THE ASSESSMENT OF FUNCTIONAL COMMUNICATION IN PATIENTS WITH ACQUIRED COMMUNICATION PROBLEMS: THE DEVELOPMENT OF THE DERBY FUNCTIONAL COMMUNICATION SCALE

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Abstract

Objective

The Derby Functional Communication Scale (DFCS) was developed to assess functional communication in patients in hospital and rehabilitation settings. The validity of the DFCS and its sensitivity to low mood was also examined.

Design Correlation analysis between DFCS and other existing measures of communication and mood.

Setting Stroke and Rehabilitation units.

Methods Sixteen hospital inpatients with acquired communication problems due to mixed aetiologies were assessed on the DFCS and other measures of communication and mood.

Main measures DFCS, Frenchay Aphasia Screening Test (FAST), Edinburgh Functional Communication Profile (EFCP), Speech Questionnaire (SQ) and speech and language therapists' (SaLT) ratings of global communication ability were used to assess communication. The Visual Analogue Mood Scales (VAMS) and the Stroke Aphasic Depression Questionnaire (SADQ) were administered as measures of low mood.

Results The data indicated that DFCS scores were significantly related to other measures of communication (r_s = .75-.9, $p<.01$). Inter-rater reliability was generally good for the DFCS with the exception of the understanding subscale, where a low correlation between staff and SaLT ratings was found. No significant ($p>0.05$) correlations between DFCS and measures of mood were found.

Conclusions The DFCS may be used for assessing observable communication skills in patients with acquired communication disorders. However, further validation and evaluation of the sensitivity to low mood is required.

Contents

Introduction

Acquired communication disorders are deficits in one or more elements of communication, such as speech, language, or gestures. These deficits impact upon the expression and/or understanding of language[1] and cause dramatic changes to patients' day-to-day functioning[2]. These disorders commonly occur following stroke[3] or traumatic brain injury (TBI)[4,5] and have a significant impact upon sufferers' long-term quality of life[6]. (See Appendix 2.1 for further discussion).

In clinical practice formal assessments of acquired communication disorders are based on models of the cognitive neuropsychological processes underlying verbal communication skills; including reading, writing and spoken language skills[7]. This approach sets out to establish the patient's 'best performance' level in a distraction-free environment[8].

Clinicians have pointed out the limitations of the traditional approach to assessment of acquired communication disorders[9,10]. Reliance on verbal instructions, for example, means that patients with severe communication disorders cannot be assessed. More broadly, these assessments may not identify the patient's rehabilitation needs effectively, as they often do not reflect the skills they rely on to complete their activities of daily living[10]. The traditional approach also fails to account for the non-verbal skills patients may rely on to compensate for deficits in verbal communication[11] and which support social interaction[12]. Furthermore, these measures do not allow the clinician to observe the environmental factors that can impede a patient's ability to

communicate, for instance the presence of medical equipment or the impact of limited staffing[13].

Formal measures of communication are limited in their capacity to capture the context of communication – an issue research shows is important for communicative effectiveness[11]. Aphasic individuals have been shown to use cues from their environment to aid understanding and expression[11]. Recently, the importance of communication ability to social participation and general wellbeing of patients with acquired communication deficits has also been highlighted[6,14]. (See Appendix 2.2 for further discussion)

The functional communication movement has broadened the definition of communication deficits associated with acquired aphasias. Leading authorities have emphasised the importance of the contextual and interactional basis of communication[15,16]. In this view, communication is defined as the ability to convey or receive a message[16,17], independently within a given environment in order to achieve activities of daily living (ADL) regardless of the mode[15,16]. This view sits comfortably with emerging models of healthcare which assess a patient's rehabilitation needs by defining the impact of disease on participation and ability to complete ADLs [10,17] (See Appendix 2.2 for further discussion).

Functional communication measures were developed in order to address several limitations of traditional measures and are discussed in detail by Manochioping[9] and Frattali[18]. They often use innovative procedures (observation, role-playing or use of informants) rather than direct or formal assessment to capture communication effectiveness within real-life situations[9]. They cover a broad range of skills in order to capture both verbal and non-verbal components of communication. In some instances

scoring procedures quantify communication in terms of overall 'efficiency', to include effective compensatory strategies and non-verbal behaviours[9] (see Appendix 2 for further discussion). However, there is no consensus as to the best way to assess functional communication in acute inpatient care[16,18]. Existing measures have been criticised because they require specialist training in administration techniques and are often time consuming[9,10]. Also, there is a paucity of reliability and validity information for most functional communication measures, making interpretation of the results problematic[9,10].

The shortcomings of these measures may explain the limited use of these assessment protocols in routine clinical practice[13,19]. When surveyed, some clinicians cited a lack of appropriate measures for use in particular clinical settings[13,19]. Notably, Worall and colleagues[10,16] highlighted the need to develop a measure of functional communication for older adults in inpatient and rehabilitation settings (see Appendix 2.4 for review). The first aim of this study was to evaluate the inter-rater reliability and validity of a new observational assessment of functional communication, the DFCS, for use with individuals with acquired communication disorders in these settings. It was hypothesised that if the DFCS has good inter-rater reliability scores on the DFCS rated by both expert and non-expert staff would be highly correlated. Similarly, if the DFCS has high content validity that DFCS scores will be highly and significantly correlated with scores on existing measures of communication.

Depression is among the most commonly occurring psychological sequelae of stroke[20] and traumatic brain injury (TBI)[21], and is frequently encountered amongst individuals with acquired communication disorders following stroke or TBI[22] (See Appendix

2.5). Both psychological and neurophysiological factors may underlie depression in stroke[20] and TBI[23]. From a psychological point of view it may represent an emotional reaction to the sudden loss of physical health and restriction of role, which typically result from these injuries[24]. Loss of communication skills often leads to greater perceived isolation and loss of autonomy[6]. Furthermore the effects of biochemical changes following stroke or TBI (such as difficulties in mood regulation, disruption to neuroendocrine systems, or fatigue) may overlap with symptoms of depression[20,23].

There are several unresolved issues in the current understanding of diagnosing depression in people with acquired communication disorders following stroke and TBI, which are reviewed by Turner-Stokes & Hassan[20] and Satz and colleagues[25]. Firstly, there are no accepted diagnostic criteria for depression in the context of stroke or TBI[20,25]. Secondly, standard mood assessments rely on verbal skills, therefore, they are unsuitable for use with people with limited communication skills[26]. Furthermore, there is no consensus or 'gold standard' non-verbal assessment of mood for use in this population[25-26]. Thirdly, there are difficulties in distinguishing between the effects of brain injury and mood. That is, distinguishing between clinically significant depression and the neurophysiological impact of stroke or TBI on mood regulation is problematic[20,23]. Similarly, the presenting picture of depression in head injury and stroke may differ from that generally encountered due to the particular neurophysiological features associated with such injuries. These variables complicate the assessment process and make it difficult to identify depression reliably when patient communication skills are impaired.

Depression following stroke and TBI is associated with poor overall functional outcome[27,28] and a range of more specific problems,

including cognitive complaints[29] and communication[27,28]. The relationship between functional communication and depression is not well understood. Given the importance of communication skills in most ADLs[20] and for social participation[6,14], it may be expected that a communication deficit may be associated with a greater risk of depression. Alternatively, depressive symptoms, for example hopelessness or fatigue, may make individuals reluctant to interact with others or develop compensatory stategies, which may in turn be misinterpreted as poorer functional communication skills[2]. Two recent studies have shown evidence of this relationship[27,30]. (See Appendix 2.6) The second aim of this study was to evaluate whether the DFCS was sensitive to the effects of low mood in patients with acquired communication difficulties. It was hypothesised that if the DFCS is sensitive to mood disturbance that scores on the DFCS will be highly and significantly correlated with scores on measures of mood or depressive symptomatology.

Method

The DFCS was developed as a brief, informant-based measure of observable communication behaviours that relate to three aspects of communication: expression, understanding and interaction (see Appendix 3).

Patients were identified by speech and language therapists (SaLTs) based at the Stroke Ward and the inpatient neurological rehabilitation unit at Derby Hospitals NHS Foundation Trust. The SaLT approached patients with a neurological condition that affected their capacity to communicate (e.g. stroke, traumatic brain injury or other neurological condition). Patients were excluded from the study if they were unable to complete the

assessments due to sensory impairment and if it was documented that they were diagnosed with dementia.

Researchers were introduced to the patients after a member of the clinical team had gained initial agreement to discuss the study. The researcher provided written and verbal information to the patient. Assent was obtained from a patient's carer or significant other in instances where informed consent was not attainable or where it was unclear whether the implications of participating in the study were fully understood by the patient. Following the initial meeting with the researcher, a 24-hour period was allowed before informed consent and/or assent to participate was obtained (Figure 1.0 A flow chart of the decision-making flowchart used by the research team to aid patient selection and referral). See Appendix 3.1 for a detailed explanation of the recruitment and referral process and consideration of ethical issues involved in obtaining informed consent.

INSERT FIGURE 1 HERE

For each patient, the DFCS was completed by a SaLT and another member of staff from the clinical team. The Edinburgh Functional Communication Profile (EFCP)[31] was selected as a measure of overall functional communication skills. The Speech Questionnaire (SQ)[32] was selected for inclusion beacuse it has previously been validated for use with individuals that have language impairment[32]. A global rating of communication (ranging from mild, moderate, severe to very severe) was completed by a SaLT to obtain an overall estimate of the patient's level of communicative ability. The Frenchay Aphasia Screening Test (FAST)[33] was included as it remains the most widely used and validated screening measure for detecting communication impairment[34,35]. Measures of mood

included the Visual Analogue Mood Scales–Revised version (VAMS-R)[36] and the Stroke Aphasic Depression Questionnaire–Community (SADQ)[37]. The former has been shown to have greater internal consistency than the original version of the VAMS[38] and is valid for assessing mood in elderly people[36], whilst the latter has been recommended for screening low mood in people with acquired communication problems[39]. Table 1 outlines which member of the research team completed the assessments. See Appendix 3.2 and 3.3 for a detailed description of the assessment procedure.

Once informed consent was obtained the VAMS-R and FAST tests were administered. The researcher then completed the EFCP. Following this, a member of the clinical team who reported at least weekly contact with the patient, completed the DFCS, SQ and the SADQ. The SaLT based on the ward completed the DFCS and the global rating of communication skills. To avoid bias, researchers were blind to the ratings of other staff.

INSERT TABLE 1 HERE

Cronbach's alpha was calculated to examine internal consistency. Scores on the DFCS completed by SaLT and staff were correlated to evaluate inter-rater reliability. Scores on the DFCS were correlated with the EFCP, FAST, global ratings, and SQ for each staff group to evaluate validity of the DFCS. Correlations between SADQ and VAMS-R were calculated to evaluate the sensitivity of the DFCS to depressed mood.

Results

Twenty-seven patients agreed to be approached by the researchers. Of these, ten refused to take part and one withdrew consent. Sixteen patients (Mean age=56.44 years, SD= 18.8 years) took part in the study. Eleven (68.8%) were male and five (31.3%) were female. Eleven participants (68.8%) were admitted for a first stroke, three (18.8%) for TBI, two (12.5%) for multiple sclerosis, and one for hereditary spastic paraparesis. All participants were inpatients in the stroke ward or rehabilitation unit.

Participant's characteristics, median scores and interquartile ranges for all measures are shown in table 2. Analyses of normality of the data revealed that several of the variables violated the assumption of normality. In addition, the small sample size necessitated the use of non-parametric analyses (see Appendix 4.1 for details of normality analysis and choice of analysis).

In total, twelve participants were rated by staff. Of these, six (45.5%) were nursing staff, one was an occupational therapist (9.1%), two (18.2%) were physiotherapists, and three (27.3%) were healthcare assistants.

The number of patients identified with mood disturbance using the VAMS-R and the SADQ varied depending on the method used. The number of patients identified with mood disturbances is presented in table 3 (see also appendix 4.2).

INSERT TABLE 2 & 3 HERE

The internal consistency of the DFCS was investigated by calculating Cronbach's alpha for total scores and three subscales completed by staff and SaLT. Cronbach's alpha values for the DFCS completed by staff and SaLT were .844 and .894 respectively, which were both within acceptable limits (See Appendix 4.3).

Inter-rater agreement between SaLT and non-SaLT DFCS ratings was evaluated using Spearman's Rank Order Correlation coefficient (SROCC) or Spearman's rho. A strong, significant and positive correlation was found between total DFCS scores derived by SaLT and non-SaLT staff (r_s = .73, p<.05). Strong positive and significant correlations were found between SaLT and non-SaLT staff on the *expression* (r_s =.88, p<.01) and *interaction* subscales (r_s = .72, p<.05). Ratings on the *understanding* subscale completed by SaLT and non-SaLT staff were weakly, but not significantly correlated (r_s = .31, p=.35).

The validity of the DFCS (rated by SaLT and non-SaLT staff) was evaluated by correlating the total and subscale scores with scores on the EFCP, FAST and SQ (see Table 4 and 5). Total DFCS ratings completed by the SaLT showed strong positive relationships with both direct measures (EFCP and FAST) and total communication ratings (ranging between r_s= .754 - .902), all of which reached significance (p<.01). DFCS total scores showed a moderate positive correlation with the non-SaLT staff rating(s) on the SQ Speech scale, but this was not statistically significant.

SaLT ratings of the *expression*, *understanding* and *interaction* subscales on the DFCS correlated strongly and positively with scores on direct measures (EFCP and FAST) as well as the total

communication rating (see Table 4). These all reached statistical significance. Only the DFCS *expression* subscale showed an association with the SQ–Speech subscale. DFCS *expression* correlated highly and positively with the non-SaLT staff ratings on the speech scale of the SQ, and reached statistical significance ($p<.05$). There were no significant correlations between other DFCS subscales rated by SaLT staff with either of the SQ scores.

INSERT TABLE 4 HERE

The validity of the DFCS was assessed by correlating staff ratings with the direct assessments (FAST and EFCP) and staff ratings on the SQ using Spearman's rho. Correlations between staff DFCS ratings and the EFCP, FAST, SQ and Global Communication ratings are presented in table 5. Total scores on the DFCS showed strong and positive correlations with direct measures (EFCP and FAST), which were significant ($p<.01$ and $p<.05$ respectively). A strong positive association was found between the total DFCS score and staff ratings on both sub-scales of the SQ, which were significant ($p<.01$). A strong positive correlation was found between staff DFCS total scores and Total Communication ratings completed by SaLT staff, which was significant ($p<.05$).

INSERT TABLE 5 HERE

To investigate whether mood was related to DFCS ratings, SROCCs were calculated between the DFCS subscale and total scores (SaLT and non-SaLT raters) with the VAMS-R and the SADQ completed by staff (presented in Tables 6 and 7).

INSERT TABLES 6 & 7 HERE

No significant relationship was found between mood when assessed using the VAMS-R and the SADQ, on DFCS scores rated by SALTs and other staff. There were two exceptions. The *expression* subscale rated by the staff showed a strong positive correlation with the VAMS-R sad scale (r_s=.55, p<.05). The *interaction* subscale on the DFCS rated by the SaLTs showed a strong positive relationship with the VAMS-R tired scale (r_s=.55, p<.05) Further discussion of these correlations is presented in Appendix 3.6.

In order to assess divergent validity, DFCS scores were correlated with the patient's age and showed no statistically significant relationship.

Discussion

The initial aim of this study was to investigate the validity of a new observational measure of functional communication, the DFCS, in patients with acquired communication problems within hospital and rehabilitation settings. The second aim was to assess the sensitivity of the DFCS to depression in this patient group. These aims were achieved by correlating DFCS scores with other established measures of communication and with two measures of depression, each designed for use in people with acquired communication impairments.

The DFCS showed good internal consistency and high inter-rater reliability with the exception of one subscale (*understanding*). The DFCS was found to be a valid measure of communication skills when rated by both SaLT and other hospital staff. However, discrepancies between SaLT and other staff ratings of understanding were consistently evident. DFCS scores were not significantly related to measures of low mood, suggesting that this new scale may not be particularly sensitive to depressive symptomatology.

Importantly, the study provides preliminary evidence that the DFCS provides a valid assessment of overall observable communication skills and can be used by non-specialist staff (see Appendix 5.1 for further discussion of validity). A particular strength of the study is that multiple forms of assessment were used for validation, rather than relying on a single source of information for comparison. However, at least two of the measures used assessed only verbal, rather than non-verbal communication.

Therefore is difficult to ascertain with any certainty which skills are being assessed by the DFCS.

Poor inter-rater agreement and weaker correlation between measures completed by SaLTs and other staff highlighted poor agreement between general medical staff when evaluating the understanding of aphasic patients. This finding suggests that estimating a patients' level of understanding is more difficult for non-specialist (in this case non-SaLT) staff. This finding is entirely in keeping with previous studies which have shown that medical staff commonly incorrectly estimate levels of understanding in aphasic patients[40,41]. See Appendix 5.3 for further discussion of these studies.

Poor agreement between ratings of understanding, when assessments are carried out by other medical staff, as opposed to SaLTs, may reflect differences in roles and the type of interactions each group of staff have with patients. Research examining staff-patient interactions on stroke wards has shown that nursing staff commonly adopt a largely standardised and practical approach to patient communication[42], providing little opportunity to gauge understanding accurately. A further complicating factor could be that the *understanding* subscale itself may not provide an adequate number of concrete examples for the staff to estimate accurately an individual's level of understanding. In contrast, SaLTs are highly trained and therefore adept at assessing the degree of communication impairment in patients[16]. In this study SaLT raters may have utilised additional information (acquired through direct assessment or structured interaction) to make judgments about the individual's understanding over and above the examples given in the scale (see Appendix 5.3 for further discussion and 5.8 for the clinical implications for clinical psychologists).

DFCS scores were not related to scores on measures of depressive symptoms. This finding provides some preliminary evidence that the DFCS is not sensitive to low mood. Our results are not consistent with the recent studies conducted by van de Weg[27] and Fucetola et al.[30] who both found significant relationships between measures of functional communication and depression. It is possible that methodological differences account for this discrepancy. For example, Fucetola et al., examined a much larger sample of patients (57) all with left-hemisphere stroke. This should be contrasted with the smaller group with mixed aetiologies studied here.

The identification of patients with low mood differed depending on the measure used for this purpose. The use of different modes of assessment (i.e. self-report vs. staff observation) may have influenced the results. Poor agreement between self-report and staff-ratings on mood measures has previously been reported[40]. The limitations of the measures we adopted in this study need to be considered. The SADQ and the VAMS-R are screening tools, and were not designed as diagnostic measures. There is little evidence for the validity of the SADQ in distinguishing between depression and other mood disturbances associated with stroke[39]. Furthermore, the VAMS-R assesses a single component of depressive symptomatology, i.e. mood disturbance. Furthermore, Price and colleagues[43] have questioned the validity of visual analogue scales for measuring internal mood states. Specifically, they demonstrated that stroke patients had difficulties using these scales accurately[43].

The lack of patients classified as depressed on the SADQ suggests that whilst some patients were reporting low mood, they did not

readily demonstrate the observable somatic or behavioural signs of depression. The sample of patients examined in this study may have not had severe enough depressive symptoms to be detected using the SADQ. A sample bias remains a possibility due to the referral procedure used in the study. It is plausible that patients who were sociable and who were not overtly distressed were selected by the SaLT staff in order to facilitate the recruitment process. Patients with severe depression may have presented as withdrawn and unmotivated, and consequently may not have been approached. Moreover, several of the patients who declined to take part in the study may have done so as a direct result of low mood or depressive symptoms. Since no information was collected on the reasons for declining the offer to participate, this issue remains unresolved (see Appendix 5.4 for further discussion).

Determining the rate of depression amongst the participants of this study posed particular difficulties. Different rates of mood disturbance were found by the three measures used for this purpose. Such discrepant results make it difficult to unequivocally establish the rate of depression in this group of participants. This problem is often faced by researchers working in this field [20,26]. Townend and colleagues[26] recently reviewed the literature on the assessment of depression in people with acquired communication difficulties. They identified a lack of consensus over assessment tools, introduction of a sample bias and the lack of a 'gold-standard' to validate measures against as the principle problems in this field.

