



Assessments and Outcome Measures for The Management of Patients with Dysarthria: A Scoping Review

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Abstract:

This is a scoping review for the specific purpose to ascertain the availability of assessment and patient-reported outcome measurements (PROM) tools for dysarthria. Five databases were searched extensively using keywords related to dysarthria assessment and PROM i.e., PubMed, CINAHL, ProQuest, Springer, and Scopus. The articles were screened at the title, abstract and full text levels. The data was descriptively analysed to create a map of the available evidences, based on the eligibility criteria e.g., paper must be in English published within 1980-2018 involving patients. Seventy-three studies met the inclusion criteria 35.62% (n=26) utilised formal assessments for dysarthria, whereas 64.38% (n=47) used informal assessments. In terms of outcome measurement tools, 46.57 % (n=34) of the studies used these assessment tools whereas 53.43% (n=39) of the studies did not use any of these tools. The Assessment of the Intelligibility of Dysarthric Speech (ASSIDS) and Frenchay Dysarthria Assessment (FDA) were the most frequently used assessment tools. The FDA-2 has been validated for participants with dysarthria in the European-Portuguese version. The Dysarthria Impact Profile (DIP) and the Voice Handicap Index (VHI) were the most frequently used PROMs. It was discovered that the DIP is validated and not the VHI for dysarthria patients. Additionally, the DIP has been validated for dysarthria in French and European Portuguese. The number of validated assessment and PROM tools are limited, however, those that are accessible have been demonstrated to have high validity and might be adapted for use in different languages.

Keywords: Scoping review, dysarthria, Patient Reported Outcome Measure (PROM), assessment, dysarthria



Introduction:

Dysarthria refers to a group of motor speech disorders that result from a disturbance in neuromuscular control affecting respiration, phonation, resonance, articulation, and prosody (Pam Enderby, 2013). Although the “gold standard” for clinical dysarthria assessment is the auditory perceptual assessment (Bunton et al., 2007), assessments for dysarthria may vary from having a brief conversation with the patient, perceptual assessments, to carrying out complete clinical assessment (Wannberg et al., 2015). To establish a differential diagnosis, the assessments may cover all aspects of speech production, the severity of dysarthria, management, and assessment of functional change in dysarthria (Bunton et al., 2007; Wannberg et al., 2015). The assessment and management of dysarthria are usually conducted by a Speech-Language Pathologist (SLP). It has been found that formal and informal assessments have been used among practising SLPs in assessing patients with dysarthria. Most SLPs in the United Kingdom use the Frenchay Dysarthria Assessment (FDA; Enderby, 1980) and Robertson Dysarthria Profile for formal assessment (Collis & Bloch, 2012). While in Saudi Arabia, most SLPs used informal assessments and non-standardised translated versions of the FDA (Khoja, 2019). Meanwhile, in a survey in Australia among SLPs in managing non-progressive dysarthria, most of the respondents assess at least one speech subsystem when working with patients with non-progressive dysarthria (Rumbach et al., 2019). The studies from these three countries showed different practices in different settings and countries.

Apart from assessment, the approaches used to monitor progress have changed, i.e., from the treatment plan to various outcome scales. These include checklists for tracking therapy progress, effectiveness, and outcomes (Walton, 2012). Patient-reported outcomes (PROM) tools potentially benefit patients since they may assess patients' perceptions of their condition and therapy (Arpinelli & Bamfi, 2006). In the future, PROMs will play a greater role in clinical treatment of patients than other clinical and physiological outcomes tools (Deshpande et al., 2011; Øvretveit et al., 2017), as PROMs assess patients' views of their overall health or health related to a specific condition (Kingsley & Patel, 2017). There are three reasons reported in the literature for the implementation of PROMs: i) Patients are the best judges of the impact of their treatment on their pain, function, symptoms, and quality of life; ii) PROMs are a valuable support for patient-centred care; iii) Systematic collection of PRO data informs efforts to improve quality and safety. Thus, PROMs will

become the key to providing an excellent service to patient-centred care (Kingsley & Patel, 2017).

