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Susan H. Lin

MGH Institute of Health Professions - USA, susanlinot@gmail.com

Pamela R. Bosch

Northern Arizona University - USA, Pam.Bosch@nau.edu

Veronica T. Rowe

University of Central Arkansas - USA, vrowe@uca.edu

Susan E. Fasoli

Massachusetts General Hospital Institute of Health Professions - USA, sfasoli@mghihp.edu

Jeanne Langan

University at Buffalo SUNY - USA, jlangan@buffalo.edu

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Use of Standardized Assessments and Online Resources in Stroke Rehabilitation

Abstract

Background: The extent to which movement-related standardized assessments and online resources are used in stroke rehabilitation is unclear in the United States.

Method: The researchers used a cross-sectional descriptive survey that examined (a) therapists use of movement-related standardized assessments, (b) factors influencing learning of new assessments, and (c) use of frequency of online resources by occupational therapists and physical therapists in the United States.

Results: Of 151 respondents (46.4% occupational therapists, 53.6% physical therapists), the most frequently used movement-related assessments by occupational and physical therapists were the Berg and Fugl-Meyer Assessment, respectively. More physical therapists use motor-related standardized assessments regularly than occupational therapists, and physical therapists showed more consensus among standardized assessments. Both professions cited quality of patient care for motivating them to integrate outcome measures into practice. Most therapists in stroke rehabilitation used online resources to access movement-related standardized assessment content at least 25% of the time. The Rehabilitation Measures Database was the most frequently used website.

Conclusion: Both occupational and physical therapists use online resources for movement-related standardized assessments on a regular basis. However, occupational therapists do not use standardized assessments as frequently as physical therapists. A systematic study of factors that impact the integration of standardized assessments is needed to further identify barriers and inform clinical practice change.

Comments

The authors report that they have no conflicts of interest to disclose.

Keywords

assessments, movement, occupational therapy, outcome assessment, physical therapy, stroke

Credentials Display

Susan H. Lin, ScD, OTR/L, FAOTA; Pamela Rogers Bosch, PT, DPT, PhD; Veronica Rowe, PhD, OTR/L, FNAP; Susan Fasoli, ScD, OTR/L; Jeanne Langan, PT, PhD

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Although many stroke survivors suffer from impaired motor skills and functional abilities, stroke remains a leading preventable cause of disability (Benjamin et al., 2018). Best evidence-based practices to address movement challenges of individuals poststroke specify the use of standardized assessments (Duncan et al., 2005; Intercollegiate Stroke Working Party, 2012). Standardized patient assessment data can inform clinical decision-making for treatment planning with stroke survivors (Intercollegiate Stroke Working Party, 2012; Jette, Halbert, Iverson, Miceli, & Shah, 2009) and serve as objective measures of patient progress and intervention effectiveness (Burton, Tyson, & McGovern, 2013; Duncan, Jorgensen, & Wade, 2000). Furthermore, administration of standardized assessments at admission has been shown to positively influence postacute discharge recommendations for stroke survivors by facilitating efficient care coordination and continuity of therapies (Bland et al., 2015).

Although standardized assessments to address movement issues of stroke survivors are widely recommended, research indicates that these assessments are underused by therapists (Burton et al., 2013; Jette et al., 2009; Maribo, Nielsen, & Nielsen, 2016). Thus, many online resources have been developed by organizations, professional associations, and government agencies in the US to encourage the use of standardized assessments. While these online databases offer excellent information regarding movement-related standardized outcome measures, little is known about the extent to which occupational therapists and physical therapists use these resources.

This paper will briefly review the literature on the use of standardized assessments in stroke rehabilitation and online resources related to movement-based standardized assessments. The central aims of this study were twofold: (a) to determine use of movement-related standardized assessments by occupational and physical therapists practicing in stroke rehabilitation in the US and (b) to examine the frequency of using online resources to access information about movement-related assessments.

Use of Standardized Assessments

Standardized assessments are formal tests that are administered and scored in the same way to all patients and provide objective data to determine a patient's abilities and level of functioning (Griswold, 2014). Most of the research about the use of standardized assessments by occupational and physical therapists in stroke rehabilitation stem from countries outside of the US with varied outcomes. A survey of health care professionals and service managers in stroke services across a large United Kingdom county revealed that 96% of clinical respondents used at least one measure; the mean number of tools used was 3.2 ($SD = 1.9$) (Burton et al., 2013). However, less than half of the respondents used measures regularly, calling into question whether the assessments were used as outcome measures. Eighty-one different tools were identified, 16 of which were unpublished and unvalidated (Burton et al., 2013). A Danish survey to determine which outcome measures are used when transitioning stroke survivors from hospital to home-based rehabilitation found (a) that health professionals identified 89 standardized instruments to describe functioning of stroke patients and (b) that there was no consensus about these outcome measures, with most instruments used in only one or two sites (Maribo et al., 2016). Another survey in New Zealand revealed that while standardized assessments were not commonly administered by occupational therapists working in acute care, they were more likely to be used when cognitive impairments needed to be documented (Robertson & Blaga, 2013).

Despite the emphasis on standardized assessments by the American Occupational and Physical Therapy Associations (American Occupational Therapy Association [AOTA], 2018; American Physical Therapy Association [APTA], 2013), the use of standardized assessments in stroke rehabilitation has historically been low. In fact, a survey distributed broadly among APTA members in 2008 revealed

that only 48% of physical therapists in the US reported using standardized assessments, citing time constraints as one of the barriers (Jette et al., 2009). Since payers are increasingly focused on outcomes and the value of rehabilitation (Burwell, 2015), research about the current use of standardized assessments by occupational and physical therapists in the US to measure the movement of individuals poststroke is urgently needed.

