospective observational study was conducted in the period August 2013 - March 2014 in the neurology ward in a university and a general hospital in the Netherlands. An observational method was chosen to observe communication disorders in poststroke patients without interference. A prospective approach was used to collect data in future, that were not included in usual care, to determine the validation and reliability of the nurses clinical observation and interpretation. The study was conducted according to the principles of the Declaration of Helsinki (version October 2013).[23] The Medical Ethical Committee of UMC Utrecht was consulted to obtain a release from the Medical Research Involving Human

Subjects Act (WMO) before this study started.[24] This paper is written in accordance to the standards for reporting of diagnostic accuracy: the STARD initiative.[25]

Population and setting

The target population of interest are patients with stroke, admitted to the neurology ward in a hospital, and their nurses. A consecutive sampling technique was used, to examine all patients admitted in the neurology ward with stroke. In order to participate in this study, a patient was admitted with a clinical diagnosis of intracerebral hemorrhage or ischemic infarction, and aged eighteen years or older. A patient who met any of the following criteria was excluded from participation in this study; too ill to participate, based on the judgement of the clinicians or the researcher, decreasing course of stroke, palliative policy or unconsciousness; unable to speak or comprehend Dutch or diagnosed with a psychiatric disorder including dementia and delirium. Nurses working in the participating wards were recruited if they were responsible for the care of included patients. Nurses could not participate if they were less than eighteen years old or temporarily working on the ward. According to the COSMIN criteria, a minimum sample size of 50 patients with and 50 without communication disorders was required.[26]

Main study outcomes

The criterion validity of the nurses' clinical observation and interpretation of communication disorders is defined by the correlation of these scores with scores of validated instruments to identify a communication disorder. This validity is determined by calculating clinimetric properties: sensitivity, specificity, positive and negative predicted value, positive and negative likelihood ratios and diagnostic accuracy (table 1).[27] The interrater reliability is the extent to which a diagnosis of a communication disorder is the same for repeated measurement by different nurses for the same patient at the same time.[27]

< Insert table 1 clinimetric properties criterion validity >

Study parameters

In this study, the index test is the nurses' clinical observation and interpretation about the communication capabilities of a patient. The reference test reflects the patient's true status; either the presence or absence of a communication disorder. If a recent diagnose of a communication disorder by a speech language therapist was present, this was used as

diagnose. Otherwise, the validated Frenchay Aphasia Screening Test (FAST) and the Mini Mental State Examination (MMSE) were used to diagnose a communication disorder.[28,29] If at least one of the FAST or MMSE were positive, a communication disorder was identified positive. If a patient has a positive outcome according to the FAST for a communication disorder, the MMSE was not executed to minimize patient's burden.

The FAST is a quick and simple instrument used to assess comprehension and expression in poststroke patients.[17,28] The FAST has been reported to be reliable when used during the acute periods poststroke and shows good concurrent validity. The FAST includes two graphical sheets with several questions to test the patient on its speech and understanding capacities. Possible scores range from 0 to 20.[28] A cut-off scores of <17 for patients < 60 years of age; <16 in patients ≥ 60 and ≤70 years of age; and <15 in patients ≥71 years of age are indicative of the presence of a communication disorder. The MMSE is the most universally used validated screening instrument in recognizing cognitive disorders.[29,30] The MMSE is a ten-minute bedside measure to evaluate the ability to adequate answer questions of the researchers. [29,30] The MMSE has acceptable clinimetric properties for poststroke patients: area under the receiver operator curve (ROC-curve) (0.84), sensitivity (0.82) and specificity (0.76).[31] Possible scores range from 0 to 30.[29] A cut-off score of <18 was used for patients to diagnose the presence of a cognitive disorder.

Patients' characteristics gender, birth date, marital status, date of stroke symptoms and diagnosis, type of stroke, lesion location, motoric-, sensory-, speech-, language and visual symptoms, functional impairments and discharge date and direction were collected. Level of independence was measured with Barthel Index and is usual care in participating wards for patients on day four poststroke.[32] Also the medical history for vascular risk factors, vascular diseases and other diseases were collected as characteristics. From the participated nurses, gender, birth date, years of working experience, working hours a week and functional working status were collected.

