

# Physiotherapy assessment of people with neurological conditions in Australia: A national survey

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## Abstract

**Background and Purpose:** Currently there are approximately one billion people worldwide affected by a neurological condition. These conditions may result in a variety of impairments that require assessment and management from a physiotherapist. However, there is a lack of consensus in the literature as to what domains physiotherapists working in clinical settings include in their assessment of this population, with only five domains identified in a recent systematic review. This study aimed to explore current physiotherapy assessments in people with neurological conditions, including barriers, enablers, and influencing factors.

**Methods:** A National online survey of Australian physiotherapists who assessed adults with neurological conditions in their clinical practice.

**Results:** A total of 212 respondents from all states in Australia completed the survey. The mean (SD) age was 35.7 (9.6) years, and the majority were female (85.4%). Respondents worked across various settings assessing stroke most frequently (58.0%). Study results demonstrated variability in assessment practice, with a number of assessment domains being assessed more commonly including balance, muscle strength, gait, falls and safety, function, goal setting, range of movement, pain, co-ordination, activity tolerance, postural alignment and symmetry, and the upper limb. Experienced physiotherapists and those in rural and remote settings included fewer domains in their assessments. On the other hand, physiotherapists in the community setting included certain domains more frequently than those in other settings. Barriers and enablers were related to therapist caseload, knowledge, and intrinsic patient factors.

**Discussion:** There is variability in domains assessed by Australian physiotherapists, with an emerging consensus for a number of assessment domains. Study results suggest that clinical experience, geographical location, and clinical setting may play a role in the assessment patterns observed.

**Implications on Physiotherapy Practice:** There is little evidence to support what physiotherapists assess in practice, in different settings, in different states within Australia. This study indicates that experience, geographical location, and

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clinical setting affect the number and types of domains included in the assessment. Further research is needed to develop a consensus on best practices.

#### KEYWORDS

assessment, neurological conditions, outcome measures, physiotherapy

## 1 | INTRODUCTION

Currently, approximately one billion people worldwide are affected by neurological conditions.<sup>1</sup> These conditions may result in a variety of impairments that can lead to participation restrictions and activity limitations that require rehabilitation. Physiotherapists are key members of the team involved in the management of neurological conditions. Neurological physiotherapy assessment is known to be particularly complex, involving systematic processes that consider participation, activities, body functions, and structures, with the addition of standardized measures.<sup>2</sup>

Traditional models of evaluation or assessment, such as those described by Ashburn,<sup>3</sup> Nilsson & Nordholm,<sup>4</sup> and Lennon<sup>5</sup> have formed the theoretical basis for physiotherapy assessment in people with neurological conditions. More recently, the theory of assessment has been explored using expert consensus,<sup>6</sup> surveys,<sup>2</sup> interviews,<sup>7</sup> and observational studies.<sup>2,6</sup> These studies, together with expert textbooks<sup>8-12</sup> and guidelines for people with specific conditions such as stroke,<sup>13</sup> form the basis of what is taught to physiotherapists pre-registration. It is suggested that this informs what is assessed by physiotherapists once qualified.

However, there is a lack of consensus in the literature regarding the key assessment domains of physiotherapists working in varied clinical settings, in people with neurological conditions.

We hypothesized that assessment in clinical practice may not be undertaken solely based on expert textbooks. What factors influence the assessment? The physiotherapist's preferred treatment approach was identified in a survey of practice by Lennon<sup>5</sup> to influence the assessment. A study exploring the application of motor learning options in neurological rehabilitation included experienced clinicians.<sup>5,7</sup> However, how these influence assessment practices has not been explored. A recent systematic review by our research team included 23 studies describing the clinical physiotherapy assessment of people with neurological conditions. The healthcare setting was identified in 18 studies,<sup>5,14-30</sup> but as demographic information only and not to attest to the influence on assessment.

In summary, there are gaps in the current literature regarding physiotherapy assessment of people with neurological conditions and routinely assessed domains. To contribute to the body of knowledge, this study aimed to survey Australian Physiotherapists regarding their current clinical assessment practices with people with neurological conditions. The specific research questions were as follows:

What is current physiotherapy clinical practice in the assessment of people with neurological conditions?

What domains do physiotherapists include in the assessment of people with neurological conditions?

Does the clinical experience, geographical location, and/or clinical setting influence how physiotherapists assess patients with neurological conditions?

What are the barriers and enablers to the assessment of people with neurological conditions?

## 2 | METHODS

### 2.1 | Design

A cross-sectional survey was conducted in two phases. The first phase involved the development of an online survey using Qualtrics software (Qualtrics) and pilot testing. The second phase involved the administration of a national survey in Australia. This study was approved by REDACTED. We referred to the Checklist for Reporting Results of Internet E-Surveys (CHERRIES)<sup>31</sup> to guide the reporting of this survey.

### 2.2 | Respondents

The respondents were Australian physiotherapists. The inclusion criteria included being a registered physiotherapist and assessing adults with neurological conditions as part of clinical practice. Physiotherapists who did not assess people with neurological conditions, only treating children, or residing outside Australia were ineligible to participate.

Respondents were recruited using convenience sampling through the website of the Australian Physiotherapy Association (APA) and through State-wide Chief Allied Health Officers. The recruitment material contained a link to an online participant information sheet containing information regarding the survey length, data storage, chief investigator (JG), study purpose, and consent. Those who consented to participate in the study were directed to the start of the survey. This was then linked to online consent. Data were collected between August and December 2020, including the initial distribution of the recruitment material and two reminders.

## 2.3 | Survey

Before widespread online distribution, the survey was pilot-tested for clarity, flow, and time to completion. Ten physiotherapists, identified through the APA website representing all states in Australia, completed the pilot survey. Based on feedback, four questions were omitted, in 11 questions the wording was modified, and additional instructions and guidance were provided throughout the survey. Pilot data were excluded from the analysis.