Barriers and Facilitators for Using Standardized Assessments

Therapists consider many variables when choosing a standardized measure, such as patients' needs and goals, stroke severity, psychometric properties, and the feasibility of using standardized assessments in the context of a given setting (Barak & Duncan, 2006; Kegelmeyer, Kloos, & Siles, 2014). Before planning interventions to increase the use of standardized assessments, it is important to understand the barriers. Commonly cited barriers include: change in practice routines, time investment, financial incentives, lack of resources (e.g., training), and lack of knowledge about appropriate measures (Burton et al., 2013; Jette et al., 2009; Van Peppen, Maissan, Van Genderen, Van Dolder, & Van Meeteren, 2008). Researchers have emphasized the importance of tailoring strategies to address barriers to using clinical outcome measures, such as positive attitudes and greater familiarity with outcome measures (Pattison, Brooks, Cameron, & Salbach, 2015; Van Peppen et al., 2008).

Since barriers to the routine use of outcome measures exist at the individual, team, and organization levels (Duncan & Murray, 2012), efforts to facilitate uptake should be designed accordingly. Australian occupational therapists reported that ongoing support and monitoring (e.g., from an experienced mentor or champion in the clinic) was more helpful for changing their practice with assessments than workshops and continuing education on outcome measurement (Bowman, 2006). Having a multicomponent program could also facilitate use of standardized assessments. A successful example of physical therapists implementing standardized outcome measures for stroke patients across the continuum of care included traditional education efforts, administrative support, having an outcome 'champion', and addressing clinicians' barriers to use of standardized outcomes (Lang et al., 2011). For example, when physical therapists were prohibited from leaving marking tape on the floor for the 10-Meter Walk Test due to cleaning policies, the hospital changed the floor tiles to a contrasting color to mark the distance, which saved therapists valuable set-up time.

Although therapists cite the benefits of using standardized assessments (e.g., aiding in treatment planning [Jette et al., 2009], measuring effectiveness of rehabilitation interventions, and monitoring patients' progress [Burton et al., 2013]), these differ from learning preferences. To facilitate the use of standardized assessments, the preferences and motivations of the end user need to be better understood. However, research about the impetus and preferred methods for learning about outcome measures in stroke rehabilitation is lacking.

Online Resources to Increase the Use of Standardized Assessments

Online resources can be viewed as facilitators to using standardized assessments in practice because they can be widely accessed and provide evidence-based information about assessments. There are many internet-based outcome measure resources developed by U.S.-based organizations, professional associations, and government agencies (see Table 1). For example, the National Institutes of Health (NIH) Toolbox offers specific assessments in movement, as well as cognitive, sensory, and emotional functioning assessments for individuals between 3 and 85 years of age (Gershon et al., 2013). The NIH Toolbox assessments are efficient, since computerized adaptive testing is used. Finally, the

NIH Toolbox demonstrates good psychometric properties and enables comparison and pooling of data across studies and populations (Gershon et al., 2013).

Another resource, the Shirley Ryan AbilityLab Rehabilitation Measures Database (RMD), offers free, concise, evidence-based summaries of assessments and administration information (Shirley Ryan AbilityLab, 2018). This website has expanded beyond the description of assessments by offering modules on: (a) measurement in rehabilitation practice; (b) importance, selection, and use of outcome measures; (c) understanding measurement properties; and (d) knowledge translation strategies: implementation of outcome measurement practice (Moore, Raad, Ehrlich-Jones, & Heinemann, 2014).

Table 1

Online Resources for Stroke Outcome Measures

Online Resource	Description and Link
National Rehabilitation Information Center (NARIC)	<ul style="list-style-type: none"> Catalogs and disseminates articles, reports, curricula, guides, and other products funded by NIDILRR http://naric.com/
National Institutes of Health (NIH) Toolbox	<ul style="list-style-type: none"> Provides a standard set of assessment tools to measure outcomes, royalty-free. Tools are normed and validated across the life span. http://www.healthmeasures.net/explore-measurement-systems/nih-toolbox
APTA Stroke Evaluation Database to Guide Effectiveness (StrokEDGE)	<ul style="list-style-type: none"> Contains recommendations on standardized assessments Only available to APTA members http://www.neuropt.org/professional-resources/neurology-section-outcome-measures-recommendations/stroke
APTA's Clinical Practice Guidelines	<ul style="list-style-type: none"> Repository of publicly available practice guidelines for a variety of conditions, including stroke http://www.ptnow.org/clinical-practice-guidelines?tid=81857631-215b-43a8-a908-db0cda96d154
AOTA Practice Guidelines	<ul style="list-style-type: none"> Evidence-based resource for AOTA members to select and implement interventions to adults poststroke Guidelines are available for purchase https://www.aota.org/Practice/Rehabilitation-Disability/Evidence-Based/stroke-recommendations-practice-guidelines.aspx
Shirley Ryan AbilityLab's Rehabilitation Measures Database	<ul style="list-style-type: none"> Free, searchable database of standardized instruments; includes evidence-based summaries Publicly available outcome measures are downloadable https://www.sralab.org/rehabilitation-measures

Note. NIDILRR = National Institute on Disability, Independent Living, and Rehabilitation.

Research

In physical therapy, the Stroke Evaluation Database to Guide Effectiveness (StrokEDGE) is a unique resource because it recommends specific standardized assessments across the care continuum (Kegelmeyer et al., 2014). These recommendations were made using a modified Delphi method to identify the best assessments across the levels of the International Classification of Functioning, Disability and Health (ICF) model and stages of stroke recovery. Developed by the members of the Neurology Section of the APTA, StrokEDGE complements APTA's practice guidelines.

