

Title: The development and psychometric investigation of ICF- compatible
speech, spoken language and cognitive communicative impairment rating scales
for adults with acquired neurogenic communication disorders

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Abstract

Speech-language pathologists working in hospitals have limited opportunities to identify patients with newly acquired communication related impairments and to support patients with communication related impairments to communicate their healthcare needs. The International Classification of Functioning, Disability and Health (ICF; WHO, 2001) conceptualises these different roles as within the Body Functions and Structures component and within the Activities and Participation component respectively. The Inpatient Functional Communication Interview (IFCI) is a measure of how well a patient is able to communicate their healthcare needs in hospital. This study investigated whether a speech-language pathologist could conduct the IFCI and have sufficient information to rate a patient's level of communication related impairments, on newly developed speech, language and cognitive communicative rating scales (named the OHW scales) in a reliable and valid way. This research indicated that the OHW scales had strong and significant concurrent criterion validity and significant interrater reliability. However the most important aspect of interrater reliability for the OHW scales was interrater agreement. Interrater agreement was moderately high for the OHW speech and cognitive communicative scales but low for the OHW language scale. Interrater agreement on the OHW language scale requires further investigation.

Introduction

The increase in the number of referrals to speech pathology of patients with dysphagia and the need to prioritise patients with dysphagia over patients with communication related impairments, has meant that speech-language pathologists working in the acute hospital setting have fewer opportunities to meet the needs of patients with communication related impairments (Armstrong, 2003). However it is important that speech-language pathologists continue to identify patients with communication related impairments in hospital for two reasons.

First, the accurate assessment of a patient's newly acquired communication related impairments such as speech, language and cognitive communicative impairments, remains an important contribution to the diagnosis of a patient's medical condition. For example, the diagnosis of stroke remains primarily a clinical one, where it is important to determine if there has been a sudden onset of neurological deficit (Pushpangadan, Wright, & Young, 2005). Therefore, an accurate speech pathology assessment of the nature and extent of a patient's newly acquired communication related impairments is an important contribution to the overall understanding of a patient's neurological deficit following stroke. Secondly, it is also well documented that many patients who have communication related impairments experience difficulty communicating their healthcare needs when they are in hospital (Iezzoni, O'Day, Killeen, & Harker, 2004; O'Day, Killeen, & Iezzoni, 2004; Parr, Byng, Gilpin, & Ireland, 1997; Robillard, 1994). These studies indicate that ineffective communication with healthcare providers can result in patients with communication related impairments receiving inadequate and inappropriate healthcare in hospital and feeling distress and anger. Speech-language pathologists not only need to understand which

communication situations a patient experiences difficulty communicating in, they also need to understand the nature and severity of a patient's communication related impairments in order to identify appropriate communication strategies to support the patient and his and her healthcare providers to communicate as effectively as possible.

The World Health Organisation's International Classification of Functioning, Disability and Health (ICF; WHO, 2001) provides a useful theoretical framework for speech-language pathologists to understand these different roles (McCooley - O'Halloran, Worrall, & Hickson, 2004). Briefly, the ICF proposes that a person's health status can be understood as the result of the dynamic interaction of two parts; a Functioning and Disability part and a Contextual Factors part. Each part consists of two components. The Functioning and Disability part consists of a Body Structures and Functions component and an Activities and Participation component. The Contextual Factors part consists of an Environmental Factors component and a Personal Factors component (WHO, 2001). By separating Functioning and Disability into two separate components, the ICF indicates that a person's functioning and disability may be considered in terms of both a person's body structures and functions, that is, a person's anatomical structures and physiological functioning, which includes a person's speech, language and/or cognitive communicative functions and can also be considered in terms of a person's daily activities and level of participation, which include a person's ability to communicate his or her healthcare needs with healthcare providers in hospital (WHO, 2001). Similarly, by separating the Contextual Factors part into two separate components, the ICF considers that the complete context of a person's life can be described in terms of Environmental Factors, which are aspects of the external environment, such as the physical, social and attitudinal environment that may impact on

a person's health status, and in terms of Personal Factors, the individual characteristics of a person that may impact on his or her health status such as their age, language and previous life experiences (WHO, 2001).

The categories that make up the three components; Body Functions and Structures, Activity and Participation and Environmental Factors can also be described in positive or negative terms.

Where there is a loss or lack in a body structure or function it is described as an impairment.

When no impairment exists, the category of body structure or function of interest is described as having structural or functional integrity (WHO, 2001). Similarly, when a person experiences difficulty executing a particular task or is not fully involved in a situation it is described as an activity limitation or participation restriction respectively. Where there is no activity limitation or participation restriction, the person is described as having full activity and participation. Finally, a factor in the environment that serves to hinder a person's functioning is described as a barrier, whereas an environmental factor that assists a person's functioning is described as a facilitator (WHO, 2001).

If the ICF framework is applied to the role of speech-language pathologists working in the acute hospital setting the different roles of speech-language pathologists become clearer. Speech-language pathologists need to identify patients with newly acquired communication related impairments (described by the Body Functions and Structures component) and support patients who experience difficulty communicating their healthcare needs and participating in their healthcare in hospital, by identifying the communication situations patients have difficulty communicating in (represented by the Activities and Participation component).