The final survey was a voluntary open e-survey consisting of 39 items divided into two sections (see Appendix A). Section 1 (questions 1–13) gathered demographic information, such as sex, age, years qualified, qualifications obtained, courses attended, clinical setting, and clinical experience. Section 2 (questions 14–38) is related to the assessment content and processes. The questions explored neurological case load, resources accessed for assessment, therapeutic approach, core domains included in assessment, assessment completion time, factors influencing assessment, clinical reasoning, documentation, and the use of measures for assessment. The survey consisted of single-answer questions ( $n = 29$ ), multiple-answer questions ( $n = 8$ ), rank questions using a 5-point Likert scale (1 always up to 5 never), and open-ended questions. ( $n = 5$ ).

## 2.4 | Data analysis

The online platform Qualtrics was used for data collection. Quantitative data were collated and analyzed using the Statistical Package for Social Sciences (SPSS) version 27.

Data from the respondents who answered Sections 1 and 2 of the survey were included in the analysis. Descriptive statistics were used to describe demographic characteristics, and to examine data generated from questions about the neurological assessment content and processes. Data from Likert scales were treated as continuous data and the means were calculated. To gain insight into the variation of domains assessed with regard to years of clinical experience, geographical location and clinical setting, a one-way analysis of variance (ANOVA) was applied. Statistical significance was set at  $p < 0.05$ . The responses to open-answer questions and comments were imported into an Excel spreadsheet for qualitative analysis. Using a content analysis approach, text responses were grouped to capture key concepts related to the corresponding question.

# 3 | RESULTS

## 3.1 | Participant demographics

Unique visitors to the survey were determined using IP addresses, and 395 respondents consented to participate in the survey; 216 answered the first four questions of Section 1 (if working clinically, gender, age, and years qualified) of the 212 respondents who

completed all questions in the survey. The participation rate was calculated by dividing the number of people who agreed to participate by the number who agreed to provide informed consent (395/395). The completion rate was 53.67%, calculated by dividing the number of participants who submitted the final survey page by those who agreed to participate (212/395). The IP address of the respondent's computer was used to identify potential duplicate entries, and no two entries from the same IP address were allowed within 24 h. All surveys were analyzed, except four surveys that only had questions completed on consent and respondent demographics. Most respondents were female ( $n = 181$ , 85.4%) and the mean (SD) age was 35.7 (9.6) years. Most respondents trained in countries in the FLYR stream (Canada, Hong Kong, Ireland, Singapore, South Africa, and the United Kingdom) ( $n = 200$ , 94.3%). This stream offers a streamlined journey towards becoming a physiotherapist in Australia. Respondents were from all states in Australia and worked predominantly in New South Wales ( $n = 76$ , 35.8%) and Victoria ( $n = 52$ , 24.5%). The geographical setting was mainly metropolitan ( $n = 151$ , 71.2%), with most respondents working in a rehabilitation setting ( $n = 119$ , 56.1%). Nearly half of the respondents received a bachelor's degree as the highest level of educational qualification ( $n = 94$ , 44.3%).

Respondents had experience working with neurological patients ranging from less than 1 year to more than 40 years. About a third ( $n = 15.1$ , 32.5%) of respondents had attended one neurology course of  $\leq 1$  day duration in the last 2 years, and respondents reported to have reviewed relevant resources at least once within the last 6 months ( $n = 160$ , 75.5%), including scientific literature, web-based information, and online videos. A minority of respondents ( $n = 34$ , 16.0%) subscribed to a name therapeutic approach, noting the most frequently used approach being Carr and Shepherd/motor relearning ( $n = 13$ , 38.2%). For further details of respondent characteristics see Table 1.

## 3.2 | Current practice in physiotherapy assessment of people with neurological conditions

A total of 195 (92%) respondents reported that they assessed the same domains (ranging from 1 to 19) in every patient; however, there was great variability as to the domains respondents referred to. The most frequently assessed domain in all patients/patients was strength ( $n = 131$ , 76.2%). Other frequently assessed domains included goal setting ( $n = 107$ , 54.8%), mobility ( $n = 99$ , 50.7%), and function ( $n = 99$ , 50.7%).

Figure 1 displays how frequently respondents reported assessing prespecified domains. When  $\geq 75\%$  of respondents reported to include a certain domain always or often, it was considered that a consensus had been reached (Diamond, 2014). This was the case for the following domains: balance ( $n = 207$ , 98.1), muscle strength ( $n = 205$ , 96.7%), gait ( $n = 203$ , 97.6%), falls and safety ( $n = 201$ , 94.9%), function ( $n = 200$ , 94.7%), goal setting ( $n = 197$ , 93.8%), range of movement ( $n = 180$ , 85.3%), pain ( $n = 179$ , 84.4%), coordination

**TABLE 1** Respondent characteristics.

Gender (female), <i>n</i> (%)	181 (85.4)
Age (years)	35.7 (9.6)
Years qualified (years)range	12.8 (9.9)
Country qualification obtained, <i>n</i> (%)	
Australia	179 (84.4)
United Kingdom	11 (5.2)
New Zealand	10 (4.7)
Asia	6 (2.9)
South Africa	3 (1.4)
United States of America	1 (0.5)
Argentina	1 (0.5)
Highest level of education	
Diploma	5 (2.5)
Bachelor	94 (44.3)
Pre-registration Masters	19 (9)
Pre-registration PhD	7 (3.3)
Masters by coursework	9 (4.2)
PhD	4 (1.9)
Bachelor with Honours	31 (14.8)
Number of neurology courses (of 1+ day) attended during the last 2 years, <i>n</i> (%)	
0	2 (0.9)
1	69 (32.5)
2	52 (24.5)
3	16 (7.5)
>3	32 (15.1)
Hours currently working clinically, <i>n</i> (%)	
<7.5	2 (1.0)
7.5–20	25 (12.9)
21–37+	162 (83.9)
Fluctuating caseload	4 (2.0)
State in which working currently, <i>n</i> (%)	
Australian Capital Territory	2 (1.0)
New South Wales	76 (35.8)
Northern Territory	2 (1.0)
Queensland	25 (11.8)
South Australia	37 (17.5)
Tasmania	1 (0.5)
Victoria	52 (24.5)
Western Australia	17 (8.0)
Geographical setting in which working currently, <i>n</i> (%)	
Metropolitan	151 (71.2)