While these online resources offer excellent information regarding a wealth of standardized assessments, little is known about the extent to which occupational and physical therapists use these U.S.-based online resources in movement-related stroke rehabilitation. Such knowledge could inform the refinement of internet resources by incorporating therapists' preferences and motivations for learning about movement-related standardized assessments.

Purpose of Study

Members of the American Congress of Rehabilitation Medicine Stroke International Special Interest Group Movement Interventions Task Force collaborated to examine the use of standardized assessments by occupational and physical therapists in stroke rehabilitation since both professions assess movement of stroke survivors.

The primary aims of this survey of occupational and physical therapists working in the US were to determine: (a) the frequency with which therapists use standardized assessments to specifically evaluate movement function after stroke, and (b) the extent to which therapists use online resources with information about stroke outcome measures. Secondary aims focused on the therapists' motivations for learning new standardized assessments and their use of non-standardized assessments regarding movement. The results of this study can facilitate the use of evidence-based movement-related stroke outcome measures in clinical practice and serve to guide the development of resources used in training clinicians about standardized outcome measures.

Method

Questionnaire

The research team, consisting of three occupational therapists and two physical therapists, who have extensive clinical and research experience in movement assessment after stroke, developed a survey to examine: (a) use of movement-related standardized and non-standardized outcome measures, (b) use of online sources for learning about standardized outcome measures, and (c) factors related to learning about outcome measures.

The 14-item survey consisted of (a) demographic questions (i.e., profession, degree level, years of experience in stroke rehabilitation, percentage of time in clinical practice, practice setting), (b) closed questions about use of online movement-related standardized assessment resources and motivating factors, and (c) open-ended questions about identifying the standardized and non-standardized movement-related assessments they use most frequently with patients who have had a stroke.

The following definitions were developed by the researchers of this study and included on the survey: "Standardized assessments are formal tests that are administered in the same way to all patients. They have published psychometric properties and norms that make it possible to compare a client/patient's performance to normative values. Non-standardized assessments evaluate an individual's abilities or performance, but do not have established norms, psychometric properties (e.g., reliability,

validity), or standard administration procedures.” Whenever applicable, “Other” was added as a response choice with space for the respondents to comment and provide additional relevant information.

To reduce the perception of bias in favor of movement-related standardized assessments, the survey asked if therapists used non-standardized assessments as well. If they answered yes, they were asked to name the top four assessments they used most often.

A recruitment cover letter explained study eligibility and the survey’s purpose and provided informed consent. The survey included questions about the frequency of using movement-related standardized and non-standardized assessments, identification of frequently used assessments (open-ended question), use of online resources about outcome measures, preferences for learning, and factors influencing selection of outcome measures (see Appendix). The criteria for the online resources related to stroke movement assessments were (a) provided evidence or assessment-specific information about stroke movement assessments and (b) developed by an organization or agency in the US. In case the respondents were using online resources not cited in the list, the choice of “Other”, with a prompt to specify the resource, was provided.

To check face validity, eight members of a stroke rehabilitation specialty group, who were occupational and physical therapists, reviewed the initial survey. Survey questions were modified based on their feedback, and the final version was pilot tested before distribution.

Recruitment and Data Collection

After receiving approval from four institutional review boards affiliated with the researchers, recruitment was initiated electronically through social media, online forums, and email lists. The participants were also recruited in person at local and state association meetings and national conferences over 7 months (i.e., October of 2015 to April of 2016) (see Table 2). The survey did not contain any identifying information and was distributed in two formats: electronic and paper. To increase the likelihood of the participants completing the 3-min in-person survey at professional meetings, paper surveys were provided to conference attendees. Eligibility criteria included: (a) occupational therapy or physical therapy practitioners (including assistants) licensed to practice in the US and (b) experience with stroke rehabilitation. Occupational therapy and physical therapy assistants were eligible to participate in this study because they can administer certain assessments when they are: (a) trained and (b) delegated and supervised by occupational and physical therapists.

Table 2

Recruitment Methods and Locations

Method	Location/Website	Modality of survey
Social Media	LinkedIn	Electronic
	American Occupational Therapy Association	Electronic
	Connections Forum	
	Twitter	Electronic
	Facebook	Electronic
	American Congress of Rehabilitation Medicine	Electronic
Conferences	American Occupational Therapy Association Conference	Paper
	Virginia Occupational Therapy Association Conference	Paper

The goal of the study was to determine if standardized assessments are being used in stroke rehabilitation, so the administration of assessments by any therapist reflects current clinical practice.

Data Analysis

All responses were either entered automatically or manually into Survey Gizmo (www.surveygizmo.com) for data analysis. The survey was predominantly completed electronically through survey software. Descriptive data were summarized using means and percentages obtained through Survey Gizmo and Excel. To determine interactions between variables, crosstab analyses were conducted with Crystal Reports and Excel software.

Results

Respondents

One hundred and fifty-three therapists responded. Two surveys were incomplete, thus information from 151 respondents was used for data analyses. The sample was balanced with approximately equal numbers of occupational and physical therapists, and most of the respondents had more than 10 years of experience (see Table 3). Most of the respondents worked in acute care hospitals (30.5%), inpatient rehabilitation facilities (40.9%), or outpatient rehabilitation (39.6%) (see Table 3). Only two respondents represented long-term acute care hospitals (LTACH), which differs from acute care hospitals in two ways: (a) LTACH usually offer stays of 20 days or more and (b) rehabilitation is offered but is usually a secondary reason for admission. More than two-thirds of the respondents spent over 25% of their clinical time working in stroke care.