Within this research area, those with severe depression or communication disorders are often excluded[26,44,37]. Although most researchers do not describe their inclusion and exclusion process explicitly, some ethical and methodological issues are raised in

research with specialised populations. Ethically, there is a lack of consensus about the best way to assess decision making capacity and obtain informed consent in people with acquired communication impairments. However, recent recommendations have suggested a staged-process, and the inclusion of communication aids, and screening measures of comprehension skills[44,45]. See Appendix 5.6 for discussion of these issues and recommendations.

Research Implications

Further research is required to establish the psychometric properties (validity, reliability and accessibility) of the DFCS. The validity of using the DFCS in this and other clinical populations should be investigated. Furthermore, the relationship between DFCS scores and depressed mood warrants further exploration. Although not collected in this study, feedback from staff about the utility of the DFCS would also be beneficial. This may shed light on reasons for differences in the consistency of DFCS ratings between general healthcare staff and expert assessors (see Appendix 5.9 for future research recommendations).

Clinical Implications

Initial indications from this study suggest that the DFCS is a promising assessment tool for establishing of communicative competence in individuals with acquired communication disorders. Further development of the DFCS should aid decision-making in patients with communication problems.

In particular, our results highlighted the need for a clear working definition of observable behaviours that enable an aphasic individuals level of understanding to be quantified. This is especially important given the diverse training, experience levels

and backgrounds of healthcare professionals involved in the assessment and care of these individuals. Clearly, the involvement of staff with expertise in this area would greatly facilitate this process. See Appendix 5.8 for more detailed discussion of the clinical implications.

Clinical Message

- The DFCS is suitable for use to assess observable communication skills in hospital inpatients with acquired communication impairments.
- Collaboration with SaLTs may be necessary to estimate understanding more reliably.
- The DFCS is not sensitive to mild mood disturbances.

References

1 Wertz R T. Aphasia Therapy: a clinical framework. In Papathnasiou I, Ed. *Acquired neurogenic communication disorders: a clinical perspective.* 2000. London: Whurr, 3-28.

2 Hirsch F M, Holland A L. Beyond activity: measuring participation in society and quality of life. In Worrall L E, Frattali C M eds. *Neurogenic communication disorders a functional approach.* New York: Thieme. 2000: 35-54

3 Engelter S T, Gostynski M, Papa S, et al. Epidemiology of aphasia attributable to first ischemic stroke: incidence, severity, fluency, etiology and thrombolysis. *Stroke* 2006; **37**: 1379-1384

4 Sarno M T, Buonaguro A, & Levita E. Characteristics of verbal impairment after closed head injury. *Arch Phys Med Rehabil* 1986; **67**: 400-405

5 Hinchcliffe F J, Murdoch B E Cheney H J. Towards a conceptualisation of language and cognitive impairment in closed-head injury: use of clinical measures. *Brain Inj* 1998; **12**: 109-13

6 Le Dorze G, Brassard C. A description of the consequences of aphasia on aphasic persons and their relatives and friends, based on the WHO model of chronic diseases. Aphasiology 1995; **9**: 239-255

7 Caramazza A. Some aspects of language processing revealed through the analysis of acquired aphasia: the lexical system. *Ann Rev Neurosci* 1988; **11**: 395-421

8 Lezak M D, Howieson D B, Loring D W. The neuropsychological examination procedures. In Lezak M D, Howieson D B, Loring D W eds. *Neuropsychological assessment, fourth edition.* Oxford: Oxford, 2004: 100-132

9 Manochioping S, Sheard C, Reed V A. Pragmatic assessment in adult aphasia: a clinical review. *Aphasiology* 1992; **6**: 519-533

10 Worrall L, McCooey R, Davidson B, et al. The validity of functional assessment of communication and the Activity/Participation components of the ICIDH-2: do they reflect what really happens in real-life? *J Commun Disord* 2002; **35**: 107-137

11 Feyereisen P, Seron X. Nonverbal communication and aphasia: a review. *Brain Lang* 1982; **16**: 213-236.

12 Bull. P. State of the art: nonverbal communication. *The Psychologist 2001*; **14**: 644-647

13 McCooey R T, Toffolo D, Code C. A socio-environmental approach to functional communication in hospital inpatients. In: Worrall L E, Frattali C M eds. Neurogenic communication disorders a functional approach. New York: Thieme. 295-311

14 Kagan A, Black S E, Duchan et al. Training volunteers as conversation partners using "supported conversation for adults with aphasia" (SCA): a controlled trial. *J Speech Lang Hear Res* 2001; **44**: 624-638

15 American Speech-Language-Hearing Association (ASHA). *Functional communication measures project: advisory report* 1990. Rockville: ASHA.

16 Worrall L E. A conceptual framework for a functional approach to acquired neurogenic disorders of communication and swallowing. In: Worrall L E, Frattali C M eds. *Neurogenic communication disorders a functional approach*. New York: Thieme. 2000: 3-18

17 World Health Organisation (WHO). *ICIDH-2 International Classification of Impairments, Disabilities, and Participation.* 1997. Geneva: World Health Organisation.

18 Frattali C M. Functional assessment of communication: merging pubic policy with clinical views. *Aphasiology* 1992; **6**:63-83

19 Simmons-Mackie N, Threats T T, Kagan A. Outcome assessment in aphasia: a survey. *J Commun Disord* 2005; **38**: 1-27

20 Turner-Stokes L, Hassan N. Depression after stroke: a review of the evidence base to inform the development of an integrated care pathway. Part 1: diagnosis, frequency and impact. *Clin Rehabil* 2002; **16**: 231-247

21 Seel R. T, Kreutzer J S, Rosenthal et al. Depression after traumatic brain injury: a national institute on disability and rehabilitation research model systems multicenter investigation. *Arch Phys Med Rehabil* 2003; **84:** 178-184

22 Tatena A, Murata Y, Robinson R G. Comparison of cognitive impairment associated with major depression following stroke versus traumatic brain injury. P*sychosomatics* 2002; **43**:295-301

23 Silver J M, Yudofsky S C, Hales R E. Depression in traumatic brain inury. *Neuropsychiatry Neuropsychol Behav Neuro* 1991; **4**: 12-23

24 Tanner D C, Gerstenberger, D L. The grief response in neuropathologies of speech and language. *Aphasiology* 1988; **2**: 79-84

25 Satz P, Forney D L, Zaucha K, et al. Depression, cognition and functional correlates of recovery outcome after traumatic brain injury. *Brain Inj* 1998; **12**: 537-553

26 Townend E, Brady M, McLaughlin K. A systematic evaluation of the adaptation of depression diagnostic methods for stroke survivors who have aphasia. *Stroke* 2007; **38**: 3076-3083

27 van de Weg F B, Kuik D J, Lankhorst G J. Post-stroke depression and functional outcome: a cohort study investigating the influence of depression on functional recovery from stroke. *Clin Rehabil* 1999; **13**: 268-272

28 Sinyor D, Amato P, Kaloupek D G, et al. Post-stroke depression: relationships to functional impairment, coping strategies and rehabilitation outcome. *Stroke* 1986; **17**: 1102-1107

29 Fann J R, Katon W J, Uomoto J M. Psychiatric disorders and functional disability in outpatients with traumatic brain injuries. *Am J Psychiatry* 1995; **152**: 1493-199.

30 Fucetola R, Tabor Connor L, Perry J, et al. Aphasia severity, semantics and depression predict functional communication in acquired aphasia. *Aphasiology* 2006; **20**: 449-461

31 Skinner C, Wirz S, Thompson I et al. *Edinburgh functional communication profile.* 1984. Edinburgh: Winslow.

32 Lincoln N B. The Speech Questionnaire: an assessment of functional language ability. *In Rehabil Med* 1982; **4**: 114-117

33 Enderby PM, Wood V A, Wade D T et al. The Frenchay Aphasia Screening Test: a short simple test for aphasia appropriate for non-specialists. Int Journal of Rehabilitative Medicine 1987; **8**:166-170

34 Enderby P, Crow E. Frenchay Aphasia Screening Test: validity and compatabiility. *Disabil Rehabil* 1996; **18**: 238-240

35 Salter K, Jutai J, Foley N, et al. Identification of aphasia post-stroke: a review of screening assessment tools. *Brain Inj* 2006; **20**: 559-568

36 Kontou E, Lincoln N B, Walker M F. Development of a modified version of the Visual Analogue Mood Scales (VAMS-R). Un published abstract. 2007

37 Sutcliffe L M, Lincoln N B. The assessment of depression in aphasic stroke patients: the development of the Stroke Aphasic Depression Questionnaire. *Clin Rehabil* 1998; **12**, 506-513.

38 Stern R A. *Visual Analog Mood Scales Professional Manual*. 1997. Odessa, US: Psychological Assessment Resources, Inc.

39 Leeds L, Meara R J, Hobson J P. The utility of the Stroke Aphasia Depression Questionnaire in a stroke rehabilitation unit. *Clin Rehabil* 2004; **18**: 228-233

40 Klinedinst N J, Clark P C, Blanton S, et al. Congruence of dperessive sytpom appraisal between persons with stroke and their caregivers. *Rehabil Psychol* 2007; **52**: 215-225

41 McClennan, R., Johnston, M., and Densham, Y. Factors affecting accuracy of estimation of comprehension problems in patients following cerebro-vascular accident, by doctors, nurses and relatives. *Journal of Disorders of Communication*; 1992: **27**, 209-19.

42 Pound P, Ebrahim S. Rhetoric and reality in stroke patient care. *Soc Sci Med* 2000; **51**: 1437-1446

43 Price C I, Curless R H, Rodgers H. Can stroke patients use visual analogue scales? *Stroke* 1999; **30**:1357-1361

44 Carlsson E, Paterson B L, Scott-Findlay S, Ehnfors M, Ehrenberg A. Methodological issues in interviews involving people with communication impairments after acquired brain damage. Qual Health Res 2007; 17: 1361-1371

45 Jimison H B, Sher P P, Appleyard R, et al. The use of multimedia in the informed consent process. *J of the Am Informat Assoc* 1998; **5**: 245-256

Appendix 1 Figures for inclusion in manuscript for publication in Clinical Rehabilitation

Figure 1. Flowchart representing the process and outcome of patient recruitment

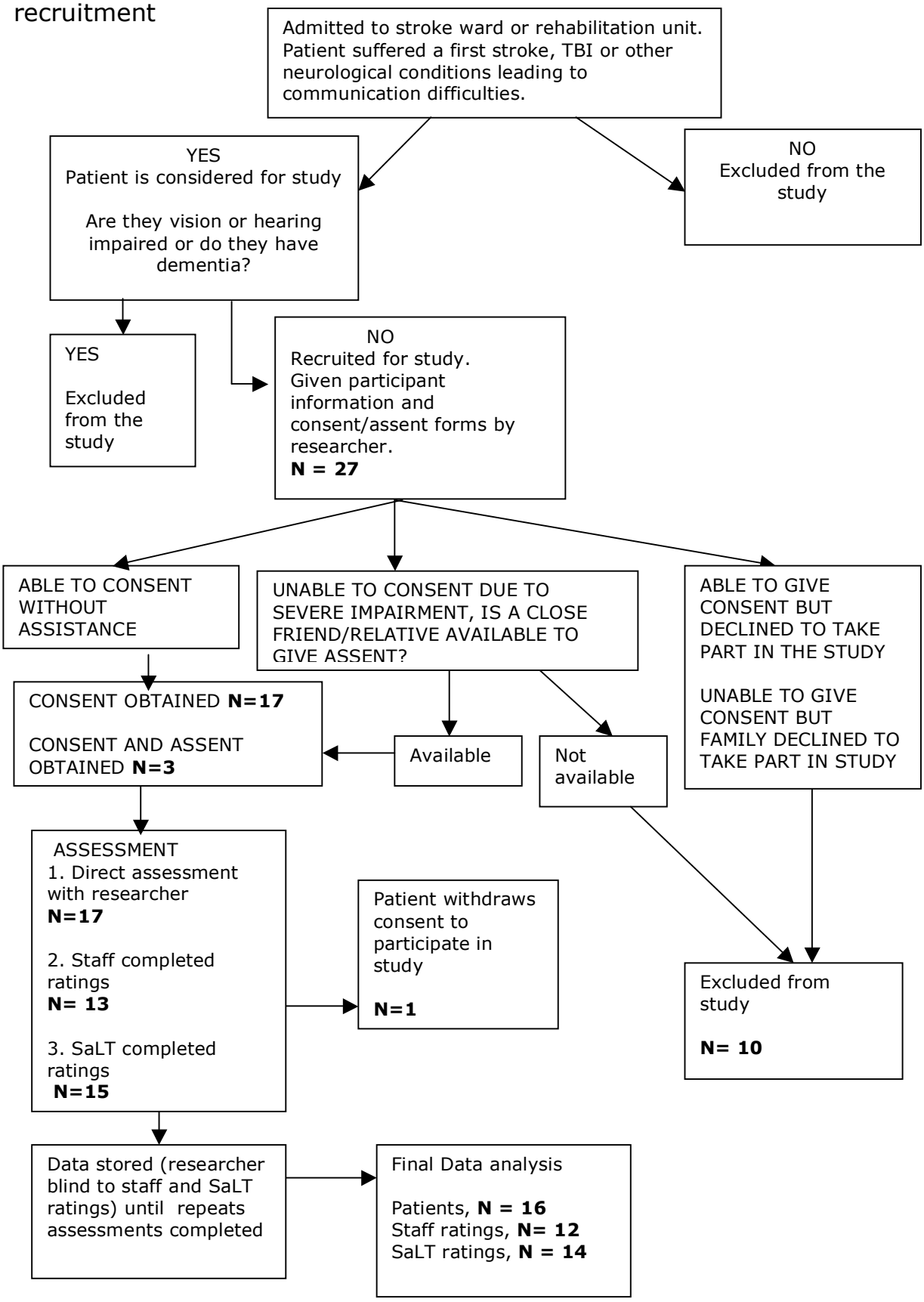


Table 1. Details of the assessment procedures – outlines who administered or completed the different measures in this study.

Measure	Trainee Psychologist / Researcher	Speech and Language Therapist	Staff
Derby Functional Communication Scale (DFCS)		✓	✓
Edinburgh Functional Communication Profile (EFCP) (Observational)	✓		✓
Speech Questionnaire (SQ)			✓
Stroke Aphasia Questionnaire (SADQ)			✓
Frenchay Aphasia Screening Test (FAST) – Direct assessment	✓		
Visual Analog Mood Scale-Revised Version (VAMS-R) (Direct assessment)	✓		
Global Rating of Language Ability (Likert Scale)		✓	

Table 2. Patient age, median scores and interquartile ranges (IQR) (25^{th} – 75^{th} percentile) on communication and mood measures used in the study.

	N	Median	IQR
Age	16	59.04	38.18- 75.53
Time from admission to assessment (days)	9	30	18 - 50
Derby Functional Communication Scale (DFCS) Total (staff)	12	12	8.75 – 19.63
DFCS Total (SaLT)	15	18	12 – 21
Frenchay Aphasia Screening Test (FAST)	16	17.5	5.5 – 24.5
Edinburgh Functional Communication Profile (EFCP	16	5.75	4 - 8.5
Speech Questionnaire (SQ) – Speech	12	11.5	4.5 – 12.75
SQ – Understanding	12	4	3 - 5
Stroke Aphasic Depression Questionnaire – Community	12	9.5	7.25 – 12.5
Total Speech and Language therapist Rating	14	2	1 - 3
Visual Analogue Mood Scale Revised (VAMS-R) T-score	N	Median	IQR
Afraid	15	70	49 - 78
Confused	15	49	43 - 68
Sad	15	56	48 – 66
Angry	15	57	43 - 66
Energetic	15	47	34 - 61
Tired	15	49	40 - 56
Happy	8	40	29 - 56
Tense	8	53.5	41.75– 67.25

IQR = Interquartile Range (25^{th} and 75^{th} percentile).
N = number of patients for whom data was collected.

Table 3. Number of participants classified as having probable low mood on assessment using different measures

	Low mood	Borderline	No low mood
Measure	Number of patients	Number of patients	Number of patients
Stroke Aphasic Depression Questionnaire Community (Cut-off Score < 14)	0	NA	12
Visual Analog Mood Scales (VAMS) -Revised raw scores (Raw Score > 50)	2 (13%)	NA	13 (86%)
VAMS (Sad) T scores No low mood: < 59 Borderline: 60-69 Low Mood: >70	8 (53%)	4 (27%)	8 (53%)

Low mood = cut off those classified as having clinically significantly levels of sadness, possibly due to depression. Further psychological assessment for mood disorders is recommended Stern (1997).
Borderline = scores in this range may indicate that the patient is experiencing low mood and further assessment is suggested (Stern, 1997).

Table 4. Correlations between DFCS ratings (SaLT) and other measures of communication

Measure	DFCS (E)		DFCS (U)		DFCS (I)		DFCS Total	
	r_s	*p*	r_s	*p*	r_s	*p*	r_s	*p*
EFCP	.72	<.01**	.66	<.01**	.64	<.05*	.75	<.01**
FAST	.88	<.01**	.79	<.01**	.71	<.01**	.88	<.01**
SQ Speech	.7	< .05*	.46	.16	.34	.31	.52	.1
SQ – Total	.45	.17	.41	0.21	.39	.24	.45	.17
Skills (SaLT)	.92	<.01**	.82	<.01**	.67	<.01**	.90	<.01**

r_s =Spearman's Rank Order Correlation coefficient ,
p = Probability,
*Correlation significant to the 5% level,
** Correlation to the 1% level
DFCS (E) = Derby Functional Communication Scale: Expression subscale
DFCS (U) = Derby Functional Communication Scale: Understanding subscale,
DFCS (I) = Derby Functional Communication Scale (Interaction)
EFCP = Edinburgh Functional Communication Profile
FAST = Frenchay Aphasia Screening Test
SQ = Speech Questionnaire
Total Skills = Rating of total communication skills by SaLT
SaLT = Speech and Language Therapist

Table 5. Correlations between DFCS ratings (Staff) and other measures for staff raters

Measure	DFCS (E)		DFCS (U)		DFCS (I)		DFCS Total	
	r_s	*p*	r_s	*p*	r_s	*p*	r_s	*p*
EFCP	.76	<.01**	.42	.17	.81	<.01**	.75	<.01**
FAST	.76	<.01**	.34	.28	.78	<.01**	.69	<.05*
SQ (S)	.88	<.01**	.54	.07	.74	<.01**	.76	<.01**
SQ (U)	.6	<.05*	.96	<.01**	.7	<.05*	.91	<.01**
Total Skills (SaLT)	.69	<.05*	.26	.47	.76	<.05*	.68	<.05*

r_s =Spearman's Rank Order Correlation coefficient
p = Probability
* Correlation significant to the 5% level
** Correlation to the 1% level
DFCS (E) = Derby Functional Communication Scale: Expression subscale
DFCS (U) = Derby Functional Communication Scale: Understanding subscale,
DFCS (I) = Derby Functional Communication Scale (Interaction)
EFCP = Edinburgh Functional Communication Profile
FAST = Frenchay Aphasia Screening Test
SQ = Speech Questionnaire
Total Skills = Rating of total communication skills by SaLT
SaLT = Speech and Language Therapist

Table 6. Relationship between ratings on mood measures and Staff ratings on the DFCS.