A survey by American Speech and Hearing Association (ASHA) found that SLPs in rehabilitation hospitals used outcome measures most frequently compared to other settings such as general medical hospitals, outpatient clinics, or paediatric hospitals (American Speech-Language Hearing, 2013), and that might be because of the limitation of the validated therapy outcome tools available for allied health professionals (Perry et al., 2004).

The following are the research questions for this study:

1. What are the assessments and patient-reported outcome measure (PROM) tools for patients with dysarthria available in the literature?
2. Were the adapted assessments and PROM tools validated for patients with dysarthria?

Materials and Methods:

Overview

Assessment and outcome measurement tools used in dysarthria management were explored by using a scoping review guided by Arksey and O'Malley (2005) and Peters et al., (2015). The protocol for scoping review was created to guide the process.

Search strategy and keywords

An extensive search of the published studies was conducted using two steps. First, a preliminary search using Google search engine and keywords “dysarthria”, “dysarthria assessment”, “outcome measure”, and “cross-cultural validity and reliability testing” was conducted. The initial search resulted in few papers related to dysarthria. Second, the keywords contained in the title and abstract of the papers were analysed. The finalized keywords for search strategy are (“dysarthria” OR “non-progressive dysarthria” OR “acquired dysarthria”) AND (“scale” OR “assessment” OR “severity”) AND (“self-assessment” OR “outcome” OR “psychosocial” OR “patient-reported outcomes” OR “quality of life”) AND (“reliability” OR “validity” OR “cross-cultural comparison”). A second search using all the identified keywords has been done through five databases (i.e., PubMed, CINAHL, ProQuest, Springer, and Scopus) via the IIUM library portal and gathered a list of titles together with abstracts.

Inclusion criteria

The eligible criteria for the sources (i.e., participants, concept, and context of the study) were decided based on the guidelines by Peters et al. (2015). First, the types of participants in the studies were either related to the following conditions: a) adults who were diagnosed with dysarthria; or, (b) participants with a medical condition that was related to motor speech disorder; or, (c) the participants of the studies had any disorder related to a motor speech disorder. Second, the concept of the studies, i.e., the studies must include the usage of any assessment or outcome measures for dysarthria. Finally, the context of the studies was the studies were published in English; dated between the year 1980 to February 2018, and involved only real patients. All studies included were primary research studies only. Articles were excluded if they were published in other languages than English. Any abstract paper, review paper, short report, or conference report were excluded.

Data extraction

Two steps of screening of previously published papers were involved in the study selection phase: "title screening" and "abstract screening". Both steps were conducted by two reviewers independently. The screenings were conducted based on the eligibility criteria listed above. Any discrepancies in the study selection decisions were discussed via phone and email until consensus was reached among the reviewers. After the abstract screening, the full texts of the studies were obtained via the IIUM Library portal or from the authors of the studies if the

full texts were unavailable online.

Data charting

The data extracted from the full texts were recorded onto an excel document. The data included were (a) the name of the author(s); (b) year of publication; (c) study location; (d) intervention type, comparator (if any) and duration of the intervention; (e) study populations (carer group; care recipient group) and the number of participants; (f) methodology; (g) assessment tool; (h) outcome measures; (i) intervention (if available); (j) translation and adaptation process (if available); and (h) any validation processes involved in the studies.

Results:

Eligible studies

The total number of titles generated from the databases was 701 titles. These titles were first screened by two researchers independently. Among these 486 titles were excluded due to the eligibility criteria and 212 titles were included in the abstract screening. From the abstract screening, 131 abstracts were further excluded. Therefore, the total articles left for full-text retrieval were $n=81$. From the full-text to be searched eight more articles were found to be not eligible. Among this non-availability of full-text ($n=1$), a review paper and not primary research study ($n=1$), and the studies were not for dysarthria patients ($n=6$), therefore leaving only $n=73$ papers for further analyses. The Figure 1 summarises the flow of the identification of the eligible studies.