Regional	44 (20.8)
Rural and remote	17 (8.0)
Primary clinical setting in which working currently, <i>n</i> (%)	
Acute	70 (33)
Rehabilitation	119 (56.1)
Outpatient	29 (13.7)
Community	35 (16.6)
Years of clinical experience with neuro conditions, <i>n</i> (%)	
<1	8 (2.0)
1–5	82 (20.8)
6–10	55 (13.9)
11–15	19 (4.8)
16–20	20 (5.1)
>20	27 (6.8)
Last review of resources related to neurological assessment, <i>n</i> (%)	
Within the last 6 months	160 (75.5)
Within the last 12 months	32 (15.1)
When studying as a student pre-registration	9 (4.2)
Other	9 (4.2)
Therapeutic approach	
Subscribing to a therapeutic approach (yes), <i>n</i> (%)	34 (16.0)

(*n* = 171, 81.1%), activity tolerance (*n* = 162, 76.8%), postural alignment and symmetry (*n* = 161, 76%), and upper limb (*n* = 158, 79.4%). Domains identified as being assessed rarely or never by more than half of respondents were deep tendon reflexes (*n* = 116, 55%) (see Figure 1).

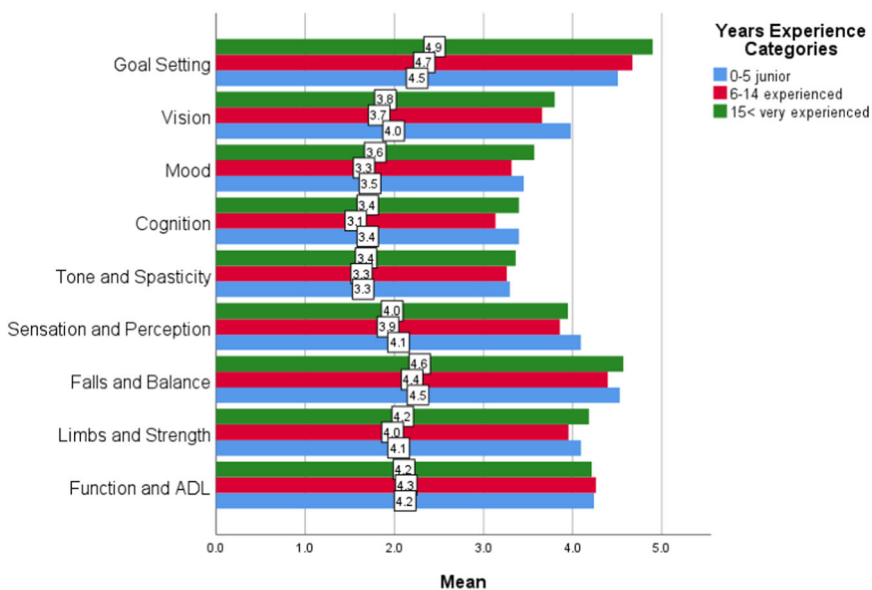
Associated with the question in the survey that asked about the frequency of assessment of pre-specified domains was a free-text comments section. Eighty-one respondents answered this part of the questionnaire. Fifty-seven (26.9%) respondents felt the identified domains listed in Figure 1 were not all-inclusive, with 24 (11.3%) reporting on other essential domains of vestibular assessment, self-management, patient's motivation to participate, respiration, and ataxia.

In Figure 2 domains included in the assessment are compared between three levels of clinical experience and show that experienced respondents included fewer grouped domains in their assessment compared to both junior and very experienced respondents. There was a statistically significant difference in the inclusion of the limbs and strength ( $F(2, 206) = 3.6, p = 0.03$ ) as well as goal-setting domains ( $F(2, 204) = 7.7, p < 0.001$ ) between the three groups. Post hoc comparisons indicated that very experienced clinicians included the grouped domain of limbs and strength more often than experienced clinicians, however this difference was small only (mean (SD) 3.95 (0.51) and 4.18 (0.60) respectively,  $p = 0.023$ ). Similarly, very experienced

**FIGURE 1** Respondents reported frequency (%) of assessing pre-specified domains.

Domain %	Always/often	Sometimes	rarely/never
Balance	98.1	1.4	0.5
Gait	97.6	1.9	0.5
Muscle strength	96.7	2.8	0.5
Falls and safety	94.9	4.7	0.5
Function	94.7	0.5	4.7
Goal setting	93.8	6.2	0
ROM	85.3	10.9	3.8
Pain	84.4	13.2	2.4
Coordination	81.1	6.6	2.4
Upper limb	79.4	18.6	2
Activity tolerance / Endurance	76.8	20.4	2.8
Postural alignment and symmetry	76	16.6	7.5
Somatosensation	72.5	21.8	5.6
Trunk core	70.3	20.8	8.9
Stairs	70.1	26.1	3.8
ADLs	68.1	20.5	11.4
Vision	65.1	27.4	7.5
Tone	62.7	30.7	6.6
Neglect	61.3	29.2	9.5
Muscle strength	58.5	31.1	10.4
Perception	55.7	32	12.3
Spasticity	56.6	35.4	8
Mood	46.7	36.3	17
Cognition	42	34	44.1
Deep tendon reflexes	16.1	28.9	55

**FIGURE 2** The influence of clinical experience on assessment domains included.



clinicians also included the goal-setting domain more frequently in their assessment (mean (SD) 4.90 (0.30)) than their experienced (mean (SD) 4.67 (0.61)) and junior (mean (SD) 4.51 (0.72)) colleagues.

Respondents reported the timing of assessment, with most taking approximately 1 h to perform an assessment (53.3%), which occurred mostly on admission (55.7%). Additional data through free-text responses noted that assessment may occur throughout multiple

therapy sessions and may vary depending on thoroughness, the condition itself, the complexity of the condition, goals, and the clinical setting.