Measure	N	DFCS (E)		DFCS (U)		DFCS (I)		DFCS Total	
Raw scores		r_s	*p*	r_s	*p*	r_s	*p*	r_s	*p*
VAMS-R Afraid	12	-.06	.86	-.14	.67	.27	.4	0	.98
VAMS-R Confused	12	.17	.60	-.2	.54	.14	.67	-.03	.92
VAMS-R Angry	12	.39	.21	-.02	.95	.18	.58	.15	.63
VAMS-R Energetic	12	-.20	.53	.24	.45	-.02	.96	.11	.74
VAMS-R Sad	12	.6*	p<.05	.06	.85	.43	.17	.37	.24
VAMS-R Tired	12	.37	.24	-.05	.89	.38	.22	.24	.45
VAMS-R Happy	8	-.35	.45	.49	.26	-.11	.82	.16	.73
VAMS-R Tense	8	.16	.73	-.15	.76	.71	.07	.24	.61
VAMS-R (Sad + Angry)	12	.21	.52	.37	.24	-.02	.94	.19	.55
SADQ Staff	12	-.02	.94	-.4	.2	-.36	.26	-.37	.24

r_s =Spearman's Rank Order Correlation coefficient
p = Probability
*Correlation significant to the 5% level
VAMS-R = Visual Analogue Mood Scales Revised Version.
DFCS (E) = Derby Functional Communication Scale: Expression subscale
DFCS (U) = Derby Functional Communication Scale Understanding subscale
DFCS (I) = Derby Functional Communication Scale: Interaction subscale

Table 7. Relationship between ratings on mood measures and Speech and Language Therapists' ratings on the DFCS. of depression on Staff rated DFCS scores

Measure	N	DFCS (E)		DFCS (U)		DFCS (I)		DFCS Total	
Raw scores		r_s	*p*	r_s	*p*	r_s	*p*	r_s	*p*
VAMS-R Afraid	15	.14	.64	.12	.69	.01	.96	.12	.68
VAMS-R Confused	15	-.09	.76	-.17	.57	-.18	.95	-.13	.65
VAMS-R Angry	15	.49	.08	.21	.47	.20	.49	.38	.18
VAMS-R Energetic	15	.02	.95	.08	.78	.09	.75	.10	.74
VAMS-R sad	15	.45	.11	.45	.11	.44	.12	.47	.09
VAMS-R Tired	15	.28	.32	.5	.07	.55	p <.05*	.45	.1
VAMS-R Happy	8	-.42	.3	-.29	.48	-.34	.41	-.35	.4
VAMS-R Tense	8	.15	.72	.45	.26	.53	.18	.37	.36
VAMS-R Sad + Angry	15	.5	.07	.32	.27	.32	.27	.44	.11
SADQ Staff	12	-.53	.88	-.39	.23	-.22	.51	-.24	.48

r_s =Spearman's Rank Order Correlation coefficient
p = Probability,
* Correlation significant to the 5% level
DFCS (E) = Derby Functional Communication Scale: Expression subscale
DFCS (U) = Derby Functional Communication Scale: Understanding subscale
DFCS (I) = Derby Functional Communication Scale: Interaction subscale

Appendix 2

Background information to the introduction

The following section contains background information for the study. Acquired communication disorders resulting from stroke and traumatic brain injury (TBI) are described. There is discussion of traditional versus functional approaches to the assessment of acquired communication in these populations. The literature on depression in stroke, TBI is discussed. Furthermore the link between functional communication impairment and depression is considered.

2.1 Acquired communication disorders

Acquired neurogenic communication disorders include any difficulty in communicating that can be attributed to a neurological trauma or disease process (Worrall, 2000). These problems are 'acquired', because prior to onset the sufferer was competent in communication (Holland, Fromm & DeRuyter et al., 1996). This broad definition can include disorders that affect the neuropsychological aspects of language comprehension or expression (aphasia) or the mechanical or physical effects (dysarthria and dysphagia). The main communication disorder of interest in this study is aphasia, defined as 'an acquired impairment of the cognitive system which comprehends and formulates language' (Wertz, 2000 pp 8).

The two most common cause of aphasia are stroke (Steele, Aftonomous & Munk, 2003) followed by traumatic brain injury (TBI) (Larkins, Worrall & Hickson, 2000).

Stroke is principally a disruption of the supply of nutrients (oxygen and glucose) to brain tissue as a result of disrupted blood flow (Lezak, Howieson & Loring, 1998). On a physiological level, the inability of the tissue to survive without blood supply after only a few minutes leads to largely irreversible focal brain damage (Lezak, et al., 2004). Aphasia arises due to the stroke affecting the language-dominant cerebral hemisphere. Although aphasic or language disorders are not necessarily limited to older adults, conditions associated with aphasia (cerebrovascular disease and stroke) are more prevalent with advancing age (Steele et al., 2003). Coupled with an 'ageing population', greater life expectancies, and improved survival rates of sufferers means that the incidence and prevalence of stroke related communication problems (like aphasias) will increase in future (Steele et al., 2003).

Communication disorders are also prevalent in Traumatic Brain Injury (TBI) (Larkins et al., 2000). TBI refers to a series of neuropathological changes to the brain caused by rapid acceleration and deceleration of the brain within the skull. During injury, forces upon the head can cause skull fracture in addition to the rapid

movement of the delicate brain tissue within and against the skull (Lezak et al., 2004). These injuries have different effects on brain functioning. Shearing of delicate nerve fibres is associated with generalised difficulties such as problems with concentration, complex thinking and slowed speed of information processing. Localised lesions commonly occur in the frontal and temporal brain areas where the brain is more likely to have been pressed against the skull (Lezak et al., 2004). These lesions are associated with specific cognitive problems including executive dysfunction and language difficulties (Lezak et al., 2004).

The most well known communication disorder seen in clinical practice following stroke are aphasia and dysarthria (defective articulation) (Lezak, Howieson & Loring, 2004). Aphasia refers to a 'language disorder following focal brain damage, typically the language-dominant cerebral hemisphere, which limits the individual's ability to communicate with others through speech, sign, reading and writing (Holland et al., 1996). Aphasic disorders include Global aphasia (severe and wide ranging impairments in all modalities, Wernicke's or fluent aphasia (intact fluent speech lacking communicative content, in addition to comprehension difficulties), Broca's or non-fluent aphasia (preserved comprehension with effortful and halting speech) and conduction aphasia (Wallesch, Johannsen-Horbach & Blanken, 2003).

Although there is some overlap in clinical presentation of aphasia and communication difficulties from TBI the pattern of impairments can be different to that associated with aphasia (caused by stroke) (Sarno, Buonaguro, & Levita, 1986). TBI can cause both focal (specific disruption to aspects of communication) and diffuse damage (causing inattention, learning and memory problems, slowed speed of processing), which can impact on a person's capacity to communicate. Other effects of brain trauma such as dysarthria, mood lability, disorganisation of thought, or executive difficulties also impact upon a patient's ability to communicate and can often present barriers to communication with staff in hospital setting (Lezak, 2004; Larkins, Worrall & Hickson, 2000).

In summary, acquired neurogenic communication disorders represent a broad range neurologically based difficulties, when prior to onset the individual was a competent communicator (Wertz, 2000). Although every individual presenting with communication disorder will show a different clinical picture, there are some common features found in these two presentations and there is considerable overlap in the assessment needs and considerations for these groups. Both will have experienced a sudden and traumatic loss of their communicative ability, and face considerable difficulties in communicating with staff and loved ones. This group often have

protracted stays in hospital due the nature of their injuries, and thus their communication and mental health needs are to be considered and assessed as accurately as possible within the inpatient rehabilitative environment.

2.2 Traditional vs. Functional approach to assessment of acquired communication disorders

The assessment of language impairment following stroke or TBI is typically completed by clinicians with specialist knowledge (neuropsychologists or speech and language therapists). Assessments of communicative ability are based on a generalised information-processing model of spoken and written language, derived from empirical research and cognitive neuropsychology theory (see Goodglass and Wingfield, 1988 for review). Briefly, an assessment of a person's communicative ability within this framework will cover specific abilities broadly categorised within language production and comprehension. This covers such receptive abilities such as word recognition, reading, comprehension and semantic knowledge/memory, and expressive abilities, such as articulation, phonology, and writing (McKenna, 2004). Assessment measures target a particular aspect of language comprehension or production or comprise individual subtests accessing these. The individual's performance is measured against group based normative data. Measures usually contain graded linguistic stimuli, which

means that they are increasingly difficult. An individual is tested until they fail a criterion number of items. Practically it takes place in a quiet area free of distractions in order to obtain the optimum performance (Spreen & Strauss, 1998), rather than providing an accurate reflection of their competence in spontaneous or interactive situations (Manochioping, Sheard and Reed, 1992). The end result is a profile of an individual's communicative strengths and weaknesses for verbal and written language.

While this form of assessment is useful in certain rehabilitation situations, aspects of this process may make it less feasible in routine in-patient care. Firstly, it is usually a lengthy process, requiring specialist training in the assessment instruments. This makes specialist knowledge expensive and time-consuming to the service. Secondly, this approach does not capture non-verbal and social aspects of communication (McKenna, 2004).

2.2.1 Communicative ability: a new approach

Several lines of evidence support the notion that traditional assessments of verbal and written communication exclude important features of individual's communicative abilities. Research into non-verbal communication and functional approaches to the assessment of communicative ability implicate a wider set of skills in communication. Nonverbal communication is a broad term only

excluding communication through words (Bull, 2001). It can include facial expression, gesture, intonation, posture and body movement. Non-verbal communication can be unintentional and idiosyncratic but serves several useful social functions for the individual. These include communication of emotion; humour and fostering interpersonal relationships. Furthermore, nonverbal behaviour is closely synchronised with spoken words to emphasis or support the communication of meaning (Bull, 2001).

On a theoretical level, nonverbal behaviour (such as use of facial expressions and gestures) has been hypothesised to form several important functions to human communication (Bull, 2001). In contrast to the principle function of verbal communication as relaying information, non-verbal communication is primarily thought to underpin the communication of emotions and social interactions/intentions. Gesture and facial expression are thought to be intertwined with speech (Bull, 2001). Facial expressions are also important to communication skills and are thought to communicate emotions (Kerman & Frieson, 1986) or alternatively communicate social intent within a given context (Fridlund, 1997). Other non-verbal behaviours such as gesture and intonation are thought to synchronise with verbal behaviour to place emphasis or added meaning or can sometimes replace words to create 'mixed syntax' (Bull, 2001).

There is emerging interest in non-verbal communicative abilities of individuals with acquired communication disorders. To date, the extent of damage to non-verbal expression is difficult to measure in individuals with acquired communication disorders, due to a lack of standardised assessment tools (Feyereisen and Seron, 1982; Bull, 2001). However, patients with acquired communication problems (typically through stroke) often show additional non-verbal communication deficits. For instance, some patients show difficulty in interpreting facial expressions, and emotional intonation in sentences and poorer gestural activity during speaking, (Feyereisen & Seron, 1982).

The relationship between verbal and non-verbal or gestural communication is unclear. Within neuropsychological theory, disorders of gesture are considered as apraxic disorders (apraxias are broadly defined as impairment in the ability to carry out voluntary movements) (Beaumont, Kenealy and Rogers et al., 1996) though they often co-occur with communication disorders (Feyerisen & Seron, 1982). Conversely, aphasic patients have been shown to decode non-verbal signals and to be aided in their understanding by situational context (Feyereisen & Seron, 1982). Similarly, some studies observed that aphasic individuals tend to express information and emotions non-verbally, which suggests that they may be

compensating for loss of verbal communicative abilities (Feyereisen & Seron, 1982). Also Holland et al., (1982) demonstrated that aphasic individuals communicated more effectively in their own real-life environment than when tested in a distraction-free environment.

This highlights the importance of taking a broader view of communicative competence in individuals with acquired communication disorders. It is clear that nonverbal or interactional aspects of communication perform important functions within everyday life and it is important these are observed within the patient's natural context. Furthermore traditional assessment formats may prevent the individual's full range of communicative abilities to be assessed.

2.2.2 Contextual issues within communication

Aphasic individuals have been shown to use both non-verbal strategies and to generally communicate more effectively when observed in their natural environment. This highlights the importance of considering the context in which communication takes place. Although context can be facilitative to the patient's communication, at times there may be features of the environment which form barriers to effective communication, which are not attributable to the patient's communication disorder (McCooey, Toffolo & Code, 2000). For the individual, there may be additional

sensory impairment, poor physical health or mood changes which prohibit the person's capacity or motivation to communicate effectively. Equipment (such as ventilators) may also affect a person's ability to communicate on the ward (McCooey et al., 2000).

At a broader systemic level, research indicates nursing staff have the most contact with patients in hospital settings and effective staff-patient communication is crucial to effective care (McCooey et al., 2000). Whilst staff-patient communication is often therapeutic, certain aspects of staff's communicative behaviour have been identified in the literature as limiting patients' opportunities to use their functional communication skills. For instance staff have been reported to withdraw from most severely aphasic patients due to lack of confidence in their ability to communicate with these patients (McCooey et al., 2000). Other issues, such as time pressures on staff can mean that staff-patient communication is often automatic and routine and provides little opportunity for the patient to develop strategies to compensate for communicative impairments (McCooey et al., 2000). Other features of the environment such as high levels of background noise, lack of privacy and management structure have also been cited as barriers to effective patient-staff communication.

Considering that there are many barriers to effective communication outside of the individual patient, it is important that the clinician

consider the patient's environment when assessing communication. On an individual level, the person's performances within the assessment may not reflect how they function within the context of everyday life (Worrall, McCooey & Davidson et al., 2002). Some evidence suggests that individuals with acquired aphasias rely on context to aid understanding and use non-verbal behaviours to compensate for losses (Feyereisen & Seron, 1982). During assessment, consideration of context of the communication and a focus on interaction (as well as expressive and receptive verbal behaviours) may provide a more comprehensive estimate of the individual's communicative effectiveness.

Undeniably, specialist assessment and knowledge of communication disorders has important applications to individualised treatment planning and diagnosis of neurogenic communication disorders. However, this approach may not fully meet the needs of acute and rehabilitation inpatient services. This approach may not provide a valid estimate of a person's communicative ability, as it fails to recognise the non-verbal aspects of communication, barriers or aids to communication within the individuals' context, the environment of the patient. It highlights the need for a move to more practical, client-centred approach which incorporates the views of multiple health professionals and significant others. A strong case can be made for a measure of 'everyday' communication that is

observational (relies on views and knowledge of non-specialist staff and patients significant others), considers non-verbal communication and the patient's context (i.e. hospital environment).

2.2.3 Current assessments of functional communication: A shift in thinking and practice?

The limitations of the traditional approach to the assessment of communication prompted an emerging interest in the assessment of 'functional' communication. This shift also found an application of the theoretical field of pragmatics (Manochioping et al, 1992). Pragmatics emphasises the behavioural and social context of communication, and considers how language and other aspects of behaviour interact and considers the interface between language and other behaviours (Code, 1987). Pragmatics appeared to be a useful framework for considering aphasic patients' ability to communicate in natural, interactive situations (Manochioping, et al., 1992). So, functional or pragmatic assessment is interested in the skills which an individual employs to communicate their intended meaning, regardless of modality, and draws on a range of skills sets (i.e. cognitive, linguistic and social).

The functional approach to the assessment of communication considers how the individual performs in natural contexts. For example, Holland (1982) defines it as 'getting the message across in

a variety of ways, from sentences to gestures, rather than grammatically correct utterances'. Similarly, the American Speech and Hearing Association (ASHA) refer to functional communication as 'the ability to receive or convey a message regardless of mode, to communicate effectively and independently in a given environment' (ASHA, 1996). All authors recognise that functional communication refers to an individual's communicative effectiveness, basically, how well the individual is able to 'convey a message' regardless of how they do it.

Leading authors disagree over where ASHA's definition fails to capture the complexity of the term 'functional communication'. Two areas not included in the above definition are the importance of the *context* and *interpersonal* nature of communication. For instance, Hartley (1992) emphasised the match between the individual's communicative skills and appropriateness to the environment for completing broad range of activities including work, independent living and interpersonal relationships. Similarly, Simons-Mackie & Damico (1995) point out that the ASHA definition refers only to the 'transactional' nature of communication. That is, it merely conveys communication as an exchange of information, and does not capture the 'interactional' side, which fosters social relationships.

2.3 World Health Organisation International Classification of Functioning Disability and Health (WHO, 1997): a framework for considering Functional Communication

Frattali (1992) described functional communication as the person's ability to communicate despite the presence of impairments [such as acquired communication disorders] to achieve their activities of daily living, including interpersonal relationships. This fits into the framework proposed by Worrall (2002) that is described below. In a rehabilitation setting, functional skills are those that enable the person to complete tasks that are important to them. Therefore the functional approach to the assessment of communication considers how the individual performs in natural contexts. All authors recognise that functional communication refers to an individual's communicative effectiveness, basically, how well the individual is able to 'convey a message' regardless of how they do it. For example, Holland (1982) defined functional communication as 'getting the message across in a variety of ways, from sentences to gestures, rather than grammatically correct utterances' (pp.). Similarly, the American Speech and Hearing Association (ASHA) referred to functional communication as 'the ability to receive or convey a message regardless of mode, to communicate effectively and independently in a given environment'.

Functional communication reflects how effectively an individual uses verbal and non-verbal skills within the context of their everyday life, (Worrall, et al., 2002), and is based on Activity/Participation dimensions of the World Health Organisation's International Classification of Functioning, Disability & Health (WHO, 1997). This approach to classifying disability places more emphasis on an individual's personal and situational factors (Worrall et al., 2002). In this sense, it recognises that communication changes in different environments and may improve or deteriorate over time. Furthermore, it emphasises the social function of communication and its importance for relationships between patients, staff and their relatives.

Worrall (2000) a leading expert on functional communication in health care concluded that the functional approach to the assessment and treatment of neurogenic communication disorders included a range of approaches which were embedded in the World Health Organisation's International Classification of Functioning Disability and Health: activity and Participation components (WHO, 1997). The ICIDH-2 is a consensus document, which established a common classification system of the consequences of disease at three levels: the body (impairments), the person (Activity restriction), and the person within their social context (participation).

These will be briefly summarised here and related to the concept of functional communication.

Within this framework the consequences of disease (such as a stroke or TBI) can be classified at the individual level of the *impairment*, which refers to the loss, or abnormality of body structure or physiological functioning. At the level of *Activity Limitation,* where the consequences of disease are considered to be the impact on the individual's ability to complete everyday activities using both basic and complex skills. Lastly, the *participation* level reflects how the individual's participation in society is affected across domains including personal care, mobility, leisure, spirituality, economic life, and community involvement.

Worrall (2000, 2002) attempted to categorise functional communication assessments within the framework of the ICIDH-2. She argued that the assessment of communicative ability mainly falls within the Activity limitation level, which considers the person's ability complete everyday communicative activities (both simple and complex). The specified communication activities fall within three categories, activities of *understanding messages*, activities of *producing messages* and *conversation* activities and use of communication devices and techniques. These are outlined in table 1.0. Typically, in keeping with the basic tenet of functional

communication assessment, activities which reflect the individual's everyday activity are assessed using a range of methods i.e. self-evaluations, observation, questionnaire.

Existing measures of functional communication are used to establish the individual's degree of activity restriction, however the current range of measures are diverse (theoretically and practically) and focus on different aspects of communicative ability. Furthermore, Worrall and colleagues (2002) argued that the nature of an individual's communicative ability comprises both simple and complex activities, which rely differentially upon the individual's context. She proposed a model of considering functional assessments of communicative activities and participation, which is outlined in Figure 1. Basically, assessments are classified on three levels depending on the complexity of the communicative activity and relevance to the individual (i.e. degree of context).

Table 1 Activities and interpersonal activities section of the ICIDH-2 adapted from Worrall et al., (2002)

Communication Activities	
Activities of understanding messages	Understanding spoken messages Understanding literal meaning of spoken messages Understanding implied meaning of spoken messages Understanding messages in formal sign language Understanding nonverbal messages Understanding written messages (reading) Other specified and unspecified activities of understanding messages
Activities of producing messages	Producing spoken messages (speaking) Producing spoken messages with literal meaning Producing spoken messages with implied meanings Producing messages in formal sign language Producing nonverbal messages Producing written messages (writing) Other specified and unspecified activities of producing messages
Conversation activities and use of communication devices and techniques	Conversation Initiating a conversation Maintaining a conversation Shaping and directing a conversation Terminating a conversation Conversational activities with many people Using communication devices and techniques

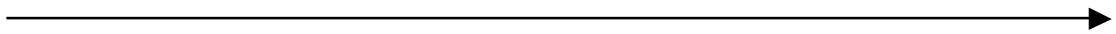
	Other specified and unspecified conversation activities and use of communication devices and techniques
Interpersonal activities	
General interpersonal activities	Basic interpersonal activities Showing respect and warmth Showing appreciation Showing tolerance in relationships Responding to criticisms Responding to social cues Using appropriate physical contact Complex interpersonal activities Maintaining social space Regulating emotions and impulses for interactions Regulating verbal aggression Regulating physical aggression Acting independently in social interactions Interacting appropriately to won social position Other specified and unspecified general interpersonal activities
Particular interpersonal activities	Initiating interaction Maintaining interactions Terminating interactions Engaging in physical intimacy Other specified particular interpersonal activities

Figure 1. Outline of Worrall and colleagues framework for categorising functional communication assessments within the WHO (1997) ICIDH-2 and where the DFCS may fit within the context of the model (adapted from Worrall et al., 2002).