Traditionally, speech-language pathologists have administered standardised assessments to identify the presence and severity of a patient's newly acquired communication related impairments (Katz, Hallowell, Code, Armstrong, Roberts, Pound et al., 2000). However, this is not always possible in the acute hospital setting. Factors such as the patient's medical stability, level of fatigue and rapid changes to the person's degree of impairment/s due to spontaneous recovery may mean that results from standardised assessments have little long term value (Holland & Fridriksson, 2001; Marshall, 1997). It can also be practically difficult to administer standardised assessments in the acute hospital setting (Lawrie, 1996). Frequently, acute hospital clinicians also develop their own informal bedside assessments to fill this gap (Katz et al., 2000) but the psychometric properties of these assessments are rarely investigated. Therefore, although speech-language pathologists need to identify and describe patients' communication related impairments in the acute hospital setting in ways that are both reliable and valid, they need to do this in a way that is mindful of the patient's medical condition, the value to be gained by the information and the speech-language pathologist's own limited time.

The Inpatient Functional Communication Interview (IFCI; O'Halloran, Worrall, Toffolo, Code, & Hickson, 2004) is a valid and reliable communication assessment of how well a patient is able to communicate their healthcare needs in 15 typical healthcare situations in hospital. The speech-language pathologist conducts a semi-structured interview with the patient at his or her bedside that usually takes between 25 and 45 minutes to administer. At the end of the interview the speech-language pathologist scores the ability of the patient and speech-language pathologist to successfully communicate in each situation as '2' successful, '1' partially successful, or '0'

unsuccessful. The 15 IFCI communication situations are provided in Appendix 1. The development of the IFCI and a description of the psychometric properties of the IFCI have been provided elsewhere (O'Halloran, Worrall, Code, & Hickson, 2007; O'Halloran, Worrall, & Hickson, 2007).

The IFCI provides clinicians with a way to assess how well a patient is able to communicate his or her needs in hospital (that is, the IFCI is a measure of a patient's communication activity limitation in hospital), but it was not designed to identify the nature or severity of a patient's communication related impairments. However, the clinician does engage the patient in a standardised semi structured interview about different aspects of his or her hospital care and this raised the question; can a speech-language pathologist conduct the IFCI, (a measure of communication activity, part of the Activities and Participation component), and gather sufficient information to rate a patient's speech, language and cognitive communicative impairment (a measure of impairment, part of the Body Structures and Functions component) in a reliable and valid way? If so, then clinicians would have a very efficient and effective way of describing both a patient's ability to communicate about their healthcare needs in hospital and the patient's communication related impairments, in situations where there was no time or opportunity to administer formal standardised speech, language and/or cognitive communicative assessments.

One set of rating scales that could possibly be used to rate a patient's communication related impairments following administration of the IFCI is the Australian Therapy Outcome Measures rating scales (AusTOMs; Perry & Skeat, 2004). The AusTOMs speech pathology scales are outcome measures that have been developed for the Australian context and are modelled on the

Therapy Outcomes Measures (TOMs; Enderby & John, 1997). Like the TOMs, the AusTOMs rating scales are also based on the WHO framework and include six point rating scales of speech, language, voice, fluency, swallowing and cognitive communication that can be described in terms of impairment, activity limitations, participation restrictions and distress/ well being. An initial investigation of the validity of the AusTOMs Speech Pathology scales has reported that the scales have good face validity (Perry, Morris, Unsworth, Duckett, Skeat, Dodd et al., 2004). A further study has investigated the interrater and intrarater reliability of the scales by asking clinicians to read case studies of different clients and rate each client's impairments, activity limitations, participation restrictions and distress/ well being. Investigated in this way, the authors concluded that the AusTOMs adult speech and cognitive communicative impairment scales had adequate interrater and intrarater reliability, but the adult language impairment scale did not (Morris, Perry, Unsworth, Skeat, Taylor, Dodd et al., 2005).

The AusTOMs, like the TOMs, has been designed to be applicable for use with a wide range of paediatric and adult clients across many different kinds of health care settings (Perry & Skeat, 2004). Therefore, the descriptions of each level of communication related impairment are by necessity broad. In considering the current issue, the authors were concerned that there would be 'too great a distance' between the information about a person's ability to communicate their healthcare needs gathered during the IFCI and the broad descriptions of communication related impairment on the AusTOMs, and that this would compromise the validity and reliability ratings in the hospital context. That is, with only the IFCI information, the AusTOMs scales may not provide enough specific information to guide a clinician to rate a person's speech, language and cognitive communicative impairment in a reliable and valid way. This process of evaluating the

outcome measure in relation to the task at hand has been described as ‘evaluating the fit’ (Skeat & Perry, 2008).

Another potential way to rate a person’s communication related impairments would be to use the WHO ICF Body Function qualifier and develop specific speech, language and cognitive communicative impairment rating scales tailored to the present needs. The WHO ICF describes the extent of a person’s Body Function impairment in terms of a qualifier, which is a five point scale ranging from no impairment to complete impairment, as described below.

ICF Body Functions Impairment qualifier (WHO, 2001)

No impairment	(none, absent, negligible,)	0-4%
Mild impairment	(slight, low,)	5-24%
Moderate impairment	(medium, fair,.....)	25-49%
Severe impairment	(high, extreme,.....)	50-95%
Complete impairment	(total,.....)	96-100%

The ICF states that the descriptive terms and percentages used to describe the Body Functions impairment qualifier may provide a guide to calibrating currently available assessments and to developing new assessment measures (WHO, 2001). This very simple impairment rating scale was used to develop specific speech, language and cognitive communicative impairment rating scales that could be completed following administration of the IFCI. A pilot study was conducted and the scales were further modified. These speech, language and cognitive communicative impairment rating scales were collectively referred to as the OHW scales, because they both

reflect the WHO ICF framework and the authors' initials. The OHW scales are included as Appendix 2. This study sought to determine whether the OHW scales were valid and reliable measures of communication related impairment following administration of the IFCI. If they were they might also form useful 'bridging' rating scales for clinicians wanting to collect data using more generic rating scales such as the AusTOMs across the continuum of care.

