Title: Stroke patients communicating their healthcare needs in hospital: A study within the ICF framework

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What is already known on this subject?

Qualitative research indicates that stroke patients experience difficulty communicating their healthcare needs in hospital and this can compromise the care that these patients receive.

What this study adds

Approximately half of all stroke patients admitted into an acute stroke unit experience difficulty communicating their healthcare needs in hospital. More severe vision, speech, language or cognitive communicative impairment was significantly associated with more severe difficulty communicating healthcare needs.

Abstract

Background: Previous research has identified that many patients admitted into acute hospital stroke units have communication-related impairments such as hearing, vision, speech, language and/or cognitive communicative impairment. However no research has identified how many patients in acute hospital stroke units have difficulty actually communicating their healthcare needs. The World Health Organization’s International Classification of Functioning, Disability and Health (ICF) conceptualises difficulty communicating about healthcare needs as a type of activity limitation, within the Activity and Participation component. The ICF proposes that activity limitation can be measured in four different ways.

Aims: The first aim of this research was to measure a patient’s difficulty communicating his or her healthcare needs, that is, activity limitation, in two of the four ways suggested by the ICF when interacting with healthcare providers. The second aim was to investigate whether communication related impairments in hearing, vision, speech, language and/or cognitive
communicative impairment predict difficulty communicating healthcare needs, measured in these ways.

Methods & Procedures: A total of 65 patients consecutively admitted into two acute hospital stroke units in Melbourne Australia who consented to this research participated in this study. Early in their admission participants were screened for hearing, vision, speech, language and cognitive communicative impairment. Participants were also assessed for difficulty communicating about healthcare needs in two ways proposed by the ICF; ‘capacity with assistance’ and ‘performance’. Relationships between communication related impairment and both capacity with assistance and performance were explored through Spearman’s correlations and binary logistic regression.

Results: A total of 87% of patients had one or more communication related impairments. Half of the patients (51%) had difficulty communicating their healthcare needs when assessed in terms of capacity with assistance. Slightly more patients (55%) were observed to have difficulty communicating their healthcare needs when assessed in terms of performance. More severe vision, speech, language and cognitive communicative impairment were significantly associated with more severe difficulty communicating healthcare needs.

Conclusions & Implications: About half of the stroke patients admitted into acute hospital stroke units had difficulty communicating their healthcare needs. Patients with more severe communication-related impairments had more severe difficulty communicating their healthcare needs. Future research is needed to understand the other factors that influence communication between people with communication disabilities and their healthcare providers in acute hospital settings.
Keywords: stroke, ICF, communication, assessment, hospital, communication activity
**Background**

Many people who have communication disabilities report difficulty communicating with healthcare providers when they are patients in hospital. For example, people who are hearing impaired have described receiving little or no information about what was happening to them in hospital, consenting to procedures they did not understand and being misdiagnosed because staff were not aware of their hearing impairment (Hines, 2000). People who are blind or have a visual impairment have described receiving written information about their health condition and medicines that they can not read (O'Day, Killeen, & Iezzoni, 2004). People with other kinds of communication disabilities such as developmental disability and aphasia following stroke have also reported difficulty communicating with their healthcare providers in hospitals (Cottrell & Davies, 2004; Cumella & Martin, 2004; Parr, Byng, Gilpin, & Ireland, 1997).

Although these studies indicate that people with different kinds of communication disabilities experience difficulty communicating with healthcare providers in hospital, there is less known about the size of the problem. One study reported that 73% of elderly patients in hospital had a communication-related impairment, such as hearing, vision, speech, language or cognitive impairment (Sweeney et al., 1993). In a more recent study, 88% of inpatients in acute stroke units were identified as having a communication-related impairment. A total of 69% of these stroke patients had multiple communication-related impairments (O'Halloran, Worrall, & Hickson, 2009a). Although these numbers are high, no research has investigated the relationship between communication related impairments and difficulty communicating about healthcare needs or how many patients overall actually experience difficulty communicating their healthcare needs in hospital. These questions are important because it is difficult communicating
about healthcare needs rather than the number, type and severity of communication related impairments that determines if patients are able to get their healthcare needs met.

The relationship between communication-related impairments and difficulty communicating about healthcare needs can be conceptualised in terms of the World Health Organization’s International Classification of Functioning, Disability and Health (ICF; WHO, 2001). In terms of the ICF, a communication-related impairment results from a loss, reduction or deviation of any anatomical (structural) part of the body, or a loss, reduction or deviation of any physiological or psychological function of the body used for communication. Hence, a loss, reduction or deviation of vision, hearing, speech, language or cognitive communicative function would result in a communication-related impairment. Communication-related impairments are classified in the Body Functions and Structures component of the ICF (World Health Organization, 2001). In contrast, difficulty communicating about healthcare needs is classified as a type of (communication related) activity limitation. An activity limitation is the term used to describe any difficulty carrying out a particular task or action. Difficulty describing symptoms, difficulty understanding medical explanations and difficulty calling a nurse are all examples of communication activity limitations. Communication activity limitations are classified in the Activity and Participation component of the ICF (World Health Organization, 2001).

The ICF describes the severity of impairments and the severity of activity limitations in different ways. The severity of an impairment is described using one qualifier; a five point scale that ranges from no impairment to complete impairment. Activity limitations can be described in four different ways, using four different qualifiers. These are; 1) performance, 2) capacity
without assistance, 3) capacity with assistance and/or 4) performance without assistance (World Health Organization, 2001).

The performance qualifier describes what a person actually does in his or her current environment and can be understood as ‘the lived experience’ of a person (World Health Organization, 2001, p. 15). A person’s level of performance includes any types of assistance, such as assistive devices and personal assistance, that is usual for him or her in everyday life (APA, 2003). The capacity without assistance qualifier is intended to capture the highest probable level of functioning that a person may reach at a given moment in a standardised environment that would neutralize the varying impact of different environments on the ability of the individual (World Health Organization, 2001). In contrast, the capacity with assistance qualifier aims to indicate the best probable level of functioning that a person may achieve, given direct assistance (APA, 2003). The performance without assistance qualifier is designed to capture the person’s level of functioning in his or her current environment without the presence of any assistive devices or personal assistance and may provide one way to demonstrate the effect of these supports on the person’s functioning (Threats & Worrall, 2004). A person’s degree of activity limitation in each of these different contexts is described on separate five point scales ranging from no difficulty to complete difficulty (World Health Organization, 2001). Further information about the ICF is available (see Ma, Threats, & Worrall, 2008; World Health Organization, 2001).