Procedures

Nurses of the participating wards received a presentation about this study and the definition of communication disorders in stroke patients. The electronic medical information system was daily consulted for new admitted patients with stroke on the neurology ward at both participated hospitals. After obtaining permission to visit a patient, a researcher visited the patients and proxies and provided study information. They were informed that participation is voluntary and will not affect their hospital care, and that they can withdraw at any point

without prejudice. The next day, the patients and their proxies were asked for oral and written informed consent. In case of a patient not able to give informed consent, this was obtained from patient's proxies. The patient's characteristics and reference test outcome were collected by a researcher. Missing information was recruited by asking medical staff, patient or proxies. Next, for each patient, two present nurses taking care of the included patient were independently asked for their clinical observation and interpretations for the presence or absence of a communication disorder from an included patient. The nurses clinical observation and interpretation were collected on paper with a possible answer yes or no to the question: "Do you think this patient is able to communicate adequately?". Informed consent was presumed based on the fact that management of the participating hospitals provided their consent for the study. In case of a nurse unwilling to participate they were enabled to withdraw from the study when they declared so individually.

Data analysis

All data were quantitative and were analysed using IBM SPSS version 21 software for windows.[33] Patient and nurses' data was coded by one single key document and all data were analysed anonymously. Complete cases analysis was applied for outcomes of index and reference tests. To evaluate the criterion validity, the patient outcomes of the index and reference test were dichotomized: positive or negative for communication disorders based on the observation and interpretation of the nurses and a positive or negative outcome of the reference test. These outcomes were used to calculate clinimetric properties for criterion validity (sensitivity, specificity, positive predictive value, negative predicted value, likelihood ratio positive and negative and diagnostic accuracy). Values of sensitivity, specificity and the test predictive values varies from 0-1.00. The interrater reliability was calculated with Cohen's Kappa between the observed clinical observation and interpretation of two different nurses as a chance-corrected measure of agreement and varies from 0-1.00.[34] Values of kappa above 0.80 represent excellent agreement; above 0.60 substantial levels of agreement, from 0.40 to 0.60 moderate agreement and below 0.40 poor to fair agreement.[34,35] For secondary analyses to examine the agreement within a hospital, the interrater reliability was separately calculated for the two hospitals.

Results

Recruitment

Originally 343 patients were assessed for in- and exclusion criteria, from which, 227 patients were excluded. Reasons for excluding patients are presented in figure 1, main reason for exclusion was discharged within four days from hospital (n=120), no informed consent from patient (n=30) or too ill to participated (n=29). Reasons because patients were too ill to participate were: delirium (n=6), severe progression after admission (n=5), palliative policy (n=4) or unconscious (n=14). Ten patients were lost before inclusion.

< Insert Figure 1: flowchart included patients>

Sample characteristics

A total of 115 patients were included in this study and had a outcome of the reference test. Their characteristics are presented in table 2. The mean age of patients was 70.4 years (±14.8), 50 percent was female, mean duration of hospital stay was 10.5 (±4.2) days and patients were admitted with a mean of 0.25 (±1.0) days poststroke in a hospital.

< Insert table 2 baseline characteristics patients>

In 113 patients, a clinical observation and interpretation of the presence or absence of a communication disorder was determined by an approached nurse to determine validity. For each patient, of in total 83 patients, different pair of nurses identified the presence or absence of a communication disorder to determine interrater reliability. A total of 74 different nurses were asked for their clinical observation and interpretation to identify communication disorders. Their characteristics are presented in table 3. Nurses were aged between 18 and 58 years with a mean age of 34.0 years (±10.8). The majority of nurses was female (88%) and 42% of the nurses had worked for more than five years on the neurology ward. The mean number of patients observations for an individual nurse was 1.81 (±1.08, range 1-6).