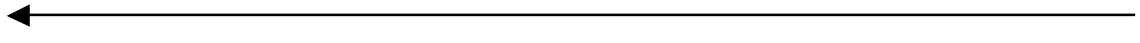
Degree of context of communication skills

Level 1	**Level 2**	**Level 3**
Generic Simple activities	Population-specific Activities	Individual Activities
e.g. Edinburgh Functional Communication Profile (Skinner, 1984)	e.g. Derby Functional Communication Scale	e.g. individualised assessment

Increasing task complexity



Frequency of communication task



The first level includes assessments of simple communicative activities, used in everyday life across various contexts. Secondly, population-specific assessments including simple and more complex activities relevant to that population, for example most measures are for English-speaking individuals in a community setting with an acquired communication disorder (e.g. aphasia). Finally, the third category of assessments include individualised assessments which focus on the communication needs of a particular client regardless of their age, gender etc. This is usually established with the individual and may include tasks that form part of their life, e.g. taking a telephone message if returning to work.

Of most relevance to clinical psychologists is to ascertain the impact of neurogenic communication problems at the activity limitation *and participation levels*. From a psychological point of view, these two levels are difficult to separate. For instance, mood disturbances commonly co-occur with acquired communication problems and may affect an individual's motivation to engage in communication activities. Alternatively the activity limitation imposed by the communication difficulties may contribute to feelings of loss and depression. The consideration of mood disturbance in relation to neurogenic communication disorders is important when considering

how best to assess functional communication. This issue is discussed below.

2.4 Existing measures of functional communication

Measures of functional communication in aphasia arose out of a rejection of formal testing procedures and emphasis on performance within natural contexts (Frattali, 1992). They are based on a more holistic view of communication and how this relates to the person's natural context. These measures are often based on diverse conceptualisations of 'communication' and have very different administration and scoring procedures that have both strengths and limitations (from too brief to too complicated). The move away from formalised procedures and emphasis on context means that functional communication measures often use innovative procedures for administration, including observation, informant ratings or role-playing (Holland, 1980). They also yield different information to formal procedures, such as overall ratings of efficiency or qualitative profiles.

So-called 'functional' or 'pragmatic' assessments differ from the traditional approach in several ways, namely their theoretical basis, testing environment, abilities assessed and administration procedures. Sarno (1965) introduced the concept of functional communication assessment and drew the distinction between formal

testing and natural contexts. Generally, the administration of these assessments is indirect or observational (relying on observation by the rater or interview with significant others). Manochioping et al., (1992) and Frattali (1992) have provided review of functional communication tools used in aphasia. Manochioping et al., (1992) outlined five forms of approach including observational profiles, observational efficiency measures, standardised procedures assessing hypothetical situations and questionnaire or survey methods. The main types of functional communication assessments are briefly reviewed below.

2.4.1 Observational profiles

Typically involve the observation of the patient in real-life interactions where an individual's responses and behaviours are described. Functional communication is judged according to whether appropriate communication is achieved via speech, non-verbal or paralinguistic behaviours (e.g. intonation). They often sample one or a limited set of situations. Measures in this category include the Edinburgh Functional Communication Profile (EFCP) (Skinner, Wirz & Thompson et al., 1984). These measures are based on observation of one conversation, and provide detailed information about how an individual interacts, initiates and maintains a conversation. However, they are considered to be subject to sampling error (Manochioping et al., 1992).

The EFCP is a structured observational measure, which relies on multiple raters to code effectiveness of different modes of communication (e.g. gesture, facial expressions, and writing, speech) in a variety of real-life contexts including greeting, requesting and problem-solving (Skinner et al., 1984). Whilst this measure has a strong basis in empirical research and theories of pragmatics, good content and face validity (Manochioping, et al., 1993), there is no reliability data for this measure.

Generally these measures provide valuable descriptions of the communication of individuals with acquired communication difficulties; by revealing verbal and non-verbal behaviours in a range of real-life situations and contexts. They are considered to be useful to intervention planning, when compared to more standardised or traditional assessment measures (Manochioping et al., 1992). However the reliability is not established and is suspected to be poor due to imprecise scoring guidelines and reliance on multiple raters.

2.4.2 Observational measures 2: Communicative efficiency measures

This form of functional assessment aims to rate overall communicative efficiency on the basis of the outcomes. These measures often require the observer to rate the individual's communicative effectiveness on a likert scale, regardless of the

specific skill they are using. These measures include the Functional communication profile (Sarno, 1965), which the rater evaluates the individual's efficiency on 45 language-based tasks, yielding a detailed qualitative profile for performance across different situations and the Communicative Effectiveness Index (CETI) (Lomas et al., 1989).

These measures are considered to be useful in gauging progress and measuring outcome for individuals with communicative difficulties, and thus useful for making management decisions about the patient (Manochioping et al., 1992). However, they do not allow the individual component skills to be identified, and have shown limited and varied levels of inter-rater reliability (Manochioping et al., 1992).

2.4.3 Standardised testing in real-life or simulated situations

This form of assessment requires the patient/individual to complete several simulated activities that represent communicative activities of daily living. The individual's performance is rated according to how successful their performance was in completing the task regardless of the strategy or skills used. Thus overall communication is based on a holistic communication model, whereby performance is not dependent on modality. Examples of this form of assessment include the Boston Diagnostic Aphasia Examination (BDAE) (Goodglass and Kaplan, 1983) and the Communicative

Abilities in Daily Living (CADL) (Holland, 1980). The mode of administration includes use of role-playing and props to capture interactive components of communication.

These measures have attempted to emulate the psychometric properties of formal or traditional measures and show satisfactory inter-rater reliability, and concurrent validity and with other functional communication measures. They are also considered to be the most rigorously standardised functional communication assessments (Manochioping et al., 1992). Clinically these measures are considered to be most useful as an adjunct to detailed language assessments and as treatment outcome evaluation tools (Manochioping et al., 1992). The BDAE is more suited to research purposes and diagnosis, as it is based on anatomical models of aphasia classification rather than functional communication.

The main limitations of these functional assessment tools are that they have been described as artificial, and fail to capture natural spontaneous communication (Frattali, 1992). Another limitation is that these measures require specialist skills and training and are time consuming to administer. For instance, the administration duration of the BDAE can be between 90-120 minutes, whilst that for the CADL is 30-90 minutes (Spreen & Strauss, 1998).

2.4.3 Questionnaires

This type of assessment comprise questionnaires, interviews with staff or carers, and direct observation. The core feature is that these assessments rely on the skills or observations from significant others who have the opportunity to communicate with the patient in their natural contexts (Manochioping et al., 1992). Furthermore, these measures are typically quick to administer and do not require specialist training, so can be completed by staff or carers (Frattali, 1992). One example is the Speech Questionnaire (Lincoln, 1982) which is designed to examine overall communicative effectiveness based on the report of the significant other or staff. There is little evidence on reliability and validity of these measures (Frattali, 1992; Manochioping, et al., 1992).

One major limitation of the current range of measures of functional communication in aphasia is that they often lack reliability and validity data which is partially due to a lack of a 'gold standard' with which new instruments can be compared against (Frattali, 1992). Worrall (2002) also notes that there is generally a paucity of the number of assessments for use in acute inpatient settings.

2.5 Depression in Stroke and Traumatic brain injury: prevalence, course and nature.

Estimates of the prevalence of Post stroke depression (PSD) vary due to methodological differences across studies and difficulties in diagnosis outlined above. Specifically, the use of diverse range of assessment tools means that researchers use different criteria for determining presence or absence of depression. Secondly, studies may assess depression at differing times post-injury. Thirdly, studies also sample different populations ranging from acute inpatient groups to those based in the community and use different inclusion and exclusion criteria (Turner-Stokes & Hassan, 2002). Robinson (2003) pooled existing literature to suggest that the frequency of major depressive disorder following stroke occurs in 19.3% of patients in acute hospital settings, and 18.5% will meet criteria for minor depressive disorder. Whereas in community settings major depressive disorder is estimated to occur in 14% of patients and minor depression prevalence was estimated at 9.1% (Robinson, 2003). Similarly, Turner-Stokes and Hassan, (2002) provided and estimate of between one third to one half of patients will be affected by PSD at some stage.

Longitudinal studies have investigated the natural course of PSD. Generally, PSD is at highest risk of developing in the first few months and up to 6 months, prevalence remains high (up to 31%)

(Astrom, Adolfsson and Asplund, 1993; Kauhanen, Korpelainen & Hiltunen et al., 2000). The prevalence reduces after six months to between 16% and 19% after the first and second year post-stroke respectively. This suggests that peak prevalence of PSD occurs in the acute stages (when patients are usually in hospital and/or returning home for the first time, which highlights the importance of mood assessment at this stage in hospital care.

The underlying cause of post-stroke depression (PSD) remains unknown (Turner-Stokes, 2003), however it is likely to represent the accumulation of several factors depending on the individual's neuropathology and context. Some authors argue that it may be a reaction to loss of physical health, social activities, and changes of role impacting upon personal relationships (Tanner, 1988; Turner-Stokes & Hassan, 2002). Others argue that PSD is the result of biochemical or structural changes in the brain following stroke (Robinson, 2003). Furthermore, studies have shown that principle factors underlying PSD vary depending on the time following the stroke (Astrom et al., 1993). Astrom (1993) found different factors to be predictive of PSD such that in the early stages following stroke communication impairment, left-hemisphere pathology, and reduced competence in activities of daily living (ADL's) were significantly associated with PSD. In contrast, after 12 months they found that limited social support was significantly predictive of PSD.

2.5.1 Depression following Traumatic Brain Injury

Evidence suggests that depression is commonly reported following TBI (Satz et al., 1998). Despite the methodological differences described above, prevalence estimates range from 26% (Jorge, Robinson & Arndt, 1993) to 50% (McKinlay, Brooks & Bond et al., 1981) among patients who suffered moderate and severe head injury. These mood disturbances have been found to occur within the first six months (Jorge et al., 1993) or even several decades following the injury, which suggests that brain injury may cause some vulnerability to mood disturbance (Koponen, Taiminen & Portin et al., 2002). As in the case of PSD, distinguishing the biological from psychological causes of depression is difficult. Silver, Yudofsky and Hales (1991) suggest that depression following TBI may be due to the individual's grief reaction to the symbolic loss of their 'former self'. They also suggested that individuals' coping strategies might not be accessible to them due the cognitive deficits sustained from their injuries (Silver et al., 1991). Furthermore neurophysiologic changes associated with TBI can affect the neurotransmitter systems that mediate mood and affect. To complicate the picture further, common physical complaints (sleep problems, fatigue) can occur in TBI patients without mood disorder (Silver et al., 1991; Jorge et al., 1993).

In keeping with the findings of research into the impact of post-stroke depression on outcome, there is some suggestion that mood and personality changes following the brain injury has a greater negative impact on patients' functional outcome than residual cognitive impairments (Lezak, 1987). Fann, Katon & Uomoto et al., (1995) assessed mood disturbances, cognitive functioning and global health outcomes in a group of TBI patients, and found that those who met criteria for mood disorders (anxiety and depression) showed greater functional impairment. Similarly, depression following TBI has been associated with exacerbation of cognitive complaints (Fann et al., 1995) and poor motivation to engage in rehabilitative strategies (Satz et al., 1998). Although there is an association between depression in TBI and its relationship to functional outcome, there is a paucity of research specifically investigating the relationship between functional communication and depression in TBI.

2.6. Depression following stroke and functional outcome

There is agreement in the literature that PSD is associated with poor functional outcome (Turner-Stokes & Hassan, 2002; Sinyor, Amato & Kaloupek et al., 1987). Sinyor, et al., (1986) assessed sixty-four stroke patients on a range of measures of depression, coping strategies, motor ability and capacity to live independently (functional outcomes). They found that patients with PSD had fewer

coping strategies and greater functional impairment at both admission and discharge when compared to the non-depressed group. In a similar study, Van de Weg, Kuik & Lankhorst (1999) found that those with depression had significantly lower scores on measures of their communication, mobility and self-care suggesting a relationship between functional communication ability and depression. Furthermore, evidence suggests that when correctly identified, the treatment of post-stroke depression results in improved functional outcome (Turner-Stokes & Hassan, 2002; Chemerinski, Robinson and Arndt, et al., 2001). This finding suggests that there is a link between PSD and functional communication ability. This is unsurprising, because generally speaking individuals with depression are typically less motivated to engage in rehabilitative strategies, which can affect overall recovery (Shill, 1979).

2.6.1 Depression and acquired communication impairment

Whilst there is a link between functional capacity and post-stroke depression, the link between functional communication and depression is not well researched or understood. This is because studies of mood often exclude participants with language impairments as validated assessments require adequate verbal communication skills (Sinyor et al., 1987; Ven de Weg et al., 1999; Lincoln and Sutcliffe, 2002; Turner-Stokes & Hassan, 2002).

Recently, alternative assessments have been developed to assess the presence of depressive symptomatology in individuals with significant communication impairments following stroke (Sutcliffe and Lincoln, 1998; Stern et al., 1997; Kontou, Lincoln & Walker, 2007). However, the reliability and validity of these measures is still being established (Sutcliffe & Lincoln, 1998; Turner-Stokes & Hassan, 2002).

From a psychological point of view, the higher incidence of PSD in individuals with more severely impaired communication may be expected, due to a greater degree of 'losses' for these patients. Tanner (1988) described the individual with acquired communication problems as experiencing many real and symbolic losses including isolation from loved ones, loss of meaningful communication, and loss of role and abilities, which elicit a grief response which can either resolve or be prolonged. When it is prolonged or severe it could be classified as post-stroke depression (Tanner, 1988).

This idea has been supported by a few studies that have related depressive symptomatology with communication difficulties (Robinson, et al., 1981; Astrom et al. 1993). Kauhanen and colleagues (2000) found that at 3 months post stroke 70% of patients with aphasia met criteria for depression (according to DSM-IIIR), and after 12 months this reduced to 62%. Although these

results are preliminary, these estimates are well above estimates of the prevalence of PSD in the general stroke populations. Additionally, Astrom et al., (1993) found that communication disorders in stroke (dysphasias) was an independent predictor of depressive symptomatology. Similarly, Kauhanen et al., (2000) studied communication disorders, cognitive functioning and mood of a group of stroke patients over one year. They found that in addition to cognitive impairment, the presence of communication impairments increased the risk of the individual being depressed. To date only a few studies have highlighted the link between depression and communicative difficulties. However it seems that the presence of communicative disorders may play a role in the incidence of depression in this population.

A recent study by Fucetola, Connor and Perry et al., (2006) attempted untangle the relationship between functional communication and PSD in a group of aphasic patients with left-hemisphere stroke. They used both functional and traditional measures of communication and also measures of neuropsychological functioning and mood. They found that the severity of depression (assessed using non-verbal measure VAMS) was predictive of poor functional communication ability assessed using the Communicative Activity of Daily Living scale (Holland, 1980).

In conclusion, depression and communicative difficulties often co-occur following stroke and TBI. Research from stroke patients suggests that patients with acquired communication difficulties (identified using both functional and neuropsychological measures) are equally as prone, if not at greater risk, of developing depressive symptomtatology. Furthermore, the times when stroke patients are most likely to experience mood disturbance after 6-12 months post injury (Astrom et al., 1999) when they are likely to be in acute or inpatient care, where staff may be planning rehabilitation interventions. The presence of depression has been shown to adversely affect engagement in rehabilitation programmes overall functional outcome (Shill, 1979). This highlights the need to consider the assessment of the co-occurrence of depression and communication

Appendix 3

Additional Information regarding the Methods and Procedures used in the study

3.1 Recruitment

Before the study commenced, the clinical teams including medical staff, nursing staff and allied health professionals met with the research team. They were given an information pack containing an abbreviated copy of the study proposal, copies of all the measures used in the study, inclusion and exclusion criteria and a flowchart to aid their decision-making in the referral process. The staff team were given the opportunity to ask questions about the study on these occasions. With regard to the extent of training provided to staff about the measures used in this study, it is important to note that not all staff members who completed the measures were present at the introductory session described above. However when the researcher approached individual staff to complete the measures they were explained in detail. The researcher was present when they completed the measures, so staff had the opportunity to ask questions or clarify any uncertainties immediately.

Patients were recruited from the acute stroke ward and neurological rehabilitation wards at Derbyshire Royal Infirmary and Derby City General Hospital respectively. Potential patients were identified by the Speech and Language Therapist based on the wards and referred

to the researchers. The Speech and Language Therapists (SaLT) were given guidance on the inclusion and exclusion criteria of the study, which was also discussed in detail with the researchers. The SaLT obtained verbal consent to be approached by the researcher to provide information about the study.

Patients were included if they experienced an acquired difficulty with communication identified by the Speech and Language Therapist (SaLT). This was based on clinical judgement, derived from a combination of formal measures and qualitative observations of the patient's communicative ability. Patients were excluded if they had significant visual and/or auditory impairments that prohibited them from completing the assessments. The researchers relied on patient self-report and medical notes to ascertain the presence of sensory or auditory impairments. Patients were also excluded if it was documented in their medical notes that they had a diagnosis of dementia.

Once the potential participant had been introduced to the researcher, informed consent was sought through the provision of verbal and written information about the study. Written consent and assent forms were based on Trust guidelines and approved by the local ethics board. Potential participants were given the chance to discuss the study and ask any questions. Communication aids (such as

drawings, simplified written information, and communication charts) were used to facilitate the participants' understanding of the study. The potential participant was approached following a 24-hour 'cooling off' period, in which they were given the opportunity to consider their participation. If they were still willing to take part, informed consent was obtained. If the individual was unable to adequately demonstrate their understanding of the study or provide clear evidence of agreeing to provide consent, a significant other (family or friend) was consulted and assent was obtained on their behalf. Patients indicated their consent by completing consent forms before beginning the assessments. Similarly, if informed consent was not obtained, the patient's family or carer completed a written form indicating their assent for the individual to take part in the study.

3.2 *Measures*

3.2.1 Derby Functional Communication Scale (DFCS)

The DFCS is a scale that was recently developed for use by non-speech and language and allied health staff. The scale was devised to provide a brief, repeatable measure of a patient's functional communication ability in the hospital environment. It is observational measure, and therefore does not place ay burden on the patient to complete. The rater is required to state how often they have communicated with the person in the past week, by choosing from 3 options (Most days, several times of one or twice). It is considered

functional because it asks the rater to evaluate the individual's effectiveness at achieving ward-based activities that depend on expression, understanding and interaction. It relies on day-to-day interaction between staff and patients in the hospital setting, and provides concrete examples of situations to aid decision-making process.

Functional communication ability is assessed by rating the individual's recent communicative behaviour on three scales: Expression (E), Understanding (U) and Interaction (I). This structure was selected to simplify the three important aspects of communication, and was based on the structure of the Glasgow Coma Scale (GCS). The GCS is a widely used measure that comprises three scales (Eye-opening, Verbal response, Motor response), which yield a single score on each ordinal scale (Teasdale & Jennett, 1974). The basic structure was employed as most staff were considered to be familiar with this measure.