The way in which speech and language therapists conceptualise communication-related impairments is similar to the way in which the ICF conceptualises communication-related
impairments, as a loss or reduction in body structure or function. For example, dysarthria is understood by speech and language therapists to be a ‘group of neurologic speech disorders resulting from abnormalities in the strength, speed, range, steadiness, tone or accuracy of movements required for control of the respiratory, phonatory, resonatory, articulatory and prosodic aspects of speech production’ (Duffy, 2005, p. 5). Dysarthria is classified within the ICF as type(s) of impairment of voice and speech functions within the Body Structures and Functions component. However the way speech and language therapists’ conceptualise a person’s ability to communicate in everyday situations is different from the way in which the ICF conceptualises this. For example, to assess a person’s ability to communicate in everyday situations on the ASHA FACS the speech and language therapist rates the person’s ability to communicate in terms of the adequacy, appropriateness and promptness of the communication (Frattali, Thompson, Holland, Wohl, & Ferketic, 1995). In contrast, the ICF describes communicating in everyday situations using the qualifiers performance, capacity without assistance, capacity with assistance and performance without assistance. That is, in terms of the degree of difficulty a person has in different contexts (capacity versus performance), and in terms of the level of assistance provided (with and without assistance).

Research is needed to develop ways to measure communication activity limitations using the ICF qualifiers and to better understand the relationship between communication-related impairments and communication activity limitations. One way to explore this issue further is to investigate the communication difficulties experienced by patients in acute stroke units. This is because many patients in acute stroke units have communication-related impairments resulting from their stroke, and/or pre-existing sensory deficits such as hearing impairment (O'Halloran et
al., 2009a). People with communication-related impairments have also reported difficulty communicating with healthcare providers about their healthcare needs when they are in hospital stroke units (Cottrell & Davies, 2004; Parr et al., 1997). Finally, increasing efforts to reduce healthcare costs means that many patients are admitted into hospital following stroke for a very short period of time. One survey of the practice in an acute stroke unit in a large tertiary hospital in Melbourne reports that by day three to five post stroke, patient care shifts towards patient education, a discussion of discharge needs and expectations of rehabilitation (Weir & Cadilhac, 2007). Therefore it is critical that stroke patients can communicate as effectively as possible with their healthcare providers during these early days post stroke if they are going to be able to participate in their care to the extent that they want to.

Two ICF qualifiers that may be particularly useful to explore in terms of stroke patients communicating their healthcare needs are capacity with assistance and performance. As described above, the capacity with assistance qualifier aims to indicate the best probable level of functioning that a person may achieve, given direct assistance. Measuring patients’ capacity with assistance would provide speech and language therapists with an indication of patients’ degree of difficulty communicating given direct assistance, such as when communicating with a supportive communication partner and with the aid of assistive communication devices such as picture boards. This may provide speech and language therapists with an indication of stroke patients’ potential to communicate healthcare needs in hospital. The performance qualifier describes what a person actually does in his or her current environment and can be understood as the lived experience of a person. Therefore, measuring stroke patients’ performance communicating their healthcare needs in hospital may provide speech and language therapists
with an indication of how many stroke patients have difficulty communicating their needs in hospital at present.

In summary, although there is some limited research about the number of stroke patients who have communication-related impairments there is no research that has identified how many stroke patients have difficulty communicating their healthcare needs in hospital and the nature of the relationship between communication-related impairments and difficulty communicating about healthcare. The ICF provides speech and language therapists with a new way of thinking about communicating healthcare needs.

**Aims**

This study had two aims. The first aim was to describe how many patients in acute stroke units have difficulty communicating their healthcare needs with healthcare providers in two of the ways proposed by the ICF, in terms of 1) capacity with assistance, that is, difficulty communicating healthcare needs given direct assistance of a healthcare provider, and 2) performance, actual difficulty communicating healthcare needs in everyday healthcare routines with healthcare providers. The second aim was to investigate the relationships between communication-related impairments and difficulty communicating healthcare needs in terms of capacity with assistance and performance.

**Method**

*Participants*
Ethical clearances from the participating hospitals and the University of Queensland were obtained prior to commencing this research. Every person admitted into one of two acute hospital stroke units in Melbourne, Australia, who had English as their first language, had a clinical diagnosis of stroke and was judged to be medically stable by a medical officer was asked by a hospital speech and language therapist if he or she would be willing to be approached about this study. Only the names of those people who were willing to find out more about the study were forwarded to the researcher. The researcher explained the study to prospective participants with the aid of a picture based communicatively accessible format when required. This format consisted of Boardmaker pictures (Mayer-Johnson, 2006) and key sentences to convey the main information about the study. Each patient’s capacity to consent for him or herself was assessed by asking the patient six questions about the study that required a yes or no response. Only those patients who answered all six questions correctly were considered to have the ability to consent. Patients who were willing to participate and demonstrated the ability to consent did so. Where patients were able to consent for themselves but had a documented history or evident language and/or cognitive impairment, verbal agreement of next of kin was also obtained. Where patients were willing to participate in the study but did not demonstrate the ability to consent, or where it could not be determined whether the patient was willing or not, written consent from the patient’s next of kin was obtained.

Information about each participant’s date of admission, date of assessment, age, sex, and type of stroke, was gathered from the medical history. The patient’s type of stroke was described according to the Oxfordshire Community Stroke Project classification of cerebral infarction (OCSP; Bamford, Sandercock, Dennis, Burn, & Warlow, 1991). Patients were classified as
having either a total anterior circulation syndrome (TACS), where the patient had a new cortical dysfunction, homonymous hemianopia and hemiparesis; a partial anterior circulation syndrome (PACS), where the patient had any two of the preceding three features of TACS or cortical dysfunction alone; a lacunar syndrome (LACS), where the patient had a hemiparesis, hemisensory or hemisensorimotor loss or ataxic hemiparesis; a posterior circulation syndrome (POCS) where the patient had brainstem symptoms and signs such as diplopia, vertigo or dysphagia; (Bamford et al., 1991) or ‘Other’. The category ‘other’ was used to identify those patients who were admitted into the stroke unit with a clinical diagnosis of stroke but were later diagnosed with a non stroke medical condition. Participants were recruited for 4.5 months at two acute hospital stroke units, from December 2007 to mid April 2008 and from mid May to September 2008.