Our respondent sample reflected a range of professional degrees: 38% held clinical doctorates, 41% held master's degrees, and 42% held bachelor's degrees. Among the physical therapy respondents, 46% held Doctor of Physical Therapy (DPT) degrees, and among the occupational therapy respondents, 44% held master's degrees, reflecting current entry-level degree requirements for each profession at the time.

Table 3

Demographic Data

Characteristic	Number (Percentile)
<u>Profession</u>	
Occupational Therapy	70 (46.4%)
Physical Therapy	81 (53.6%)
<u>Professional degree/role</u> (could select more than 1)	
BA/BS OT	23 (14.9%)
MA/MS OT	36 (23.4%)
OTD/clinical doctorate	6 (3.9%)
BS PT	23 (14.9%)
MS PT	18 (11.7%)
DPT/clinical doctorate	47 (30.5%)
PhD/research doctorate	26 (16.9%)
OT assistant	4 (2.6%)
PT assistant	2 (1.3%)
<u>Length of time as a practicing therapist in stroke rehabilitation</u>	
< 1 year	8 (5.2%)
1-5 years	26 (16.9%)
6-10 years	21 (13.6%)

> 10 years	99 (64.3%)
<u>Practice setting</u> (could select more than 1)	
Acute hospital	47 (30.5%)
Subacute rehabilitation	10 (6.5%)
Inpatient rehabilitation facility	63 (40.9%)
Outpatient rehabilitation	61 (39.6%)
Skilled nursing facility	28 (18.2%)
Long-term acute care hospital	2 (1.3%)
Home health	10 (6.5%)
Pediatrics	5 (3.2%)
Education	26 (16.9%)
Research	29 (18.8%)
Other (write in)	9 (5.8%)
<u>Percentage of practice devoted to treating stroke patients</u>	
< 25%	43 (27.7%)
25-50%	47 (30.3%)
51-75%	35 (22.6%)
> 75%	18 (11.6%)
Not currently in clinical practice	12 (7.7%)

Although our sample included more physical therapists with a clinical doctorate degree (30%, $n = 47$) than occupational therapists with a master's degree (23%, $n = 36$), this is expected, since all US entry-level physical therapy programs now confer the DPT degree (Mathur, 2011) and occupational therapy has required a master's degree since 2007 (Accreditation Council for Occupational Therapy Education [ACOTE], 2007).

Standardized Assessments

Of the respondents who reported using movement-related standardized assessments more than 50% of the time, 73% ($n = 59$) were physical therapists and 43% ($n = 30$) were occupational therapists. Of those who indicated that they used standardized assessments more than 75% of the time, 29% were occupational therapists and 71% were physical therapists.

To determine if use of movement-related standardized assessments was related to years of clinical experience, crosstab analyses revealed differences between the therapists by years of experience, which were categorized into four levels (i.e., less than a year, 1 to 5 years, 6 to 10 years, and more than 10 years). Since only five respondents had less than 1 year of experience, their responses were combined with those who had 1 to 5 years of experience. When the occupational therapists were asked how often they used movement-related standardized assessments, the most frequent responses for use of standardized assessments were varied: 51% to 75% for 1 to 5 years, less than 25% for 6 to 10 years, and 25% to 50% for more than 10 years of experience. In contrast, among the physical therapists, more than 75% was the most frequent response for all four categories of experience level.

Since the early career therapists reported the highest frequency of using movement-related standardized assessments, another crosstab of the occupational therapists' years of experience by degree level was analyzed to determine if the respondents with 1 to 5 years of experience had a higher number of OTDs. However, there were no respondents with OTDs in the 1 to 5 years category (i.e., most occupational therapists in this category had master's degrees). The category with the highest number of

occupational therapists with OTDs and PhDs was more than 10 years of experience, which reported using standardized assessments 25% to 50% of the time.

The number of movement-related standardized assessments that occupational therapists ($n = 35$) and physical therapists ($n = 34$) reported using (typed in an open-text field) in stroke rehabilitation were similar. However, when the assessments were ranked based on frequency of responses for each profession, only a small percentage of occupational therapists reported using the most frequently identified assessments: the Fugl-Meyer Assessment (FMA) (25%) and the 9-Hole Peg Test (23%) (see Figure 1).

Figure 1. Percentage of occupational therapists using movement-related standardized assessments in stroke rehabilitation. Most highly used assessments were Fugl-Meyer and 9-Hole Peg Test.

The next most frequently used assessments by occupational therapists were grip strength testing with a dynamometer, measuring range of motion with a goniometer, and the Action Research Arm Test. Assessments with five or fewer responses included: Wolf Motor Function Test; Performance Assessment of Self-Skills; Stroke Rehabilitation Assessment of Movement; Box and Blocks; Activity Measure for Post-Acute Care; Disabilities of the Arm, Shoulder and Hand; Minnesota Manual Dexterity/Minnesota Rate of Manipulation; Jebsen Taylor Hand Function Test; Functional Test for the Hemiplegic Upper Extremity; Rivermead Motor Assessment; Arm Motor Ability Test; and Purdue Peg Board.

In contrast to the occupational therapists, higher percentages of the physical therapists used the following core group of assessments: Berg Balance Scale (BBS) (78%), Timed Up and Go (TUG) (52%), and 6-Minute Walk Test (38%) (see Figure 2).

Figure 2. Percentage of physical therapists using movement-related standardized assessments in stroke rehabilitation. Many physical therapists use a core set of standardized assessments.

In summary, while the occupational and physical therapists identified a similar total number of movement-related standardized assessments, there was more agreement among the physical therapists about a core group of movement-related standardized assessments.