For the OHW scales to be reliable they need to give consistent scores across different examiners (inter-examiner reliability), across different raters (inter-rater reliability), with the same examiner (intra-rater reliability) and over time (test-retest reliability) (Anastasi, 1988). All these aspects of reliability are important in the evaluation of these scales. As a preliminary investigation into the reliability of these scales this study investigated the inter-rater reliability.

For the OHW scales to be valid measures, they need to measure what they claim to measure (Anastasi, 1988). This can be investigated in a number of different ways. Content related validity involves examining the content of the scale to determine whether it covers a representative sample of the behaviour being measured (Anastasi, 1988). Construct related validity concerns the extent to which a scale measures a theoretical construct and criterion related validity indicates the effectiveness of the scale in predicting a person's performance against a separate independent criterion (Anastasi, 1988). The criterion measure against which the scales' scores are validated may be obtained at the same time, or concurrently. This is referred to as concurrent validity. Alternatively, the criterion measure may be obtained some time in the future. In this situation investigators are interested in how well a person's score on the scale predicts his or her

performance on the criterion measure that will be measured at a later date and this is described as predictive validity (Anastasi, 1988).

The content validity and construct validity of these scales were not investigated further because these scales are not assessments of speech, language and cognitive communicative function, but simply descriptions of the degree of speech, language and cognitive communicative impairment. That is, they consist of very little actual content in themselves to examine. However, as these impairment rating scales were designed to provide speech-language pathologists with a quick estimate of a person's communication related impairments, the concurrent (criterion related) validity of these scales, that is, how well these scales estimate a patient's performance on standardised measures of speech, language and cognitive communicative impairment, was important. Finally, whether a patient's score on these scales was predictive of his or her performance on a measure in the future was not the aim of this study. Therefore this research investigated the concurrent (criterion related) validity of the OHW scales.

In summary, this study aimed to investigate whether a speech-language pathologist could administer the IFCI (a measure of communication activity) and rate a patient's speech, language and cognitive communicative impairment (ratings of impairment) on newly developed OHW scales in a way that was consistent across raters (inter rater reliability) and consistent with a patient's performance on standardised measures of speech, language and cognitive communicative impairment (concurrent criterion related validity).

Method

Participants

Following ethical clearance from Austin Health, Victoria and The University of Queensland, a total of 38 patients receiving inpatient rehabilitation were recruited for this study. Although the OHW scales were designed for use with patients in the acute hospital setting, the psychometric properties of these scales were investigated with patients receiving inpatient rehabilitation. This was because rehabilitation inpatients could be interviewed on the IFCI and were believed to be more able to tolerate the administration of multiple standardised assessments than patients in the acute phase of an illness. Therefore all rehabilitation inpatients with English as their first language and who had a documented history of an acquired neurological impairment, including inpatients with acquired degenerative neurological conditions were approached by a speech-language pathologist employed by the hospital and asked if they would be interested in participating in this research. Only the names of those patients interested in the study were forwarded to the researchers. Information was provided to prospective participants in standard and communicatively accessible formats. Communicatively accessible formats consisted of booklets of picture communication symbols (Mayer-Johnson, 2006) with key sentences that described the main elements of the research study. Rehabilitation inpatients who were willing to participate in the study and demonstrated capacity to consent by correctly answering six questions about the study, consented for themselves. Where patients were willing to participate and demonstrated a capacity to consent to the study but had a documented or evident language and/or cognitive impairment, agreement of the patient's next of kin was also obtained. Where patients were willing to participate but did not demonstrate a capacity to consent, written consent of the patient's next of kin was obtained.

Patients with Parkinson's disease were not recruited to investigate the validity of the OHW speech impairment scale. This was because these patients needed to be assessed on two separate occasions; one to administer the IFCI and a second time to administer the standardised speech assessment. Patients with Parkinson's disease can experience marked fluctuations in their speech impairment over the course of a day due to their medication schedule, and it was believed that these fluctuations might introduce significant error in understanding the relationship between the speech impairment rating scale and performance on the standardised speech impairment measure. In addition participants rated as having a language impairment due to aphasia, were assessed on the standardised language measure but were not assessed on the standardised speech or cognitive communicative measures as it was believed that their language impairment would prevent an accurate assessment of their speech intelligibility and cognitive communicative ability. However participants who were rated as having a language impairment as part of a dementia, were assessed on all standardised measures.

In order to investigate the interrater reliability and concurrent validity across all points of each of the impairment rating scales, it was predetermined that at least 15 participants with a range of different levels of impairment severity would be recruited. Specifically, it was decided that recruitment would include participants where the first rater had rated at least two participants as having no impairment, four participants as having a mild or moderate impairment and four participants as having a severe or complete impairment. These criteria were met for the interrater reliability and the validity studies of the OHW language and cognitive communicative scales, but were not met for the interrater reliability and validity of the OHW speech scale. Although a total of 24 people were recruited to investigate the interrater reliability of the OHW speech scale, and

included six participants rated by the first rater as having mild or moderate speech impairment, only three participants were recruited who were rated as having severe or total speech impairment. In addition, only 13 participants in total were recruited to investigate the validity of the OHW speech scale. Recruiting people with English as their first language, who also had an acquired neurogenic impairment (not Parkinson's disease) resulting in a speech intelligibility impairment but who had the cognitive and visual skills to read aloud sentences from the Assessment of the Intelligibility of Dysarthric Speech (ASSIDS; Yorkston & Beukelman, 1981) proved difficult. This investigation included three who were rated as having a mild to moderate speech impairment and only one as having a severe impairment.

