Self-reported symptoms of anxiety and depression in chronic stroke patients with and without aphasia

Hedda Døli

University of Bergen, Norway

Haukeland University Hospital, Norway

Turid Helland

University of Bergen, Norway

Wenche Andersen Helland

University of Bergen, Norway

Helse Fonna, Norway

Address correspondence to: Hedda Døli, Department of Biological and Medical Psychology, University of Bergen, Jonas Lies vei 91, NO-5009 Bergen, Norway. E-mail: Hedda.Doli@uib.no

Introduction

Several studies have reported a high incidence of emotional difficulties such as depression and anxiety in patients with aphasia post-stroke (Kauhanen et al., 1999; Shehata, El Mistikawi, Risha, & Hassan, 2015). However, the assessment procedures, time of assessment after stroke, stroke population and the severity and type of aphasia in the participants vary across studies. According to Fure (2007) emotional difficulties are likely to be the most ignored sequela of stroke in Norway due to the lack of systematic clinical investigation. The need for systematic research on emotional difficulties in patients with aphasia after stroke is necessary in order to optimize rehabilitation and clinical routines in the hospital and community settings.

The aim of the present study was to investigate self-reported symptoms of anxiety and depression in stroke patients with and without aphasia. Furthermore, we aimed to investigate the relationship between aphasia severity, self-reported symptoms of anxiety and depression, ability to communicate, abilities to carry out daily activities and abilities to participate in leisure and social activities and cognitive functioning in chronic stroke patients with and without aphasia.

Aphasia

Approximately one-third of the stroke population in Norway suffer from aphasia post-stroke (The Norwegian Directorate of Health, 2010). Aphasia is defined as an acquired communication deficit affecting all modalities of language, reading, writing, speaking and listening (Hallowell & Chapey, 2009).

Aphasia may limit a persons' ability to communicate with others, and it may also limit communication activities like speaking on the telephone, reading a book or the newspaper, listening to the radio or watching TV. Patients with aphasia will naturally react differently to

the experience of acquiring aphasia. However, emotional difficulties such as depression and anxiety, and other symptoms like fear, despair, social isolation, embarrassment and frustration are frequently reported among these patients (Halpern & Goldfarb, 2013; Shehata et al., 2015; Spaccavento et al., 2014).

Gainotti (1997) presented three main factors to understand the complexity of quality of life in people with aphasia post-stroke. Specifically, emotional difficulties after stroke might be influenced by neurological factors, such as the size and location of the brain damage, and the resulting disorders. Further, psychological factors, such as the personality of the patient, might also be influential. Finally psychosocial factors, which include the patient's social network, are also considered influential and important to take into consideration when investigating emotional difficulties in patients with aphasia. In the present study the psychosocial factors are emphasized, however, the psychological and neurological also have to be taken into account.

The experience of acquiring aphasia is likely to cause psychosocial distress for both patients and their relatives. Herrmann and Wallesch (1989) studied the psychosocial changes and adjustment of patients with chronic aphasia and their relatives using structured and semi-standardized interviews. Their results showed that patients with non-fluent aphasia and their relatives experienced considerable psychosocial changes and strain; however both patients and relatives were optimistic regarding future improvement. The authors argue that lack of information and little knowledge about aphasia gives the patients and their kinds unrealistic expectations on the recovery of aphasia, which again causes emotional and motivational distress when their expectations are not fulfilled (Herrmann & Wallesch, 1989).

Several studies have investigated the quality of life in patients with aphasia (Gainotti, 1997; Hilari, 2011; Ross & Wertz, 2003; Spaccavento et al., 2014). Quality of life can be defined as a persons' perception of their well-being (Spaccavento et al., 2014).

In a study by Ross & Wertz (2003) the quality of life in stroke patients with and without aphasia was investigated. Ross & Wertz found that patients with aphasia engage in fewer social activities than stroke patients without aphasia. The group of patients with aphasia experienced that they had less independence and they experienced fewer and less meaningful social relationships compared to the persons without aphasia (Ross & Wertz, 2003).

Hilari (2011) investigated the quality of life and functional outcomes at three time intervals (2-weeks, 3-months and 6 months) in stroke patients with and without aphasia. The study showed that patients with aphasia participated in fewer activities and reported worse quality of life than the group without aphasia. On the physical measures the main difference between the groups was the activities that required communication, such as social and leisure activities, work, shopping and travelling where the patients with aphasia reported more difficulties. Further, Hilari (2011) found that at three months post-stroke the patients with aphasia reported higher levels of psychological distress compared to the patients without aphasia. However, at six months post-stroke the difference in the levels of reported psychological distress had diminished whereas the patients with aphasia reported lower levels of distress, and the patients without aphasia reported the same levels of psychological distress. However, looking past the first year post-stroke it does not seem that this is the common path for patients with aphasia as several studies show that patients with aphasia have a higher prevalence of depression (Kauhanen et al., 2000; Shehata et al., 2015). Hilari (2011) argues that the mood of the patient with aphasia changes during the time course post-stroke due to perceived social support. After three months the patients is in need of a great extent of social support to cope with the new situation of being communicatively impaired. However, after six months the patient with aphasia does not experience the same need for social support. After one year post-stroke the aphasia has become chronic and the differences between patients with aphasia and without aphasia reappear (Hilari, 2011). In sum, the time of the assessment

of emotional difficulties in patients with aphasia is necessary to bear in mind. Surely, aphasia is a life-changing experience; it does not only affect one's ability to communicate. Aphasia affects several aspects of a person's social life and may lead to considerable emotional difficulties (Code, Herrmann, & Hemsley, 1999).