< Insert table 3 Baseline characteristics nurses>

Reference tests were collected with a mean of 6.1 (±2.7) days poststroke. A total of 45 (40%) patients were identified positive for a communication disorder and 68 (60%) patients negative according to the reference test. Twenty patients were positively screened for a communication disorder by a speech-language therapist. The mean score for the FAST was

16.0 (±4.7, n=87). The FAST identified 24 patients positive for communication disorder based on the cutoff score depending on age. Mean score for MMSE was 24.4 (±2.9, n=64). One patient scored positive for communication disorders based MMSE. Two patients were excluded for data analysis for not having a single nurse's clinical opinion. A second nurse's opinion was missing in 30 patients. The index test was measured with a mean of 6.3 days (±2.4) poststroke (n=113). The first approached nurses identified 80 (71%) patients positively for a communication disorder, and 33 (29%) patients negatively. In 83 patients, a different pair of nurses gave a clinical observation and interpretation: 52 (63%) patients were identified positively with a communication disorder, and 31 (37%) negatively by the second nurse (table 4).

< Insert table 4 dichotomized outcomes index and reference test>

Criterion validity

In total, out of the 113 patients, 85 (75%) patients were not properly identified for the absence or presence of a communication disorder in contrast to 28 (25%) properly identified patients. A number of 60 (53%) patients were identified positively according to the index test, in contrast to the reference test which indicated that were was not a communication disorder present. For 25 patients (22%), a negative index test for communication disorder was in contrast to the reference test, which indicated that there was a communication disorder (table 5). Clinimetric properties of the criterion validity are presented in table 5. Sensitivity was 0.44 and specificity was 0.12. The diagnostic accuracy of communication disorders according to the nurse clinical observation and interpretation was in this sample 25%.

< Insert table 5 Clinimetric properties criterion validity>

Interrater reliability

Different pairs of nurses gave their clinical observation and interpretation for the presence or absence of a communication disorder in 83 patients (72.2%). The agreement for communication disorder by two independent nurses is presented in table 6. The interrater reliability showed a Cohen's Kappa (κ) of 0.54.This represented a moderate agreement.[34,35] The null hypothesis κ =0 was rejected with a p-value <0.000.

< Insert table 6 Agreement for communication disorder by two independent nurses>

Secondary outcomes

The interrater reliability was also calculated for the individual participating hospitals. For the university hospital Cohen's Kappa (κ) was 0.30 (n=23). This represented a poor agreement. [34,35] The agreement of diagnose in communication disorder in the participating university hospital was properly in fifteen out of the 23 patients (65%). Cohen's Kappa (κ) for the participating general hospital was 0.60 (n=60). This represented a moderate agreement. [34,35] The agreement of diagnose in communication disorder in the participating general hospital was properly identified in 51 out of the 60 patients (85%).

Discussion

The results of this study showed poor to moderate clinimetric properties for criterion validity and a moderate agreement for interrater reliability for nurses' clinical observation and interpretation for communication disorders in stroke patients. In particular a low specificity was examined; a large amount of patients were identified positively for communication disorders by a nurse, in contrast to a negative reference test. The diagnostic accuracy indicated one out of four patients were properly identified for communication disorders. These outcomes may indicate a limited view of nurses to identify communication deficits in poststroke patients.

There are several strengths and limitations in this study. The first limitation is that the results cannot be generalised to all nurses' clinical observation and interpretations due to the small sample sizes and different results in agreement between hospitals. For this study the sample size was sufficient to determine validity and reliability, according COSMIN criteria.[26] Little missing values appeared to determine validity. Practical reasons as workload, resulted that a second nurse's observation and interpretation was not obtained in 30 patients to determine reliability. These missings may have created bias and negatively influences the generalizability. No subanalyses for criterion validity were calculated for the individual hospitals due to small sample sizes. Sample size was sufficient to calculate reliability for individual hospitals to present differences in agreement between nurses. A consecutive sample technique was used for including patients, to minimize the risk of selection bias compared to a convenience sampling technique. The amount of different nurses asked for their observation and interpretation is indicative that selection bias for approached nurses is minimized. Communication disorders according to the reference test were measured at one