Figure 3 presents the frequency with which the respondents included grouped domains in neurological physiotherapy assessment by geographical location. Respondents in rural and remote settings reported to include all but two domains (goal setting, tone, and spasticity) slightly less frequently than respondents in metropolitan and regional areas (see Figure 3). Observed differences in the grouped domains of sensation and perception ( $F(2, 209) = 6.3, p = 0.002$ ), and vision ( $F(2, 209) = 5.07, p = 0.007$ ) were statistically significant. The grouped domain of 'Sensation and perception' was significantly more often assessed by metropolitan respondents than by those working in rural/remote geographical locations with a mean (SD) of 4.03 (0.64) versus 3.48 (0.44),  $p = 0.02$ . The same pattern was observed in the domain of vision with a mean (SD) of 4.03 (0.64) for the metropolitan group versus 3.48 (0.44) for the rural remote group ( $p = 0.06$ ).

Figure 4 presents the same data, frequency of inclusion of grouped domains, in neurological physiotherapy assessment by clinical setting. Respondents working in community settings included goal setting, mood, cognition, falls and balance, and function and activities of daily living slightly more often than respondents from other clinical settings (see Figure 4). This between-group difference was statistically significant for the goal-setting domain ( $F(3, 174) = 8.5, p < 0.001$ ), with goal setting being done more in the community (mean (SD) 4.96 (0.21)) and rehab (mean (SD) 4.82 (0.44)) settings than in the acute setting (mean (SD) 4.39 (0.78)), both reaching significance with  $p < 0.001$ . In addition, a small but statistical between-group difference was observed in the function and ADL domain. Respondents working in the outpatient setting assessed less in the grouped domain of Function and ADL (mean (SD) 3.83 (0.69)), compared to those working in the other settings and this was statistically significant compared to the

acute group (mean (SD) 4.23 (0.36),  $p = 0.008$ ) and rehab groups (mean (SD) 4.30 (0.41),  $p < 0.001$ ).

The results showed that 38 (17.9%) respondents used the same approach in their assessment across all people with a neurological condition. When asked how therapeutic approaches influenced their assessment of people with neurological conditions using an open text question, the importance of clinical reasoning, experience, use of evidence-based practice, movement facilitation, and flexibility in approaches was reported. Of the 99 respondents who indicated that therapeutic approaches informed their assessment, nearly all ( $n = 91$ ) of them used more than one approach.

Look at trunk control based on Bobath training. I may take a very task-based approach at times based on influence of Carr and Shepherd.

The Feldenkrais Method influences how I do my assessments. I pay attention to how the patient is able to engage in movement in a variety of starting positions (e.g. side lying or getting up and down from the floor). I also take a very functional approach and am interested in how a person is living their life, not just how they are moving a limb.

### 3.3 | Barriers and enablers influencing the assessment of people with neurological conditions

The most frequently reported enablers or facilitators of neurological physiotherapy assessment were clinical reasoning skills (43.6%), use of standardized measures (39.1%), therapist knowledge (39.3%), and experience (38.7%). Barriers to assessment included lack of time

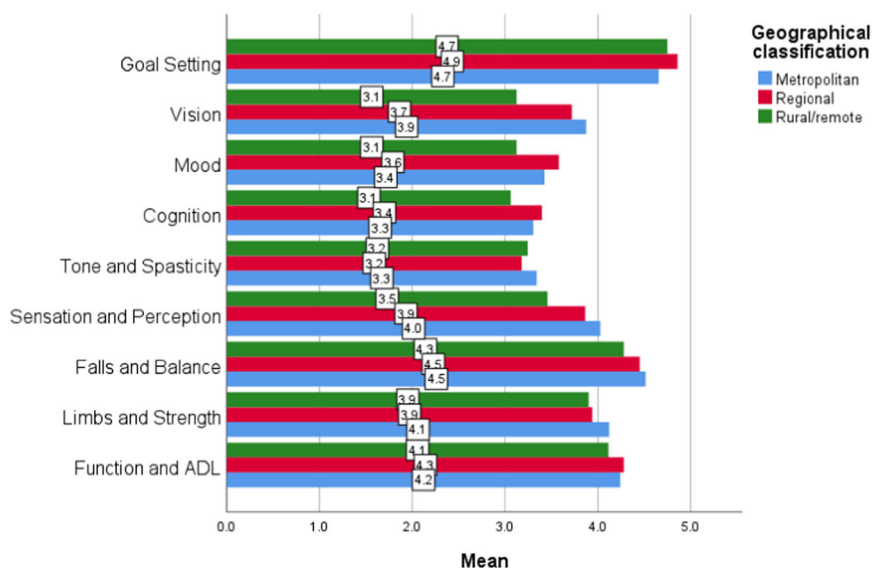
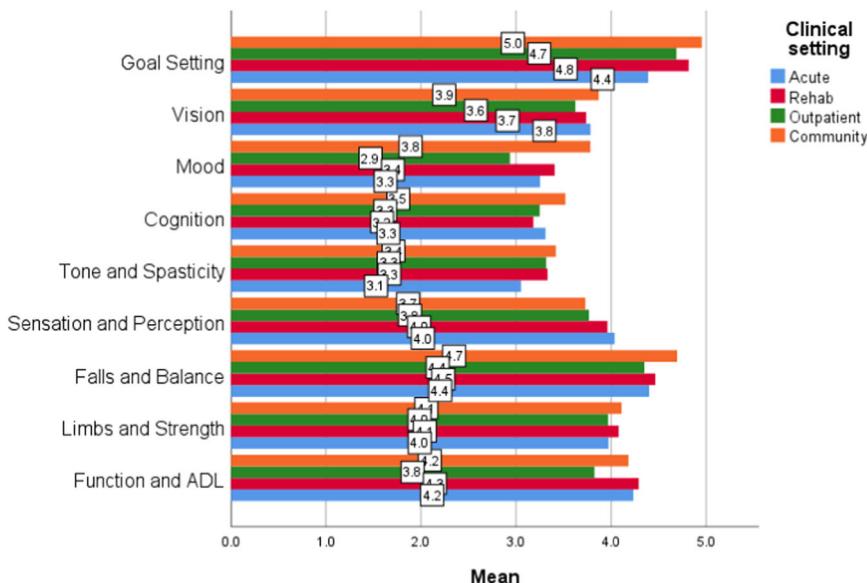
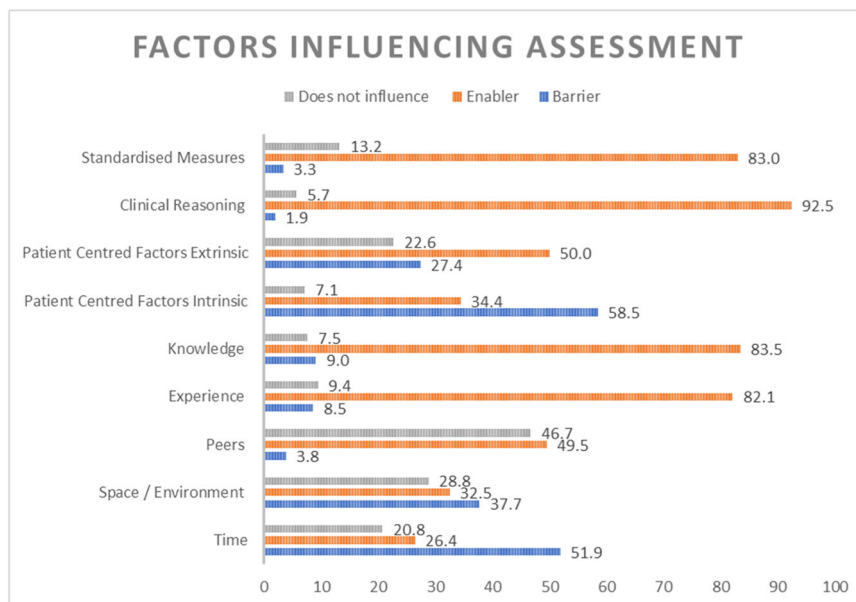