Emotional difficulties after stroke

It is estimated that 39-52% of the overall stroke population suffer from depression within the first five years post-stroke (Robinson & Jorge, 2015). Emotional difficulties after stroke have an adverse effect on the recovery and prognosis of the stroke rehabilitation (Fure, 2007; Robinson & Jorge, 2015). It is therefore necessary to assess patients at risk of developing significant emotional difficulties after stroke in order to optimize the rehabilitation of post-stroke difficulties.

The causes of post-stroke depression (PSD) are debated, and there is no clear consensus of what the major cause is. The research on PSD yields several explanations, it can be explained as a biological mechanism caused by the brain lesions and location, or it can be explained as psychological reactions due to the impact of experiencing stroke. Other factors like previous depression and personality traits may also be possible influences (Brewerton, 2012). A possible influence of age has also been investigated, however the results do not yield any clear answers (Hadidi, Treat-Jacobson, & Lindquist, 2009). PSD is associated with negative outcomes such as increased mortality, and has an adverse effect on quality of life and cognitive deficits (Starkstein, Brockman, & Hayhow, 2013).

Several studies have found that patients with aphasia are more likely to develop depression than patients without language difficulties post-stroke (Kauhanen et al., 1999; Shehata et al., 2015; Starkstein & Robinson, 1988).

Emotional functioning and aphasia

The prevalence of depression in patients with aphasia is estimated to be higher than in the overall stroke population (Hilari, 2011; Shehata et al., 2015; Starkstein & Robinson, 1988). Studies have shown that approximately 60% of the patients with aphasia suffer from depression one year post-stroke (Cruice, Worrall, & Hickson, 2010; Kauhanen et al., 1999). According to Starkstein & Robinson (1988) depression is more common among patients with aphasia with good language comprehension than in patients with other aphasia types. One possible explanation for this is that patients with poor comprehension do not realize the magnitude of their condition (Code et al., 1999). Starkstein & Robinson (1988) found that left hemisphere lesions within the basal ganglia and the frontal cortex were associated with post-stroke depression in patients with aphasia. Furthermore, injuries in the anterior areas of the left hemisphere increased the likelihood of developing post-stroke depression and non-fluent aphasia. The authors hypothesized that patients with non-fluent aphasia may have a higher risk of developing depression because of the anatomical location of the brain lesion. However, Starkstein and Robinsons' results do not support the hypothesis that acquiring aphasia is a risk of depression. According to these authors aphasia and depression have to be viewed upon as separate outcomes of stroke (Starkstein & Robinson, 1988). Thus, it is not clear whether it is the experience of acquiring aphasia that causes the depression, or if aphasia and post-stroke depression are two separate outcomes of brain lesions that sometimes co-exist independent of each other and sometimes not.

There is some evidence showing that anxiety might be as common as depression in patients suffering from stroke (Kneebone, Neffgen, & Pettyfer, 2012). However, Kneebone and colleagues reported in their study, where they investigated suitable tools for assessing depression and anxiety in stroke patients, that there are no proper screening tools for identifying anxiety in patients with aphasia. The main body of research on emotional difficulties in patients in aphasia focuses on depression.

Assessment of aphasia

In Norway few standardized tests are developed to assess aphasia post-stroke. In the present study we used the Norwegian Basic Aphasia Assessment (Reinvang & Engvik, 1980) which is standardized. The NBAA measures several areas of language production, language comprehension and literacy. However, it is often criticized for not being able to distinguish patients with mild aphasic symptoms from patients with no aphasic symptoms.

Assessment of anxiety and depression in aphasia

The assessment of post-stroke depression is most commonly investigated using a psychiatric interview according to the Diagnostic and Statistical Manual of Mental Disorders (DSM-IV) (American Psychiatric Association, 2014). However there is no "gold standard" for the assessment of PSD in patients with aphasia (Laures-Gore, Farina, Moore, & Russell, 2016). Interviewing patients with aphasia may be quite challenging as the patients may exhibit severely impaired comprehension and expressive language. Therefore a psychiatric interview may not be the appropriate method for diagnosing this clinical population (van Dijk, de Man-van Ginkel, Hafsteinsdóttir, & Schuurmans, 2015).