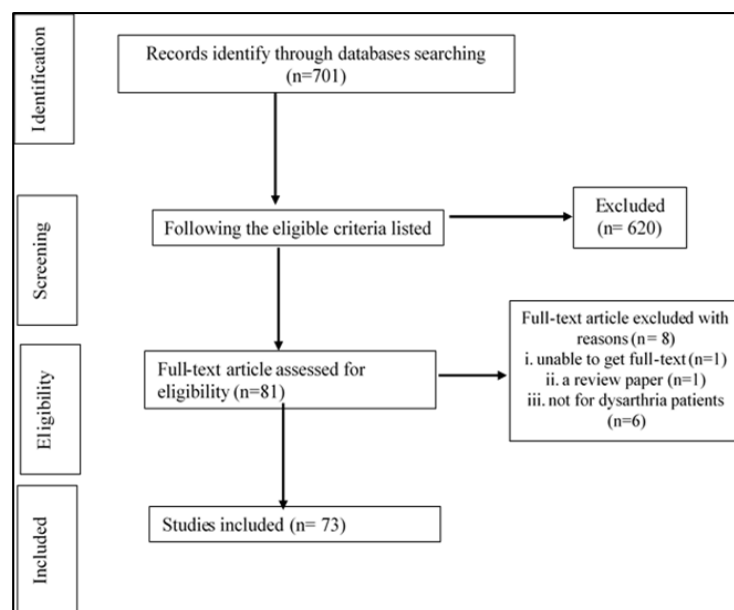


Figure 1 Flow chart for the identification of the eligible studies

Articles features

The 73 unique articles from five databases, published from 1998-2018. From these studies 35.62% (N=26) used formal assessment for dysarthria, and 64.38% (N=47) used informal assessment. For outcome measurement tools, only 46.57% (n=34) studies used outcome measurement tools in their study, and 53.43% (n=39) studies did not include any outcome measurement tools. From the thirty-four studies with outcome measurement tools, 21 studies used responses from patient-reported outcome measure (PROM), and the rest 13 studies used other types of outcome measurement tools.

The first authors of included articles represented 19 different countries. The highest numbers were the United State of America (28.77%; [21/73]), Australia (17.81%; [13/73]), and the United Kingdom (15.07% [11/73]). The lower numbers were France (n=5), The Netherlands (n=3), Belgium (n=3), Italy (n=2), Czech Republic (n=2), Portugal (n=2), Sweden (n=2). The rest were one article from the following countries, i.e., Austria, Canada, Croatia, Cuba, Germany, Ireland, Japan, Republic of Korea, and Poland.

Availability of the standardised assessment tools for dysarthria

As aforementioned, 26 studies (35.6%) used formal assessment for dysarthria in their study, either one or two assessment tools per study. The findings showed the most frequently used standard assessment tool was Assessment of the Intelligibility of Dysarthric Speech (ASSIDS; Yorkston et al., 1984). The Figure 2 showed the number of studies that used the formal assessment tools for dysarthria in their studies. The Assessment of the Intelligibility of Dysarthric Speech (ASSIDS; Yorkston et al., 1984) was used in seven studies on its own and was pair with the Dysarthria Rating Scales (DRS; Yorkston, Beukelman, Strand, & Bell, 1999) and the Sentence Intelligibility Test (SIT; Yorkston, Beukelman, & Tice, 2011) in one study. The Frenchay Dysarthria Assessment (FDA) (Enderby, 1980) was used in five studies alone and in four research in conjunction with other assessment methods. Other assessments tools were Radboud Oral Motor Inventory for Parkinson’s Disease (ROMP) (Kalf et al., 2011), Robertson Dysarthria Profile (RDP), Radboud Dysarthria Assessment (RDA) (Knuijt et al., 2018), Dysarthria Rating Scale (DRS), Adapted Dysarthria Score (ADS) (Eigentler et al., 2012) and European Portuguese version of Frenchay Dysarthria Assessment (EP-FDA) (Cardoso et al., 2017).