Non-Standardized Assessments

A slightly higher percentage of occupational therapists (39%) reported using movement-related non-standardized assessments more than 50% of the time, which was higher than that of the physical therapists (29%). The most commonly used non-standardized assessments were related to observation, including observations of functional abilities, movement quality, and level of independence and assistance during tasks.

Online Resources

Most therapists reported using online resources to access evidence-based information about movement-related standardized assessments; 81% of occupational therapists and 94% of physical therapists reported using at least one website either occasionally or regularly. Among the therapists who used online resources, 67% of occupational therapists and 84% of physical therapists reported using multiple websites. When responses were analyzed by website, therapists were most familiar with online resources that were developed by their respective professional organizations, such as practice guidelines (see Figure 3). For the profession-specific websites, only responses from the corresponding profession

were considered in the percent reported (i.e., most physical therapists are not members of AOTA and would be unable to access member-specific resources).

The Rehabilitation Measures Database, available through the Shirley Ryan AbilityLab, was the most regularly used online resource, used by 64% of the occupational and physical therapists. The National Institutes of Health (NIH) Toolbox and the National Rehabilitation Information Center (NARIC) website were the least used resources (see Figure 3). In terms of other frequently used movement-related stroke resources, 7% of the respondents (four occupational therapists, seven physical therapists) cited the Canadian-based Stroke Engine website (Canadian Partnership for Stroke Recovery, 2018), which was not listed in the survey because only websites originating in the US were listed.

Over 80% of the occupational therapy respondents were aware of AOTA's practice guidelines, with 71% of the occupational therapists occasionally or regularly using this AOTA resource. Over 80% of the physical therapy respondents were aware of APTA's practice guidelines. However, the physical therapists' occasional or regular use of APTA's Evaluation Database to Guide Effectiveness (EDGE) was greater (74%) than their use of clinical practice guidelines available on the APTA website (48%).

Figure 3. Familiarity and use of online resources.

*Indicates discipline-specific responses for these websites. NARIC: National Rehabilitation Information Center; NIH: National Institutes of Health; APTA PG: American Physical Therapy Association Practice Guidelines; AOTA PG: American Occupational Therapy Association Practice Guidelines; APTA EDGE: American Physical Therapy Association Evaluation Database to Guide Effectiveness; Rehab Measures: Shirley Ryan AbilityLab's Rehabilitation Measures Database.

Preferences and Motivators for Learning

Occupational and physical therapists reported learning about movement-related outcome measures in similar ways; most commonly through their didactic education, continuing education, and on-the-job training. When asked how they prefer to learn about outcome measures, the top responses

were similar: continuing education/conferences (63%), on-the-job training (62%), professional program education (61%), journals/publications (56%), and websites (56%). The therapists with fewer years of experience valued learning about outcome measures during their professional training, whereas therapists with more than 10 years of experience preferred learning about outcome measures through continuing education.

The most frequently reported reasons for occupational and physical therapists to learn about new movement-related outcome measures was to improve the quality of patient care. Other frequent responses included: (a) publications/research articles (reading), (b) the need to improve documentation, (c) continuing education courses, and (d) to provide patient with feedback on performance. Although these reasons were not associated with work settings, some trends were noted by education and profession. Most occupational therapists with a bachelor's or master's degree chose quality of patient care as their motivation to consider using new movement-related outcome measures. More physical therapists with bachelor's degrees chose providing patient with feedback on performance as their motivation, and the physical therapists with master's or DPT degrees chose publications/research articles and quality of patient care as their motivation to consider using new movement-related outcome measures. The therapists with more years of experience also tended to identify the need to improve documentation of progress as a motivator.

Discussion

This study examined the use of online resources and movement-related standardized assessments by occupational and physical therapists working in stroke rehabilitation in the US, as well as their preferred methods and motivators for learning about them. The researchers noted similarities between the occupational and physical therapists in the frequency of accessing online resources and their reasons for learning about assessments. However, the use of standardized assessments differed between professions in clinical practice.

Standardized Assessments

Since evidence-based practice has been emphasized in occupational therapy educational programs, continuing education, and practice guidelines for many years, it is not expected that the use of movement-related standardized assessments is not consistently higher among the occupational therapists with more than 5 years of experience. Educational degree was not associated with the frequency of using movement-related standardized assessments, so other factors may be influencing practice. A possible explanation for these findings could be related to the fact that best practice in occupational therapy consists of using a top-down approach to evaluation; therapists may be prioritizing standardized assessments that focus on occupational performance versus component skills, such as discrete measures of motor function. Because of the breadth of occupational therapy outcomes, which range from body structure and function to activity and participation levels of the ICF (World Health Organization [WHO], 2001), it is possible that occupational therapists use their evaluation time to administer standardized assessments in other domains, such as cognition or visual perception.

In support of these identified challenges to the use of standardized movement-related outcomes by occupational therapists, the occupational therapy respondents in our survey reported using non-standardized assessments more routinely than physical therapists. While the reasons for this need further exploration, it stands to reason that if occupational therapists spend more time gathering important qualitative information that helps elucidate their evaluations, including quality of movement and other

factors that influence movement (e.g., mental health, spatial neglect), this might limit the time to also administer movement-related standardized outcome measures.

Our finding of a lack of consensus on movement-related outcome measures used by occupational therapists is consistent with studies from Europe. Surveys from Denmark (Maribo et al., 2016) and the United Kingdom (Burton et al., 2013) found that health care professionals used 89 and 81 different assessment tools in stroke rehabilitation, respectively. Occupational therapists may not use a core set of outcome measures in stroke rehabilitation because of a lack of time to administer and analyze data (Otterman et al., 2017) and resources (e.g., training) (Robertson & Blaga, 2013).