Materials

Measuring capacity with assistance

In order to measure capacity with assistance in the hospital setting, speech and language therapists need a measure that assesses if a patient has difficulty communicating about his or her healthcare needs given direct assistance. One measure that may be useful for this purpose is the Inpatient Functional Communication Interview (IFCI; O’Halloran, Worrall, Toffolo, Code, & Hickson, 2004). The IFCI consists of 15 communication situations that were identified from observing communicative interactions between patients and healthcare providers in the acute hospital setting (O’Halloran, Worrall, & Hickson, 2007). These communication situations are listed in Appendix 1. To conduct the IFCI, the speech and language therapist interviews the patient about these healthcare situations through a semi-structured conversation. Before the
interview, the clinician may make any number of environmental modifications such as
minimising background noise and/or turning on the patient’s overhead light in order to maximize
the likelihood of successfully communicating. In addition, if the patient and speech and language
therapist experience difficulty communicating during the interview then the speech and language
therapist can also investigate whether any strategies such as repeating or rephrasing a question,
providing a topic cue, or using written or picture support facilitate more successful
communication. At the end of the interview the clinician scores the success of communication in
each situation as successful (2 points), partially successful (1 point), unsuccessful (0) or not
observed (N/O). A preliminary study into the reliability of the IFCI indicated that it had a point
to point interrater and intrarater reliability of 90.7% and 93.8% respectively (O’Halloran,
Worrall, Code, & Hickson, 2007). Because the speech and language therapist actively seeks to
modify the physical environment and provides direct assistance during the interview to facilitate
optimal communication, the IFCI may be a suitable measure of a patient’s capacity with
assistance in the hospital setting. An example of interviewing a patient and scoring the patient’s
ability to communicate with assistance is also provided in Appendix 1. For this study, once the
IFCI was scored, each patient’s score was converted to an ICF compatible five point scale of
capacity limitation, ranging from no difficulty to complete difficulty. The capacity limitation
rating scale is provided in Appendix 2.

Measuring performance

A measure of a patient’s performance communicating in hospital situations would measure the
degree of difficulty a patient actually experienced communicating his or her healthcare needs in
hospital. Although no measure of performance in the hospital setting was found, one way to
assess this may be to directly observe the communication that occurs between the patient and healthcare providers.

Therefore, the first author directly observed patients communicating with their healthcare providers during everyday healthcare routines. Event sampling was used to guide the observation of interactions between participants and healthcare providers. In order to obtain a representative sample of each participant’s communication with healthcare providers, participants were observed communicating for a minimum of one hour or until the participant had been observed communicating in at least six different IFCI situations. The observed interactions between participants and healthcare providers were recorded in a note book as close to verbatim as possible, as no audio recording was taken. At times not all the interaction could be recorded and in these situations the interaction was described in as much detail as possible during the event and further details were added immediately afterwards. After the observation period, the written notes were reviewed and any communication situations that represented IFCI situations were identified. These situations were scored using the same criteria developed to score communicative interactions in the IFCI. That is as successful, partially successful, unsuccessful or not observed (O’Halloran et al., 2004).

Table 1 shows how a transcript was recorded and how IFCI situations were identified within the transcript and then scored. The number of successful IFCI communication situations observed divided by the total number of IFCI communication situations observed was calculated to determine the participant’s performance score as a percentage. As with the capacity with assistance score, this percentage score was converted into a rating score on the performance rating included in Appendix 2. As indicated in Table 1 the observer required clear evidence that
the communicative interaction had been successful, partially successful or unsuccessful in order to score the interaction. In circumstances where there was no evidence that the interaction had been successful, such as utterance 2 in Table 1, the situation was scored as ‘not observed’ (N/O).

Table 1 about here

The method used to identify IFCI situations from the written transcripts of directly observed interactions in this study had been used in a previous study, in which the point to point intrarater reliability of identifying IFCI situations was 88% (O'Halloran, Worrall, & Hickson, 2007). Scoring directly observed IFCI situations as ‘successful’, ‘partially successful’, ‘unsuccessful’ or ‘not observed’ had not been done previously. Given there was only one researcher observing and scoring the interactions between all participants and healthcare providers point to point intrarater reliability of scoring observations was examined. The observation transcripts of every fifth participant (n = 13) were rescored between one to four months after the initial scoring. Point to point intrarater reliability was 96.7%. The development of the communication activity limitation performance measure was informed by the need to create as reliable a measure as possible.

*Communication-related impairment measures:* In order to investigate if there were any relationships between communication-related impairments and difficulty communicating healthcare needs, each patient’s degree of hearing, vision, speech, language and cognitive-communicative impairment was also rated.
**Rating hearing impairment:** Participants’ hearing was screened at bedside using a portable audiometer. Participants’ ears were checked for wax however as one aim of this study was to investigate the presence of any relationships between communication-related impairments (including hearing impairment) and difficulty communicating healthcare needs in hospital, no attempt was made to clear participants’ ears of wax prior to hearing assessment. Secondly, given that this was only a simple bedside screening, the researchers were not able to determine how well patients were hearing with their functioning hearing aids in situ. Therefore data on hearing impairment from these participants with hearing aids was not included in the analysis. Participants who owned hearing aids but did not have them in hospital, or who had hearing aids with them that were not working were screened for their degree of hearing impairment and this data was included in the analysis. A sound level meter was used to monitor background noise during hearing screening. When background noise exceeded 40dBA but was less than 50dBA this was recorded and the hearing screening results were reviewed by an audiologist. When background noise exceeded 50dBA, hearing screening was abandoned and the patient’s hearing was rated as ‘unable to assess’. Nursing staff were informed of any participant identified with impacted cerumen, with the participant’s permission. The participant’s degree of hearing impairment was rated on a five point scale, which is included in Appendix 3.