Aben and colleagues (2002) investigated the validity of several depression scales in 202 patients with stroke. Forty-two percent of the patients were excluded because of aphasia and dementia. Of the remaining sample the authors reported that 12.9% of the patients were unable to complete any of the scales (Aben, Verhey, Lousberg, Lodder, & Honig, 2002). It is therefore not likely to assume that screening tools for depression and anxiety in stroke patients necessarily are valid for patients with severe communication deficits as aphasia after stroke. However, as several studies have pointed out patients with aphasia should be included in studies on anxiety and depression (Poynter et al., 2009). Furthermore, Aben and colleagues reported high sensitivity and acceptable specificity of the Hospital Anxiety and Depression

Scale (HADS) (Zigmond & Snaith, 1983) for use in the stroke population. The authors concluded the HADS and the Beck Depression Inventory (Beck, Steer, & Brown, 1996) to be the preferred screening tools for post-stroke depression because of the short time used to administer the tests and the sensitivity of the measures (Aben et al., 2002). In a review by Herrmann (1997) the author found that the HADS is a valid measurement in both clinical and community settings. Further, a review by Bjelland, Dahl, Haug, and Neckelmann (2002) also found the HADS to be a valid instrument to assess symptom severity in anxiety disorders and depression in both a clinical and in the general population. The Norwegian version of the HADS is not validated, but the version has been presented to and accepted by the developers. In spite of little evidence to support the use of the instrument in stroke-populations with aphasia, the HADS is one of the most frequently used diagnostic screening tools for anxiety and depression in Norwegian stroke units (Fure, 2007). Patients with aphasia should therefore if possible always be included when screening for symptoms of anxiety and depression post-stroke.

Aim of the study

The aim of the present study was to investigate self-reported symptoms of anxiety and depression in patients with and without aphasia post-stroke. We hypothesized that patients with aphasia were more likely to exhibit symptoms of anxiety and depression than stroke patients without aphasia. Furthermore, we hypothesized that we would find significant correlations between aphasia severity and symptoms of anxiety and depression in patients one year post-stroke.

Method

Participants

Participants were recruited from the Stroke Unit at the Department of Neurology at Haukeland University Hospital (HUS), Bergen, Norway. The present study is a part of a larger project at HUS, the Early Supported Discharge after stroke in Bergen-study (ESD) (Hofstad, Naess, Moe-Nilssen, & Skouen, 2013). From January 2008 throughout December 2012 a total of 347 patients were included in the ESD-study. Of these 114 (33%) patients with symptoms of aphasia caused by stroke were asked to participate in the study. The study received approval from the Regional Ethics Committee prior to the data collection.

Materials

*The Norwegian Basic Aphasia Assessment (NBAA) (*Reinvang & Engvik, 1980). The NBAA is a Norwegian standardized test for the assessment of aphasia severity and aphasia types. The NBAA contains eight subtests with subordinate tasks, measuring spontaneous speech, auditory comprehension, repetition, naming, reading comprehension, reading out loud, syntax and writing. The NBAA is adjacent to the Boston Diagnostic Aphasia Battery (Goodglass & Kaplan, 1972) and the Western Aphasia Battery (Kertesz, 1982).

The Hospital Anxiety and Depression Scale (HADS) (Zigmond & Snaith, 1983). The HADS was developed to investigate if patients with physical illnesses experience symptoms of anxiety and depression. The HADS consists of fourteen items, whereas seven of the items relate to the experience of anxiety and the remaining seven items relate to the experience of depression. The test consists of written questions, and the patient can mark his or hers answers independently or with help.

The modified Ranking Scale (mRS) (Rankin, 1957). The mRS is a widely used global disability measure (Banks & Marotta, 2007) aiming to measure functional independence. The mRS is shown to have high validity, however the reliability of the measure is debated due to the few items (Kasner, 2006).

The Stroke Impact Scale Version 2.0 (SIS)(Duncan et al., 1999*).* The SIS was developed to evaluate how stroke has affected the health and life of stroke survivors. It consists of 64 questions divided into eight subscales. In the present study the subscale measuring communication, daily activities and participation in social activities was included. The internal consistency and the interrater reliability in the SIS is reported to be high (Kasner, 2006).

The Mini Mental State Examination (MMSE). The MMSE is a short global cognitive functioning questionnaire which consists of different measures within cognition, such as episodic memory, language skills, orientation, memory and attention (Folstein, Folstein, & McHugh, 1975).

Groups

We created two groups in the present study, one group consisted of patients with aphasia, and the other group consisted of patients with stroke, but without aphasia.

Aphasia group. The aphasia group consisted of 13 men and five women. Their mean age was 69.1 years (Min: 27, Max: 90, SD: 13.7). Of the 18 patients with aphasia 12 patients underwent the NBAA assessment at all three time points and completed the HADS, the mean age in the group of patients who underwent all assessments was 65.7 years (Min: 27, Max: 80, SD: 14.0; 9 men and 3 women).

Figure 1 about here

Aphasia was diagnosed using the Norwegian Basic Aphasia Assessment (NBAA) (Reinvang & Engvik, 1980) by speech and language pathologists at the Stroke Unit. The

patients were tested with the NBAA within seven days post-onset of initial stroke symptoms. The patients were thereafter summoned for retesting after three months and finally after twelve months.

A total of 114 of 347 patients were tested with the NBAA at admission, sixty-six of these patients were diagnosed with aphasia. The remaining 48 patients did not have aphasia when assessed by the speech and language pathologist. Of the 66 patients with aphasia 45 met up for the follow-up after three months and 33 attended the twelve month follow-up. However, of the patients with aphasia, 18 of 45 patients completed the HADS. Of the 18 patients who answered the HADS, 14 answered the SIS. Finally, all 18 patients were tested with the mRS and the MMSE.