In contrast to the occupational therapists, the physical therapists tended to identify a core group of standardized outcome measures to assess the motor skills of patients with stroke. Their identification of the BBS and TUG as the most frequently-used assessments is consistent with the StrokEDGE, an APTA resource used by most of the physical therapists responding to our survey. Occupational therapists reported using a wide range of movement-related standardized assessments, with less consistency. Of interest, no consensus statements and recommendations for movement-related standardized assessments in occupational therapy in the US, like the StrokEDGE, have been published. Establishing a national consensus regarding stroke rehabilitation outcome measures across the continuum of care could help galvanize occupational therapists to use a set of standardized outcome measures in clinical practice.

Using the same core set of standardized assessments across the spectrum of stroke care could benefit practice and research. Standardizing a set of movement assessments may improve efficiency, care coordination, and documentation of rehabilitation progress (Lang et al., 2011). In a similar way, having a core set of measures would enable researchers to pool data across studies, which would be helpful for systematic reviews and meta-analyses (Kwakkel et al., 2017).

Based on previous literature, there appears to be an increasing trend among physical therapists to use standardized assessments. A study by Jette, Halbert, Iverson, Miceli, and Shah (2009) found that 48% of members of the APTA, across all practice areas and settings, used standardized measures regularly. The findings of our study indicate that 73% of the therapists who use movement-related standardized measures in stroke rehabilitation most of the time are physical therapists. While it is possible that the percentage of physical therapists who use standardized assessments frequently has increased across all practice areas, it is also possible that this positive characteristic appears only in certain practice areas, such as stroke rehabilitation.

Contrary to a study suggesting that experience levels may influence the use of standardized assessments (Crennan & MacRae, 2010), our findings did not reveal differences between novice and experienced physical therapists. Since most of the physical therapy respondents across all experience levels indicated that they use movement-related standardized assessments more than 75% of the time, this suggests that educational programs and/or continuing education activities are emphasizing standardized assessments in practice. Given that the physical therapy entry-level requirements have shifted from master's degree to clinical doctorates since 1996 (Plack & Wong, 2002), the higher percentage of movement-related standardized assessment use in this study could reflect an emphasis on measuring outcomes and clinical research associated with clinical doctoral education.

Another important finding was that only 43% of the therapists who use movement-related standardized assessments most of the time were occupational therapists, which is substantially lower than that of the physical therapists. Since this study offers the first estimate of frequency of movement-

related standardized assessment use by stroke rehabilitation occupational therapists in the US, the international literature was examined. The present study's percentage is relatively low compared to occupational therapists treating individuals with physical dysfunction in other countries (Robertson & Blaga, 2013; Stapleton & McBrearty, 2009). As an example, occupational therapists in Denmark hospitals were the most frequent users of standardized instruments (i.e., greater than 79%) to measure the functioning of stroke survivors transitioning from hospital to home-based rehabilitation (Maribo et al., 2016). However, Maribo, Nielsen, and Nielsen (2016) did not exclusively examine use of movement-related standardized assessments. Thus, it is possible that when both cognitive and movement-related standardized assessments are considered, occupational therapists in the US may have a higher use of standardized assessments. Our study found that the highest percentage of occupational therapists using standardized assessments had 1 to 5 years of experience. While this may represent a changing trend, these findings should be interpreted with caution because the data does not show a clear trend between years of experience and standardized assessment use. Additional research is needed to replicate these findings and explicate why early career occupational therapists may be using standardized assessments to a greater degree.

Online Resources to Increase Use of Standardized Assessments

This study is the first to examine therapists' use of online resources for information on movement-related stroke standardized assessments in the US. The most used online resource by occupational and physical therapists was the Shirley Ryan AbilityLab's Rehabilitation Measures Database (RMD), which provides summaries of many assessments, including links to freely available assessments (Shirley Ryan AbilityLab, 2018). The long-term planning and development of the RMD online content, using data collected from focus groups of health care professionals to identify and address the needs of practicing physical and occupational therapists, likely contribute to the higher frequency of use observed from our study (Moore et al., 2014). The RMD's attractive features include: (a) free access; (b) user-friendly interface; and (c) a quick, searchable database.

In addition, a majority of the physical therapy respondents reported using the APTA member-only online resource, StrokEDGE, which recommends specific consensus-driven outcome measures for use with stroke survivors across the care continuum (Kegelmeyer et al., 2014). In fact, StrokEDGE II, a recent update to StrokEDGE, was shared with the Rehab Measures Database (Academy of Neurologic Physical Therapy, 2018) because it contains reviewed tests, including instructions, psychometrics, and minimally clinically important differences. Therefore, these two online resources, frequently used by our respondents, share similar content about movement-related assessments poststroke and provide guidance to therapists about the use of assessments for stroke survivors in terms of timing, clinical setting, and stroke severity. The ease of use and clear formats of these online resources and direct relevance to assessments and practice may contribute to their higher percentages of use by therapists.

It was expected that the NIH Toolbox would be more widely used by the occupational and physical therapists, but there may be several possible reasons why it was not. Although it is intended for therapists and researchers, the NIH Toolbox's emphasis on measuring outcomes in longitudinal epidemiological studies and intervention trials may be related to its rather low uptake from this survey. A positive aspect of the NIH Toolbox is its iPad app, but the subscription cost is \$499 (Health Measures, 2019). Finally, administration of the motor, cognition, and sensation measures of the NIH Toolbox require specific training.