**Rating near vision impairment:** Participants’ near vision was tested with the participant wearing glasses where applicable, on the Tumble E test (Keeffe & Carnicelli, 2000). The participant’s degree of near vision impairment was then rated on a four point scale also included as Appendix 3.
Rating speech, language and cognitive communicative impairment: So participants would not have to undergo separate speech, language and cognitive communicative impairment assessments, a combined method for efficiently rating each participant’s degree of speech, language and cognitive communicative impairment was developed. Speech, language and cognitive communicative impairment rating scales were designed so that they could be completed following the administration of the IFCI. They were also developed to be compatible with the ICF body functions impairment qualifier and so consisted of five point scales that ranged from no impairment to complete impairment. These speech, language and cognitive communicative impairment rating scales were collectively called the OHW scales because they reflected the WHO and also represented the initials of the three authors (O’Halloran, Worrall, & Hickson, 2009b). The clinician listens to the patient’s speech intelligibility during administration of the IFCI then rates the patient’s degree of speech intelligibility impairment on the OHW speech intelligibility impairment rating scale. He or she also observes the length and complexity of instructions and explanations that are understood during administration of the IFCI and listens to the effectiveness, efficiency and consistency of the patient’s verbal expression before rating the patient’s degree of spoken language impairment on the OHW spoken language impairment scale. Finally, the clinician observes the patient’s alertness and responsiveness during the IFCI and by assesses the patient’s orientation, insight and recall of information as part of the semi-structured interview before rating the patient’s degree of cognitive communicative impairment on the OHW cognitive communicative impairment scale. The OHW scales describe aspects of speech, language and cognitive-communicative function in order for clinicians to simply rate the severity of the impairment/s. The OHW scales provide no information about the nature of the
impairment, for example whether a cognitive communicative impairment is consistent with a traumatic brain injury or dementia (O'Halloran et al., 2009b).

A preliminary investigation of the concurrent validity and inter rater reliability of the OHW scales was conducted. Spearman’s correlations between scores on the speech, language and cognitive communicative OHW scales and scores on the standardised measures the Assessment of Intelligibility of Dysarthric Speech (ASSIDS, Yorkston & Beukelman, 1981), the Western Aphasia Battery (WAB, Kertesz, 1982) and subtests of the Scales of Cognitive Ability for Traumatic Brain Injury (SCATBI, Adamovich & Henderson, 1992) were 0.82, 0.83 and 0.87 respectively. Point to point interrater reliability of scores on the OHW speech and cognitive communicative impairment rating scales were 70% and 72% respectively. Point to point interrater reliability of the spoken language scale was poorer (O'Halloran et al., 2009b). As a minimum, this preliminary study indicated that the first author could administer the IFCI and rate the participant’s degree of speech, language and cognitive communicative impairment on the five point OHW speech, language and cognitive communicative impairment rating scales and that these ratings corresponded to scores on standardised measures of speech, language and cognitive communicative impairment.

Procedure

The first author administered the IFCI at the participant’s bedside. An attempt was made to interview every participant on all 15 communication IFCI situations, however often this was not possible. Participants who were unable to stay alert and attend for the entire interview and participants who had a severe language and/or cognitive communicative impairments and were
unable to indicate yes or no in any way or follow any commands with gesture did not complete the entire interview. In addition, some participants who were able to engage in the entire interview could not be scored on all the situations they were interviewed in. This was in accordance with the scoring instructions of the IFCI that state that if the patient’s ability to communicate in a particular situation can not be directly elicited then the patient’s ability to communicate in that situation is recorded as ‘not observed’. Each participant’s IFCI score was calculated on the basis of those situations that were directly assessed and scored. This score was converted into the capacity with assistance rating scale provided in Appendix 2.

Following administration of the IFCI, the participant was rated on the OHW speech, language and cognitive communicative impairment rating scales. On the same day or next day, the participant was also screened for near vision impairment and scored on the near vision impairment rating scale. Participants’ hearing was screened at some time during their admission and then the participant was scored on the hearing impairment rating scale. When participants could not be rated on a measure, this was rated as ‘unable to assess’.

Once participants had been interviewed on the IFCI, scored on the capacity with assistance rating scale, the OHW speech, language and cognitive communicative impairment rating scales and the near vision impairment rating scale, participants were then observed communicating with healthcare providers in order to determine the participant’s performance rating. At the end of the observation period, participants’ notes were reviewed and the interactions were scored as described above. This percentage score was then converted to a performance rating using the performance rating scale provided in Appendix 2.
Data Analysis

The number of participants with difficulty communicating on the capacity with assistance measure and performance measure was described and analysed with SPSS 14.0 (SPSS, 2003) and a confidence interval calculator (Dimension Research Inc, 2005). Relationships between communication-related impairments, capacity with assistance and performance were explored through scatter plots, Spearman’s correlations and binary logistic regression.

Results

Sample demographics

A total of 113 patients and/or next of kin were willing to be approached about this study. Nineteen patients (17%) were discharged before they were contacted by the researcher, eight (7%) did not meet research criteria, for example they were medically unstable, one patient (<1%) was transferred to another ward and 15 patients (13%) or their next of kin did not consent. This left 70 participants (62% of the total willing to be approached) who consented. Complete data sets were not collected on five participants. The remaining 65 participants included 33 men and 32 women, ranging in age from 22 to 91 years, with a mean age of 71 years. Of the 65 participants, 14 (22%) had a TACS, 23 (35%) PACS, 11 (17%) LACS and 12 (18%) POCS. Five patients (8%) were classified as ‘other’ as they were clinically diagnosed as having a stroke but this diagnosis was revised during their admission.

Participants were admitted into the acute stroke unit on the day or day after their stroke and their communication abilities were assessed on day one to day 12 of their admission in the stroke unit.
Most participants were interviewed on the IFCI (the capacity with assistance measure) on the first or second day after admission into the stroke unit. They were assessed on the communication-related impairment measures and observed communicating with healthcare providers to obtain the performance measure on the same day or the following day. All 65 participants were interviewed on the IFCI and scored on the capacity with assistance rating scale. However, not all of the participants could be assessed on all of the communication-related impairment measures, resulting in some missing data. Some participants were too cognitively impaired to participate in hearing or vision screening; others had such severe speech impairments that they could not be rated on the language or cognitive communicative impairment scales; others had such severe language impairments that they were unable to produce enough speech to be rated on the speech impairment rating scale; and some participants were not screened for hearing impairment because they were discharged from hospital early or because of high levels of background noise. In total, 48/65 (74%) participants were assessed for hearing impairment, 4 of these patients had functioning hearing aids with them in hospital, 52/65 (80%) for near vision impairment, 54/65 (83%) for speech impairment, 56/65 (86%) for cognitive communicative impairment and 60/65 (92%) for language impairment. A total of 47 participants were assessed on all five communication-related impairment measures and only one participant could not be assessed on any of the communication-related impairment measures. Finally, all 65 participants observed communicating with healthcare providers were rated on the performance scale. Participants were observed communicating with healthcare providers from 7 to 197 minutes (average = 62 minutes). Participants were observed communicating in 1 to 15 different IFCI situations, with most participants being observed communicating in 7.
How many patients have difficulty communicating their healthcare needs?

a) measured in terms of capacity with assistance?