Non-aphasia group. Ninety-four patients were enrolled in the non-aphasia group (53 men and 41 women). Their mean age was 68.3 years (Min: 30, Max: 95, SD: 13.2). The HADS was answered by all 94 patients (who were not diagnosed with aphasia post-stroke). The SIS communication, daily activities and participation in social activities was answered by 79 patients. Finally all 94 patients were tested with the mRS and the MMSE. See Figure 1 for an overview of the flow of patients in the study.

Descriptive statistics on the background variables age, gender, the occurrence of earlier ischemic stroke, earlier haemorrhage and earlier transcient ischemic attack in both groups is presented in Table 1.

Table 1 about here

Drop-out analysis. Because of the large amount of drop-outs in the aphasia group in the present study a Students' independent samples t-test was performed investigating the patients' scores on the NBAA at admission in order to see if there was any difference between the group of patients who summoned for retesting and the group who did not participate in the retesting at the three and twelve month follow-up. First, we compared the group who filled out the HADS with the group which did not participate in any retesting. Descriptively, the results showed a higher mean score (better performance) on the NBAA at admission in the group of patients who participated in the retesting and filled out the HADS, but the results were not significantly different. There was also a slight difference in the mean age between the two groups where the group that did not participate in the retesting had a higher mean age than the group that participated throughout the study. However, none of the results were significant.

Procedures

The NBAA was administered and scored by an experienced speech and language pathologist within one week post-admission to the hospital, after 3 months and finally after one year. The mRS was filled out by a skilled doctor or nurse at discharge from the Neurology department or seven days after admission to the hospital. The HADS and the SIS were sent out to all patients in the project and they were asked to self-report symptoms one year post-stroke. An experienced neuropsychologist scored the SIS. The MMSE was administered and scored by a neuropsychologist at 1 year post-stroke.

Statistical analysis

All analyses were computed using IBM SPSS Statistics for windows version 23. Descriptive statistics (means, standard deviation, range) were used to describe the sample and groups (aphasia group and non-aphasia group). Pearson's correlations were used to examine

the associations between age, the NBAA at admission, after three months and after one year, the HADS total scores, the HADS depression scores, the HADS anxiety scores, the SIS communication, daily activities and participation in social activities scores, the mRS scores and the MMSE scores.

To compare self-reported symptoms of depression, anxiety and aphasia severity, t-tests were used. One-way repeated measure ANOVA for dependent samples was conducted to investigate changes over time on the NBAA scores from admission, and between the three and 12 months follow-up. An alpha-level was set at <0.05.

Results

Self-reported symptoms of anxiety and depression in both groups

A one-way repeated measures ANOVA was conducted to compare scores on the NBAA at admission. There was a significant effect of time, Wilks' $\lambda = .28$, F (2,10) = 13.20, $p < .002$ (see Figure 2), and follow-up test showed a significant increase in scores from test-point 1 through test-point 2 to test-point 3 (p <0.2).

Figure 2 in here

The patients' mean total scores on the HADS showed that both patient groups scored below the cut-off score (8 points) for both the subscales anxiety and depression indicating that none of the groups were exhibiting clinical symptoms of depression and anxiety at 12 months post-stroke (see Table 2). Both groups also scored below the cut-off score of 15 on the HADS total score.

The t-test was performed to investigate group differences on the patients' scores from the HADS, the SIS communication, daily activities and participation in social activity scores, the mRS and the MMSE. The results showed no significant differences in the HADS scores between the patients in the aphasia group and the non-aphasia group. On the SIS communication the patients with aphasia were significantly more impaired than the group without aphasia, $t = -4.95$, $p = .000$. On the SIS daily activities the patients with aphasia scored significantly higher than the group without aphasia, thus indicating fewer difficulties in daily life activities, $t = 1.52$, $p = .003$. There were no significant differences in the patients scores on the SIS participation in social activities or on the mRS. In addition, on the MMSE, the patients with aphasia scored significantly lower than the non-aphasia group, $t = -3.09$, $p = .003$. All results are presented in Table 2.

Table 2 in here

The relationship between aphasia severity and symptoms of depression and anxiety

We aimed to investigate if aphasia severity, measured by the NBAA on admission to the hospital, after three months and after twelve months, correlated with the patients self-reported results from the HADS.

There were no significant correlations between the patients aphasia severity at admission on either of the HADS. Neither were there any significant correlations between the patients' aphasia severity measured at three months and their scores from the HADS. Age did not correlate with the patients' scores on the HADS. There was however a significant correlation between the patients' aphasia severity measured at 12 months and the HADS depression scores indicating that more self-reported symptoms of depression are related to

aphasia severity after 12 months. There was a significant correlation between the patients scores on the NBAA at admission and the mRS scores at admission, indicating a relationship between aphasia severity and global functioning at admission. There was also a significant correlation between aphasia severity at 12 months and cognitive functioning, as measured by the MMSE at 12 months.

An overview of the correlations is presented in Table 3.