Table 3.1 Subscales and items of the Derby Functional Communication Scale

	Expressing (E)	**Understanding (U)**	**Interaction (I)**
0	Unable to express needs and does not attempt to attract attention.	Little or no evidence of understanding. (Blank facial expression, no or inappropriate response)	Little or no interaction. (Does not respond to a greeting, may laugh or smile inappropriately.)
1	Unable to express needs, but shows evidence of intention to communicate.	Some evidence of understanding that someone is trying to communicate something, but cannot understand even simple yes/no choices.	Shows awareness of others, through eye contact and posture, but no ability to interact specifically (e.g., through a greeting).
2	Uses non-verbal communication (e.g., gesture, pointing, facial expression) and/or sounds to express a basic need (e.g., for the toilet). Yes/no responses are unreliable.	Understands some simple choices with non-verbal support (e.g., showing a cup, pointing to tea/coffee), but cannot understand words or symbols.	Responds to greetings and to social signals conveyed by facial expression (e.g., smiles and frowns). Can interact with one person, but it is poorly sustained.
3	Yes and no responses are reliable. Can express the concept of an action or object (e.g., 'book', 'eat', 'chair').	Understands simple yes/no expressions and may understand some simple concrete words or symbols.	Can interact with one person consistently using words and/or non-verbal communication.
4	Expresses simple ideas non-verbally or in short spoken / written phrases (e.g., can ask for a book to be put on a chair)	Understands simple ideas conveyed either with single words or short phrases or non-verbally.	Can interact with two people consistently and participates appropriately.
5	Expresses more complex ideas using verbal phrases but not fully intelligible without non-verbal communication. (e.g., can ask to be given a drink later)	Understands ideas that can only be fully expressed in words.	Can interact with several people but requires support to participate effectively.
6	Expresses abstract ideas that require words. (e.g., 'my father is disappointed') May lose fluency when anxious, tired etc..	Understands more complex conversation (series of sentences) when paying attention fully, but may lose the thread at times.	Interacts independently with any number of people, but poorly sustained and may have some difficulties (e.g., with turn taking).
7	Can express subtle nuances in language (e.g., humour) but with some loss of fluency.	Fully understands complex communications, but with occasional difficulties.	Can sustain interactions with any number of people with only slight difficulties.
8	No detectable problems.	No detectable problems.	No problems in social interactions.
	Enter the number from the list above that describes this person's current level of **expression** most accurately: E =	Enter the number from the list above that describes this person's current level of **understanding** most accurately: U =	Enter the number from the list above that describes this person's current level of **interaction** most accurately: I =

Each scale (E, U and I) consists of eight statements with a corresponding score (range 0-8, where 0=unable to express needs, no evidence of understanding, or no interaction for the E, U and I scales respectively. In the middle ranges, such as a score of 4 corresponds to statements that highlight a person's skills and impairments using concrete examples. For instance, a score of 4 corresponds to the statement ' expresses simple ideas non-verbally or in short spoken or written phrases e.g can ask for a book to be put on a chair'. At the highest end of the scales, a score of 8 corresponds to 'no detectable problems' on all three scales. Thus
the DFCS yields scores corresponding to E, U and I subscales. The developers of the DFCS devised the measure to be rated by an individual health care professional, or for the entire clinical team to rate the individual. See Appendix 1.

3.2.2 Direct Self-report and observation measures

Visual Analogue Mood Scales Revised (Kontou, Lincoln & Walker, 2007) (Unpublished)

The Visual Analog Mood Scales (VAMS) (Stern, 1996) is a self-report measure designed to assess mood states in individuals with communication problems. The measure consists of scales using schematic faces depicting mood states. The patient is asked to rate their mood by placing a mark on a continuous line between two faces (one is neutral, the other face is depicting a mood). The VAMS was

designed to assess intensity of individuals' internal mood states when they are unable to complete more demanding or language based instruments. In normal healthy volunteers, with or without verbal labels, it shows high content validity, suggesting that the schematic faces are reliable representations of mood (Stern, 1997; Kontou, Lincoln & Walker 2007).

The VAMS has been shown to have good to excellent validity and accounts for variance in depressive mood states when compared with more language based assessments in normal participants (Stern, 1997). Furthermore, this measure has been shown to have excellent convergent and discriminant validity when compared to a similar visual analogue mood measures when used to assess mood in stroke and other neurologically impaired patients (Arruda, Stern, Somerville et al., 1997).

Bennett, Thomas and Austen et al., (2006) conducted a validation study of several measures designed to assess mood in stroke including the VAMS, using both healthy and stroke populations. They found that internal consistency of the VAMS was reduced when the 'energetic' and ''happy' subscales were removed from analysis. The authors found that participants in their study failed to notice that the scales were reversed. Furthermore, some authors have also suggested that stroke patients have some difficulties using analogue

scales (Price, Curless & Rodgers, 1999). Bennett et al., (2006) suggested that the format of the scales in the VAMS be modified to address these problems. The revised version of the VAMS (VAMS-R) devised by Kontou, Lincoln and Walker (2007) consists of all 8 scales, however, the direction of the 'energetic' and 'happy' scales were reversed to avoid confusion between 'positive' and 'negative' mood states (personal communication). It has been validated for use with healthy older adults, correlates significantly with anxiety and depression scales of an established measure of mood (HADS), and had greater internal consistency than the original VAMS (Kontou, Lincoln & Walker, 2007).

3.2.3 Frenchay Aphasia Screening Test (FAST)

The FAST is a brief direct assessment of four aspects of an individual's communication skills; comprehension, expression, reading and writing (Enderby & Crow, 1996; Enderby, Wood, Wade, 1986). This measure was designed to determine the presence of communication difficulties (or dysphasia) in individuals shortly following (in days or weeks) a stroke accident within an inpatient setting. The test consists of five simple language tasks; sentence comprehension; object naming, reading and writing. Scores across all tasks are added to yield a total score. The presence or absence of dysphasia is established through the use of a cut-off score, which is stratified for age.

The FAST is among the most widely used and thoroughly validated aphasia screening tools (Salter, Jutai & Foley et al, 2006 for review). In addition, this measure has also been shown to have high inter-rater reliability to be useful as a measure change over time (Salter et al., 2006). It has been shown to correlate significantly with more detailed and established aphasia and functional communication assessments reflecting high concurrent validity (Enderby & Crow, 1996). The use of the cut-off score for classifying aphasia (dysphasia) has been found to show high sensitivity (87%) compared to similar measures (Salter et al., 2006). In contrast, however the specificity of the FAST (for correctly classifying poor performance as due to aphasia) is low (80%) (Salter, et al., 2006) and is adversely affected by the presence of sensory or cognitive deficits associated with stroke (Enderby et al., 1987).

3.2.4 *Observational Measures*

Stroke Aphasic Depression Questionnaire Community (SADQ) (Sutcliffe & Lincoln, 1998).

The SADQ is a 10-item scale, designed to assess the frequency of behaviours that may be associated with depression in individuals with functional communication difficulties following stroke or neurological impairment. It is based on observations of the individual such that the rater indicates how often the individual has shown these behaviours on a 4-point scale (Often, Sometimes, Rarely, or Never).

It yields a totals score between 0-30, with the higher score corresponding to greater depressed mood.

The original version of the SADQ was developed by identifying observable behaviours associated with depressed mood and also included items from existing mood measures (Sutcliffe & Lincoln, 1998). However, the original version was revised to improve the validity. A study researching the validity of the 10-item version of the SADQ conducted with older adults living in the community following stroke found that participants scores on the SADQ10 correlated significantly with two other depression measures (the Hospital Anxiety and Depression Scale – HADS) and the Wakefield Self-Assessment of Depression Inventory – WDI), which are relevant to patients in a hospital setting, and those who suffered stroke (Sutcliffe & Lincoln, 1998). In the same study, factor analysis confirmed the construct validity of this measure, and that negative mood accounted for 23% of the variance in the scores on the SADQ10.

A second study by the same authors examined the reliability of the 10-item measure in a group of aphasic patients living in the community who had experienced a stroke over 1 year prior to the study. This version, SADQ10-Community was found to have satisfactory test-retest reliability over a 4-week period, however this

was based on a small sample size (Sutcliffe & Lincoln, 1998). A further study investigating the validity of the SADQ–Community found this measure to be useful in identifying depressed mood in individuals with communication impairments (Leeds, Meara & Hobson, 2004). They also demonstrated that this measure has good internal reliability, and adequate sensitivity and specificity in the detection of depression (Leeds, et al., 2004). However, the SADQ only showed a weak correlation with a self-report measure of depression (Geriatric Depression Scale). The authors interpreted this result to mean that this measures was only suitable for use with individuals with significant communication difficulties. This measure was selected because this study was part of a multi-centre study. As part of this study protocol it was anticipated that at 3-month follow-up individuals may be discharged and living in the community.

3.2.5 Speech Questionnaire (SQ) (Lincoln, 1982)

The SQ is a 19-item rating scale of functional speech, which can be administered by any staff member in contact with aphasic patients or by relatives. It consists of two scales: Speech (S) and Understanding (U), which yield two scores that indicate the severity of the deficit. The SQ has been shown to have high inter-rater reliability, and test-retest reliability over a four-week period (Lincoln, 1982).

3.2.6 Edinburgh Functional Communication Profile (Skinner, Wirz & Thompson et al., 1984)

The EFCP is a measure that focuses on the pragmatic aspects of a person's communicative behaviour through direct observation and input from staff or relatives to establish efficiency of an individual's functional communication. Raters code behaviours including speech, gesture, writing, and facial expression in real-life contexts and communicative intentions such as greeting, acknowledging, requesting. Effectiveness is judged based not only on speech but the use of other modalities (e.g. gesture) to achieve the intention of the communication e.g. pointing to a cup to ask for a drink. It also yields a total 'communicative effectiveness score'.

The EFCP was devised using theoretically defined functions of language and language coding systems, which give it high face and content validity (Manochioping, Sheard & Reed 1992). However, there is no reliability and validity data available. There are some limitations of this measure, firstly that it provides imprecise scoring guidelines, requires experience, and has no known norms (Manochioping, et al., 1992).

3.2.7 Global rating of level of communicative ability from Speech and Language Therapist (SaLT)

The SaLT who identified the patient was asked to rate the patient's overall communicative impairment, based on their experience with the patient. The raters were asked to assign the patient to a category of communicative ability that correspond to the following percentage of impairment (Mild – 0-24% highest ability, Moderate – 25-49%, Severe-50-75% and Very Severe –76-100% of lowest ability).

3.3 Assessment Procedure

All assessments were completed on the same day that informed consent or assent was obtained and all assessments took place on the ward setting. In the rare instance that the assessment occurred at a time when the SaLT staff were not available to complete their ratings, these were completed as soon as practically possible (usually within three days of the assessment). Measures assessing the patient's communicative ability and mood were completed through direct assessment of the individual (by the researchers). In addition, observational measures of the patients' communicative ability and mood were completed by the SaLT staff, other ward staff that had regular contact with the patient. The measures are described in more detail below and represented in the table 3.0.

Each assessment session involved consisted of four components in the following order:

3.3.1. Direct assessment of mood and communication: Following consent, a conversation with the patient was conducted to allow them the opportunity to ask the researcher any further questions, and to also develop rapport. During this time, the researcher was also making observations in order to complete the EFCP. Direct assessment was then commenced. This assessment included the administration of the VAMS-R, the FAST by the researchers. The VAMS was administered first to develop rapport and was considered to be less challenging than the language based assessment (FAST). These were completed with the patient at the bedside on the ward, and where possible involved the use of patients table. If further observations were necessary to complete the EFCP, further observations of the patient (approximately 45 mins) were conducted in order to complete the EFCP.

3.3.2. Staff ratings of the patients' communication ability and mood: Members of the multidisciplinary team included nursing staff, allied health (e.g. Occupational Therapy, physiotherapy), and health care assistants. Research indicates that it is often these members of hospital staff who have the most day-to-day contact with patients in a hospital setting (McCooey, et al., 2000). Therefore it was anticipated that they would provide useful observations of the

person's functional communication skills. The team on the ward at the time of the assessment were approached and informed of the patient's involvement in the study. Those who were identified as having regular contact with staff were approached. A brief discussion of the patient's communication skills was conducted with the staff member. Where not enough information was obtained from observation to complete the EFCP, the staff members were asked specific questions relating to the strategies the individual used to communicate effectively on the ward. This contributed to the EFCP. The staff were then asked to complete the observational communication and mood assessments (the DFCS, Speech Questionnaire, and the SADQ10) with the researcher.

3.3.3 Observational Ratings of communication ability completed by the SaLT from the clinical team: The SaLT who initially assessed and referred the patient to the study completed the Derby Functional Communication Scale and rated the individual's overall communicative ability on the Likert Scale.

In order to avoid the researchers ratings of the patient's communicative ability being influenced by the other ratings, members of the research team were blind to the results of the other component assessments. Furthermore, the researchers did not have access to the initial admission assessment completed by the SaLT. Researchers

did not open data until the assessment cycle was completed for each patient. Staff and family were asked to make the judgements independently, based on their own experience of the patient.

Appendix 4

Additional Background Information on Statistical Analysis and Results

4.1 Normality

Tests were conducted to assess whether the data was distributed normally (see Table 1 for results). Using the Kolmogorov-Smirnov test, all but one variable had non-significant results, suggesting that the scores on the Speech Questionnaire (Speech subtest) violated the assumptions of normality. Using the Shapiro-Wilk test, all but four variables (SaLT global ratings, Speech and Understanding scales of Speech Questionnaire, VAMS-R confused scores) had non-significant results. The scores on these four scales were therefore not normally distributed.

The shapes of the distributions of scores for each measure were explored using skewness and kurtosis values (see Table 2). Skewness refers to how symmetrical the data around the mean (Field, 2005). The values that failed tests of normality on the Shapiro-Wilk analysis (both scales of the Speech Questionnaire, the VAMS-R confused score, and the SaLT rating of global communicative ability) these values were examined in more detail. Tabachnick and Fiddell (1996) state that Values of 2 standard errors of skewness or more indicate that the data is significantly skewed. Scores on the SaLT interaction were highly negatively skewed, whilst those on the

VAMS-R confused scale were highly positively skewed. Scores on the remaining measures were not significantly skewed using this analysis.

Kurtosis refers to the 'peakedness' of the distribution of scores, or whether it is too tall or too flat relative to the normal distribution (Field, 2005; Pallant, 2005). Scores are either clustered too high in the centre or flattened out across the range of scores. Normal distributions produce a kurtosis statistic of approximately zero. A positive value indicates the possibility of a distribution that is too tall and a negative value indicates the possibility of a distribution that is too flat when compared to the normal distribution.

Table 1 Results of tests of normality for all measures

	Kolmogorov-Smirnov			Shapiro-Wilk		
	Value	df	p	Value	df	p
DFCS (E) SaLT	.22	15	.06	.92	15	.2
DFCS (U) (SALT)	.14	15	.2	.95	15	.44
DFCS (I) SaLT	.17	15	.2	.91	15	.13
DFCS Total SaLT	.15	15	.2	.96	15	.76
DFCS (E) Staff	.19	12	.2	.89	12	.06
DFCS (U) Staff	.2	12	.2	.92	12	.3
DFCS (I) Staff	.19	12	.2	.89	12	.11
DFCS Total Staff	.2	12	.2	.91	12	.22
SaLT Total Rating	.22	14	.08	.86	14	p<.05*
FAST	.14	16	.2	.92	16	.14
SQ-(S)	.24	12	p<.05*	.86	12	<.05*
SQ (U)	.24	12	.06	.83	12	p<.05*
VAMS-R Raw Afraid	.18	15	.2	.92	1	.19
VAMS-R Raw confused	.20	15	.1	.82	15	p<.05*
VAMS-R Raw sad	.2	15	.11	.93	15	.32
VAMS-R Raw angry	.17	15	.2	.91	15	.13
VAMS-R Raw energetic	.12	15	.2	.91	15	.13
VAMS-R Raw tired	.18	15	.2	.92	15	.2
VAMS-R Raw happy	.17	8	.2	.93	8	.54
VAMS-R Raw tense	.22	8	.2	.9	8	.26
SADQ Staff	.14	12	.2	.94	12	.46

Df = degrees of freedom, p = significance level, SaLT = Speech and Language Therapist, DFCS = Derby Functional Communication Scale,
E = DFCS Expression subscale, U = DFCS Understanding subscale, I = DFCS Interaction Subscale
FAST = Frenchay Aphasia Screening Test
VAMS-R Raw = Visual Analogue Mood Scale – Revised Version Raw score
p < .05 = distribution of data differed significantly from normal distribution

With the exception of scores on the Confused and Afraid scales of the VAMS-R, scores on the DFCS SaLT interaction subscale, and the Understanding scale on the Speech Questionnaire, all kurtosis statistics were negative, suggesting that the distribution of scores on most measures were flat in comparison to normal distribution. Values of 2 standard errors of kurtosis or more (regardless of sign) are though to differ significantly from the normal distribution (Tabachnick & Fiddell, 1996). Using this rule, it is evident that the scores on the Confused scale of the VAMS-R were significantly peaked relative to the normal distribution. However the rest of the scores were not found to be significantly kurtotic, the consistently negative values suggest that the data was fairly flat in its distribution.

4.2 Choice of Non-parametric analysis

Spearman's Rank Order Correlation coefficient examines the strength of the relationship between two continuous variables. It is the non-parametric equivalent of Pearson's Product Moment co-efficient (Pallant, 2005). The use of non-parametric technique was considered to be more appropriate as some of the data failed tests of normality, and showed evidence of skewness and kurtosis.

The sample was small, and due to some missing data, in some instances the analysis was limited to below ten participants. In multiple regression, Cohen (1992) states that at least ten participants

for each factor is required for multiple regression to be a valid form of analysis. Given the small sample size falls well below this value, a multiple regression analysis was not possible.

4.3 Determining the presence or absence of low mood using the VAMS-R and the SADQ

The analysis of the number of participants identified to be experiencing mood difficulties was analysed in several ways. Leeds et al., (2004) suggest a cut-off score of 14 for the SADQ to classify people as either experiencing probable low mood or not. This cut-off score had sensitivity of 70% for identifying individuals with mood disorders, and 77% specificity for identifying individuals classified on the Geriatric Depression Scale as depressed (Leeds et al., 2004). Using this method, none of the participants were identified as experiencing symptoms of low mood.

Table 2. Skewness and kurtosis values for scores on measures used in the study

	Skewness		Kurtosis	
	Statistic	S. Error	Statistic	S. Error
DFCS (E) SaLT	-.08	.58	-1.11	1.1
DFCS (U) SaLT	-.03	.58	-1	1.1
DFCS (I) SaLT	-1.07	.58	1.18	1.12
DFCS Total SaLT	-.2	.58	-.93	1.12
DFCS (E) Staff	.32	.64	-1.4	1.23
DFCS (U) Staff	-.21	.64	-1.29	1.23
DFCS (I) Staff	.66	.64	-.53	1.23
DFCS Total Staff	.20	.64	-1.44	1.23
SaLT Rating	-.38	.6	-.95	1.2
FAST	-.16	.56	-1.55	1.09
SQ Speech	-.74	.64	-.97	1.23
SQ Understanding	-.92	.64	.59	1.23
EFCP	-.20	.56	-.97	1.1
VAMS-R Raw Score - Afraid	-.03	.58	-.95	1.12
VAMS-R Raw Score – confused	1.5	.58	2.52	1.12
VAMS-R Raw Score – sad	.38	.58	-.98	1.12
VAMS-R Raw Score – angry	.43	.58	-.94	1.12
VAMS-R Raw Score – energetic	-.25	.58	-1.4	1.12
VAMS-R Raw Score – tired	-.33	.58	-.92	1.12
VAMS-R Raw Score – happy	-.06	.75	-1.67	1.48
VAMS-R Raw Score – tense	.44	.75	-1.26	1.48
SADQ Staff	-.59	.64	.16	1.23

S.Error = Standard Error
SaLT = Speech and Language Therapist,
DFCS = Derby Functional Communication Scale,
E=Expression subscale, U=Understanding subscale, I=Interaction Subscale
FAST = Frenchay Aphasia Screening Test
SQ = Speech Questionnaire (S= Speech subscale, U = Understanding subscale)
EFCP = Edinburgh Functional Communication Profile
VAMS-R Raw = Visual Analogue Mood Scale–Revised Version Raw score
$p < .05$ = distribution of data differed significantly from normal distribution.
SADQ = Stroke Aphasic Depression Questionnaire (Community version).