The numbers of participants who had difficulty communicating their healthcare needs with direct assistance is provided in Table 2. A total of 33/65 (51%) participants had a mild or greater difficulty. That is just over half of all participants interviewed on the IFCI had at least some difficulty communicating about their healthcare needs with direct assistance. It is estimated that between 39-63% (95% confidence interval) of patients in acute stroke units have difficulty communicating about their healthcare needs even with direct assistance.

Table 2 here

b) measured in terms of performance?

Table 3 provides details about the number of patients who were observed to have difficulty communicating about their healthcare needs with healthcare providers. A total of 36/65 (55%) participants had difficulty. It is estimated that between 43-67% (95% confidence interval) of patients experience difficulty actually communicating with healthcare providers in acute stroke units.

Table 3 about here

What is the relationship between communication-related impairments and difficulty communicating healthcare needs?

a) measured in terms of capacity with assistance?
A total of 64/65 of participants could be assessed on at least one of the communication-related impairment measures. Of these, 56/64 (87%) had at least one communication-related impairment. Further details are provided in Table 4.

Of the 56 participants with communication-related impairments, 32 (57%) had difficulty communicating their healthcare needs given direct assistance on the IFCI. Only four of these participants had mild communication-related impairments. The majority, 28/32 (87%) had moderate or more severe communication-related impairment/s. No participant without a communication-related impairment had difficulty communicating his or her healthcare needs on the IFCI.

To investigate whether some communication-related impairments were associated with participants’ capacity with assistance, Spearman’s correlations were calculated between communication-related impairment ratings and capacity with assistance ratings. Table 5 indicates that more severe vision, speech, language or cognitive communicative impairment was significantly correlated with more severe difficulty communicating healthcare needs as assessed on the IFCI.

Table 5 about here
A binary logistic regression analysis was conducted to determine whether having any communication-related impairment predicted difficulty communicating healthcare needs as measured by capacity with assistance. Given the relatively small number of cases, the predictor variables (the communication-related impairments) and the dependent variable (capacity with assistance measure) were collapsed into discrete variables of no impairment/ mild or greater impairment and no difficulty/ mild or greater difficulty respectively. Chi square tests of independence indicated that the presence of both language impairment and cognitive communicative impairment were significantly related to the presence of difficulty communicating healthcare needs. However, both these independent variables were highly associated so only one of these predictor variables could be entered into the logistic regression model. As indicated in Table 5, cognitive communicative impairment correlated the highest with difficulty communicating healthcare needs and so this variable was entered into a logistic regression model. After deletion of 9 cases due to missing data, 56 cases were available for analysis. The model indicated that the presence of cognitive communicative impairment predicted the presence of capacity limitation, $\chi^2 (1, N = 56) = 43.308, p<.001$ and as a whole explained up to 72.3% (Nagelkerke R squared) of the variance in the presence of capacity with assistance measure.

b) measured in terms of performance?

As described above 56/64 (87%) participants had a mild or greater communication-related impairment. Of those 56 with a communication-related impairment, 35 (62%) were observed to have difficulty communicating with healthcare providers. Only 2/35 participants who were observed to have difficulty communicating with healthcare providers had mild communication-
related impairments. The remaining 33 participants had moderate or more severe communication-related impairments. One participant did not have a communication-related impairment but was observed to have a mild difficulty when observed. Although this participant’s hearing was not assessed, a review of the observation notes suggested that the observed breakdown was not due to a hearing impairment but more likely due to the healthcare provider introducing a new topic of conversation unexpectedly.

Spearman’s correlations were calculated between each of the communication-related impairment measures and performance measures and these are provided in Table 5. Table 5 indicates that more severe vision, speech, language or cognitive communicative impairment was significantly associated with more severe difficulty when observed communicating.

A logistic regression was conducted to further explore the relationship between communication-related impairments and performance limitation. As described above, due to the small number of cases the predictor variables (communication-related impairments) and the dependent variable (performance measure) were collapsed into bivariate variables of no impairment/ mild or greater impairment and no difficulty performance/ mild or greater difficulty performance respectively. Chi square tests of independence indicated that the presence of vision, speech, language and cognitive communicative impairment were significantly related to the presence of difficulty on the performance measure and therefore these four predictor variables were analysed further. The independent variables of speech impairment and vision impairment were not highly associated with any other independent variable, however as noted earlier language impairment and cognitive communicative impairment were highly associated and therefore only one of these
independent variables could be entered into the model. Cognitive communicative impairment, correlated highest with difficulty communicating about healthcare needs and so this variable was entered in the model. After deletion of 18 cases for missing data, 47 cases were available for analysis. The presence of vision, speech and cognitive communicative impairment significantly predicted the presence of performance limitation $\chi^2 (3, N = 47) = 14.834$, $p<.05$). The model as a whole explained up to 36.2% (Nagelkerke R squared) of the variance in presence of difficulty communicating as measured by performance. Interestingly, only the presence of vision impairment made a unique statistically significant contribution to the model.