Table 3 about here

The results from the correlation analysis between the HADS total score, the scores from the subscales depression and anxiety and the seven different subtests from the NBAA showed that the HADS total score had a significant negative correlation with the NBAA subscales repetition and reading comprehension. Furthermore, the patients' results from the HADS anxiety scores also yielded a significant correlation with the scores from the subtest repetition.

Finally, the NBAA total score after twelve months, the scores from the subtests repetition and reading comprehension correlated significantly with the HADS depression score. Also the scores from the subtest reading out loud had a significant negative correlation to the HADS depression score. All correlations are presented in Table 4.

Table 4 about here

Discussion

Our main aims in the present study were to investigate self-reported symptoms of anxiety and depression in a group of patients with aphasia and a group of patients without aphasia one year post-stroke. Furthermore we aimed to investigate if there was a relationship between aphasia severity and symptoms of anxiety and depression one year post-stroke. We used self-report scales to investigate the patients' symptoms of depression and anxiety. We also included measures on self-reported communication skills, ability to carry out daily activities and ability to participate in social activities, a global disability measure and a global cognitive functioning measure.

Self-reported symptoms of anxiety and depression in patients with and without aphasia

Contrary to our expectations we found no differences between the group of patients with aphasia and the group without aphasia on the measure of self-reported symptoms of anxiety and depression. However descriptively, the group of patients with aphasia had slightly higher mean scores on the HADS total and on the HADS depression than the non-aphasia group, indicating that the patients with aphasia reported more symptoms of depression than the non-aphasia group, though the differences were not significant.

Group differences on self-reported communication skills, daily activities, participation in social activities, initial functional disability and cognitive functioning

Furthermore, by examining the group differences on the other measurements, the two groups differed on the SIS communication scores, where the patients with aphasia scored significantly lower than the patients without aphasia, thus indicating that the patients with aphasia subjectively regarded their communication skills as more problematic than the group of patients without aphasia. However, on the SIS daily activities scores the patients with aphasia scored significantly higher than the patients without aphasia, indicating that the

patients with aphasia had fewer difficulties with typical daily activities, such as getting dressed, household tasks and going shopping than the patients without aphasia. However, when investigating the group differences on participation in social/leisure activities, the patients did not differ. These items include questions where one would assume patients with aphasia would have greater difficulties, such as being limited in social activities, active recreation or being limited in the role as a family member or friend. By looking at the scores from the mRS at admission, the groups did not differ significantly when it came to initial functional disability. Both groups had a mean score of 2 (aphasia group M = 2.28, non-aphasia group M = 2.03), indicating that on average both groups had slight disabilities at discharge or seven days after admission to the hospital. This also might suggest that the patients in the present study had fewer disabilities and difficulties post-stroke than expected for the general stroke population.

Further, by looking at the scores from the cognitive functioning measurement, the patients with aphasia had lower scores on the MMSE indicating more cognitive difficulties such as episodic memory, language skills, orientation, memory and attention than the patients without aphasia. However, as a group the patients with aphasia did not score below the clinical cut off of <24, indicating that on a group level the patients with aphasia had mild to no detectable cognitive deficits.

The relationship between aphasia severity and self-reported symptoms of depression and anxiety

Our second aim was to examine the relationship between aphasia severity and self-reported symptoms of anxiety and depression in patients with aphasia. We aimed to examine the relationship between aphasia severity and self-reported symptoms of anxiety and depression. Our results showed that aphasia severity assessed at twelve months post-stroke had a significant correlation with symptoms of depression, thus indicating that more aphasic

symptoms were associated with more self-reported symptoms of depression. By looking closer at the items in the HADS, items such as "I can enjoy a good book or radio or TV program" or "I still enjoy the things I used to enjoy" (Zigmond & Snaith, 1983), one can clearly draw the conclusion that some items are closely linked to language skills such as reading or communicating with others. As aphasia makes it more difficult to participate in social situations, to read books or watch TV it is likely that the severity of aphasia will increase the amount of symptoms related to depression measured by the HADS.

Consequently, by investigating the different subscales on the NBAA we found that difficulties within the subscales repetition, reading comprehension and reading out loud were associated with self-reported symptoms of anxiety and depression. The subscale repetition was significantly correlated with both self-reported symptoms of anxiety and depression. In this subscale from the NBAA the patient is asked to repeat words, non-words and sentences with increasing difficulty. According to a study by Caramazza, Basili, Koller, and Berndt (1981) the ability to repeat in patients with aphasia might be caused by limitations in the auditory-verbal short-term memory. Thus, disturbances in the underlying cognitive processes and language processes that are involved when repeating words and sentences might have a negative impact on emotional well-being.

Both reading comprehension and reading out loud were associated with more symptoms of depression. One of the statements in the HADS is directly related to reading ("reading a good book"). The results indicate that difficulties with the reading process, both comprehension and reading out loud, might cause symptoms of depression. Reading is a fundamental skill in society today, the sudden experience of reading difficulties might negatively influence a person's emotional well-being. This finding is line with the study of Fucetola et al. (2006) where the authors concluded that semantic processing, depression and reading comprehension were predictive of functional communication in patients with aphasia

(Fucetola et al., 2006). As functional communication is crucial in social relationships and social activities one might hypothesize that symptoms within these language domains also are influential in emotional well-being post-stroke.