The two speech-language pathologists who participated in the investigation of the interrater reliability of the OHW scales were clinicians with over 15 years experience working with people with acquired neurogenic communication related impairments. They were also familiar with the conceptual framework of the ICF, and the IFCI. Recruitment of participants to investigate the interrater reliability and validity of the OHW scales commenced in March 2007 and continued until the criteria described above had been met. Recruitment for the studies investigating the interrater reliability and the validity of the OHW speech scale continued for 18 months and was concluded in August 2008. Participant details for each investigation are described in detail below in Table 1.

Insert Table 1 here

Procedure

To investigate the interrater reliability of the OHW scales one speech-language pathologist administered the IFCI, and a second speech-language pathologist observed. Following administration of the IFCI both speech-language pathologists independently rated the participant's degree of communication related impairment on each of the OHW scales.

To investigate the validity of the scales, participants were also assessed on one or more standardised measures of speech, language and cognitive communicative impairment within two days of administering the IFCI. The time between administration of the IFCI and the standardised assessments was restricted to a two day period to minimise any effects of recovery and rehabilitation.

The validity of the OHW speech impairment scale was investigated by conducting the Assessment of Intelligibility of Dysarthric Speech (ASSIDS; Yorkston & Beukelman, 1981). The validity of the OHW language impairment scale was investigated with The Aphasia Quotient of the Western Aphasia Battery (WAB AQ; Kertesz, 1982) and the validity of the OHW cognitive communicative impairment scale was investigated by administering the Orientation and Recall subtests of the Scales of Cognitive Ability in Traumatic Brain Injury (SCATBI; Adamovich & Henderson, 1992). These assessments were selected because they were standardised measures of speech, language and cognitive communicative function and also measured aspects of speech, language and cognitive communicative function that could be revealed during administration of the IFCI.

Some participants could not be assessed on some or all of the standardised measures. In seven participants this was due to the severity of their visual impairment. In addition, as described above, three participants rated as having a language impairment due to aphasia, were assessed on the WAB AQ but were not assessed on the SCATBI or the ASSIDS. Finally, two participants did not want to continue with the standardised assessments after administration of one standardised measure. These participants withdrew consent and therefore no further assessments were conducted with these participants.

Statistical analysis

The interrater reliability of the impairment rating scales was explored in two ways. Given that the OHW scales were criterion referenced scales, that is, each level of severity on the scales was described by particular criteria, it was particularly important to investigate whether both raters agreed exactly on the same rating for a participant (Streiner & Norman, 2003). Exact agreement was calculated by determining the point to point agreement between the two raters. Another important aspect of interrater reliability is the degree of association or consistency between the raters when rating participants. Therefore, the weighted kappa statistic was also calculated because it is sensitive to both agreement and association between two raters (Schuster, 2004). The criterion concurrent validity of each of the scales was investigated by calculating the Spearman's correlation coefficient between the participant's score, as rated by the first rater and his/her score on each related standardised measure.

Results

The results of the interrater reliability and concurrent validity of the ICF compatible speech, language and cognitive communicative impairment rating scales are presented in Tables 2 and 3. Weighted kappas calculated to investigate the interrater reliability of the scales indicated that there was statistically significant agreement and association between raters on all the OHW scales, however exact point to point agreement between raters ranged from 39% on the OHW language scale to 72% on the OHW speech scale. Spearman's correlations calculated to investigate the concurrent validity of the scales indicated that there were highly significant correlations between a person's rating on each of the rating scales and their score on the respective standardised measures.

Insert Table 2 about here

Insert Table 3 about here

Discussion

This research indicates that speech-language pathologists can conduct the IFCI (a measure of communication activity) and on the basis of this standardised semi-structured interview rate a patient's communication related impairments (measures of impairments) in a reliable and valid way. Specifically, the OHW speech, language and cognitive communicative scales have strong and significant concurrent validity of 0.82, 0.83 and 0.92 respectively. That is, when a speech-language pathologist administered the IFCI and rated a patient's speech, language and cognitive communicative impairment on the OHW scales, these ratings correlated significantly with the patient's score on the respective standardised assessments.

In addition, this research also indicates that when two raters rate a patient's communication related impairments on these scales, they arrive at the same or very similar ratings. However as described above, the most important aspect of interrater reliability for criterion referenced scales, such as the OHW scales, is that there is a high level of exact agreement between raters. Although there was moderately high absolute agreement between raters on the OHW speech and cognitive communicative rating scales there was poor absolute agreement on the OHW language impairment scale. Despite this low level of absolute agreement, when there was a disagreement between the raters, the first rater consistently rated the patient's language impairment as more severe than the second rater. Because this pattern was consistent, that is, because there was a very high degree of association or correlation between the two raters, the weighted kappa was significant. Interestingly, interrater reliability on AusTOMs language scale was also low (Morris et al., 2005) which might suggest that language function is a particularly difficult function to reliably rate.