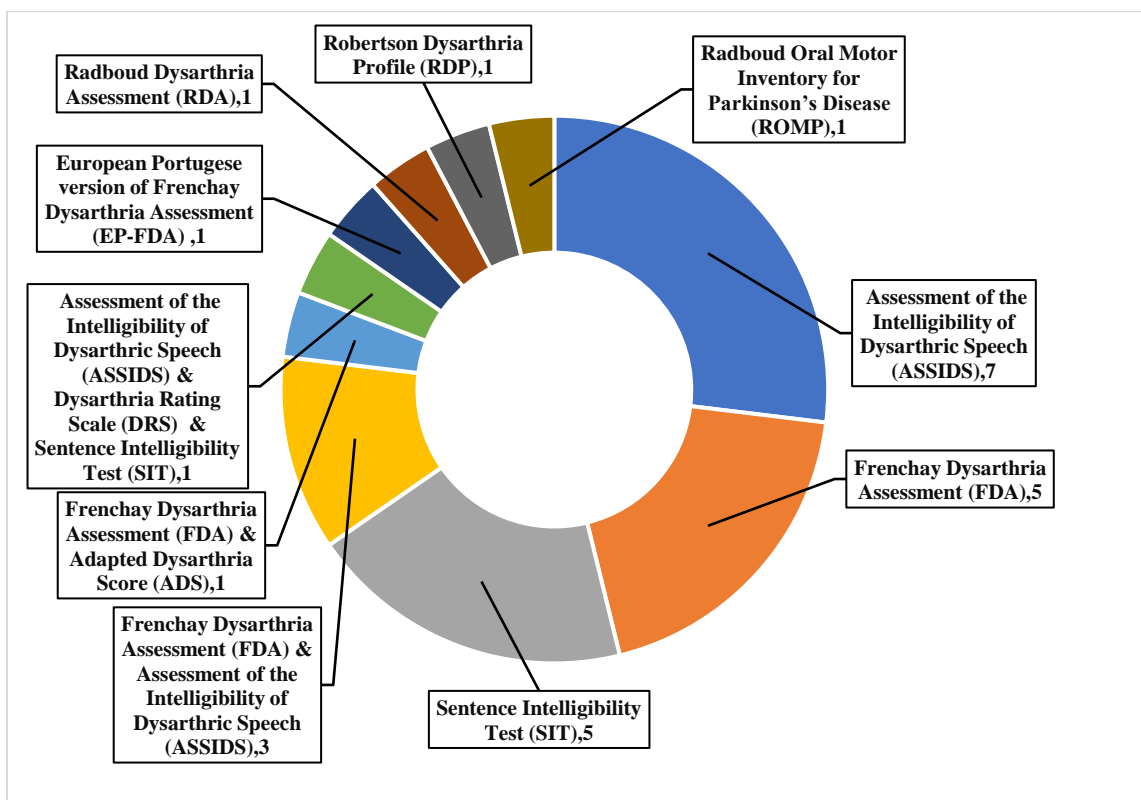


Figure 2 Formal assessment tools recurrence in previous studies with dysarthria participants.

Adapted dysarthria assessment in other languages

From the analysis, one assessment tool was adapted from English to another language and validated for participants with dysarthria. The tool is the FDA and was adapted into the European Portuguese version of the Frenchay Dysarthria Assessment (EP-FDA) (Cardoso et al., 2017). The EP-FDA has undergone a standardisation process and was validated to be used with dysarthria patients. Based on the studies, EP-FDA was adapted from Frenchay Dysarthria Assessment 2nd edition (FDA-2) and was proven to have good validity to be administered for patients with dysarthria. The EP-FDA has been reported as has high reliability of the total score (0.94), an excellent inter-rater agreement for the total score (0.96), and moderate to large construct validity for 81 % of its items (Cardoso et al., 2017).

Availability of standardised patient-reported outcome measure (PROM) for dysarthria

From the total of 73 studies, 39 studies did not use any outcome measurement tools. Only 34 studies used outcome measurement tools which consist of formal (n=29) and informal (n=5) measurement tools. From the 29 studies that used formal outcome measurement tools, only 25 studies used patient-reported outcome measurement tools that were validated for communication, voice, and dysarthria.