Stern (1997) recommended the use a cut-off of 50 for raw scores on the VAMS Sad scale. In a psychiatric population 86% of individuals scoring above 50 have been diagnosed with depression following further mood assessment (Stern, 1997). Using this method, 2 (13%) of participants scored above this cut-off, suggesting they were more likely to be experiencing probable low mood.

Alternatively Stern (1997) also recommended the analysis of T-scores to identify individuals who may be candidates for further mood assessment. Three categories: 'within normal limits', 'borderline' and 'abnormal' levels of reported mood provide an indication of severity of mood state. On this basis, 8 (53%) participants scored within normal limits on the Sad scale, 4 (27%) scored within the borderline range, and 3 (20%) scored within the 'abnormal range' on this scale.

4.4 Internal Consistency

Cronbach's alpha is the most commonly used measures of internal consistency or the degree to which the subscales on a scale are measuring the same construct. Field (2005) states that this value should be greater than .7. In this case the values for both staff and SALT raters for the DFCS subscales were well above this value, indicating that the DFCS subscales have high internal consistency.

4.5 Validity of the DFCS for Measuring Specific Communication skills

In order to assess whether the DFCS was sensitive to specific communication skills Spearman's rho Correlations were calculated between subtest scores on the direct assessment (FAST) to and individual DFCS subscales (see Table 3). SaLT ratings of Expression and Understanding subscales were strongly and positively correlated with all subtest scores and were all statistically significant. Similarly all SaLT ratings on the Interaction subscale showed strong positive correlations with FAST subtest scores and were all statistically significant, with the exception of the writing subtest.

Staff ratings on the Expression subscale showed strong and positive correlations with the Expression and Reading subtests of the FAST, which were statistically significant. Ratings of the Understanding subscale by staff showed no significant correlation with FAST subtest scores. With the exception of the writing subtest, the staff ratings of the interaction subscale showed strong, positive correlations with all subtests of the FAST, which were statistically significant.

4.6 Divergent Validity of the DFCS

Total DFCS scores (both staff and SaLT) and DFCS subscales scores Expression, Understanding, Interaction for both Staff and SaLT raters showed no significant correlation with participant age suggesting that there is no relationship between these variables.

Relationship between Functional Communication skills and scores on the DFCS and the VAMS-R and SADQ: Correlations between and DFCS. No correlation between individual mood measures (VAMS-R and SAD-Q).

Table 3. *Correlations between DFCS subscales and specific language skills obtained through direct assessment*

		FAST score							
DFCS Sub-scale Score	Rater	Comprehension		Expression		Reading		Writing	
		r_s	p	r_s	p	r_s	p	r_s	p
E	SaLT	.74**	<.01	.80**	<.01	.82**	<.01	.82**	<.01
	Staff	.35	.26	.83**	<.01	.66*	<.05	.47	.12
U	SaLT	.82**	<.01	.64*	<.05	.88**	<.01	.53*	<.05
	Staff	.05	.87	.35	.26	.46	.11	.37	.23
I	SaLT	.75**	<.01	.54*	<.05	.81**	<.01	.49	.06
	Staff	.515	.87	.7*	<.05	.82**	<.01	.58*	<.05
Total	SaLT	.84**	<.01	.72**	<.01	.91**	<.01	.6*	<.05
	Staff	.36	.24	.66*	<.05	.76*	<.05	.57*	<.05

r_s =Spearman's Rank Order Correlation coefficient ,
p = Probability,
Correlation significant to the 5% level*,
**Correlation to the 1% level,
DFCS = Derby Functional Communication Scale,
E= Expression subscale of DFCS,
U = Understanding subscale,
I = Interaction subscale

4.7 Correlations with the DFCS and measures of mood

Spearman's Rank Order Correlation coefficients were calculated between the DFCS and VAMS-R raw scores, as well as the sum of Sad and Angry scales. Fucetola et al., (2006) used this index as

these two scales both show high correlations with measures of depression (Arruda et al., 1999).

Many of the correlations between the VAMS-R, SADQ and the DFCS failed to reach statistical significance, However, two significant correlations were noted. A strong positive correlation was found between staff ratings on the Expression subscale on the DFCS that was statistically significant. A moderate positive relationship was found between the Interaction subscale of the DFCS and the VAMS-R tired scale, which was statistically significant. It is possible that with a high number of correlations calculated, with a probability value set to 5%, it would be expected that several significant results were due to chance.

Examination of the strength of the insignificant correlations found moderate relationships between DFCS total score (rated by SaLT) and the VAMS-R Sad scale (r_s = .47, p > .05), VAMS-R angry (r_s = .38, p > .05) and the 'Depression scale' (VAMS-R Sad + Angry) (rs= .44, p>.05), but these failed to reach statistical significance.

Similarly, when the (albeit insignificant) correlations relationships between DFCS subscale scores are considered with the VAMS-R scores, moderately strong positive relationships were found between SaLT ratings of all subscales (Expression, Understanding and

Interaction) on the VAMS-R angry scale (r_s = .47-.49, p>.05). A moderate positive relationship was found between the Depression scale and the Expression subscale rated by the SaLT (r_s =.5, p=.07). A moderate negative relationship was found between VAMS-R happy and the Expression subscale of DFCS (rated by SaLT) and weak negative correlations were found between this scale and Understanding and Interaction subscales.

It is possible that these correlations failed to reach statistical significance due to the limited size of the sample. Future research may replicate statistically significant the relationships identified here.

4.8 Discrepancy between SaLT and non-SaLT DFCS scores

Inspection of the median values of the total DFCS scores presented in table 2 shows that median DFCS total score rated by SaLT was 6 points higher than the median of total scores for DFCS when rated by staff. Taken at face value this difference is considerable and may have important clinical implications.

Speculatively this suggests that there is a considerable discrepancy in judgements of communicative competence made by SaLT when compared with staff. The direction of this discrepancy suggests that when compared to ratings made by non-SaLT staff, SaLTs tend to rate patients as being more competent. Given that we found a higher

degree of correlation between SaLts ratings and existing measures of communication, and lesser degree of correlation between ratings of staff. That is, the SaLT ratings appear to be a more valid assessment of the individuals' communicative competence. This discrepancy is consistent with previously noted observations that staff underestimate aphasic individual's communicative ability competence. This issue has been discussed in depth by Kagan (1995).

The noted discrepancy raises interesting issues relating to clinical practice. However, it is not possible to determine whether this difference is statistically significant due to the limited amount of data collected and the distribution of these scores was skewed. Also the range of scores on the DFCS rated by the SaLT and staff largely overlap. These questions could potentially be explored by analysing whether the differences between DFCS total scores and subscale scores are statistically significant in a larger sample of scores.

APPENDIX 5 Extended Discussion

The following section contains additional discussion of the conclusions drawn from the study. Consideration of the ethical issues and methodological limitations of the study is provided. The findings of the study are considered in their application to clinical psychology practice with patients with acquired communication impairments. Finally, future research questions that have emerged from the current study are presented.

5.1 Validity of the DFCS as a measure of Functional Communication

The current study indicates that the DFCS showed good internal consistency and reliability across assessors for all but one subscale (understanding). The strong relationships found between existing measures of communication, both direct and informant based, are encouraging, and provide preliminary evidence that the DFCS will be a valuable assessment tool for multidisciplinary use within an inpatient setting.

Total scores on the DFCS completed by raters from both staff groups correlated with either all or some of the established measures of communicative ability used in the study. When completed by SaLT, all DFCS subscales correlated highly with a direct formal assessment of verbally based communication skills (FAST) and an observational

measure of functional communication (completed by researchers). When completed by staff, the DFCS correlated with both direct assessment of communication skills (FAST) and an observational measure of speech (Speech Questionnaire) (completed by staff). Taken together these results indicate that there is generally consensus among raters of individuals' communicative competence when observable communicative skills (such as spoken verbal language and social communication) are being assessed. However, this is not the case when less readily observed skills (comprehension or understanding) are being assessed.

The DFCS correlated significantly with all individual skills directly assessed on the FAST (with the exception of comprehension when rated by staff). This suggests that the subscales of the DFCS are tapping highly interrelated communicative skills. The finding that the DFCS is tapping the most if not all abilities as the FAST suggests that on the whole the DFCS subscales do not reliably discriminate between specific language-based skills of expression, understanding, reading or writing.

Some relationships between specific skills and DFCS scores were noted. The reading performance skill correlated most highly with individual DFCS scores and total scores, suggesting some relationship between perceived communicative competences and reading skills.

One possible explanation for this finding is that aphasic individuals with better reading skills may demonstrate better comprehension, in order to compensate for spoken language difficulties. Ward-based tasks and some communication aids provided by SaLT rely on individuals reading skills; such as selecting meals using the hospital order form or using writing or word charts to convey meaning were often used by some patients to aid their communication. Use of these strategies likely affects observers judgments of their overall communicative skills.

5.2 Interaction

The apparent overlap between observer ratings of the interaction component with other communicative skills that were directly assessed supports this notion, that communicative skills are closely related to abilities to interact, and play a role in social participation.

Byng, Pound and Parr (2000) have explored the definition of functional communication, and the psychosocial context of aphasia. They have criticised the 'task-based' definitions of functional communication, in which goals of rehabilitation aim towards achieving tasks that allow the individual to convey a message (e.g. compensatory strategies, such as writing or signing). They point out that this is an oversimplification of what it means for an individual to 'function'. Specifically that this approach to assessment fails to

account for the functions that individuals' communication skills play in their sense of identity their relationships with others. For example, they outline the typical example of a man who lost several roles in his family and professional life (as a story teller, and facilitator of discussions) due to his communication difficulties and felt that although he had reached goals in therapy felt that he had 'lost his personality'.

The person with acquired communication disorder has undergone a tremendous change to their life: both in terms of their sense of identity and communication skills (Byng et al., 2000). It is unrealistic to expect that they are going to return to their premorbid state. The sudden change in communication skills changes the individual's capacity to interact with others and complete their activities of daily living. Similarly, with new experiences of reduced communication skills and poor health (even if short-term) are likely to impact upon their employment status and roles within their family. These ultimately alter individuals' self-concepts, self-esteem and sense of identity. Role changes influence individuals' relationships with significant others. Individuals with acquired communication difficulties often report a sense of loss of autonomy and greater dependence on others (Le Dorze et al., 1994).

Characterising the changes in identity has been difficult, as patients often show a poor awareness of what caused their communication difficulties as well as may have limited expressive capacities to describe their emotional and identity (Byng et al.,2000). However qualitative studies with aphasic patients have indicated that these patients report being in a process of adjusting or developing a new sense of self and their relationships with others due to enforced changes (Brumfitt, 1993).

On this basis Byng et al., (2000) recognises that the location of the impact of acquired communication impairments to be distributed across the sufferer and systems of people around them. This recognises the impact on the individual, but also on the family and carers, and their interactions. They propose a definition of functional communication that includes the individuals' ability to communicate competently, through their own and the communication skills of others (Byng et al., 2000). This is a central tenet of definition of functional communication within the framework for WHO's ICIDH-2 (Worrall et al., 2002). Participation refers to the individual's level of involvement in 'life situations', or the degree to which the individual can take part in their usual activities such as going to work, socialising or leisure activities (Hirsch & Holland, 2000).

Summary

So in summary, the findings suggest that the DFCS is a valid measure of observable communication skills with high internal consistency and high inter-rater reliability for subscales describing observable communicative behaviours. When the relationship between DFCS scores and specific communication skills was examined, the strong association with all specific skills suggest that it does not discriminate between components of communication skills. Although the strongest relationship between reading skills and DFCS scores was noted, perhaps suggesting that compensatory strategies are considered by the DFCS, where verbal language is affected.

The evidence strongly supports the use of a total score on the DFCS as a valid way of quantifying overall communicative effectiveness. This is in keeping with the definition of functional communication established by ASHA and other prominent authors in this area. The idea of overall 'effectiveness' of communication reflects the more holistic approach to understanding and assessing communication skills. In this view functional communication is defined as the ability to receive or convey a message within natural contexts regardless of the strategy used and is consistent with Sarno's (1983) description of 'global communication effectiveness' as the sum of skills used to achieve a goal. This fits with approaches to the assessment of

functional communication, which yield an overall score of communicative effectiveness (such as the EFCP).

The finding that the Interaction subscale of the DFCS correlated strongly with other measures of communication (directly assessed or observed) supports the view that communication skills are important to social interaction and relationships. These ideas are more in keeping with a more functional view of communication, which emphasises communication within the person's natural context rather than traditional skill-based conceptions.

There are some remaining questions about the validity of the DFCS as an assessment of communicative ability in the context of the definition of 'functional communication'. In this view functional communicative ability is a very broad term encompassing the diverse range of skills with which individuals can draw on to convey and receive information. The communication assessments used in this study were limited as they only assessed certain aspects of communication. Amongst the measures, the FAST and SQ place an emphasis on verbal aspects of communication particularly spoken language. The FAST provides a brief measure of verbal or linguistic abilities (Enderby & Crow, 1996). Similarly, the Speech Questionnaire focuses on the individual's observable spoken behaviours within their natural context.

Whilst the EFCP does consider non-verbal aspects of communication, (gesture, facial expression and voice intonation), it is not possible to obtain an estimate of non-verbal communicative ability using this measure as this tool yields a combined overall score. Therefore it is difficult to evaluate the validity of the DFCS as an assessment of non-verbal communicative ability, in relation to other measures. This reflects a more general problem, in that there are few, if any, standardised measures of nonverbal communication skills for use in clinical practice (Bull, 2001).

So in conclusion, the study provides the first empirical evidence that the DFCS is a valid, non-invasive brief assessment tool that allows an overall rating of a person's general communicative ability in their natural context (in this case the ward environment). This study has shown that there is generally consensus between multidisciplinary professionals regarding an individual's overall communicative competence. It was also shown the DFCS has high agreement with existing measures of communicative skills. The DFCS is therefore well placed to measure observable, verbally based communicative behaviours.

The conceptual basis of the DFCS fits within the broad definition of functional communication as it considers the interpersonal nature of communication and the context in which it takes place. By asking

staff to rate communication in the ward environment is focussed on how the individual uses their communicative skills to meet their everyday needs, without the need to simulate artificial situations. It also includes examples of communication that involve other modalities, (e.g. through compensatory strategies) like non-verbal communication, gesture, pointing, or facial expression).

Some questions have been raised by this study regarding the validity of the DFCS. Firstly, further investigation is necessary to identify the type of communication skills that the DFCS is and is not assessing. Secondly, the apparent discrepancy in judgments made by SaLT and non-SALT staff regarding the individuals understanding, raises questions about different staff group's ability to accurately gauge an individuals comprehension skills. This is discussed in detail below.

5.3 Poor agreement between SaLT and non-SaLT staff on patients Understanding

The results of the study consistently identified differences between SaLT and non-SALT staff's ratings of patient's comprehension or understanding. That is, poor and insignificant inter-rater agreement was found between staff ratings and SaLT ratings on the Understanding subscale of the DFCS. Furthermore, ratings by SaLT and non-SALT staff on DFCS Understanding subscales showed a differential relationship to the other communication measures. The

SaLT ratings of understanding correlated with direct assessment (FAST) and the EFCT, whilst the staff's ratings on this subscale correlated with an observational measure (SQ). So there was consistency in the staff ratings on the understanding subscale of the DFCS and the other staff rated questionnaire. However, what is clear is that the staff groups, SaLT and non-SaLT's judgements about patient's understanding abilities were not related.

There are several possible reasons for this lack of consistency between staff and SaLT ratings. As discussed above, the expressive and interactive subscales refer to directly observable communicative behaviours, whereas the Understanding subscale requires the rater to make a judgement about the patient's level of comprehension.

Estimating a patient's level understanding is perhaps more difficult than rating expression and interaction. This may be because expressive and social interaction skills are more readily observable, whist comprehension is less so. Several studies have found evidence suggesting that nursing and medical staff (McClennan, Johnston & Densham, 1992) as well as significant others have difficulty accurately estimated aphasic individuals level of communicative competence. Kagan (1995, 2001) refers to 'masked competence' of aphasic individuals in hospital settings. She states that many staff are unaware of aphasic individuals communicative competence and

may avoid contact with those who have severe impairments (Kagan, 1995).

Staff patient interactions and different roles

Staff's perceptions of patients understanding may differ due to differences in expertise and roles within the multi-disciplinary team. By virtue of their training and their role within the team in aphasia care, SaLT's conduct individual assessments of patients' communicative ability and plan interventions to facilitate their rehabilitation. Accordingly they have more access to information regarding the patient's competence. It is possible then that the SALT has a more accurate estimate of the individual's competence, through direct assessment or through structured interactions that reveal difficulties in comprehension.

Furthermore, observational studies of patient-staff interactions within rehabilitation and inpatient settings have found that staff have a limited amount of conversation with patients (Ashworth et al 1980; McCooey et al., (2000). Pound & Ebrahim (2000) conducted a qualitative observational study examining the communication patterns between multidisciplinary professionals, nursing staff and patients across different inpatient settings including a stroke unit, an elderly care unit and a general medical ward. Within the stroke unit studied, staff patient interaction was largely 'standardised and

functional'. In contrast, interactions on the elderly patient ward were attentive and tailored to individual needs. They propose that the former approach provides little opportunity for interaction with the staff on a personal level or promote rehabilitation (i.e. through encouraging the patient to become more independent). This may explain why non-SaLT staff's ratings of understanding did not correlate with those of other staff in the current study. That is, non SaLT staff who typically interact in a standardised and practical way may not fully gauge the level of the patient's understanding, whereas SaLT who by the nature of their role need to develop a relationship to accurately assess understanding. It may be that SaLT and staff were basing judgments of patients understanding on different features or types of interactions. Staff judgments were probably heavily based on the patients expressive abilities and other behaviour on the ward.

One further contributory factor is that the content of the Understanding subscale on the DFCS may not provide adequate concrete examples where understanding can reliably be assessed.

5.4 Issues relating to the assessment of mood in patients with acquired communication problems faced in this study: measurement

Problems inherent diagnosing low mood in those with communication impairments is an important issue for consideration here. We have shown that the number of individuals identified to be showing signs of

depressed mood vary depending on the measure being implemented. Estimates based on an observational measure of somatic and behavioural depressive symptomatology (SADQ), using a cut-off score with reasonable sensitivity and specificity (Leeds et al.,) failed to identify anybody with depressive symptomatology. In contrast a self-report measure yielded two different rates (cut-off scores for raw scores and T-scores) identified 13% and 53% of the sample showing possible indications of low mood respectively.

The numbers of individuals identified with mood disturbance using the different measures were conflicting and should be interpreted with caution. However we should consider the reasons for discrepant results. One possible explanation is the use of different informant and assessment formats (i.e. self-report vs. observer rating scales). Studies investigating the congruence between patients and staff's appraisal of depressive symptomatology have shown conflicting results. One study reported no significant difference between staff ratings on a Depressive symptom checklist in stroke patients (Caplan, 1983). In contrast a study of hospital inpatients showed little agreement on staff and patients ratings of internal mood state, however, staff tended to overestimate their level of mood disturbance (Klinedinst, Clark, & Blanton et al., 2007). Klinedinst et al., (2007) point out that evidence supporting the congruence between staff raters on internal mood states is equivocal. Furthermore, the validity

of relying on somatic complaints in elderly or stroke population has been criticised, as they are often higher in this population when compared to the general population (Gordon, Hibbard, Egelko et al., 1991).