**Discussion**

This study had two aims. Firstly, to identify how many acute stroke patients have difficulty communicating their healthcare needs with healthcare providers and secondly, to conduct a preliminary investigation into the relationship between communication-related impairment and difficulty communicating healthcare needs. The ICF (World Health Organization, 2001) framework provided the opportunity to explore the issue of difficulty communicating about healthcare needs in two different ways. The capacity with assistance qualifier described the degree of difficulty patients experience communicating their healthcare needs given direct assistance and it was suggested that this measure might provide speech and language therapists and other healthcare providers with an indication of patients’ potential to communicate their needs given communicative support. The performance qualifier described the degree of difficulty patients experience communicating their healthcare needs in everyday healthcare interactions, and may provide speech and language therapists and other healthcare providers with an indication of the size of this problem in hospitals.
Communicating healthcare needs as measured by capacity with assistance

This study found that 51% of patients had difficulty communicating their healthcare needs when measured in terms of capacity with assistance. That is, approximately half of all patients experienced difficulty communicating about at least some of their healthcare needs even with the direct assistance of a supportive communication partner and assistive communication devices. Some patients with communication-related impairment/s did not have difficulty communicating their healthcare needs. The majority of patients who did have difficulty communicating his or her healthcare needs on the IFCI had moderate or more severe communication impairments. There was a clear association between the severity of a patient’s vision, speech, language or cognitive communicative impairment and the severity of his or her difficulty communicating about healthcare needs. Further analysis of the data revealed that the presence of a cognitive communicative impairment alone accounted for 72% of the variance in the IFCI scores. This finding suggests that, despite the communicative support provided by a communication partner at bedside, many patients with cognitive communicative impairment may still be unable to communicate all their healthcare needs successfully. These patients need to be identified as they may be particularly vulnerable when in hospital. They may also need to be supported in other ways, for example, by having an advocate when they are a patient in the acute hospital setting.

Interestingly there was no association between an increase in the severity of a patient’s hearing impairment and an increased difficulty communicating about healthcare needs on the IFCI. There are two possible explanations for this finding. One is that 38/48 (79%) patients screened had a hearing impairment, and it may be that there were not enough patients without hearing
impairment to reveal a relationship. Alternatively, it may be that the communication partner provided those patients with hearing impairment with sufficient support so that the hearing impairment did not result in communication difficulties during the IFCI.

*Communicating healthcare needs as measured by performance*

When patients were directly observed communicating about their healthcare needs with their healthcare providers, 55% had some difficulty. That is, approximately half of all patients were observed to have difficulty communicating their healthcare needs in the acute hospital stroke unit. All but one of the patients observed to have difficulty communicating their healthcare needs had a communication-related impairment and most of these patients had moderate or more severe communication-related impairment/s. Similar to the findings reported above, the severity of a patient’s near vision, speech, language or cognitive communicative impairment was also associated with an increase in the severity of difficulty communicating with healthcare providers. The severity of hearing impairment was not associated with the severity of performance limitation and this may reflect a sampling issue as described above.

The other important finding to emerge from this research is that although patients with near vision, speech and cognitive communicative impairment were more likely to have difficulty communicating their healthcare needs when observed, the presence of these impairments only accounted for 36% of the variance in performance measures. Therefore environmental factors, such as the communication skills, knowledge and attitudes of healthcare providers, the workload of healthcare providers as well as the resources and support they receive to help them communicate with patients with communication disabilities may also be contributing to the
difficulties patients experience when communicating in everyday healthcare situations. Personal factors such as the patient’s level of fatigue and motivation may also be contributing as well.

**Limitations and Future Directions**

Future research needs to be conducted with a larger sample of patients to better understand the relationship between hearing impairment and difficulty communicating about healthcare needs in hospital. Future research with stroke patients should also include a measure of the severity as well as the type of the stroke to better understand the relationship between the severity of stroke and difficulty communicating about healthcare needs in hospital. Furthermore this study only considered the ability of patients and healthcare providers to communicate effectively, family members are integral to supporting patients with communication disabilities and how well stroke patients and their family members are able to communicate needs to be understood as well.

However, this research does indicate that when patients communicate about their healthcare needs with a supportive communication partner, the presence of communication-related impairments, particularly cognitive communicative impairments strongly predicts how successful the communication is going to be. However, when patients communicate about their healthcare needs in everyday healthcare routines the presence of communication-related impairments is not so influential in determining how successful communication is going to be. Therefore, further research is required to understand how other factors, such as patient factors like fatigue, and the communicative environment, contribute to patients’ difficulties communicating about healthcare needs in hospital.
Threats and Worrall (2004) suggest that the difference between the ability to communicate in a supportive environment (as measured by capacity with assistance) and the ability to communicate when observed in everyday interaction (as measured by performance) might indicate the extent to which the communicative environment can be changed to support the patient to communicate their needs effectively. This may be true, however it was not possible to directly compare a patient’s ability to communicate given direct assistance on the IFCI (capacity with assistance) with his or her ability to communicate when directly observed (performance) in this study. This was because the way in which communicating about healthcare needs was assessed and scored on the IFCI (capacity with assistance) was so different from the way it was assessed and scored in direct observation (performance). For example, on the IFCI (capacity with assistance measure), patients are scored as having communicated successfully in the situation ‘understanding what is happening, has happened or going to happen’ if they can accurately recall or respond to questions about three events. In contrast, during observation (performance measure), patients were scored as having communicated successfully in this situation if they were observed to give any indication of understanding just one event. Differences were also evident in the way each measure was scored. On the IFCI, the patient is scored as being able to successfully communicate in a situation, even if the speech and language therapist needs to employ many different communication strategies to achieve successful communication. In contrast, each time communication breakdown was observed in the direct observation condition, this was scored as partially successful or unsuccessful. That is, the performance measure actually provided a measure of the number of times communication was observed to breakdown. Communication breakdown is equivalent to the sociolinguistic notion of communication trouble (Ferguson, 1996). Communication trouble is a normal part of everyday communication.
interactions and, perhaps what is ultimately more important to capture in a measure of performance, is whether or not the main ideas are effectively conveyed regardless of the number of repairs that are required (see Ramsberger & Rende, 2002). The significance of the differences between the capacity with assistance measure and the performance measure only became evident during the analysis of the results. Future research is needed to continue to develop these measures so that results from the capacity with assistance measure and the performance measure can be directly comparable.

This study found that approximately half of all stroke patients experienced difficulty communicating their healthcare needs. Patients who have difficulty communicating are at greater risk of an adverse event in hospital (Bartlett, Blais, Tamblyn, Clermont, & MacGibbon, 2008). They are also less satisfied with their healthcare overall (Hoffman et al., 2005). Therefore it is important to understand the range of factors that influence difficulty communicating with healthcare providers in hospital. The presence of a communication-related impairment is one factor that predicts a patient’s difficulty communicating with healthcare providers but it is not the only factor. Understanding the range of other factors that influence difficulty communicating about healthcare needs is necessary to develop effective interventions.

Acknowledgements

This research was conducted as part of the first author’s doctoral research and was funded by an Australian Postgraduate Award. Thanks to Dr Ross Darnell and Dr Asad Khan for their advice on the statistical analysis.
References


Table 1: Example of the analysis of an observed communication interaction between a nurse and a patient.