About 12 patient-reported outcome measure (PROM) tools were identified among the 25 studies. The 3 showed the most frequent tools used as PROMs from the previous studies. The Dysarthria Impact Profile (DIP; Walshe et al., 2009) was the most frequent outcome measurement tool used by researchers, i.e. (n=6/25), followed by the Voice Handicap Index (VHI; Jacobson et al., 1997) in English version (n=5/25), the Communication Outcomes After Stroke (COAST; Long et al., 2008) scale (n=4/25), followed by the Communication Effectiveness Survey (CES; Donovan et al., 2008) (n=2/25). The rest of the PROMs only occurred once each among the studies.

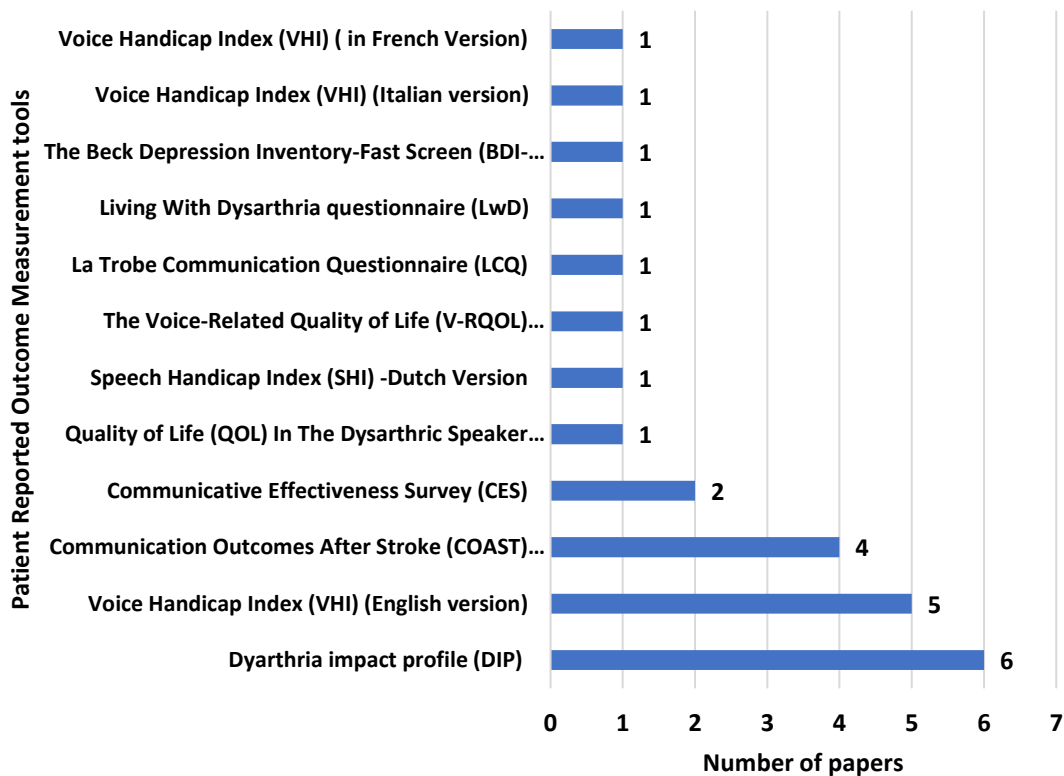


Figure 3 Patient-Reported Outcome Measurement tools recurrence in previous studies with dysarthria participants.

PROM tools validated for dysarthria

Although the PROM tools have been used in previous studies with dysarthria, only four (4) PROM tools

were validated for dysarthria participants. The Table 1 shows the PROMs that have undergone adaptation and validation from English to other languages. The tools that were validated in English for dysarthria

participants were the DIP, the COAST Scale, the CES, the QOL-DYS, and the LWD. While the BDI-FS and VHI were not validated for dysarthria.

Table 1 The validated PROMs and adapted to other languages.