Both the VAMS and the SADQ have not been identified as assessments for the diagnosis of depressive symptomatology per se. Rather their purpose is screening, to identify the need to conduct further psychological assessment of mood (Stern, 1997). There are some limitations to using these methods. The SADQ has shown weak correlation with other measures of depression, and some authors have suggested that it may assess mood disturbances associated with stroke (such as frustration, emotional lability) rather than depression (Leeds et al., 2004). Visual Analogue scales such as the VAMS and VAMS-R have some limitations in their use for the identification of depression in aphasia following stroke (Arruda et al., 1999; Price, Curless and Rogers, 1999). One criticism of these scales are that they only assess one aspect of depressive symptomatology (i.e. mood disturbance) and exclude physical, behavioural and cognitive symptoms (Townend et al., 2007). Also, they require verbal instructions for their administration, which limits their use for people with significant comprehension difficulties (Stern et al., 1997; Townend et al. 2007). Furthermore, studies that have attempted to

use non-verbal instructions in aphasic individuals have showed limited success (Gainotti, Azzoni & Gasparini et al., 1997).
Others question the validity of the use of analogue scales as a direct assessments of mood in some populations (including stroke) (House, Dennis & Hawton et al., 1989; Price, Curless and Rodgers, 1999). The task of rating one's internal state on a visual representation has been criticised by some researchers and thought to be too difficult for some patient groups. Price et al., (1999) showed that stroke patients were less able to use visual analogue scales accurately in gauging subjective physical sensations. Difficulties were commonly associated with loss of higher cortical function and higher sensitivity of the scale (i.e. greater number of options e.g. 1-100). They concluded that in the absence of gold standard to ensure the validity of measures in addition to this finding, subjective internal states cannot reliably or objectively be measured using visual analogue scales (such as the VAMS).

5.5 Selection Bias of Sample: Severity of Depressive Symptoms

The failure to identify individuals using an observer-rating scale suggesting that despite a higher rate of reported low mood, fewer people showed other somatic signs associated with depression. This may mean that the current study sample did not include individuals with severe levels of depressive symptomatology.

One reason for this outcome may be the process of recruitment and the referring clinician's decision-making process. Both Severe depression and severe communication difficulties can impact upon patient's motivation to interact with others, and staff's motivation to engage in communication with patients (Kagan, 1995; McCooey et al., 2000). As well as selecting individuals with milder communication difficulties, it is possible that clinicians selected individuals who appeared motivated or whom they felt were not distressed and would be able to cope with participating in the study.

The findings of this study highlighted difficulties in accurately determining depression and the inclusion of individuals with severe depression and/or communication impairments. These problems extend to this research area in general. Townend, Brady and McLaughlan (2007) conducted a systematic review of sixty studies that identified depression in aphasic individuals following stroke using a range of diagnostic tools including structured clinical interviews, observer rated scales and questionnaires. They found that the main method of screening for a possible diagnosis of depression was clinical interviews (80%), or a combination of clinical interviews and questionnaires, and 65% used observational rating scales. Seventy two percent of studies used a version of diagnostic criteria to establish the presence of depression, whilst the remaining 28% used

cut-off scores on observational rating scales similar to those used in the current study.

Townend and colleagues discussed the main problems in this area of research. They described a lack of consensus over the diagnostic definition of depression following stroke (Townend et al., 2007). They also noted that well validated direct assessments of depression designed for use in the healthy populations rely on language, which makes these measures invalid in the aphasic population. Several examples of modified versions exist, which rely on observation of staff or carers, modified questions or responses (e.g. response cards) and visual analogue mood scales (Stern, 1997). Validation of these measures is difficult because there is no established 'gold standard' tool for testing these tools against (Townend, Brady & McLaughlan, 2007).

To date, researchers have often excluded those with severe aphasia from research studies validating assessment tools for a number of reasons. Whereas in the past individuals with communication impairments were often excluded from research in this area (Sutcliffe & Lincoln, 1998), Townend and colleagues (2007) found that 63% of studies included individuals with 'limited' or 'mild aphasia', whereas only 37% of studies included aphasic individuals classified as 'unlimited aphasia' which included individuals with more severe

communication impairments. They concluded that whilst there is some improvement in inclusion rates for people with severe communication deficits, the majority of studies face difficulties in including individuals with severe aphasia.

There continues to be some issues in conducting research with these patients. Firstly diagnosis of language and other cognitive impairments is more difficult. Secondly, it is difficult to determine informed consent in this population Carrlson, Paterson and Scott-Findley (2007) point out that in order to obtain informed consent, some assessment of the individual's cognitive capacity to give that consent is necessary, which poses a ethical dilemma for the researcher as to whether they are proceeding with an assessment without full consent. This has been borne out in the literature looking at studies validating more direct assessments in people with severe communication difficulties, as they often faced poor completion rates (Townend et al., 2007), for a number of reasons including difficulties gaining informed consent and participants with severe communication problems often had difficulties understanding instructions for measures (Gainotti, Azzoni, Gasparini et al., 1997). In contrast those studies using informant rated observational measures reported greater completion rates or rates of participation.

5.6 Competence and Informed consent issues relevant to working with individuals with Acquired Communication Disorders

Two issues, capacity and informed consent are pertinent to the area of research with people with acquired communication impairments. Meaningful consent requires that the patient is given sufficient understandable information to make a valid choice (Jimison, Sher and Appleyard et al., 1998). However, for people to take a decision they need capacity to do so. Capacity to give informed consent to take part in research has four dimensions as outlined by Grisso and Appelbaum (1995). These include; understanding of information provided by the researcher; an appreciation of risks, reasoning ability to weigh up consequences of taking part and the ability to express choice (Grisso & Appelbaum, 1995).

The law relating to determining capacity in healthcare was recently revised in the form of the Mental Capacity Act (2005). The Act provides a legal framework for clinicians to judge decision-making on behalf of adults who may lack the capacity to make decisions. Major conceptual changes made to the Act are the assumption that all adults have capacity unless there is evidence to prove that this is not the case. Secondly, the capacity to give consent is determined as specific to the decision at a particular time (HMSO, 2005). The definition of capacity used in this framework incorporates the concepts outlined by Grisso & Appelbaum (1995). That is, people lack the capacity to make a decision for themselves if they are unable to understand the information relevant to the decision, to retain that

information (as long as is necessary to make a decision), to use the information to make a decision or to communicate their decision. In the case of communication it may not necessarily be verbal communication.

Within the NHS, there is no single standard for determining decision-making capacity in individuals with cognitive impairment. Although no specific assessment tools are listed in guidance on the Mental Capacity Act (British Psychological Society, 2006) to determine capacity, Professional practice guidelines recommend a functional approach to assessment that integrates a wide range of information from medical or other records, interviews with patients, structured functional assessments and/or standardised cognitive assessments. This approach aims to establish the individual's abilities i.e. what the person is able to know, understand and do that is relevant to the particular context of the decision (British Psychological Society, 2006). Secondly whether the person's abilities are sufficient for the person to make the informed decision at hand. This conceptualises capacity as an interaction between an individual's abilities and a situation. It also considers capacity is specific to time and situation (BPS, 2006). In the case of research recruitment when and individuals' capacity may be unclear (such as a person with acquired communication difficulties), the guidelines recommend assessment of abilities. They also recommend the researcher to consult with

someone who may be able to 'appreciate the person's reaction' (BPS, 2006 pp. 133) in order to judge whether the individual is able to give informed consent.

In terms of the processes for determining capacity, there are some assessment tools devised for this purpose (Appelbaum & Grisso, 2001; Miller, O' Donnell, Searight et al., 1996). However Palmer, Dunn & Appelbaum (2005) point out that these tools tend to assess individual components of capacity, such as comprehension skills. The authors state that a complete tool for assessing capacity does not yet exist. Recently, researchers have attempted to determine the characteristics of clinical groups that most likely to lead to impaired capacity (Palmer, et al., 2005;Carlsson et al., 2007). Research on assessing capacity has been undertaken in elderly, schizophrenic (Palmer et al., 2008) with a view developing population-specific assessments and procedures to facilitate informed consent.

Complicated problems exist in assessing capacity to give informed consent for clinical populations who may have cognitive and/or communication impairments. Several authors have considered the issues in informed consent with individuals with acquired communication difficulties. Inevitably the reliance of existing procedures on verbal communication may mean that the individual has to use their limited skills, which can be taxing for an individual

early after stroke and cause fatigue (Carlsson et al., 2007). The presence of cognitive and communication impairments, in the early stages following admission to hospital are distressing. When approached by a researcher, there is a risk the individual will be distressed by having to communicate unknown member of staff who does not know their communication strengths and deficits (Carlsson et al., 2007). Acquired communication deficits may mean that patients are unable to understand the written and verbal explanations of the research procedures they are consenting to (Philpin, Jordan and Warring, 2005). Also, Carrlson, Paterson and Scott-Findlay (2007) point out that other cognitive impairments linked to stroke and TBI such as concentration and recall problems often coincide with acquired communication problems. Their concern is that an individual with these difficulties may sign a consent form and then be unable to recall doing so at a later time.

Some authors have made suggestions how to overcome methodological and ethical issues in research with clinical populations. In order to assess capacity, assessments of cognitive abilities and communication, have been recommended including the Mini-Mental State Examination (Folstein, Folstein & McHugh 1975) as well as standard comprehension tests. Other standardised measures of competence have also been devised, for example the MacCarthur

Competence Assessment Tool for Clinical Research (MacCat-CR) (Appelbaum & Grisso, 2001).

In order to facilitate understanding and expression in gaining informed consent, Carlson et al., (2007) recommend having a member of research team spend time discussing the information. They state that ideally, the person should have experience of using communication aids and structuring conversation to aid understanding. To aid comprehension of written and verbal materials, other researchers have suggested adapted materials e.g. use of computerised assessments (Jimison et al., 1998). To aid expression the use of augmented communication aids have been recommended (Carlson et al., 2007). One example is the use of 'talking mats' whereby familiar phrases and questions are presented in a grid and the person points to these during conversation. In order to minimise the effects of fatigue on patients and to make information more accessible, Miller and Willner (1974; cited Jimison, et al.,1998) recommend the consent process be completed in stages, with a two-part consent form. Similarly, others recommend shorter duration of time spent discussing the study with the patients.

The role of gaining assent from the patient's family or carer has also been discussed. Inevitably the carer is involved at some level in the process, at least when research is conducted in the early stages of

acquired disability, when patients are at their most affected. The advantages and disadvantages of this method have been discussed in detail (Lewis & Porter, 2004). Seeking assent from a carer or family member side steps the issues presented by obtaining direct confirmation of capacity and fully informed consent. It raises equally challenging issues for the clinician or researcher as the needs and wishes of the patient and their carer may be very different. These recommendations may be useful to improve sample rates and informed consent in future research involving people with acquired communication impairments.

5.7 Other Limitations of the study: lack of power

The issue of power has been considered. The current study was potentially underpowered for several reasons. Despite efforts of the researchers to recruit as many participants as possible, the intended sample size (40) was not obtained. In addition to the small sample size, the measures used may also undermine the power of the study. Some of the measures used in this study had no reliability data (such as the Edinburgh Functional Communication Profile) or had been validated using small sample sizes (Stroke Aphasic Depression Questionnaire - Community), thus have limited reliability. Barker, Bausell & Li (2002) suggest that using measures with high reliability and sensitivity to change can increase effect size. Therefore using measures with limited reliability or unknown levels of sensitivity and

reliability may compromise power. The reported results may be questionable and the potential for Type I and Type II errors is high.

5.8 Clinical Implications

The results are initially promising, that DFCS correlates significantly with existing measures of communicative ability and expert ratings. In cases of mild communication problems and milder (or absence) of mood disturbance this measure is a valid way of assessing communicative ability in hospital and rehabilitation environment. It allows clinical non-specialist staff to gauge overall communicative effectiveness. Unlike traditional skill-based assessments, the DFCS is an observational measure it does not have practice effect. The limitations of the measure are that the DFCS does not allow individual profile of strengths and weaknesses. Furthermore, it raised the issue of lack of consistency in gauging individuals understanding.

The DFCS can be used by nurses and therefore able to be used by clinical psychologists in a hospital or rehabilitation setting. This may provide information about the individual's capacity to communicate in their environment, and in their interactions with others. The capacity for interaction with others is crucial to a sense of identity and social participation. Low scores on interaction may be an indicator of an individual who for various reasons, (e.g. low mood, expressive communication difficulties or fatigue) is at risk of social isolation.

As clinical psychologists often do not have the time to observe patients to gain detailed information about their level of communication, this brief observational measure completed by staff who have day-to-day contact with patients would be useful for considering several treatment issues. Information regarding patients' ability to communicate with others is relevant to clinical psychologists in a number of ways.

Having an overall estimate of a person's communicative ability may assist in adapting interventions to individuals' competence level. Considering Byng and colleagues (2000) emphasis on the patients' interaction with others and their skills in communicating, as well as McCooey (2000) acknowledgment of contextual barriers, poor ratings of interaction may suggest more systemic issues in the aphasic patients communication difficulties. It may also provide an initial indicator of instances where staff-patient interaction may be hindered, for a number reasons including communication problems, low mood or cognitive impairment. However, further assessment of these issues would be necessary.

The findings from this study highlight the need to clarify non-SALT staff's definition of understanding. As it was highlighted in this study that without direct knowledge of an individual's comprehension it is

difficult for general staff to gauge an aphasic individual's level of understanding accurately. A potential role for clinical psychologists working in neuro-rehabilitation setting is the education of staff about how to structure communication to reveal patients comprehension skills.

Kagan (2001) emphasises the importance of staff's accurate perceptions of aphasic individuals level of competence in determining quality of life and participation within the WHO ICIDH-2 framework. This can impact upon their care, rehabilitation and quality of life in several ways. Kagan (2001) and colleagues point out that particularly when people experience severe communication impairment, staff are less likely to engage them in communication (Kagan, 1995; McCooey et al, 2000). Kagan suggests that this 'lack of knowledge and awareness' can present a significant barrier to life participation when considering patient care in within the social participation framework advocated by the ICIDH-2 (WHO, 1997).

Researchers have suggested interventions to improve patient-staff communication, considering effective communication as key to improving quality of life by increasing social participation (Kagan, Black, Duchan et al., 2001). Glenwright, Davidson & Hilton, (1999) describe a case study in which SaLT staff conducted training with staff to modify their communication style to aid an aphasic patient's

comprehension with positive benefits to staff-patient communication. Kagan and colleagues (2001) have developed interventions to improve aphasic patients communication based on the idea that masked communicative competence can be uncovered skills used by a conversation partner. Through collaborative conversation, individuals build on their compensatory strategies and improve their communication skills.

Supported Conversation for Adults with Aphasia (SCA) is a generic training package for 'communication partners' (staff or carers) of aphasic patients (Kagan, et al., 2001). The intervention aims to teach partners to use non-verbal techniques (gesture, writing key words and drawing) during conversations with aphasic patients to meet three constant goals. These are to firstly ensure the patient understands what is being communicated, secondly to ensure they have the chance to express themselves, and lastly to check out the perspective of the patient (Kagan et al., 2001). They found promising results from an initial trial of SCA when compared to an untrained group, who spent an equal amount of time with aphasic patients. Those who received training were significantly better at demonstrating the competence of their aphasic partner when compared when rated by an independent observer. Importantly, the patients demonstrated significant increases on measures of participation in conversation (Kagan et al., 2001).

These results suggest that training staff on techniques to facilitate effective social interaction with aphasic patients has a measurable impact on the patients observable levels of competence is promising, and emphasises the rehabilitative value of social interaction and communication. Training also allows the individual to demonstrate their existing skills. With these findings in mind, it may be helpful to provide more detailed training about using conversational skill to gauge a patient's level of comprehension. Also if the DFCS or other functional communication tools are to be used by non-specialist staff, it is important to spend time training staff about the DFCS and how to facilitate effective communication with aphasic individuals.

Whilst the intended purpose of the DFCS is to identify individuals with communication problems the role of clinical psychologist in this instance could be to use this initial info from the DFCS to highlight individuals who may require further direct assessment of the cognitive impairment and communication strategies. An individualised assessment would be helpful to provide feedback and some education for staff about the individual's communication style. Furthermore, collaboration with multidisciplinary staff with expertise in this area is also important.

With regard to the important issue of identifying depression in individuals with acquired communication problems, the study has highlighted some important clinical implications within the responsibilities of the clinical psychologist. In keeping with previous literature the current study encountered similar problems faced by most researchers and clinicians. Namely it was apparent that the use of different measures produced variable number of individuals at risk of experiencing low mood. The lack of reliability and validity for these measures underline the clinician's necessary caution in using these measures as stand alone instruments. Townend and colleagues (2007) make several recommendations for clinical practice in the identification of depression in aphasic individuals, which are consistent with the outcomes of the current study. They recommend that when investigating the possibility of depression in individuals with communication impairments that the clinician use of multiple informants and measures. It also recommends that during assessment of mood collaboration with speech and language therapists who have skills in the accurate assessment and supporting effective communication in aphasic individuals (Townend et al., 2007).

5.9 *Future Research*

Further verification and exploration of the psychometric properties of the DFCS are necessary as the current study was based on a small

sample of patients. Confirmation of the validity of the DFCS in a larger sample of individuals with acquired communication difficulties is recommended. It would be useful to investigate whether the level of impairment impacts upon the validity of the DFCS. That is whether it is more suited to individuals with severe or milder communication impairments. The current study sampled a group with mixed aetiologies, so it is unclear whether the validity of the DFCS is better or poorer within one type of clinical groups. For instance it may be more useful in detecting acquired functional impairments associated with stroke rather than TBI. Further research could also address whether the individual subscale scales on the DFCS correspond to particular types of acquired communication difficulties, e.g. fluent vs. non-fluent aphasia.

Inter-rater reliability between SaLT and non-SaLT staff was evaluated in this study, however further investigation of inter-rater reliability is necessary. In order to assess the inter-reliability of the DFCS Staff and non-SaLT scores were correlated. Ratings completed by SaLT and non-SaLT staff for total DFCS and the expression and interaction subscales scores were significantly correlated, suggesting a degree of inter-rater reliability. Although promising, these results should be interpreted cautiously for a number of reasons. SaLT raters were those with clinical responsibility to the patient, whilst the non-SaLT raters were drawn from the rest of the multidisciplinary team. This

means that non-staff raters could have been from a nursing or allied health background (e.g. Occupational Therapy, Physiotherapy). Regardless of individual differences between raters within the groups, the non-SaLT group was more heterogenous. This is because raters from different professional backgrounds were likely to have varied to a greater degree than SaLT raters on factors such as level of education, amount of time spent with the patient, role and responsibilities. As such, there would be greater degree of variance in these scores on all measures completed by non-SaLT because of the greater heterogeneity within this group.

It is evident that SaLT and non-SALT staff had high agreement on observable communication skills, but poor reliability on less readily observable comprehension skills. Further development of this subscale is required to improve its reliability. This could possibly be achieved by using more concrete examples of comprehension within the scale. Alternatively strategies that target non-SaLT staff's perceptions and understanding of patients' comprehension abilities may be necessary. For instance greater level of staff training about the meaning of each of the scales of the DFCS and how to rate the DFCS may also address this issue of poor agreement on this subscale.

Poor agreement highlighted the issue that there may be diverse perceptions of an individual's competence held by the staff groups involved in their care. Further exploration of the inter-rater reliability of the DFCS completed by carers and non-medical staff, would be useful. It is possible that carers or family may have better ability to gauge patients' interaction or understanding abilities. A related issue for further exploration is how staff and/or family raters find the DFCS to use. This could be evaluated by feedback from raters about the layout, readability and comprehensibility of the measure. This feedback could be used to develop a more accessible measure with greater inter-rater reliability.

Test-retest reliability of the DFCS was not addressed in the current study. It was not possible to determine how reliable or stable the assessment of communicative competence provided by the DFCS is over time with the limited amount of data that was collected for this study. Furthermore, test-retest reliability provides some indication of how sensitive the measure is to changes over time. In this population it could be that poor test-retest reliability reflects sensitivity to changes in communicative competence over time, which may be due to spontaneous recovery of function following traumatic brain injury or stroke. Therefore future research into the DFCS should aim to determine whether how reliable assessment of functional communication using DFCS is over time, or alternatively, how

sensitive the DFCS is at detecting changes in communicative competence over time.

This would be particularly useful as the DFCS is an observational measure. An advantage of an observational measure is that there are no practice effects, because they do not involve direct patient assessment.

The study highlighted the problems in assessing depressive symptoms in individuals with acquired communication impairments. Although it was evident that the DFCS was not sensitive to low mood assessed on a self-report measure, this question requires further exploration. Future research should investigate the relationship between depression and DFCS scores in individuals with more severe depression. This may further elucidate the relationship between depression symptoms and individual subscale scales on the DFCS.

References

Appelbaum, P. S., and Grisso, T. (2001). *MacCAT-CR: MacArthur Competence Assessment Tool for Clinical Research.* Sarasota: Professional Resource Press.