In addition, these interrater reliability results may also indicate that there are aspects of the OHW scales that need further development. For example, some disagreement between raters occurred when rating patients on the OHW language and cognitive communicative scales when participants had severe or total impairments and there was very little information about the patient's language and cognitive communicative function on which to base a rating. On these occasions, one rater attempted a rating whereas the other rater did not, resulting in a disagreement. The need for impairment rating scales that are as detailed as possible was a main reason to develop the OHW scales and it would appear that these scales could be made more detailed still. The ICF Body Functions impairment qualifier includes options for 'not specified'

and 'not applicable' and the OHW scales may be improved if a description of how much information is needed before a clinician can make a rating is included.

The low level of interrater agreement between raters on the OHW language scale suggests that this scale in particular needs revising. There are at least three ways this may be achieved. Firstly, there may be an inherent contradiction in the OHW language scale at present. Guidelines for rating a patient on this scale state that, where the rating between a patient's receptive language and expressive language are different, then the overall rating should be based on the lowest rating. However, the guidelines also state that whenever the rater was unsure of the rating, that they should be guided by the overall categories of 'no impairment', 'mild', 'moderate', 'severe' and 'complete impairment' to make a judgement. It became apparent on discussion between the raters that the first rater tended to rely on the first guideline to make a decision whereas the second rater relied on the second. The OHW scale may be improved if these guidelines were more consistent.

Secondly, it also became evident that disagreement between the raters frequently occurred when judging a person's degree of receptive language impairment on the basis of ability to communicate on IFCI item 8: 'Understanding what has happened, is happening or is going to happen'. In developing the OHW language scale, this IFCI item was expected to provide valuable information about a patient's receptive language abilities because the interviewer describes three events that are going to happen to the patient, and then asks the patient questions about this information to check his/her understanding. However, it became apparent during the study that the ability to 'understand what has happened, is happening or going to happen' in hospital does

not simply require that a patient has adequate receptive language abilities but also requires that he or she has sufficient cognitive communicative abilities. That is, in order to communicate successfully in this situation, patients needed to be oriented to the fact that they were in hospital and needed to understand their current medical condition, in order to make sense of the information about what was happening, integrate this information and respond to questions about it accurately. This was clearly demonstrated by participants in the study with a history of dementia. These patients could often follow discrete simple and complex instructions well, but could not integrate new information about what was happening to them in hospital at all. The OHW language scale could be further revised so that a person's ability to communicate successfully or not, in IFCI situation 8, is not used to guide the speech-language pathologist in rating the person's receptive language impairment abilities. A person's ability to communicate in this IFCI situation proved to be a much better indicator of his or her cognitive communicative ability.

Finally, both raters found rating a patient's language impairment particularly problematic when the patient had an evident cognitive communicative impairment secondary to dementia. An understanding of dementia suggests that the patient's language abilities will be broadly commensurate with his or her cognitive communicative abilities, however frequently in the supportive context of a semi-structured conversation, no evidence of the patient's (presumed) language impairment was revealed. Both raters were reluctant to rate a patient with a history of dementia and evident cognitive communicative impairment, as having no language impairment even though that is how they presented during the IFCI. One possible solution to this dilemma would be to rate patients with a history of dementia on the OHW cognitive communicative scale

but score them on the OHW language scale as ‘not specified’. This difficulty highlights the fact that although a patient’s impairments at the body level are related to their level of functional abilities, a patient’s impairments may not be evident at a functional level, particularly in the context of a supportive environment (Reed, Lux, Bufka, Trask, Peterson, Stark et al., 2005) and is a reminder that the OHW scales are attempting to identify and describe patients’ communication related impairments through the lens of a supportive semi-structured interview (communication activity).

The reliability and validity of the OHW scales may also depend on a number of other factors. As described above both the raters were experienced clinicians and familiar with the ICF framework and the conceptual difference between communication related impairments (Body Functions and Structures component) and communication activities (Activities and Participation component). Furthermore both raters trialled conducting/ observing the IFCI and discussed rating patients’ degree of communication related impairment in a small pilot study and this may have served as training for both raters when investigating the interrater reliability of these scales for this research. Finally, the rater who administered the IFCI was also very familiar with conducting this interview as well. Therefore although the OHW scales may be valid and reliable with these raters, further research with regard to the intra and inter examiner reliability and the intra rater reliability of these scales is required to understand how familiar clinicians would need to be with the ICF, the IFCI and the OHW scales in order to rate patients’ communication related impairments on these scales in a valid and reliable way.

Further research is required to investigate the sensitivity of the OHW scales in detecting speech, language and/or cognitive communicative impairment on the basis of the IFCI as well. Again given the supportive context of a semi-structured conversation, it is likely that some patients may communicate without any apparent difficulty on the IFCI about their healthcare needs in hospital and yet have high level language and/or cognitive communicative impairments that are only evident on standardised assessment. Thus, the sensitivity of the OHW scales in detecting the presence of language and cognitive communicative impairment also needs exploration.