Our data showed that the patients in the aphasia-group were mildly affected by aphasia, and had rather high scores on all subscales on the NBAA indicating mild aphasic symptoms within the language areas which were assessed. In addition, the patients did not score above the clinical cut-off for either anxiety or depression. However, even by indicating some symptoms of depression or anxiety this might influence every-day life. It may seem counter-indicative that relatively mildly affected patients with aphasia exhibit more symptoms of depression than other stroke patients without aphasia. However, one may speculate that their closeness to typical functioning gives them a hope of returning to their old life. As patients with aphasia gradually realize that the language difficulties are chronic, the psychological distress might increase (Hilari, 2011). The patients might gradually experience that skills such as reading and conversational skills will take long time, and perhaps not be achievable. In sum, difficulties with everyday communication, such as reading the newspaper, or writing a text message might impair a person's life in great extent.

Limitations of the study

Drop-outs are commonly found in aphasia research (Pollock, Freemantle, Sheldon, Song, & Mason, 1993). This was also the case for the present study as for the group of patients who were diagnosed with aphasia at admission about half of the patients met up for the follow-up testing. We sought to find possible explanations to this. Our drop-out analysis showed that the patients who did not participate in retesting were slightly older than the group of patients with aphasia who participated in the study; however, the age difference was not significant. Neither was there a significant difference in the patients' aphasia severity at admission, as we expected that the most language impaired patients were the ones who

dropped out of the study. Most likely several explanations can account for the high percentage of drop-outs, whereas the written information flow to the patients with aphasia might be one. Patients with aphasia may not benefit from written consent forms without sufficient help to understand the information. Patients with aphasia might rather benefit from consent forms that are adapted to their language comprehension (Penn, Frankel, Watermeyer, & Müller, 2009; Stein & Brady Wagner, 2006).

The skewed distribution of unequal sample sizes is a limitation in the present study. As most studies find differences between patients with aphasia and without aphasia (Hilari, 2011; Ross & Wertz, 2003), it is likely to assume that equal groups could yield other results. Also, as shown in the mean scores of the mRS both groups were on average slightly impaired within the first seven days post-onset of the stroke. This indicates that both groups in the present study consisted of mildly impaired stroke patients, the representativity of the sample might therefore not reflect the overall stroke population.

One might also discuss the validity of the HADS and the SIS when used in a stroke population with aphasia. However, the descriptive results from the present study showed that the patients were mildly affected by aphasia at twelve months; this might indicate that the patients in the aphasia group were able to understand the HADS and the SIS and self-report their symptoms of depression and anxiety. However, research on patients with aphasia should include valid questionnaires for the population investigated.

Further research

Further research on depression and anxiety in patients with aphasia should include questionnaires or interviews that are adapted to patients with aphasia. To avoid minimal selection bias one could also conduct interviews to investigate emotional difficulties (Hilari, 2011). Visual analog mood scales are also considered as more promising tools when assessing

mood states in people with aphasia (Fucetola et al., 2006). However, in order to compare groups of patients with and without aphasia in a research setting the measurements and variables should be identical.

Clinical implications

Patients with aphasia are often excluded in studies investigating anxiety and depression (Hilari, 2011; Poynter et al., 2009). According to several studies patients with aphasia have a higher risk of developing depression post-stroke than stroke patients without aphasia (Kauhanen et al., 1999; Shehata et al., 2015). However, by excluding the stroke population with aphasia one will not achieve the full picture when investigating anxiety and depression in the stroke patients. Furthermore, patients who are not screened and treated for depression have a higher risk of reduced quality of life and poorer prognosis post stroke (Poynter et al., 2009). In order to ensure sufficient treatment schedules for all stroke patients with aphasia, the emotional well-being of the patient has to be considered.

In sum our findings show that patients with aphasia and patients without aphasia do not differ regarding self-reported symptoms of anxiety and depression. However, patients with aphasia report more difficulties with everyday communication, measured with the SIS communication, and the patients with aphasia exhibit more cognitive difficulties post-stroke measured with the MMSE. Finally, language processes involving repetition, reading comprehension and reading out loud are associated with more self-reported symptoms of depression. Patients with aphasia should be a priority when investigating symptoms of depression in the clinical setting. Speech and language pathologists should address emotional well-being and psychosocial factors in the rehabilitation of aphasia post-stroke.