Methods and Motivation for Learning

A secondary aim of this survey focused on how therapists prefer to learn about new movement-related outcome measures. Since occupational and physical therapists value learning about outcome measures through continuing education, professional programs, and on-the-job training, organizations should consider disseminating information through these methods. For example, a qualitative study found that Australian occupational therapists needed more than workshops and continuing education on outcome measurements; ongoing support and monitoring (e.g., from a champion in the clinic or an experienced mentor) were identified as more helpful for changing their practice (Bowman, 2006). In addition, familiarity of outcome measures facilitates adoption into clinical practice (Pattison et al., 2015), so innovative programs to increase familiarity of outcome measures should be supported.

This study contributes to our knowledge about the factors that motivate occupational and physical therapists to learn about movement-related stroke outcome measures. The most frequently identified motivator was to improve the quality of patient care, which aligns with national priorities of value-based health care (Burwell, 2015). Educators and continuing education programs may consider emphasizing the link between quality of care and use of standardized assessments. Another commonly cited reason was to provide patients with feedback on performance, which parallels a study that identified a relationship between communicating patients' progress and physical therapists' use of standardized measures; more than 90% of the physical therapy respondents reported that using standardized measures enhanced communication with patients and helped with treatment planning (Jette et al., 2009). Our respondents also reported that use of standardized assessments improved the quality of documentation, which suggests possible influences from reimbursement and health care system policies. In summary, these findings reinforce that occupational and physical therapists who work in stroke rehabilitation are patient-centered and motivated to improve quality of care by using movement-related standardized assessments.

Limitations

The limitations of this study include a small sample, which was limited to occupational and physical therapists in the US. However, the respondents were geographically diverse, representing 90 cities and 31 states. Among the survey respondents, 7% ($n = 12$) did not report clinical practice as their primary occupation, so this may have influenced the findings as well. In addition, the survey did not define the inclusion criterion of "experience with stroke rehabilitation", so the respondents' experience in stroke rehabilitation may have been in the past with varying lengths of experience, which could have affected their perspectives of standardized assessments.

To avoid assumptions and bias, this survey purposefully refrained from asking the therapists why they do not use standardized assessments, and thus the barriers to using standardized assessments from our respondents' perspective are unknown. However, several studies have addressed barriers to using standardized assessments in stroke rehabilitation practice (Burton et al., 2013; Duncan & Murray, 2012; Jette et al., 2009; Van Peppen et al., 2008). To reduce potential bias, neutral wording of survey questions and feedback from a task force of the American Congress of Rehabilitation Medicine International Stroke Interest Group were incorporated into the final survey.

Future Directions

Since this study only examined movement-related assessments, future studies are needed to examine the use of standardized assessments in other areas of functioning, such as cognition and activities of daily living performance. Additional research is needed to determine the most effective

methods to increase the frequency of using standardized assessments in clinical practice. While strategies such as audit, ongoing feedback (Kristensen & Hounsgaard, 2014), and the use of champions (Moore et al., 2018) have some evidence of effectiveness, more research is needed to evaluate other implementation strategies, such as using technology to promote the use of movement-related standardized measures in clinical practice.

Considering that therapists want on-the-job training to learn more about administering and interpreting outcomes, online resources, such as the Shirley Ryan AbilityLab Rehabilitation Measures Database (RMD), should be promoted because they provide educational content and evidence-based summaries about assessments. Moreover, if feasible, the addition of training videos to the RMD for accurate administration of assessments, scoring, and interpretation, would be helpful to therapists as well as students.

Our findings underscore the need to determine factors (i.e., education, training, evaluation process) that explain the limited and varied use of movement-related standardized assessments by occupational therapists in stroke rehabilitation. The issues surrounding the low adoption of standardized assessments among occupational therapists are likely multifactorial and need to be systematically examined. For example, research is needed to examine if clinical doctoral education influences the use of standardized assessments in practice.

It is remarkable that longitudinal data on the use of movement-related standardized assessments for stroke rehabilitation in the US were not found in the published literature. As professions are being pressed to explicate how they contribute value to patient outcomes, the systematic measurement of functional movement after stroke will likely become even more important. This study can serve as a baseline for documenting the use of movement-related standardized assessments by occupational therapists in stroke rehabilitation in the US.

Conclusion

To provide efficient and effective stroke rehabilitation, it is crucial to track progress and outcomes using standardized assessments. Movement-related standardized assessments are used more regularly among physical therapists than among occupational therapists, and there appears to be greater consensus about the specific movement-related standardized assessments used in physical therapy. Multiple online resources exist to provide evidence-based information about standardized assessments, and the majority of occupational and physical therapists use some of them. Both occupational and physical therapists cited quality of patient care most frequently as the motivating reason for wanting to learn about outcome measures. Further studies are needed to determine factors that promote consistent use of standardized movement-related assessments for patients with stroke in clinical practice.

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Appendix

Choosing Movement-Related Outcome Measures: A Stroke Rehabilitation Survey

You are invited to participate in a research survey to identify which movement-related outcome measures you currently use in stroke rehabilitation and what factors influence your decision when choosing an outcome measure. The purpose of this study is to gain a deeper understanding of how outcome measures are selected in clinical practice and which resources are being used. This information is important for improving communications between organizations that provide outcome measure resources for clinical practice and the rehabilitation clinicians they serve.

Why have I been selected to participate?

We seek responses from occupational and physical therapists* who provide rehabilitation services to individuals with stroke in the United States. We would like to inquire about your use of outcomes that are focused on recovery of movement/motor skills.

*OTs and PTs who have graduated from accredited U.S. programs

What does my participation in the research involve?

You will complete an anonymous survey that takes no more than 10 min (14 questions).

Is there any risk or discomfort?

There is no significant risk associated with participating in this study. Your identity will not be recorded when completing the survey.

What are the benefits to me for participating in this study?