moment in time. However, the nurses clinical observation and interpretation is based on a longer period of time related to the time of care of the nurse. Data was not collected how long the nurse had cared for the patient before giving their clinical observation and interpretation for communication abilities. It is known that a patient's particular set of language impairments may change over time.[36] Reference and index test were assessed with only a very small delay in time and this have limited the risk for measuring a different status of communication abilities due to recovery. The used reference tests, diagnose of a speech therapist and instruments FAST and MMSE, limits the generalisibility of the results of this study in relation to the nurses clinical observation and interpretation because these instruments are not widely accepted as golden standards.[17,31,37] Originally, the FAST assesses language in four major areas: comprehension, verbal expression, reading and writing.[28] To minimize patient's burden, in this study only two areas were taken into account: comprehension and expression because the sensitivity of the shortened version of the FAST is reported to be similar in comparison with the complete assessment.[17] Another strength of this study is the described method which makes it easy for another setting to assess the validity and reliability of their nurses' clinical observation and interpretation. This paper is written in accordance to the standards for reporting of diagnostic accuracy: the STARD initiative to improve the completeness and transparancy of reporting and allow readers to assess the potential for bias in this study and to evaluate its generalisability.[25] Finally, nurses were independently asked and not influenced for giving their clinical observation and interpretation.

A retrospective study with screening instruments detected significantly more impairments than were noted in acute stroke patient's chart for cognitive disorders.[22] This confirms the results of this research that nurses may not recognize adequately communication disorders. Several studies recommended to routinely use screening instruments by health care professionals for detection of communication disorders.[8,17,18,22,37] The use of screening instruments by nurses can increase early identification of communication disorders in stroke patients.[28] Screening instruments are quick and efficient to determine the presence or absence of communication deficits but do not provide detailed descriptions of specific language deficits or.[28] In daily practice, little is known how often a screening instrument is used by a nurse to identify a communication disorder in stroke patient.

The findings of this research are clinically relevant because communication deficits are essential for patients' recovery and their independence in community setting. To optimize patient's care these results should be improved. Therefore, implications for daily practice are optimizing the clinical observation and interpretation of communication disorders by nurses.

Besides, it could be considered to implement a screening instrument in identifying a communication disorder by nurses in daily care for poststroke patients because this research indicates that the recognition of communication disorders in stroke patients might improve if nurses use screening instruments for communication disorders.

Recommendations

Advanced future studies are indicative to conduct with larger sample groups to provide results that are more definitive. Future research should also be performed to investigate reasons why nurses are not always adequately in identifying a communication disorder. The generalisability of this study for other settings can be investigated, to for example other wards in a hospital. This study indicated differences in reliability between nurses between hospitals. Therefore, before a hospital considers to implement a screening instrument, research is indicated in the current status of validity and reliability of nurses' clinical observation and interpretation.

Conclusion

Based on this study, we conclude that the nurses' clinical observation and interpretation has poor to moderate clinimetric properties for criterion validity in recognizing a communication disorder in stroke patients in comparison to validated screening instruments. The reliability showed a moderate agreement between nurses.

Conflict of interest: there are no financial, personal, political, academic or other relations that could lead to a conflict of interest.