FIGURE 3 The influence of geographical location on assessment domains included.

**FIGURE 4** The influence of clinical setting on assessment domains included.



**FIGURE 5** Factors influencing assessment.



(51.9%) and intrinsic patient centered factors (58.5%), such as medical stability and motivation. Twenty-one percent of respondents reported that peers did not influence their assessment practices (see Figure 5).

Free text input regarding influences on the time taken to perform an assessment revealed that organizational barriers such as environmental constraints and availability of equipment impacted the time to complete an assessment. Therapist-related factors impacting time for assessment included subjective findings and therapists' caseload. Finally, patient-related factors were also mentioned, including patient availability for assessment and issues impacting the patient's ability to participate in the assessment, such as arousal levels, behavior, and engagement. The severity and complexity of the patients were referred to most frequently,

suggesting that the more complex the patient, the longer the time taken for assessment.

#### 4 | DISCUSSION

We aimed to obtain a representative sample of physiotherapists in Australia who assessed people with neurological conditions. This was difficult to ascertain, as not all registered physiotherapists would assess this population in their clinical practice.

The results of this survey suggest that there is variability in assessment practice, with an emerging consensus between registered physiotherapists in Australia for the assessment domains of balance, muscle strength, gait, falls and safety, function, goal setting, range of

movement, pain, coordination, activity tolerance, postural alignment, symmetry, and upper limb. There is little data to support how setting, approach, or clinical experience influences the assessment of people with neurological conditions.

In this survey, most respondents (>90%) reported assessing domains that are related to movement such as balance, function, gait, falls, safety, and strength. These findings are similar to those of a recent systematic review of assessment by Garner et al.<sup>50</sup> that identified five key domains in multiple studies (at least 10 of 23 included studies), including function, postural alignment and symmetry, gait, balance, and muscle strength.

Balance was the most frequently assessed domain, reported by 98% of the survey respondents. A systematic review and meta-analysis investigating exercise training on balance in people with chronic stroke<sup>32</sup> highlighted that independence in activities of daily living, an important focus of rehabilitation, is underpinned by the ability to balance, especially standing balance. In addition, achievement of standing balance is a predictor of functional recovery.<sup>33,34</sup> In the stroke literature, the assessment of balance deficits has been discussed and emphasized in relation to an increased risk of falls after stroke.<sup>35</sup> The fact that assessing balance is essential in all phases of recovery has been supported by the findings of this survey, including all domains that may influence balance, such as postural alignment and symmetry, muscle strength and falls, and safety.

Function and movement are typically assessed through observation.<sup>36</sup> The performance of functional activities is known as movement analysis.<sup>37</sup> Assessment of the movement system is a key component of neurological physiotherapy and one of the many factors that lead to effective neurorehabilitation.<sup>38,39</sup> Movement and functions are undeniably linked. In a qualitative study by McGinnis et al.,<sup>36</sup> exploring clinical decision-making in assessment, the observation of patients' movements was reported to be an important source of knowledge for physiotherapists, comparing their observations with what is known as normal and atypical movement.

Over half of survey respondents reported to assess mood or cognition only sometimes (34%) or rarely or never (44%), even though depressive moods are commonly identified in people with neurological conditions and may impact the effect of therapeutic intervention.<sup>40,41</sup> As part of neurorehabilitation, there are certain shared domains that may be assessed by physiotherapists, as well as by other healthcare professionals. The fact that mood was not frequently assessed by the survey respondents is possibly due to this domain being included in the assessment of other multidisciplinary healthcare team members.<sup>42</sup>

Respondents reported that the assessment occurred at variable times, ranging from admission to multiple times throughout the therapy sessions. These results suggest blending assessment and treatment, and thus more of a continual process of clinical reasoning. This is supported by the theories of critical reflection in practice.<sup>43</sup>

The geographical location appeared to have an impact on the inclusion of the grouped domain of sensation/perception and vision as this was included more in metropolitan settings compared to rural

ones. The reason for this is unclear. However, there appear to be many factors that impact service provision rurally including population, funding models, and availability of services,<sup>44</sup> this may indicate that with the limited-service provision in rural areas, sensation/perception and vision are not prioritized. Health care setting appeared to impact on the inclusion of the grouped domains of function/Adl and goals setting, with the former assessed less in outpatient settings compared to acute and rehab and the latter more in the rehabilitation and community settings. It is known that goal setting in the initial stages after a stroke can be inconsistent.<sup>45</sup> Physiotherapy respondents in this qualitative study perceived that patients/clients did not always want to be closely involved in making decisions at this stage. Clinical practices were generally based more on professional choice or patient goals, with 54.8% of respondents reporting to include their assessments.