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Figure 1**.** Flow-chart of participants in the study

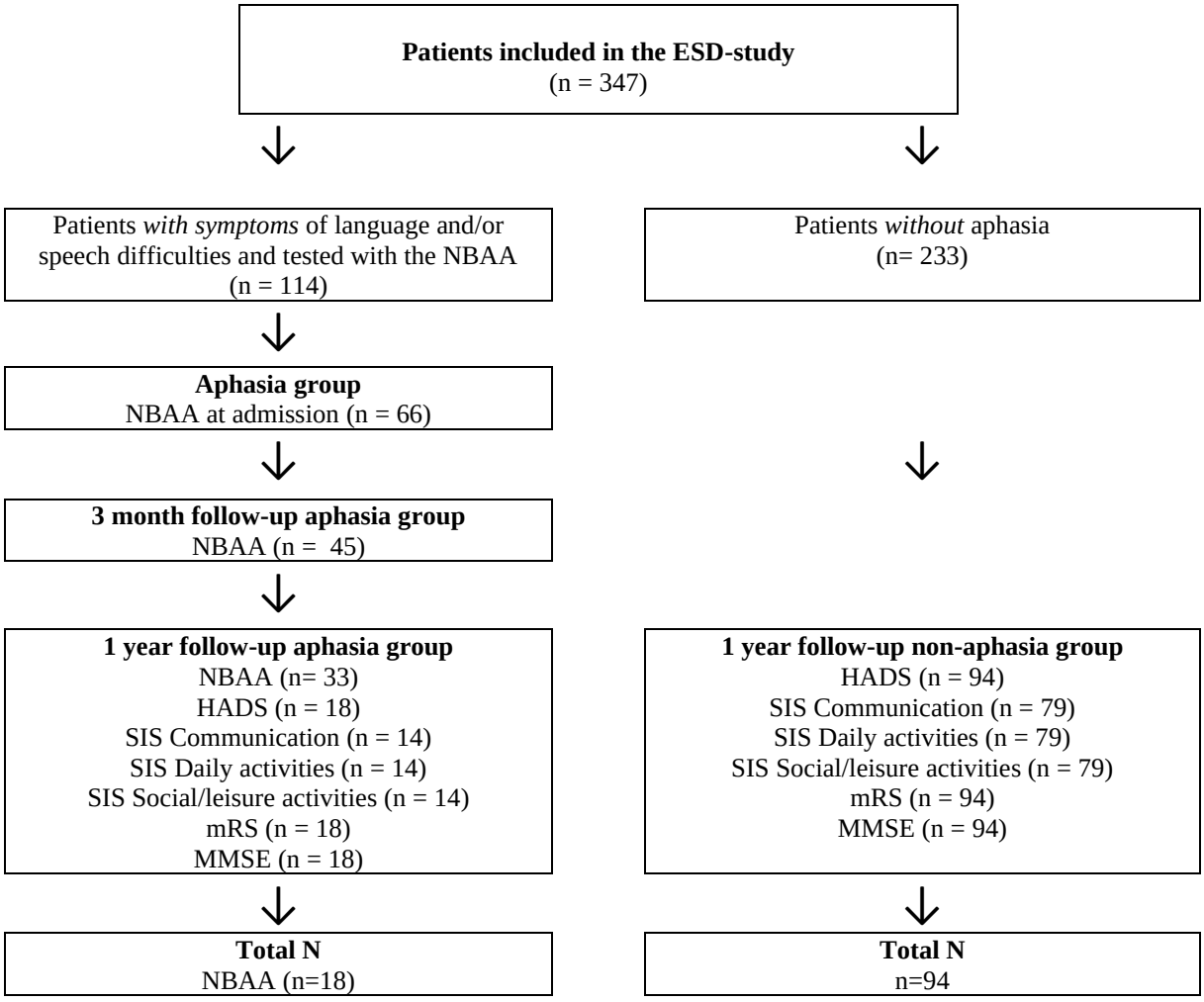

Figure 1. Flow-chart of participants in the study

Note. ESD-study = Early Supported Discharge after Stroke-study, NBAA = Norwegian Basic Aphasia Assessment, HADS = Hospital Anxiety and Depression Scale, SIS = Stroke Impact Scale, mRS = modified Rankin Scale, MMSE = Mini Mental State Examination.

Table 1

Background variables in the non-aphasia group and the aphasia group

	n	Non-aphasia	Min/max	Aphasia	Min/max
Total	112	94		18	
Age		68.3 (SD: 13.2)	30/95	69.1 (SD: 13.7)	27/90
Male/Female	66/46	53/41		13/5	
Earlier ischemic stroke	101	11 (*n* = 83)		-	
Earlier hemmorrhage	101	- (*n* = 83)		-	
Earlier transcient ischemic attack	101	3 (*n* = 83)		2	

Note. Total number of participants in the non-aphasia group was 94 and in the aphasia group n = 18, however missing data occurred during the data collection, n is therefore stated in all cases where missing data occurred.