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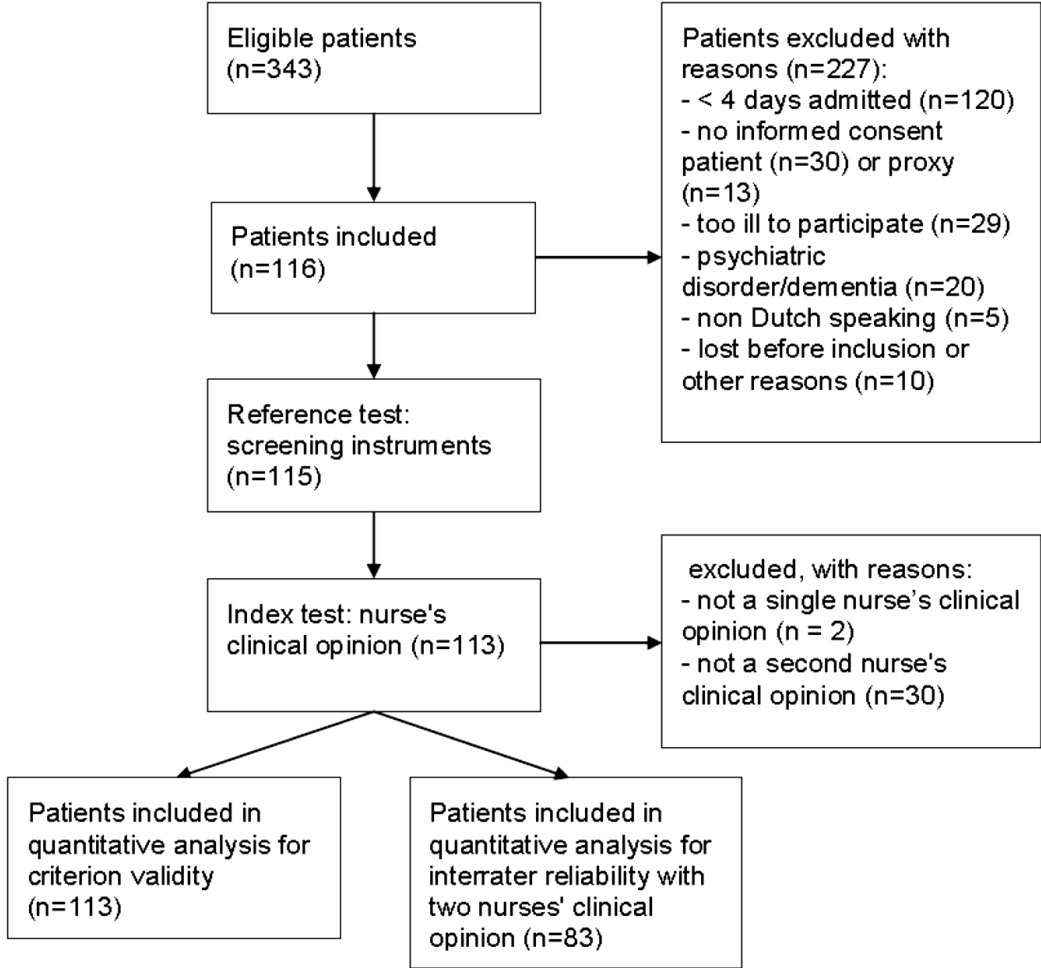
Figures and tables

Figure 1: flowchart included patients

Table 1 clinimetric properties criterion validity

Clinimetric property	Definition
Sensitivity	The proportion of those who have communication disorders, who are labelled positive by the nurses clinical opinion
Specificity	The proportion of those who don't have communication disorder, who are labelled negative by the nurses clinical opinion
Positive Predictive Value (PPV)	The proportion of patients with positive communication disorder according to the nurses' opinion, who have a communicative disorder
Negative Predictive Value (NPV)	The proportion of patients with negative communication disorder according to the nurses' opinion, who don't have a communicative disorder
Likelihood Ratio Positive (LR+)	The probability of a patient who has the communication disorder testing positive divided by the probability of a patient who does not have the communication disorder testing positive
Likelihood Ratio Negative (LR-)	The probability of a patient who has the communication disorder testing negative divided by the probability of a patient who does not have the communication disorder testing negative

Table 2 Baseline characteristics patients

Patient's characteristics N=115 (100%)	Included patients Frequency (percent)
Demographics	
Age	N=114
Mean, range, sd	70.4, 27-90, 14.8
18-50 years; n (%)	12 (10%)
51-65 years; n (%)	27 (23%)
66-75 years; n (%)	20 (17%)
≥76 years; n (%)	55 (48%)
Gender	N=115
Female; n (%)	58 (50%)
Marital status	N=115
Single; n (%)	5 (4%)
Married/cohabiting; n (%)	71 (62%)
Widowed/Divorced; n (%)	39 (34%)
Institution	N=115
University Hospital; n (%)	30 (26%)
General Hospital; n (%)	85 (74%)
Discharge direction	N=115
Home; n (%)	33 (29%)
Rehabilitation center; n (%)	19 (17%)
Nursing home; n (%)	59 (51%)
Other hospital; n (%)	4 (4%)
Stroke lesion characteristics	N=115
Type CVA	87 (76%)
Ischaemic infarct; n (%)	26 (23%)
Intracerebral bleeding; n (%)	2 (2%)
Both; n (%)	
Leasion location	N=110
Left; n (%)	65 (57%)
Right; n (%)	38 (33%)
Other; n (%)	7 (6%)
Symptoms	N=115
Motor; n (%)	95 (83%)