<table>
<thead>
<tr>
<th>Interaction no:</th>
<th>Speaker</th>
<th>Transcribed notes</th>
<th>Is this an IFCI situation?</th>
<th>IFCI situation</th>
<th>Score/ Total possible score</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1st nurse: Mary</td>
<td>No response</td>
<td>Yes</td>
<td>Gaining the patient’s attention</td>
<td>0/2</td>
</tr>
<tr>
<td>2</td>
<td>1st nurse: I need to check your blood pressure</td>
<td>No response</td>
<td>Yes</td>
<td>Understanding descriptions about what is happening, going to happen, or has happened as they relate to hospital procedures (immediate recall)</td>
<td>N/O</td>
</tr>
<tr>
<td>3</td>
<td>1st nurse: Wake up</td>
<td>No response</td>
<td>Yes</td>
<td>Following instructions</td>
<td>0/2</td>
</tr>
<tr>
<td>4</td>
<td>1st nurse: Squeeze my hand</td>
<td>No response</td>
<td>Yes</td>
<td>Following instructions</td>
<td>0/2</td>
</tr>
<tr>
<td>5</td>
<td>1st nurse: Mary come on</td>
<td>No response</td>
<td>Yes</td>
<td>Gaining the patient’s attention</td>
<td>0/2</td>
</tr>
<tr>
<td></td>
<td>1st nurse:</td>
<td>Lift this arm</td>
<td>No response</td>
<td>Following instructions</td>
<td>0/2</td>
</tr>
<tr>
<td>---</td>
<td>-----------</td>
<td>---------------</td>
<td>-------------</td>
<td>------------------------</td>
<td>-----</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1st nurse asks another nurse to review patient</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>2nd nurse:</td>
<td>Mary! (loudly)</td>
<td>Yes</td>
<td>Gaining the patient’s attention</td>
<td>2/2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>P startled, opens her eyes and looks at nurse</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Patient:</td>
<td>Can you tell me where you are? In bed</td>
<td>No</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>8</td>
<td>2nd nurse:</td>
<td>Can you squeeze my hands for me? Squeezes N’s hands</td>
<td>Yes</td>
<td>Following instructions</td>
<td>2/2</td>
</tr>
<tr>
<td></td>
<td>Patient:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Overall performance score (%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>4/14 (26%)</td>
</tr>
</tbody>
</table>
Key:  N/O Not observed

N/A Not applicable
Table 2: Capacity with assistance rating as measured on the IFCI

<table>
<thead>
<tr>
<th>Capacity with assistance</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>No activity limitation.</td>
<td>32 (49%)</td>
</tr>
<tr>
<td>No difficulty. Communication is successful in all communication situations interviewed (96 – 100%)</td>
<td></td>
</tr>
<tr>
<td>Mild activity limitation</td>
<td>10 (15%)</td>
</tr>
<tr>
<td>Mild difficulty. Communication is successful in most communication situations interviewed (76 – 95%)</td>
<td></td>
</tr>
<tr>
<td>Moderate activity limitation.</td>
<td>7 (11%)</td>
</tr>
<tr>
<td>Moderate difficulty. Communication is successful in more than half of the communication situations interviewed (50 – 75%)</td>
<td></td>
</tr>
<tr>
<td>Severe activity limitation.</td>
<td>10 (15%)</td>
</tr>
<tr>
<td>Communication is successful in less than half of the communication situations interviewed (5-49%)</td>
<td></td>
</tr>
<tr>
<td>Complete activity limitation.</td>
<td>6 (9%)</td>
</tr>
<tr>
<td>Communication is not successful in any communication situations interviewed (0-4%)</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>65 (100%)</td>
</tr>
</tbody>
</table>
Table 3: Performance rating on the basis of direct observation

<table>
<thead>
<tr>
<th>Performance</th>
<th>Number (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>No activity limitation.</td>
<td>29 (45%)</td>
</tr>
<tr>
<td>No difficulty. Communication is successful in all communication situations observed and scored (96 – 100%)</td>
<td></td>
</tr>
<tr>
<td>Mild activity limitation.</td>
<td>22 (34%)</td>
</tr>
<tr>
<td>Mild difficulty. Communication is successful in most communication situations observed and scored (76 – 95%)</td>
<td></td>
</tr>
<tr>
<td>Moderate activity limitation.</td>
<td>9 (14%)</td>
</tr>
<tr>
<td>Moderate difficulty. Communication is successful in more than half of the communication situations observed and scored (50 – 75%)</td>
<td></td>
</tr>
<tr>
<td>Severe activity limitation performance.</td>
<td>3 (5%)</td>
</tr>
<tr>
<td>Communication is successful in less than half of the communication situations observed and scored (5-49%)</td>
<td></td>
</tr>
<tr>
<td>Complete activity limitation performance.</td>
<td>2 (3%)</td>
</tr>
<tr>
<td>Communication is not successful in any communication situations observed and scored (0-4%)</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>65 (100%)</td>
</tr>
</tbody>
</table>
**Table 4: Number of participants with a mild or greater communication-related impairment**

<table>
<thead>
<tr>
<th>Type of impairment (n)</th>
<th>No impairment</th>
<th>Mild impairment</th>
<th>Moderate or more severe impairment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vision impairment (52)</td>
<td>23 (44%)</td>
<td>28 (54%)</td>
<td>1 (2%)</td>
</tr>
<tr>
<td>Hearing impairment (48)</td>
<td>10 (21%)</td>
<td>13 (27%)</td>
<td>25 (52%)</td>
</tr>
<tr>
<td>Speech intelligibility impairment (54)</td>
<td>39 (72%)</td>
<td>8 (15%)</td>
<td>7 (13%)</td>
</tr>
<tr>
<td>Language impairment (60)</td>
<td>34 (57%)</td>
<td>14 (23%)</td>
<td>12 (20%)</td>
</tr>
<tr>
<td>Cognitive communicative impairment (56)</td>
<td>31 (55%)</td>
<td>8 (14%)</td>
<td>17 (30%)</td>
</tr>
</tbody>
</table>
Table 5: Spearman’s correlations between each communication-related impairment and capacity with assistance and performance ratings