Finally, the intrarater reliability of the OHW scales also warrant investigation. As demonstrated by this study and research into the interrater and intrarater reliability of the AusTOMs (Morris et al., 2005), subjective rating of a patient's level of communication related impairment, particularly language impairment is difficult. However, efforts to make rating measures such as these as reliable and valid as possible need to be pursued. Clinicians, government, third party payers and researchers depend on patients' scores on rating scales such as these to make decisions about who benefits from intervention and which interventions are effective and which are not. Yet despite all efforts some aspects of the OHW scales may never be revealed. Although this study indicates that a speech-language pathologist can rate a person's communication related impairments on the basis of the IFCI and that these ratings correlate significantly with patient scores on standardised measures, no patient with aphasia was assessed on either the speech or cognitive communicative standardised measures. This was because it was believed that the patient's aphasia would prevent an accurate assessment of his or her speech and cognitive communicative abilities on the standardised speech and cognitive communicative measures. Therefore although a patient with aphasia may present as having an additional speech intelligibility impairment and/or a cognitive

communicative impairment during administration of the IFCI which can be rated on the OHW scales, the validity of rating a patient with aphasia on the OHW speech and cognitive communicative scales has not and possibly can not be directly assessed on standardised measures.

This research explored whether a speech-language pathologist could conduct a supportive semi structured interview with a patient about his or her healthcare needs in hospital (a measure of communication activity) and through this lens gauge the patient's level of speech, language and cognitive communicative impairment (measures of impairment). These results indicate that this is possible. By conducting the IFCI and describing patients' degree of speech, language and cognitive communicative impairments on the OHW scales, speech-language pathologists may have another way to continue to identify patients with newly acquired communication related impairments as well as assist those hospital patients with communication related impairments who need communication support to be able to communicate their healthcare needs.

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Table 1: Participant details

Measure	Number	Male/ Female	Age range in years	Diagnoses (n)	Speech-language pathologist's ratings (n)
<i>Validity of the OHW speech scale</i>	13	5/8	54-91	Stroke (9) Dementia (1) Brain tumour (1) Multiple neurological co morbidities (2)	No speech intelligibility impairment (9) Mild/moderate impairment (3) Severe impairment (1)
<i>Validity of the OHW language scale</i>	15	4/11	67-90	Stroke (8) Dementia (3) Parkinson's Disease (2) Multiple neurological co morbidities (2)	No spoken language impairment (5) Mild to moderate impairment (4) Severe/total impairment (6)
<i>Validity of the OHW cognitive communicative scale</i>	15	6/9	67-90	Stroke (7) Dementia (4) Parkinson's Disease (2)	No cognitive communicative impairment (7) Mild to moderate impairment (4)

				Multiple neurological co morbidities (2)	Severe/complete impairment (4)
<i>Reliability of the OHW speech scale</i>	24	10/14	54-92	Stroke (11) Dementia (6) Parkinson’s Disease (3) Brain tumour (1) Multiple neurological co morbidities (3)	No speech intelligibility impairment (13) Mild/moderate impairment (6) Severe impairment (3) Unable to rate (2)
<i>Reliability of the OHW language scale</i>	18	7/11	66-92	Stroke (10) Dementia (6) Brain tumour (1) Multiple neurological co morbidities (1)	No spoken language impairment (4) Mild to moderate impairment (4) Severe / complete impairment (10)
<i>Reliability of the OHW cognitive communicative scale</i>	18	7/11	66-92	Stroke (10) Dementia (6) Brain tumour (1)	No cognitive communicative impairment (7) Mild to moderate impairment (4)

				Multiple neurological co morbidities (1)	Severe/complete impairment (7)
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Table 2: Interrater reliability of the ICF compatible speech, language and cognitive communicative impairment rating scales

OHW scales	Absolute agreement on rating, including agreement on whether to rate participant or not rate	Weighted kappa
Speech	17/24 (70.8%)	0.837*
Language	7/18 (39%)	0.766*
Cognitive communicative	13/18 (72.2%).	0.928*

* p<0.0001

Table 3: Concurrent validity of the ICF compatible rating scales

OHW scales	Standardised measure	Concurrent Validity
Speech	Assessment of Intelligibility of Dysarthric Speech (Yorkston & Beukelman, 1981)	0.82*
Language	Aphasia Quotient Western Aphasia Battery (Kertesz, 1982)	0.83*
Cognitive communicative	Orientation and Recall subtests of the Scales of Cognitive Ability in Traumatic Brain Injury (SCATBI; Adamovich & Henderson, 1992).	0.92*

* p< 0.01 level

Appendix 1: IFCI communication situations (O'Halloran, Worrall, Toffolo, Code, & Hickson, 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)

Appendix 2: OHW speech, language and cognitive communicative scales

OHW Speech Intelligibility scale

4	No speech intelligibility impairment	<p>Speech is consistently and completely intelligible in conversation.</p> <p>The listener understands the person’s speech all/ almost all of the time. The listener never or rarely needs to seek clarification. If the listener does seek clarification it is usually for another reason eg the speaker has used an unfamiliar word or phrase, the listener was distracted.</p> <p><i>Although the speaker may have an impairment of one or more of the component parts of speech eg mild hoarse voice quality, mild articulation difficulty, if the person’s speech is consistently and completely intelligible to the listener then the person is rated as having no speech intelligibility impairment.</i></p>
3	Mild speech intelligibility impairment	<p>Speech is mildly unintelligible.</p> <p>Occasionally the listener does not understand the person’s speech (without clarification). Occasionally, the listener needs to seek clarification, such as asking for the speaker to repeat him/herself. The listener understands the person’s speech clarification always/ almost always.</p>
2	Moderate speech intelligibility impairment	<p>Speech is moderately unintelligible.</p> <p>Frequently, the listener does not understand the person’s speech (without clarification).</p> <p>Frequently the listener needs to seek clarification, and may need to repeat what the speaker has said to confirm that they have understood The listener understands the person’s speech clarification about half / more than half of the time.</p>