Sensory; n (%)	35 (30%)
unknown; n (%)	39 (34%)
Speech; n (%)	45 (39%)
Language; n (%)	49 (43%)
Visual; n (%)	15 (13%)
unknown; n (%)	43 (37%)
Barthel Index	N=115
Mean, range, Sd.	10.1, 0-20, 7.3

N= number of patients, %= percentage, range = minimum to maximum,

sd= standard deviation, age is determined in years at time of stroke

Table 3 Baseline characteristics nurses

Characteristics N=74 (100%)	Included nurses Frequency (percent)
Age	N=63
Mean, range, sd	34.0, 18-58, 10.8
18-30	30 (42%)
31-40	13 (18%)
41-50	16 (22%)
>50	4 (6%)
Gender	N=74
Female	65 (88%)
Institution	N=74
University hospital	32 (43%)
General hospital	42 (57%)
Work year experience neurology ward	N=69
≤1 year	21 (28%)
1-2	5 (7%)
2-5	14 (19%)
5-10	13 (18%)
>10	17 (24%)
Function (n=74)	N=74
Nurse	48 (65%)
Assistant nurse	6 (8%)
Senior Nurse	4 (6%)
Student Nurse	16 (22%)
Fulltime percentage	N=70
<0.2	1 (1%)
0.2-0.5	8 (11%)
0.6-0.7	18 (25%)
0.8-1.0	44 (60%)

N= number of nurses, %= percentage, range = minimum to maximum,
sd= standard deviation, age is determined in years at time of stroke

Table 4 Dichotomized outcomes index and reference test

Diagnose for communication disorder (n=113)	Reference test*: Positive	Negative	Total
Index test: nurses' clinical observation and interpretation			
Positive	20	60	80
Negative	25	8	33
Total	45	68	113

* a recent diagnose of a speech-language therapists was used or validated screenings instruments
FAST and MMSE were used. N= number of patients

Table 5 Clinimetric properties criterion validity

Clinimetric property	Outcomes
Sensitivity	44.4%
Specificity	11.8%
Positive Predictive Value (PPV)	25.0%
Negative Predictive Value (NPV)	24.2%
Likelihood Ratio Positive (LR+)	0.50
Likelihood Ratio Negative (LR-)	1.99
Diagnostic accuracy	24.8%

% = percentage

Table 6 Agreement for communication disorder by two independent nurses

Agreement for communication disorder by nurses' clinical observation and interpretation (n=83)	*Nurse 2* Positive	Negative	Total
Nurse 1			
Positive	47	12	59
Negative	5	19	24
Total	52	31	83

N= number of patients

Abstract

**Nurses' clinical observation and interpretation of
communication disorders in patients admitted with stroke**

Background - Communication disorders are very common and a serious outcome of stroke. Early diagnosis of communication disorders is highly important for patients to enhance recovery. Care provided by nurses offers the opportunity to collect relevant information concerning patients' communication impairments. To optimize care and rehabilitation of stroke patient, it is important to gain insight if the nurses' clinical observation and interpretation of communication disorders is adequately.

Aim - The objective is to evaluate the criterion validity and reliability of the nurses clinical observation and interpretation of communication disorders in comparison with validated screenings instruments, the Frenchay Aphasia Screening Test and Mini Mental State Examination, or the diagnose of a speech therapist.

Method - A multicenter prospective observational study was conducted on a neurology ward in a university and a general hospital. Consecutive sampling technique was used to examine all patients and their nurses admitted in the neurology ward with stroke. The validity of the nurses' clinical observation and interpretation is determined in comparison with diagnose of a speech therapist or screening instruments. Interrater reliabilty was determined by asking two nurses independently if the patient was able to communicate adequately.

Results - In total, 85 patients (75%) were not properly diagnosed for the absence or presence of a communication disorder in contrast to 28 properly diagnosed patients (n=113). Sensitivity (44%), specificity (11%), positive predicted value (25%) and negative predicted value (24%) showed a poor to moderate clinimetric properties. The interrater reliability (Cohen's Kappa=0.54) showed a moderate agreement (n=83).

Conclusion - It appears that nurses make different judgments regarding the communication abilities of patients in comparison to validated screening instruments.

Recommendations - Advanced future studies conducted with larger sample groups will provide results that are more definitive.

Keywords - Communication disorder - Stroke - Nurses' clinical observation and interpretation