The tendency to perform assessments based on professional choice is supported by results from a study surveying clinical practice in the screening and diagnosis of spatial neglect post-stroke in healthcare professionals.<sup>46</sup> This suggests a shift from a more structured, all-inclusive assessment to a patient-centered/goal-centric assessment.<sup>47</sup> Morgan and Yoder<sup>47</sup> noted that the practice of patient-centered care has increased over time, with emphasis placed on a holistic approach to patient management. Goal setting as well as the patient's problem list was one of many components of assessment; 75% of respondents reported that goal setting informed their clinical reasoning process. Jones and Rivett<sup>48</sup> described goal setting as the key component of a clinical reasoning process and this study indicates that it is typically done more often in those that are very experienced.

Experience affects the domains included in the assessment, noting very experienced respondents including the grouped domains of limb strength and goal setting more than others. It is known that methods of clinical reasoning, which include assessment as part of this process, can differ from novice to experienced clinician<sup>49</sup> and this difference was not reflected in our results.

Over one-third of the respondents reported using a named therapeutic approach for their assessment. The reported approaches were motor relearning, Bobath concept, and a flexible or eclectic approach.<sup>5</sup> McGinnis et al.<sup>36</sup> noted therapeutic approach influenced balance assessment, leading to therapists' balance assessment inclusion being highly individualized.

The factors reported to influence the time taken for assessment included organizational, therapist, and patient factors. Organizational factors identified time and availability (see Figure 5), which links to the therapist factor of caseload, suggesting that with increasing therapist caseload, there may be less available time to complete and assess. The most influential patient factors were severity of the condition and complexity, suggesting tailoring of the assessment based on the patient's profile and therapist expectations.<sup>46</sup>

Assessment enablers included experience, knowledge, clinical reasoning skills, and standardized measures, which is supported by a systematic review by Garner et al.<sup>50</sup> that identified these areas as key themes influencing the assessment process.



The strength of this study is the foundation for consensus regarding the domains included when assessing people with neurological conditions in Australia. Recruitment for this study was conducted through the Australian Physiotherapy Association, a national professional body, and the study sample represented physiotherapists from across all states and territories within Australia, from metropolitan rural and remote settings, and a variety of clinical settings. A few limitations should be acknowledged. First, the study has a small sample size and unknown potential participant pool. Observed power associated with significant between-group differences suggests that the sample size was sufficient ( $>0.80$ ) to support the detected differences in all assessment domains except for the limbs and strength domain. This study did not consider the practice variability associated with specialization in neurological physiotherapy which may impact on practice and assessment patterns. Future research may include additional demographic questions related to specialization. Finally, a few domains, such as vestibular, respiration, and motivation, were mentioned in the free-text responses. We do not know whether these assessment domains would have been reported on more frequently had they been included in the pre-determined response options.

In conclusion, the findings of this study provide a rich data source for the current clinical practice in the assessment of people with neurological conditions in Australia. The survey demonstrated consensus among respondents on the inclusion of 12 domains of assessment for people with neurological conditions. Geographical location, clinical work setting, clinical experience, and therapeutic approach did not appear to influence the assessment practices. Therapist, patient, and organizational factors were all reported as barriers or enablers to the assessment process.

## 5 | IMPLICATIONS ON PHYSIOTHERAPY PRACTICE

There is variability in what physiotherapists assess in practice, in different settings, and in different states within Australia. This study indicates that experience affects the number and types of domains included in the assessment and the clinical setting influences the inclusion of the domains of function/Adl's and goal setting. Geographical location is also a factor that influences what domains are included with sensation/perception and vision assessed more in metropolitan locations. These study indications were found when the domains were grouped together, so caution should be taken in applying this to practice. Barriers to assessment include lack of time and intrinsic patient-centered factors. Enablers include the ability to assess clinical reasoning skills, use of standardized measures, therapist knowledge, and experience. Further research is needed to develop a consensus on best practices.

### AUTHOR CONTRIBUTIONS

The authors confirm their contribution to the paper as follows. *Study conception and design*: Jill Garner, Belinda Lange, Sheila Lennon, and

Maayken van den Berg. *Data collection*: Jill Garner. *Analysis and interpretation of results*: Jill Garner and Maayken van den Berg. *Draft manuscript preparation*: Jill Garner, Belinda Lange, Sheila Lennon, and Maayken van den Berg. All authors reviewed the results and approved the final version of the manuscript.

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### CONFLICT OF INTEREST STATEMENT

The authors declare no conflict of interest.

### DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available on request from the corresponding author. The data are not publicly available due to privacy or ethical restrictions.

### ETHICS STATEMENT

The Southern Adelaide Clinical Human Research Ethics Committee approved this study (OFR 73.20). All potential participants will be asked to read the online PICF before commencing the survey. Potential participants who wish to proceed with the completion of the survey will be asked to provide online consent by selecting one of two statements. "Yes, I have read and understood the information and would like to participate in the survey" noting they can withdraw from the survey at any time, they can select "no" or close the tab and they do not proceed to the survey.

### TRANSPARENCY STATEMENT

The lead author Jill Garner affirms that this manuscript is an honest, accurate, and transparent account of the study being reported; that no important aspects of the study have been omitted; and that any discrepancies from the study as planned (and, if relevant, registered) have been explained.

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## APPENDIX A

### Physiotherapy clinical practice in the assessment of people with neurological conditions

Please read the 'Participant Information Form' on this embedded link before consenting to complete the survey.