Ashworth, P. (1984). Communicating in an intensive care unit. In A. Faulkner (Ed). *Recent Advances in Nursing: Communication*. Edinburgh: Churchill Livingstone. (pp.94-112).

American Speech-Language-Hearing Association (ASHA). (1990) *Functional Communication Measures Project: advisory report*. Rockville: ASHA.

Astrom, M., Adolfsson, R., Asplund, K. (1993). Major depression in stroke patients: a 3-year longitudinal study. *Stroke, 24,* 976-82.

Arruda, J. E., Stern, R. A., Somerville, J. A. (1999). Measurement of mood states in stroke patients: validation of the Visual Analog Mood Scales. *Archives of Physical Medicine and Rehabilitation, 80,* 676-680.

Barker-Bausell, R. and Li, Y. (2002). *Power analysis for experimental research: A practical guide for the biological, medical and social sciences.* Cambridge, UK; Cambridge.

Beaumont, J. G., Keannearly, P. M., and Rogers, M. J. (1999). *The Blackwell dictionary of neuropsychology.* Massachussetts, USA: Blackwell.

Bennett H.E., Thomas S.A., Austen R., Morris A. M. S, Lincoln NB. (2006). Validation of screening measures for assessing mood in stroke patients. *British Journal of Clinical Psychology*, *45*, 367–376.

British Psychological Society, Professional Practice Board Assessment of Capacity Guidelines Group. (2006). *Assessment of Capacity in Adults: Interim Guidance for Psychologists.* Leicester; The British Psychological Society.

Brumfitt, S. (1993). Losing your sense of self: what aphasia can do. *Clinical Forum in Aphasiology, 7*(6), 569-91.

Bull, P. (2001). State of the art: nonverbal communication. *The Psychologist, 14*,644-647.

Burvill, P. W., Johnson, G. A., Jamrozik, K. D., Anderson, C. S., Stewart-Wynne, E. G., and Chakera, T. M. (1995a). Anxiety disorders after stroke: results from the Perth Community Stroke Study. *British Journal of Psychiatry, 166*, 328-332.

Burvill, P. W., Johnson, G. A., Jamrozik, K. D., Anderson, C. S., Stewart-Wynne, E. G., and Chakera, T. M. (1995b). Prevalence of depression after stroke: results from the Perth Community Stroke Study. *British Journal of Psychiatry, 166*, 328-332.

Byng, S., Pound, C., and Parr, S. (2000). Living with aphasia: a framework for therapy interventions. In I. Papathanasiou (Ed). Acquired neurogenic communication disorders: A clinical perspective. (pp. 49-75). London: Whurr publishers.

Carlsson, E., Paterson, B. L., Scott-Findlay, S., Ehnfors, M. and Ehrenberg, A. (2007). Methodological issues in interviews involving people with communication impairments after acquired brain damage. *Qualitative Health Research, 17*(10) 1361-1371.

Chemerenski, E., Robinson, R. G., Arndt, S., and Kosier, J. T. (2001). The effect of remission of post-stroke depression on activities of daily living in a double-blind randomised treatment study. *The Journal of Nervous and Mental Disease, 189*, 421-425.

Code, C. (1987). *Language, aphasia and right hemisphere.* New York, USA: Wiley.

Cohen, J. (1992). A power primer. *Psychological Bulletin*, 112 (1), 155-159.

Department of Health, (2005). *Reducing brain damage: faster access to better stroke care.* London, UK: The Stationary Office.

Department of Health (2001). *Seeking consent: working with older people*. London, HMSO.

Enderby, P. and Crow, E. (1996). Frenchay Aphasia Screening Test: validity and comparability. *Disability and Rehabilitation, 18,* 238-240.

Enderby, P., Wood, V. Wade, D. (1986). *Frenchay Aphasia Screening Test: Test Manual*. Windsor, UK.: NFER-Nelson.

Enderby, P. M., Wood, V. A., Wade, D. T., Langton Hewer, R. (1987). The Frenchay Aphasia Screening Test: A short, simple test for

aphasia appropriate for non-specialists. *International Journal of Rehabilitation Medicine, 8,* 166-170.

Ekman, P., and Frieson, W. V. (1986). A new pan-cultural facial expression of emotion. *Motivation and Emotion, 10, 159*-168.

Fann, J. R., Katon, W. J., Uomoto, J. M. and Esselman, P. C. (1995). Psychiatric disorders and functional disability in outpatients with traumatic brain injuries. *American Journal of Psychiatry, 152*, 1493-199.

Feyereisen, P. and Seron, X. (1982). Nonverbal communication and aphasia: a review. *Brain and Language, 16,* 213-236.

Field, A. (2005). *Discovering statistics using SPSS, Second Edition.* London: Sage.

Folstein, M. F., Folstein, S. E., & McHugh, P. R. (1975). 'Mini-mental state'. A practical method for grading cognitive state of patients for the clinician. *Journal of Psychiatric Research, 12*, 189-198.

Frattali, C. M. (1992). Functional assessment of communication: merging public policy with clinical views. *Aphasiology, 6*(1), 63-83.

Fridlund, A. J. (1997). The new ethology of facial expressions. In J. A. Russell and J. M. Fernandez-Dols (Eds). *The psychology of facial expression* (pp. 103-129). New York, USA: Cambridge University Press.

Fucetola, R., Tabor Connor, L., Perry, J., and Leo, P. (2006). Aphasia severity, semantics and depression predict functional communication in acquired aphasia. *Aphasiology, 20*(5), 449-461.

Gainotti, G., Azzoni, A., Gasparini, F., Marra, C., Razzano, C. (1997). Relation of lesion location to verbal and nonverbal measures in stroke patients. *Stroke, 28*, 2145-2149.

Glenwright, S. Davidson, A., & Hilton, R. (1999). Communication training and aphasia: a case study. *International Journal of Therapy and Rehabilitation, 6*(9), 340-435

Goodglass, H. and Wingfield, A. (1998). The changing relationship between anatomic and cognitive explanation in the neuropsychology of language. *Journal of Psycholinguistic Research, 27*(2), 147-165.

Goodglass, H and Kaplan, E. (1983). Boston Diagnostic Aphasia Examination. Philadelphia: Lea & Febiger.

Gordon, W. A., Hibbard, M. R., Egelko, S., Riley, E., Simon, D., Diller, L., Ross, E. D., and Lieberman, A. (1991). Issues in the diagnosis of post-stroke depression. *Rehabilitation Psychology, 36*(2), 71-87.

Grisso, T., Appelbaum, P. S. (1995). The MacArthur Treatment Competence Study, IIII: Abilities of patients to consent to psychiatric and medical treatments. *Law and Human Behavior, 19*, 149-174.

Great Britain. *The Mental Capacity Act 2005*. London: The Stationary Office.

Hannay, J., Howieson, D. B., Loring, D. W., Fischer, J. S., and Lezak, M. D. (2004). Neuropathology for neuropsychologists. In M. D. Lezak, D. B. Howieson, and D. W. Loring (Eds). *Neuropsychological assessment: fourth edition.* (pp. 157-285). Oxford, UK: Oxford.

Hartley, L. L. (1992). Assessment of functional communication. *Seminars in Speech and Language, 13*, 264-279.

Hirsch, F. M. and Holland, A. L. (2000). Beyond activity: Measuring participation in society and quality of life. In L. E. Worrall and C. M. Frattali (Eds). *Neurogenic communication disorders: a functional approach.* (pp. 35-54). New York: Thieme.

Holland, A. (1980). *The Communicative Abilities in Daily Living. Manual.* Austin, USA; Pro-Ed.

Holland, A. L. (1982). Observing functional communication of aphasic adults. *Journal of Speech and hearing disorders*, *47*, 50-56.

Holland, A. L., Fromm, D. S., DeRuyter, F., Stein, M. (1996). Treatment efficacy: aphasia. *Journal of Speech, Language Hearing Research*, *39*, S27-S36.

House, A. (1987). Mood disorders after stroke: a review of the evidence. *International Journal of Geriatric Psychology, 2*, 211-221.

House, A., Dennis, M., Hawton, K., Warlow, C. (1989). Methods of identifying mood disorders in stroke patients: experience in the Oxfordshire Community Stroke Project. *Age and Ageing, 18,* 371-379.

Jimison, H. B., Sher, P. P., Appleyard, R., LeVernois, Y. (1998). The use of multimedia in the informed consent process. *Journal of the American Medical Informatics Association, 5*(3), 245-256.

Jorge, R. E. Robinson, R. G. & Arndt, S. (1993). Are there symptoms that are specific for depressed mood in patients with traumatic brain injury? *The Journal of Nervous and Mental Disease, 181*(2), 91-99.

Jorge, R. E., Robinson, R. G., Moser, D., Tateno, A., Benedicto, C., Arndt, S. (2004). Major depression following traumatic brain injury. *Archives of General Psychiatry, 61*, 42-50.

Kagan, A. (1995). Revealing the competence of aphasic individuals through conversation: a challenge to health professionals. *Topics in Stroke Rehabilitation, 2*, 15-28.

Kagan, A., Black, S. E., Duchan, J. F., Simmons-Mackie, N. and Square, P. (2001). Training volunteers as conversation partners using supported conversation for adults with aphasia (SCA): A controlled trial. *Journal of Speech, Language and Hearing Research, 44,* 624-638.

Kauhanen, M. L., Korpelainen, J. T., Hiltunen, P., Brusin, E., Mononen, H., Maattaa, R., Nieminen, P., Sotaniemi, K. A., and

Myllyla, V. V. (1999). Post-stroke depression correlates with cognitive impairment and neurological deficits. *Stroke, 30*, 1875-1880.

Klinedinst, N. J., Clark, P. C., Blanton, S., and Wolf, S. L. (2007). congruence of depressive symptom appraisal between persons with stroke and their caregivers. *Rehabilitation Psychology, 52* (2), 215-225

Kontou, E., Lincoln, N. B., and Walker, M. F. (2007). Development of a modified version of the Visual Analogue Mood Scales (VAMS-R). Poster presented at the BPS PSIGE Conference, 4th-6th July 2007.

Koponen, S., Taiminen,T., Portin, R., Himanen, L., Isoniemi, H., Heinonen, H., Hinkka, S. and Tenovuo, O. (2002). Axis I and II Psychiatric disorders after traumatic brain injury: a 30-year follow-up study. *American Journal of Psychiatry, 159,* 1315-21.

Larkins, B. M., Worrall., and Hickson, L. M. H. (2000). Functional communication in cognitive communication disorders following traumatic brain injury. In L. E. Worrall and C. M. Frattali (Eds). *Neurogenic communication disorders: a functional approach.* (pp. 206-219). New York, USA: Thieme.

Le Dorze G, Julien, M., Brassard, C., Durocher, J. & Boivin, G. (1994). An analysis of the communication of adult residents of a long term care hospital as perceived by their caregivers. *European Journal of Disorders of Communication, 29*, 241-67

Leeds, L., Meara, R. J., and Hobson, J. P. (2004). The utility of the Stroke Aphasia Depression Questionnaire in a stroke rehabilitation unit. *Clinical Rehabilitation, 18,* 228-233.

Lewis, A., & Porter, J. (2004). Interviewing children and young people with learning disabilities: Guidelines for researchers and multi-professional practice. *British Journal of Learning Disabilities, 32*, 191-197

Lezak, M. D. (1987). Relationships between personality disorders, social disturbances and physical disability following traumatic brain injury. *Journal of Head Trauma Rehabilitation, 2*(1), 57-69.

Lezak, M. D., Howieson, D. B., and Loring, D. W. (2004). Neuropsychological assessment: fourth edition. Oxford, UK: Oxford.

Lincoln, N. B. (1982). The Speech Questionnaire: an assessment of functional language ability. *International Rehabilitation Medicine, 4*, 114-117.

Lincoln, N. B., Sutcliffe, L. M., and Unsworth, G. (2000). Validation of the Stroke Aphasic Depression Questionnaire (SADQ) for use with patients in hospital. *Clinical Neuropsychological Assessment, 1*, 86-94.

Lomas, J., Bester, S., Elbard, H., Finlayson, A and Zoghaib, C. (1989). The Communicative Effectiveness Index: development and psychometric evaluation of a functional communication

measure for adult aphasia. *Journal of Speech and Hearing Disorders, 54,* 112-124.

Manochioping, S., Sheard, C., Reed, V. A. (1992). Pragmatic assessment in adult aphasia: a clinical review. *Aphasiology, 6*(6), 519-33

McClennan, R., Johnston, M., and Densham, Y. (1992). Factors affecting accuracy of estimation of comprehension problems in patients following cerebro-vascular accident, by doctors, nurses and relatives. *Journal of Disorders of Communication, 27*, 209-19.

McCooey, R. T., Toffolo, D., and Code, C. (2000). A socio-environmental approach to functional communication in hospital in-patients. In L. E. Worrall and C. M. Frattali (Eds). *Neurogenic communication disorders: a functional approach*. (pp. 295-311) New York, USA: Thieme.

McKenna, P. (2004). Disorders of language and communication. In L. H. Goldstein and J. E. McNeil (Eds). C*linical neuropsychology: A practical guide to assessment and management for clinicians.* (pp.165-184). Chichester: Wiley.

Miller, C. K., O'Donnell, D., Searight, R. and Barbarash, R. A. (1996). The Deaconness Informed Consent Comprehension Test: An assessment tool for clinical research subjects. *Pharmacotherapy, 16,* 872-878.

Pallant, J. (2005). *SPSS survival manual: a step by step guide to data analysis using SPSS version 12, Second Edition.* Berkshire, UK: Open University Press.

Papathanasiou, I., and Whurr, R. (2000). Recovery of function in aphasia. In I. Papathanasiou (Ed). *Acquired neurogenic communication disorders: A clinical perspective.* (pp. 29-48). London: Whurr publishers.

Palmer , B. E., Dunn, L. B., Appelbaum, P. S., Mudaliar, S., Thal, L., Henry, R., Golsham, S., Jeste, D. V. (2005). Assessment of capacity to consent to research among older persons with schizophrenia, Alzheimer's Disease or Diabetes Mellitus: comparison of a 3-item Questionnaire with a comprehensive Capacity Instrument. *Archives of General Psychiatry, 62,* 726-733.

Philpin, S., Jordan, S., & Warring, J. (2005). Giving people a voice: reflections on conducting interviews with participants experiencing communication impairment. Journal of Advanced Nursing, 50 (3), 299-306.

Pound, P. and Ebrahim, S. (2000). Rhetoric and reality in stroke patient care. *Social Science and Medicine, 51*, 1437-1446.

Price, C. I., Curless, R. H., and Rodgers, H. (1999). Can stroke patients use visual analogue scales? *Stroke, 30,* 1357-1361

Robinson, R. G. (2003). Post-stroke depression: prevalence, diagnosis, treatment and disease progression. *Biological Psychiatry, 54,* 376-387.

Salter, K., Jutai, J., Foley, N., Hellings, C. and Teasell, R. (2006). Identification of aphasia post stroke: a review of screening assessment tools. *Brain Injury, 20*(6) 559-568.

Sarno, M. T.(1983). The functional assessment of verbal impairment. In G. Grimby (Ed). Recent Advances in rehabilitation medicine. Stockholm, Almquist, Int.

Sarno, M. T. (1965). *The Functional Communication Profile.* New York: Institute of Rehabilitation Medicine.

Sarno, M. T., Buonagura, A., & Levita, E. (1986). Characteristics of verbal impairment after closed head injury. *Archives of Physical Medicine and Rehabilitation, 67*, 400-405.

Satz, P., Forney, D. L., Zaucha, K., Asarnow, R. R., Light, R., McCleary, C., Levin, H.,Kelly, D., Bergsneider, M., Hovda, D., Martin, N., Namerow, N., Becker, D. (1998). Depression, cognition, and functional correlates of recovery outcome after traumatic brain injury. *Brain Injury, 12*(7), 537-553.

Seel, R. T., Kreutzer, J. S, Rosenthal, M., Hammond, F., Corrigan, J. D. and Black, K. (2003). Depression after traumatic brain Injury: a National Institute on Disability and Rehabilitation Research Model Systems Multicenter Investigation. *Archives of Physical Medicine and Rehabilitation, 84, 177-182.*

Shill, M. A. (1979). Motivational factors in aphasia therapy: Research suggestions. *Journal of Communication Disorders, 12*, 503-517.

Silver, J. M., Yudofsky, S. C. and Hales, R. (1991). Depression in traumatic brain injury. *Neuropsychiatry, neuropsychology and behavioural neurology, 4,* (1), 12-23.

Sinyor, D., Amato, P., Kaloupek, D. G., Becker, R., Goldenberg, M. and Coopersmith, H. (1986). Post-stroke Depression: Relationships to Functional Impairment, Coping strategies and Rehabilitation Outcome. *Stroke, 17*(6) 1102-1107.

Skinner, C., Wirz, S., Thompson, I. and Davidson, J. (1984). *Edinburgh Functional Communication Profile.* Edinburgh: Winslow Press.

Spreen, O. & Strauss, E. (1998). *Compendium of neuropsychological tests administration norms and commentary: Second Edition.* New York, USA: Oxford.

Steele, R. D., Aftonomous, L. B., and Munk, M. W. (2003). Evaluation and treatment of aphasia among the elderly with stroke. *Topics in Geriatric Rehabilitation, 19*(2), 98-108.

Stern, R. A. (1997). Visual Analog Mood Scales: Professional Manual. Psychological Assessment Resources, Inc.

Sutcliffe, L. M. and Lincoln, N. B. (1998). The assessment of depression in aphasic stroke patients: the development of the

Stroke Aphasic Depression Questionnaire. *Clinical Rehabilitation, 12*, 506-513.

Tabachnick, B. G., & Fidell, L. S. (1996). *Using multivariate statistics (3rd ed.)*. New York: Harper Collins.

Tanner (1988). Clinical Forum: the grief response in neuropathologies of speech and language. *Aphasiology, 2* (2), 79-84.

Teasdale, G. and Jennett, B. (1974). Assessment of coma and impaired consciousness: a practical scale. *The Lancet, 7872,* 81-4.

Townend, E., Brady, M., and McLaughlin, K. (2007). A systematic evaluation of the adaptation of depression diagnostic methods for stroke survivors who have aphasia. *Stroke, 38*, 3076-3083.

Turner-Stokes and Hassan, N. (2002). Depression after stroke: a review of the evidence base to inform the development of an integrated care pathway. *Clinical Rehabilitation, 16,* 231-247.

van de Weg, F. B., Kuik, D. J., and Lankhorst, G. J. (1999). Post-stroke depression and functional Communication outcome: a cohort study investigating the influence of depression on functional recovery from stroke. *Clinical Rehabilitation, 13,* 268-272

Wallesch, C. W., Johannsen-Horbach, H., and Blanken, G. (2003). Assessment of acquired spoken language disorders. In P. W.

Halligan, U. Kischka, and J. C. Marshall, (Eds). *Handbook of Clinical Neuropsychology.* Oxford: Oxford.

Wertz, R. T. (2000). Aphasia therapy : a clinical framework. In I. Papathanasiou (Ed). *Acquired neurogenic communication disorders: A clinical perspective.* (pp. 4-27). London: Whurr publishers.

Wong, J. G., Clare, I. C. H., Holland, A. J.,Watson, & Gunn, M. J. (2000). The capacity of people with a 'mental disability' to make health care decisions. *Psychological Medicine, 30*, 295-306.

World Health Organisation (WHO) (1997). ICIDH-2 International Classification of Impairments, Disabilities, and participation. Geneva: World Health Organisation.

Worrall, L. E. (2000). A conceptual framework for a functional approach to acquired neurogenic disorders of communication and swallowing. In L. E. Worrall and C. M. Frattali (Eds). *Neurogenic communication disorders: a functional approach*. (pp. 3-18). New York, USA: Thieme.

Worrall, L., McCooey, R., Davidson, B., Larkins, B. and Hickson, L. (2002). The validity of functional assessment of communication and the Activity/Participation components of the ICIDH-2: do they reflect what really happens in real-life? *Journal of Communication Disorder, 35,* 107-137