1	Severe speech intelligibility impairment	<p>Speech is severely unintelligible.</p> <p>Usually, the listener does not understand the person's speech (without clarification).</p> <p>Usually, the listener needs to seek clarification and may need to repeat what the speaker has said to confirm that they have understood. The listener understands the person's speech clarification less than half of the time.</p>
0	Complete speech intelligibility impairment	<p>Speech is completely unintelligible.</p> <p>Rarely or never does the listener understand the person's speech.</p> <p>The listener needs to seek clarification almost all/ all the time. The listener rarely or never understands the person's speech clarification.</p>

OHW Language Impairment scale *

4	No spoken language impairment	<p>Receptively: Understands all spoken language all of the time.</p> <p>Understands all simple and complex instructions.</p> <p>Understands descriptions about what has happened or is going to happen immediately after the explanation is given.</p> <p>Expressively: Expresses self verbally effectively and efficiently all of the time.</p> <p>No evidence of any specific word retrieval or grammatical errors in routine and more complex and novel communication situations. Occasional expressive language errors such as self corrections are within normal limits.</p>
3	Mild spoken language impairment	<p>Receptively: Able to understand spoken language most of the time.</p> <p>Understands all simple instructions. Understands some but not all complex instructions.</p> <p>Understands most of the description (eg 2/3 events/ symptoms) about what has happened or going to happen immediately after the explanation is given.</p> <p>Expressively: Able to express intended message verbally most of the time.</p> <p>Expressive language impairment may not be evident in routine communication situations however mild word retrieval and/or grammatical errors are evident in more novel and/or complex communication situations, such as describing what happened to bring him/her into hospital, expressing concerns and asking questions.</p>

2	Moderate spoken language impairment	<p>Receptively: Able to understand spoken language about half of the time.</p> <p>Understands all simple instructions. Does not understand any complex instructions.</p> <p>Understands some of the description (eg 1/3 events/ symptoms) about what has happened or going to happen immediately after the explanation is given.</p> <p>Expressively: Able to express intended message verbally about half of the time.</p> <p>Expressive language impairment is evident in most routine communication situations and all novel and complex communication situations. Expressive language impairment includes word retrieval errors, paraphasic errors, word omissions and grammatical errors. Utterances are significantly reduced in length and grammatical complexity.</p>
1	Severe spoken language impairment	<p>Receptively: Able to understand spoken language occasionally / less than half of the time.</p> <p>May understand some but not all simple instructions. Does not understand any complex instructions.</p> <p>Does not demonstrate any understanding of any part of the description about what has happened or going to happen immediately after the explanation is given.</p> <p>Expressively: Able to express intended message occasionally/ less than half of the time.</p> <p>Expressive language impairment is evident in all attempts to verbally communicate. Expressive language is marked by delays in word retrieval, paraphasic errors or word omissions. Expressive language is severely reduced in length and complexity.</p>

0	Complete spoken language impairment	<p>Receptively: Unable to understand any spoken language or does so very rarely.</p> <p>May or may not recognise name.</p> <p>Does not follow any simple instructions or complex instructions.</p> <p>Does not demonstrate understanding any of the description about what has happened or going to happen immediately after the explanation is given.</p> <p>Expressively: Unable to express intended message verbally in any way, or does so very rarely. Attempts at verbal expression may be characterised by perseveration of a phrase, single word or sound. May vocalise to express self, for example to get attention, express frustration.</p>
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* Note 1: When a person has a moderate or more severe speech impairment, his/her speech may not be intelligible enough to determine whether there is also an expressive language impairment. In this circumstance the person’s overall spoken language impairment is rated according to the person’s receptive language impairment.

*Note 2: In all other circumstances, where there is a discrepancy within a person’s receptive and expressive language impairment or between a person’s receptive language and expressive language rating, the person is rated according to the more severe impairment.