By clicking the button below, you acknowledge that

Your participation in the study is voluntary. You are 18 years of age. You are aware that you may choose to terminate your participation at any time for any reason.

- I consent, begin the study (1)
- I do not consent, I do not wish to participate (2)

#### End of Block: Informed Consent

#### Start of Block: Introduction

We surveyed the physiotherapy profession in Australia to explore current clinical practice, views, and perspectives on physiotherapy assessment of people with neurological conditions. If you decide to participate, you will be asked to complete a survey that will involve answering questions about your thoughts and views on the clinical assessment of people with neurological conditions. We are interested in your current practice in this area. This study was conducted by the physiotherapist Jill Garner as part of research to meet the requirements of a master's (research) in Clinical Rehabilitation at Flinders University. Jill teaches neurological assessments to undergraduate students and works clinically in neurology. The results of this study will contribute to the development of a clinical assessment framework.

The survey is divided into two sections.

**Section 1: These questions aim to find out about background information about you (Questions 1-13).**

**Section 2: These questions aim to find out about assessment content and process (Question 14-38).**

The survey took approximately 20 min to complete.

If you have any further questions regarding this survey or would like to view the collated results, please contact Jill Garner ([jill.garner@flinders.edu.au](mailto:jill.garner@flinders.edu.au)).

Q1 Are you currently working clinically with patients/patients with neurological conditions?

- Yes (1)
- No, if you have answered no to this question, please do not complete the survey (2)

Section 1: These questions aim to provide background information about you.

Q2 What is your gender?

- Male (1)
- Female (2)
- Other (3)

Q3 What is your age (in years)?

-----

Q4 How many years have you been a qualified physiotherapist? Please state.

-----

Q5 Where did you obtain your primary physiotherapy qualification?

- Australia (1)
- Overseas, please specify (2) -----

Q6 What is your highest level of professional education?

- Diploma of Physiotherapy (1)
- Bachelor of Physiotherapy (2)
- Bachelor of Physiotherapy, Honours (9)
- Master of Physiotherapy pre-registration (3)
- Doctor of Physiotherapy pre-registration (4)
- Honours (5)
- Master by coursework (6)
- Master by research (7)
- PhD (8)

Q7, Have you attended a neurology-related course with a minimum duration of 1 day in the last 2 years? If so, please select the number to attend. Include those with and without additional qualifications.

- 0 (1)
- 1 (2)
- 2 (3)
- 3 (4)
- >3 (5)

Q8 Currently, please specify hours per week you are working clinically?

- Hours per week (1) \_\_\_\_\_
- Other, if you do not work hours per week, please specify (2) \_\_\_\_\_.

Q9 During the last working month, in which state have you spent the most time working?

- Australian Capital Territory (1)
- New South Wales (2)
- Northern Territory (3)
- Queensland (4)
- South Australia (5)
- Tasmania (6)
- Victoria (7)
- Western Australia (8)

Q10: Below are the definitions of the work areas. Please choose the areas you have worked in during the previous month. Tick all that apply.

- Metropolitan (1)
- Regional (4)
- Rural/remote (5)

Q11 In what clinical setting do you work primarily? Please select one only.

- Acute inpatients/public (134)
- Acute inpatients/private (135)
- Inpatient rehabilitation/public (136)
- Inpatient rehabilitation/private (137)
- Outpatient rehabilitation/public (138)
- Outpatient rehabilitation/private (139)
- Outpatients/public (140)
- Outpatients/private (141)
- Residential care (142)

- Home care/community (143)
- Other, please specify (144) \_\_\_\_\_

Q12 How many years have you been working with neurological patients/patients?

- (1)
- 1–5 (2)
- 6–10 (3)
- 11–15 (4)
- 16–20 (5)
- >20 (6)

Q13 During your average working week, please specify the hours spent per week with patients/patients who have neurological conditions?

- Please specify (9) \_\_\_\_\_

Section 2: This section focuses on the content and process of the assessment.

Q14 Considering your neurological patient/patient caseload, how often do you assess each of the following conditions? Please select all that apply.

	Daily/ weekly (1)	Often (3)	Sometimes (4)	Rarely (5)	Never (7)
Stroke (1)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Multiple sclerosis (2)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Parkinson's disease (3)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Guillain Barre (4)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Spinal surgery (5)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Brain cancer (6)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Traumatic brain injury (7)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Spinal cord injury (8)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Motor neuron disease/ALS (9)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Cerebral palsy (10)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other upper motor neuron conditions (11)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other lower motor neuron conditions (12)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Q16: When did you last review resources related to neurological assessment? These include the literature, web-based information, and online videos.

- Within the last 6 months, please specify (27) \_\_\_\_\_
- Within the last 12 months, please specify (28) \_\_\_\_\_
- When studying as a pre-registration student, please specify (29)
- Other, please specify (30) \_\_\_\_\_

Q17, Do you assess all neurological patients using the same approach?

- Yes (1)
- No (2)

Q18 Are their certain core domains that you assess in every patient? For the purposes of this survey, domains such as leg strength or patient goals were defined as areas covered in the assessment.

- If yes, please list (1) \_\_\_\_\_
- No (2)

Q19 On an average, how long does it take you to perform a neurological physiotherapy assessment?

- ≤ 15 min (82)
- ≤ 30 min (83)
- ≤ 60 min (84)
- Other please specify (85) \_\_\_\_\_

Q20 What influences the amount of time required to perform an assessment?

- Please specify (1) \_\_\_\_\_

Q21 At what point in the patient journey do you perform an assessment with patients/patients with neurological conditions? Select all that apply.

- On admission (42)

- On discharge (43)
- At set time points, that is, Day 1, Day 7, Day 14, or halfway through the therapy schedule—Please specify (45) \_\_\_\_\_
- Other—please specify (46) \_\_\_\_\_

Q22 We would like to know a little bit more about what influences the assessment process. Please indicate below which factors influence the assessment.