PROM tools& Authors	Types of participants Validated for	Adapted and validated to another language
Dysarthria Impact Profile (DIP)	Dysarthria	French & European Portugese
Voice Handicap Index (VHI)	General Voice	Italian & French
Voice Handicap Index (VHI) (Italian version)	General Voice	No
Voice Handicap Index (VHI) (in French Version)	General Voice	No
Communication Outcomes After Stroke Scale (COAST)	Aphasia and Dysarthria	No
Communicative Effectiveness Survey (CES)	Dysarthria	No
The Beck Depression Inventory-Fast Screen (BDI-FS; Beck, Steer, & Brown, 2000)	Stroke	No
Quality of Life in the Dysarthric Speaker (QOL-DyS; Piacentini et al., 2011).	Dysarthria	No
Living With Dysarthria (LWD; Hartelius et al., 2008),	Dysarthria	No

The PROM tools adapted to other languages

There were only two PROMs that were adapted to other languages i.e., the DIP and VHI. However, there were no articles on the validation of VHI for dysarthria participants. Besides, the DIP was adapted to French and European Portuguese and was validated for participants with dysarthria. Table 3 showed the

validation details of the DIP into French and European Portuguese (EP). Both versions of the DIP showed a high correlation with VHI i.e., good convergent validity. While the DIP in French has been proved to be able to discriminate patients with Parkinson's Disease with and without dysarthria ($\chi^2 = 176.6$, $df = 4$, $P < 0.05$). Anyhow, there were no details in discriminant validity for the DIP in EP language.

Table 2 The PROM has undergone adaptation and validation to other languages.

Authors	PROM	Translated and adapted to	Convergent Validity	Discriminant validity
Letanneux, Walshe, Viallet, & Pinto (2013)	DIP	French version of DIP	High correlation with VHI (Spearman's $r = -0.70$, $P < 0.01$).	Discriminant with participants with Parkinson's Disease ($\chi^2 = 176.6$, $df = 4$, $P < 0.05$)
Cardoso et al. (2018)	DIP	European Portuguese version of DIP	Convergent validity with Voice Handicap Index; Spearman's $P = -0.8$	No information

Discussion:

This scoping review findings showed the assessment and outcome measurement tools used in the previously published studies related to dysarthria patients. The findings showed that most of the studies used informal assessments rather than formal assessments for dysarthria in their research.

Assessment of Dysarthria

Standard assessments for dysarthria have been used in different studies for dysarthria worldwide, and most are available in the English version. These scoping review findings are similar to a study by Altaher et al. (2019) which has identified the FDA, ASSIDS, VHI, and DIP as the most commonly used assessments for dysarthria (Altaher et al., 2019). In this scoping review, the FDA-2 and ASSIDS are found to be the most popular assessment tools for dysarthria. This is probably due to both tools are meant to be clinically diagnostic, and clinicians will be able to determine the severity and type of dysarthria (Enderby, 2008). The FDA-2 and ASSIDS either have been used individually in a study or together with other formal assessment tools.

Patient-reported outcome measure (PROM) of Dysarthria

The PROMs are used in studies without validation. The studies indicate that PROMs for dysarthria is still not commonly used, although it has been proven to be valid for patients with dysarthria (Pascoal et al., 2018 and Pascoal et al., 2018). It was found that studies from the year 2008 until 2019 that related to PROM were available online, but were limited in number. The DIP was produced specifically for dysarthria participants and was adapted into French and European Portuguese. The translated DIP showed good validity and have good use. While for the VHI, although it was not validated for dysarthria, it was commonly used in previous studies on dysarthria possibly due to it being a 'gold standard' self-perception tool, albeit for voice (Kasper et al., 2011).

Conclusion:

The two most widely used FDA-2 and ASSIDS tools have good validity and were created for patients with dysarthria. Both assessment tools also have been used in research worldwide and adapted to other languages. However, there are limited outcome measurement tools in research so far, and limited choices of validated PROM are available online. The DIP and VHI are the common outcome measuring

tools in use. Furthermore, the tools are available in English and might be adapted into other languages.

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