Figure 2

Change in patients' scores on the NBAA over time

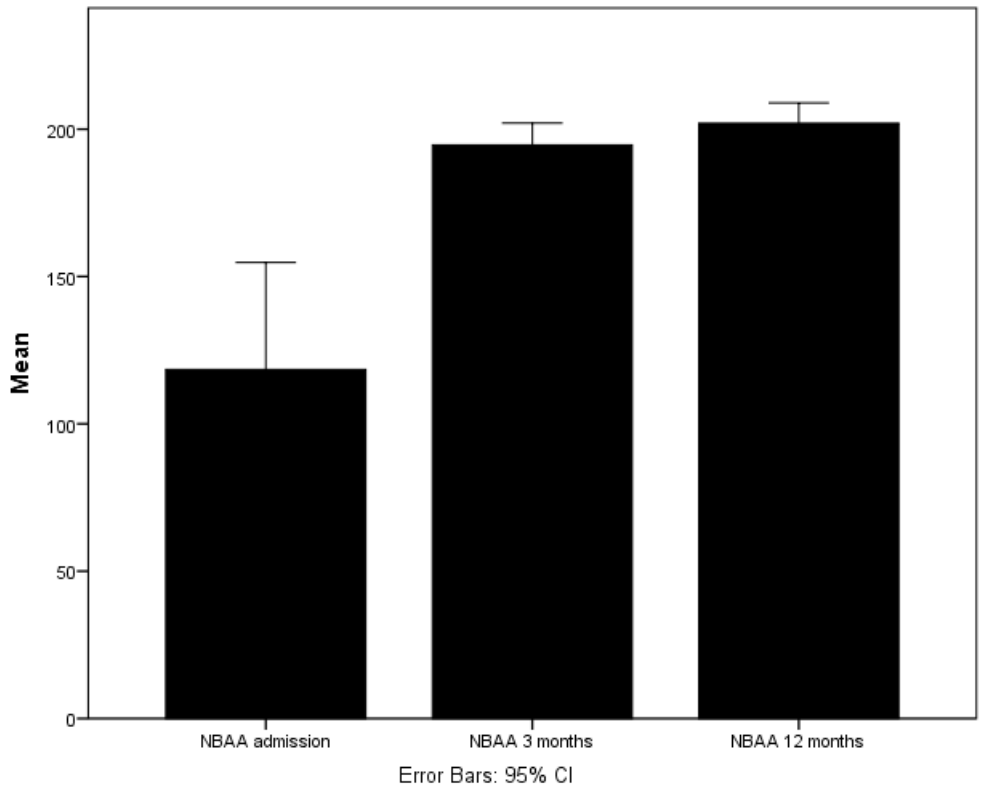

Figure 2. Mean scores on the NBAA at admission, at three months and 12 months. NBAA = Norwegian Basic Aphasia Assessment (range 0-217).

Table 2

Independent samples t-test between the non-aphasia group and the aphasia-group on the scores from the HADS, SIS communication, SIS daily activities, SIS social/leisure activities, mRS and the MMSE.

		Aphasia		Non-aphasia				
Measure	*Range*	*n*	M (SD)	*n*	M (SD)	*t*	Cohen's *d*	p
NBAA 12 months	0-217	18	200.1 (12.5)					
HADS Anxiety	0-21	18	3.83 (3.54)	94	3.56 (3.45)	.30	0.08	.763
HADS Depression	0-21	18	4.50 (3.42)	94	3.26 (3.17)	1.51	0.38	.134
HADS total	0-21	18	8.33 (5.90)	94	6.82 (5.99)	.99	0.25	.327
SIS Communication	0-35	14	31.14 (2.88)	79	33.96 (1.77)	-4.95	-1.18	.000
SIS Daily activities	0-60	14	57.79 (3.14)	79	54.61 (7.70)	1.52	0.54	.003
SIS Social/leisure activities	0-45	14	41.00 (5.70)	79	38.57 (8.31)	1.05	0.34	.041
mRS	0-6	18	2.28 (1.07)	94	2.03 (1.24)	.79	0.22	.830
MMSE	0-30	14	25.56 (3.98)	74	27.74 (2.47)	-3.09	-0.66	.003

Note. *p<.05. M=Mean. SD = Standard Deviation. N = total participants. NBAA = Norwegian Basic Aphasia Assessment, HADS = Hospital Anxiety and Depression Scale, SIS = Stroke Impact Scale, mRS = modified Rankin Scale, MMSE = Mini Mental State Examination.

Table 3

Pearsons correlations between aphasia severity at admission, after three months, after one year and HADS anxiety scores, depression scores, HADS total scores, SIS Communication, Daily activities and Social/leisure activities scores, mRS and MMSE scores (n = 12).

Measure	Age	NBAA 1	NBAA 2	NBAA 3
HADS Anxiety	.10	.18	-.07	-.29
HADS depression	.51	-.31	-.52	-.68*
HADS total score	.37	-.08	-.35	-.57
SIS Communication	.32	.49	-.08	-.54
SIS Daily activities	.33	-.03	.02	.58
SIS Social activities	.40	-.11	-.25	.22
mRS	.17	-.64	-.13	-.12
MMSE	-.39	.38	.49	.86**

Note. *p<.05. **p<.01. HADS = Hospital Anxiety and Depression Scale, SIS = Stroke Impact Scale, MMSE = Mini Mental State Examination

Table 4

Pearsons product moment correlations between HADS subscales, HADS total score and NBAA subtests (n=12)

Measure	HADS Total	HADS Anxiety	HADS Depression
NBAA 12 months total score	-.57	-.29	-.68*
Auditory comprehension	-.29	-.02	-.47
Repetition	-.78**	-.71**	-.63*
Naming	-.38	-.18	-.47
Reading comprehension	-.67*	-.42	-.73**
Reading out loud	-.54	-.28	-.64*
Syntax	-.15	-.01	-.26
Writing	-.07	.23	-.34

Note. *p<.05. **p<.01. NBAA = Norwegian Basic Aphasia Assessment.