<table>
<thead>
<tr>
<th>Communication-related impairment</th>
<th>Capacity with assistance rating</th>
<th>Performance rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>Near Vision</td>
<td>0.322**</td>
<td>0.459**</td>
</tr>
<tr>
<td>Hearing</td>
<td>-0.095</td>
<td>0.239</td>
</tr>
<tr>
<td>Speech</td>
<td>0.321**</td>
<td>0.425**</td>
</tr>
<tr>
<td>Language</td>
<td>0.762**</td>
<td>0.437**</td>
</tr>
<tr>
<td>Cognitive communicative</td>
<td>0.887**</td>
<td>0.572**</td>
</tr>
</tbody>
</table>

**p<0.01
Appendices

Appendix 1: IFCI communication situations (O'Halloran et al., 2004)

1. Gaining the patient’s attention
2. Telling you what has happened to bring them into hospital
3. Understanding the medical diagnosis or reason for admission
4. Understanding the implications of the medical condition
5. Following instructions
6. Expressing feelings
7. Telling you about preadmission medical history
8. Understanding descriptions about what is happening, going to happen, or has happened as they relate to hospital procedures (immediate recall)
9. Asking you questions about their care
10. Telling you about any current medical concerns
11. Telling you about pain or discomfort
12. Asking for something
13. Telling you about what they do/do not like
14. Calling for a nurse
15. Understanding descriptions about what is happening, going to happen, or has happened as they relate to hospital procedures (delayed recall)
Interviewing and scoring a patient’s ability to communicate in the IFCI situation 6: Expressing feelings

In this situation, the interview is investigating whether patients can describe a feeling and provide a reason for feeling that way. Patients may describe how they felt in the past, how they feel at the present or how they might feel in the future and why.

Successful communication (score = 2)

Successful communication occurs when the patient describes a specific emotional state, such as fear, nervousness, worry, relief or joy and describe why they are feeling this way. For example, ‘I never thought I’d be like this (indicating hemiplegic side), it’s awful. I’d rather be dead’ or ‘I was so relieved when my neighbor heard me calling out’. Alternatively, the patient’s ability to communicate in this situation may need to be elicited with communication support, for example:

Interviewer: I understand the doctors have been in to see you earlier and they have given you a bit more information about what’s happened. Now you have had a chance to think about that, is there anything that you are worried or concerned about?

Patient: (points to her neck)

Interviewer: Are you worried about the ultrasound the doctors want to do on your neck?

Patient: (nods)

Interviewer: Are you worried about the actual procedure, or what they might find?
Patient: No (patient gestures to indicate the first thing the interviewer said was correct.)

Interviewer: You’re worried about the actual procedure?

Patient: (nods)

**Partially successful communication (score = 1)**

The patient and interviewer may only be able to partially communicate for different reasons. For example, the patient may be able to communicate a particular emotion, but the interviewer and patient are unable to communicate about why, as occurs in the following manuscript.

Interviewer: Are you worried or concerned about anything?

Patient: yes

Interviewer: What are you worried about?

Patient: (shrugs shoulders)

Interviewer: Are you worried about something in hospital or something at home?

Patient: I suppose

Interviewer: Are you worried about something in hospital?

Patient: No

Interviewer: Are you worried about something at home?
Patient: No

Unsuccessful communication (score = 0)

The patient and interviewer cannot communicate about any of the patient’s emotions or identify why (O’Halloran et al., 2004, pp. 36-37).
Appendix 2: Capacity with assistance and performance rating scales

*Capacity with assistance rating scale*

4 No difficulty  No difficulty. Communication is successful in all communication situations interviewed (96-100%)

3 Mild difficulty  Mild difficulty. Communication is successful in most communication situations interviewed (76-95%)

2 Moderate difficulty  Moderate difficulty. Communication is successful in more than half of the communication situations interviewed (50-75%)

1 Severe difficulty  Communication is successful in less than half of the communication situations interviewed (5-49%)

0 Complete difficulty  Communication is not successful in any communication situations interviewed (0-4%)

*Performance rating scale*

4 No difficulty  No difficulty. Communication is successful in all communication situations observed and scored (96-100%)

3 Mild difficulty  Mild difficulty. Communication is successful in most communication situations observed and scored (76-95%)
<table>
<thead>
<tr>
<th>Difficulty Level</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 Moderate difficulty</td>
<td>Moderate difficulty. Communication is successful in more than half of the communication situations observed and scored (50-75%)</td>
</tr>
<tr>
<td>1 Severe difficulty</td>
<td>Communication is successful in less than half of the communication situations observed and scored (5-49%)</td>
</tr>
<tr>
<td>0 Complete difficulty</td>
<td>Communication is not successful in any communication situations observed and scored (0-4%)</td>
</tr>
</tbody>
</table>
## Appendix 3: Near vision and hearing impairment rating scales

### Hearing impairment rating scale

<table>
<thead>
<tr>
<th>Score</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>No Hearing Impairment. Better ear response at all frequencies at 25dB. Worse ear hearing all frequencies at 45dB or better.</td>
</tr>
<tr>
<td>3</td>
<td>Mild Hearing Impairment. Better ear response at 2 or more frequencies at 25dB and better ear response at all frequencies at 45dB or better.</td>
</tr>
<tr>
<td>2</td>
<td>Moderate Hearing Impairment. Better ear response at 2 or more frequencies at 45 dB and better ear response at all frequencies at 75dB or better.</td>
</tr>
<tr>
<td>1</td>
<td>Severe Hearing Impairment. Better ear response at 2 or more frequencies at 75 dB.</td>
</tr>
<tr>
<td>0</td>
<td>Complete Hearing Impairment. Better ear response less than 2 frequencies at 75dB.</td>
</tr>
<tr>
<td>9</td>
<td>Unable to assess. No consistent response to auditory signal.</td>
</tr>
</tbody>
</table>
Near vision impairment rating scale (Keeffe & Carnicelli, 2000)

4  No visual impairment. Able to see at least 3 of the 4 smallest Es. Able to read newspaper print.

3  Mild visual impairment. Able to see at least 3 of the 4 medium size Es. Able to read large print books. People may experience difficulty with seeing fine detail and small patterns.

2  Moderate visual impairment. Able to see at least 3 of the 4 largest Es. Able to read signs, labels and headings in books and newspapers.

1  Severe visual impairment. Unable to see at least 3 of the 4 largest Es. Unable to read signs, labels and headings in books and newspapers.

9  Unable to assess.