	Barrier to assessment (1)	Enabler of assessment (2)	Does not influence (3)
Time (200)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Space/environment (201)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Peers (202)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Experience (203)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Knowledge (204)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Patient centered factors-intrinsic i.e. fatigue, motivation, pain (205)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Patient centered factors-extrinsic i.e. environment, family (206)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Clinical reasoning, i.e., using subjective to inform objective (207)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Standardized measures (including outcome measures) (208)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other—please specify (209)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Q23 As part of a recent systematic review exploring current practice in physiotherapy assessment of people with neurological conditions, 55 domains that physiotherapists may assess were identified. These domains collapsed together, and there was no specific order for these domains.

Please indicate how often you include the domains below in the assessment of people with neurological conditions:

	Always (1)	Often (2)	Sometimes (4)	Rarely (5)	Never (7)
10080 (10080)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Function (e.g., bed mobility, transfers, lie to sit, sit to stand), please specify (10081)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Activities of daily living- please specify (10082)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Stairs (10083)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Muscle strength (10084)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Muscle length (10085)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Trunk/core (10086)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Postural alignment and symmetry (10087)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Somatosensory assessment (e.g., light touch, proprioception, pinprick, temperature, pressure, stereognosis, 2-point discrimination, vibration), please specify (10088)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Pain (10090)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Vision (10091)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Perception (10092)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Neglect (10093)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
ROM (range of motion) (including AROM and PROM (passive range of motion)) (10094)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Balance (e.g., orientation in space, postural reactions, perturbations, anticipatory movements strategies, sway, static and dynamic balance), please specify (10095)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Deep Tendon Reflexes (10096)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Goal setting (10097)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Gait (e.g., speed, distance, endurance, cognitive loading during gait), please specify (10098)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Activity tolerance (endurance) (10099)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Cognition (10100)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Mood (including confidence and anxiety) (10101)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Co-ordination (10102)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Selective movement (10103)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Spasticity (10104)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Upper limb, please specify (10105)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Tone (e.g., tremor, bradykinesia, dyskinesia) (10106)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Falls and safety (10107)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Q24 Are you satisfied that all essential domains specific to neurological assessment have been identified in Q23?

- Yes (1)
- No, please comment (2) \_\_\_\_\_

Q25 This text box contains any additional comments you would like to make regarding the assessment domains.

- Additional comments (8) \_\_\_\_\_

Q26 The next two questions explored clinical reasoning. Physiotherapists gather and analyze information during the assessment process to inform clinical decisions. The clinical reasoning components below were derived from Higgs et al.<sup>51</sup> and Garner and Lennon<sup>52</sup>.

Please select all the components that you use to inform your clinical reasoning and comments, if needed.

- Evaluation of subjective findings (409)
- Evaluation of objective findings (410)
- Hypothesis formation (411)

- Use of standardized measures (412)
- Goal setting (413)
- Patient's problem list (414)
- Treatment plan (415)
- Clinical pattern recognition (416)
- None (417)
- Other, please specify (418)
- Comments (419) \_\_\_\_\_

Q27 This section is related to the information gathered as part of the assessment and what it is used for. Please select as many times as possible

- Form hypothesis (1)
- Write a problem list (2)
- Develop patient/patient centered goals (3)
- Plan treatment (4)
- Handover to other physios (5)
- Handover to other Healthcare professionals (6)
- Handover to carers (8)
- Other, please comment (11) \_\_\_\_\_

Q15, Do you subscribe to a particular therapeutic approach?

- No (1)
- Yes, please specify (2) \_\_\_\_\_

Q28 How do different therapeutic approaches influence the assessment of patients?

Example: I assess patients/patients based on this approach.

- Please detail how the different therapeutic approaches influence your assessment (1) \_\_\_\_\_

Q29 Does anything else guide your assessment?

- Please comment (1) \_\_\_\_\_

Q30 Regarding documentation of assessment. Please select which format applies.

- As per organizational format, please specify (1) \_\_\_\_\_
- SOAP format (2)
- Other (3) \_\_\_\_\_

Q31. The next six questions will explore your approach to using measures as part of the assessment. These tools are used to measure impairments, activity limitations, participation, and quality of life. Those

that have had their psychometric properties evaluated are termed standardized measures. The measures used to measure treatment outcomes are termed outcome measures (Braun et al., 2018).

Do you use any measures in your assessment?

- Yes (1)
- No, please continue to question 37 (2)

Q32 Please select all measures that you include as part of your assessment.

- Standardized diagnostic specific measures. Please specify (84) \_\_\_\_\_
- Standardized activity measures. Please specify (85) \_\_\_\_\_
- Standardized participation/quality of life measures. Please specify (86) \_\_\_\_\_
- Standardized outcome measures: please specify (87) \_\_\_\_\_
- Self- devised measures, please specify (88) \_\_\_\_\_
- Other, please specify (89) \_\_\_\_\_

Q33 How often do you use standardized measures? Select as many as apply.

- Always (43)
- Often (44)
- Sometimes (45)
- Rarely (46)
- Never (47)
- Other (48) \_\_\_\_\_

Q34 What influences your choice of standardized measures? Select all that apply.

- EBP (1)
- Familiarity (2)
- Experience (3)
- As directed by organization (4)
- What will most reflect change in my patient/patient population (5)

Q35 When do you use standardized outcome measures?

- Initial assessment (1)
- Subsequent assessment (2)
- On discharge (3)
- Other, please specify (4) \_\_\_\_\_

Q36, do you use measures of outcome that are not standardized?

- Yes, please specify (1) \_\_\_\_\_
- No (2)

Q37 This question is for physiotherapists working clinically to supervise students. Do you supervise the students in a clinical setting? If you do not answer, you may continue to question 39.

- Yes (6)

- No, continue to question 39 (7)

Q38 Please share any suggestions you may have about the best way to teach students and qualified physiotherapists how to perform a neurological assessment.

Thank you for taking time to complete the survey. We welcome any additional comments regarding the physiotherapy assessment of adults with neurological conditions in the clinical setting.

- Additional comments (1) \_\_\_\_\_