There are no direct benefits to you for participating in this study, but our findings may indirectly benefit practitioners like yourself who wish to learn more about evidence-based stroke rehabilitation practices. Findings may also help organizations create or disseminate resources to clinicians.

What are the costs and compensation for participating in this study?

There is no cost or compensation associated with this survey.

What if I have a question or complaint?

Any questions or concerns that you may have about the study can be answered by the researchers.

If you choose to be part of the survey*, please respond within two weeks. Your participation is voluntary and the information you provide will be reviewed only by approved members of the research team. All information associated with the survey will remain on a password-protected computer and paper copies will be stored in a locked office. You may decline to answer any question of the survey.

*A decision to complete and return the survey implies your informed consent and voluntary participation in this study. Please do not write your name or identifying information on the survey/text boxes.

Movement-Related Outcome Measures: A Stroke Rehabilitation Survey

1. As a practitioner in the United States, please indicate your profession.

- ☐ Occupational Therapist ☐ Physical Therapist

2. Please indicate your professional degree(s) (check all that apply):

- ☐ BA/BS, OT
- ☐ MA/MS, OT
- ☐ OTD or other clinical doctorate
- ☐ BS, PT
- ☐ MS, PT
- ☐ DPT or other clinical doctorate
- ☐ PhD or other research doctorate
- ☐ Occupational therapy assistant
- ☐ Physical therapy assistant

3. How long have you been a practicing therapist in stroke rehabilitation?

- ☐ Less than 1 year
- ☐ 1-5 years
- ☐ 6-10 years
- ☐ More than 10 years

4. Check the setting(s) in which you work (Please check all that apply).

- ☐ Acute Hospital
- ☐ Subacute Rehabilitation
- ☐ Inpatient Rehabilitation Facility
- ☐ Outpatient Rehabilitation
- ☐ Skilled Nursing Facility
- ☐ Long-Term Care Hospitals
- ☐ Home Health
- ☐ Adult Daycare
- ☐ Pediatrics
- ☐ Education
- ☐ Research
- ☐ Other: _____

5. What percentage of your clinical practice is devoted to treating patients with stroke?

- ☐ Less than 25%
- ☐ 25-50%
- ☐ 51-75%
- ☐ More than 75%
- ☐ I am not currently in clinical practice.

The questions in the following section ask about your use of non-standardized and standardized assessments when you evaluate motor/movement skills of patients with stroke.

Definitions of Terms:

Standardized assessments are formal tests that are administered in the same way to all patients. They have published psychometric properties and norms that make it possible to compare a client/patient's performance to normative values.

Non-standardized assessments evaluate an individual's abilities or performance, but do not have established norms, psychometric properties (e.g., reliability, validity), or standard administration procedures.

6. How often do you use non-standardized assessments as part of your evaluation of motor/movement skills of patients with stroke?

- ☐ Less than 25%
- ☐ 25-50%
- ☐ 51-75%
- ☐ More than 75%
- ☐ I am not currently in clinical practice.

7. List the most common non-standardized outcome measures that you use to measure movement progress of your patients with stroke (List most frequently used first; list no more than 4).

8. How often do you use standardized assessments as part of your evaluation of motor/movement skills of patients with stroke?

- ☐ Less than 25%
- ☐ 25-50%
- ☐ 51-75%
- ☐ More than 75%
- ☐ I am not currently in clinical practice.

9. List the most common standardized outcome measures that you use to measure movement progress of your patients with stroke (List most frequently used first; list no more than 4).

10. Where did you learn about the current outcome measures you use? (check all that apply)

- ☐ Part of professional program curriculum (including Fieldwork, Residencies)
- ☐ Continuing education courses and/or Conferences (online or in-person)
- ☐ Journals and/or books
- ☐ On the job training
- ☐ Websites about outcome measures
- ☐ All of the above
- ☐ Other: _____

11. Please indicate your familiarity with the following online resources for movement-related outcome measures. If you do use the listed resource, please indicate how often you have utilized this resource.

Resource	Not familiar	Familiar – but do not use	Occasionally Use	Regularly Use
NIH Toolbox www.nihtoolbox.org/				
APTA's Stroke Edge http://www.neuropt.org/special-interest-groups/stroke/strokedge				
RIC's Rehabilitation Measures Database www.rehabmeasures.org				
National Rehabilitation Information Center (NARIC) http://www.naric.com/				
APTA's practice guidelines http://www.apta.org/EvidenceResearch/ImplementingEBP/CPGs/				
AOTA's practice guidelines https://www.aota.org/practice/researchers/practice-guidelines.aspx				
Other: please specify _____				

- 12. Do you use any of the online resources related to outcome measures (listed below) for assessing areas other than movement or motor skills?**

(NIH Toolbox, APTA's Stroke Edge, RIC's Rehab Measures, NARIC, APTA's websites, AOTA's websites, Other)

☐ No

☐ Yes

- 13. What motivates you to consider using new movement-related outcome measures? (Check all that apply).**

- ☐ Continuing education courses
- ☐ Publications/Research articles
- ☐ Quality of patient care
- ☐ Provide patient with feedback on performance
- ☐ Managers/Leadership (Administration)
- ☐ Insurance payment requirements
- ☐ Need to improve documentation of progress
- ☐ Co-workers using that outcome measure
- ☐ Other _____

- 14. How do you prefer to learn about movement-related outcome measures for patients who have had a stroke? Rank in order of priority; 1 – being most frequent (leave blank if you do not use that method).**

- ____ Part of professional program curriculum (including Fieldwork, Residencies)
- ____ Continuing education courses and/or Conferences (online or in-person)
- ____ Journals and/or books
- ____ On the job training
- ____ Websites about outcome measures
- ____ Other: _____