OHW Cognitive-Communicative Impairment (CCI) scale

4	No CCI	<p>Alert</p> <p>Responsive</p> <p><u>Attends in conversation</u> Eg Consistently attends in the conversation, only gets distracted if someone directly interrupts or there is an unexpected event, eg loud trolley crash</p> <p>Oriented Eg. Recognises their name, knows they are in hospital</p> <p><u>Demonstrates complete insight into the present situation and the possible future implications of the situation</u> Eg Has full insight into the present difficulties he/she is having. Has full insight into the possible future implications of these difficulties eg on his/her functioning in the future, the support he/she may require and/or the level of care he/she may need.</p> <p><i>The following guidelines are only applicable for people who do not have a specific language impairment:</i></p> <p><u>Recalls all information accurately immediately and after a delay</u></p> <ul style="list-style-type: none"> • Able to recall accurately what happened to bring him/her into hospital, or if he/she can't remember and wants to know, he/she can accurately recall the explanation given immediately and after a delay. • Follows all simple and complex commands. • Accurately recalls his/her preadmission medical history. • Able to accurately recall explanations about what is going to happen (by retelling or responding to questions) both immediately and after a delay. <p>These cognitive processes fully support all communication situations. To be rated as having no cognitive communicative impairment, the person must demonstrate most/ all of the above abilities and have no behaviours that describe people with mild, moderate, severe or total cognitive communicative impairment.</p>
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3	Mild CCI	<p>Alert</p> <p>Responsive</p> <p>Attends to conversation most of the time. Usually attends in conversation but may get distracted by irrelevant background noise or activities occasionally.</p> <p>Oriented Recognises name, knows he/she is in hospital</p> <p><u>Demonstrates insight into present situation and partial insight into the future implications of this situation.</u> Has full insight into the present difficulties he/she is having. May have incomplete insight into all of the implications for the future, eg may be aware he/she needs hoist transfer but not aware of the implications of this in terms of the level of support and care he/she would need if at home.</p> <p><i>The following guidelines are only applicable for people without a specific language impairment:</i></p> <p><u>Recalls all information accurately immediately and some information accurately following a delay.</u></p> <ul style="list-style-type: none"> • Able to recall accurately what happened to bring him/her into hospital, or if he/she can't remember and wants to know, he/she can accurately recall the explanation immediately. May have incomplete recall of this information after a delay. May be aware that he/she has not recalled all the information. May acknowledge that he/she has forgotten but does not confabulate. • Follows all simple instructions. Follows some complex instructions. May be aware that he/she has not carried out the complete instruction. • Able to accurately recall explanations about what is going to happen by retelling or responding to questions immediately. May have incomplete recall of this information after a delay. May be aware that he/she has not recalled all the information. May acknowledge that he/she has forgotten but does not confabulate. <p>These cognitive communicative processes support most daily communication situations. To be rated as having a mild cognitive communicative impairment the person must have at least one underlined behaviour in this category.</p>
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<p>2</p>	<p>Moderate CCI</p>	<p>Alert</p> <p><u>Responsive but may be delayed at times.</u> Responsiveness is mildly delayed consistently or may be mildly to moderately delayed occasionally</p> <p>Attends to conversation most of the time. Usually attends in conversation but may get distracted by irrelevant background noise or activities occasionally.</p> <p>Oriented Recognises his/her name, knows he/she is in hospital</p> <p><u>Demonstrates partial insight into his/her present and possible future situation.</u> Demonstrates incomplete insight into the present difficulties he/she is having, and incomplete or no insight into the implications for the future, eg food spilled all over self but denies trouble feeding self, takes a large amount of medication but denies any health problems / conditions, requires assistance to walk but feels will be ok once gets home.</p> <p><i>The following guidelines are only applicable for people without a specific language impairment</i></p> <p><u>Recalls most information accurately immediately and some or no information accurately after a delay</u></p> <ul style="list-style-type: none"> • Given an explanation about what happened to bring him/her into hospital, he/she can accurately recall 2/3 events or symptoms in the explanation immediately. May have incomplete or no recall of this information after a delay. May confabulate responses. • Carries out some simple instructions. May carry out part of complex instructions and may not be aware that he/she has not completed the whole instruction. • Able to accurately recall 2/3 pieces of information about what is going to happen immediately but little or no recall of this information after a delay. May confabulate responses. <p>These cognitive communicative processes support about half of all daily communication situations. To be rated as having a moderate cognitive communicative impairment the person must have at least one underlined behaviour in this category.</p>
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1	Severe CCI	<p><u>Mostly alert.</u> May need rousing to become more alert at the beginning of the interview and may require additional rousing occasionally during the interview to stay awake.</p> <p><u>Mostly responsive</u> Usually responds but there may be moderate to severe delays before any response. Occasionally may not respond at all.</p> <p><u>Attends to conversation some of the time.</u> May need to frequently regain person’s attention during the interview</p> <p><u>Partially oriented</u> Recognises his/her name, not aware that he/she is in hospital</p> <p>Demonstrates minimal or no insight into present situation or possible future implications of this situation. Demonstrates little or no insight into present difficulties, and no insight into the implications for the future. May deny presence of impairments.</p> <p><i>The following guidelines are only applicable for people without a specific language impairment</i></p> <p><u>Recalls some information accurately immediately and some or no information accurately after a delay</u></p> <ul style="list-style-type: none"> • Given an explanation about what happened to bring him/her into hospital, he/she can accurately recall at least one piece of information immediately. May confabulate some responses. • May follow some simple instructions only. Unable to follow any complex instructions. • Able to accurately recall at least one piece of information about what is going to happen immediately. May confabulate some responses. <p>These cognitive communicative processes support less than half of all daily communication situations. To be rated as having a severe cognitive communicative impairment the person must have at least one underlined behaviour in this category.</p>
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<p>0</p>	<p>Complete CCI</p>	<p><u>Occasionally/ rarely alert.</u> May need rousing to be alert at the beginning of the interview and may require frequent/ continual rousing during the interview to stay awake.</p> <p><u>Occasionally responsive</u> Usually person does not respond, occasionally he/she may respond after a very long delay.</p> <p><u>Occasionally attends to conversation.</u> Attends to conversation for short periods of time.</p> <p><u>Minimal/ no orientation</u> Does not demonstrate recognition of name</p> <p>Demonstrates minimal or no insight into present situation or possible future implications of this situation. Demonstrates little or no insight into present difficulties, and no insight into the implications for the future.</p> <p><i>The following guidelines are only applicable for people without a specific language impairment</i></p> <p><u>No recall of any information immediately or after a delay</u></p> <ul style="list-style-type: none"> • Given an explanation about what happened to bring him/her into hospital, he/she does not respond accurately to any questions about this information immediately. • Does not follow any simple instructions. • Unable to accurately recall any information about what is going to happen immediately. <p>These cognitive communicative processes rarely support any daily communication situations. To be rated as having a total cognitive communicative impairment the person must demonstrate some of the above behaviours and no behaviours that describe people with no, mild, moderate or severe cognitive communicative impairment.</p>
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