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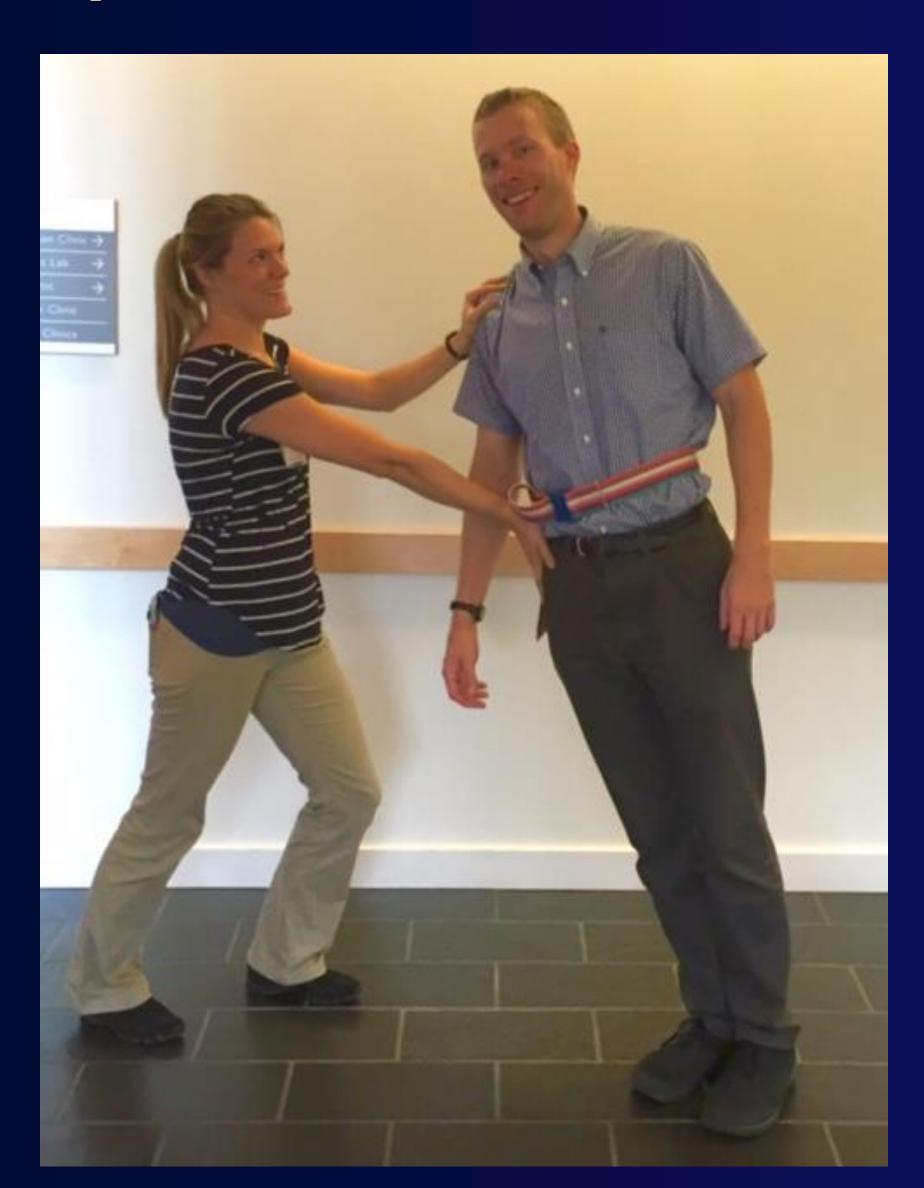
INTRODUCTION

Individuals with acquired brain injury (ABI) frequently seek care in outpatient physical therapy clinics to regain functional abilities in balance and coordination. Impairments to balance and mobility occur among people with brain injury, reducing participation and quality of life.[1,2] Physical therapy is essential to the rehabilitation of individuals with ABI, because therapists are able to intervene in ways to help patients regain balance.[3-6] With a progressively growing push for evidence-based practice in healthcare, it is crucial that physical therapists use consistent and effective outcome measures to draw useful conclusions about treatment effects.

Classic assessment tools such as the Berg Balance Scale (BBS) are particularly useful because they allow researchers to compare results across many studies; however, some assessments have limitations. For example, the BBS demonstrates floor and ceiling effects for very low or very high functioning individuals, it does not measure anticipatory or reactive balance, patients cannot use an assistive device, and there is no gait component (one of the functional activities in which falls often occur).[7] Examples of more appropriate outcome measures that have yet to be widely assimilated into clinical practice include the Clinical Gait and Balance Scale, Fullerton Advanced Balance Scale, Mini-BESTest, and Unified Balance Scale. These are the most comprehensive balance measures to date, as they included 8 of the 9 components of balance.[8]

PURPOSE

There is currently a profound lack of research regarding the use of balance outcome measures in outpatient settings in rehabilitation of patients with ABI. In an effort to fill this gap in the literature, the purpose of this retrospective records review is to identify outcome measures used to assess balance impairments in patients with ABI in a student-led onsite physical therapy clinic housed at the University of Puget Sound. We hypothesize that student physical therapists will select optimal and up-to-date balance measures that capture a meaningful improvement in balance over a specified episode of care.

SUBJECTS

Twenty three initial patient records were selected from a patient population that had received therapy services in the UPS Onsite Physical Therapy Clinic from fall 2012 to spring 2015. The inclusion criteria was: at least 18 years of age, diagnosis of an ABI (either traumatic brain injury or cerebrovascular accident) with at least one identifiable balance impairment, a documented initial and discharge score for a balance measure, the ability to ambulate household distances (approximately 50 feet) with or without an assistive device. Records were excluded if the subject had a congenital or progressive brain disorder, or a confounding illness or musculoskeletal disorder.

METHODS

This retrospective records review analyzed the balance-related outcome measures selected by student physical therapists in consultation with their clinical instructors. Records were independently assigned and two reviewers evaluated each record. All reviewers were blinded to the assignments of other reviewers. The reviewers independently extracted demographic information, evidence of balance impairments, and presence of balance outcome measures at initial evaluation and discharge. Discrepancies were discussed and for those conflicts for which no consensus could be reached, the research mentor acted as the final arbiter.

Episode of care	Fall 2012-Spring 2015
Number of Subjects	13
Age Range	35-85
Mean Age	58.46
History of falls	9/13
Onset to EOC Range (SD)	.75 years to 21 years (4.8)
Onset to EOC Mean	5.2 years
Number of Medications (SD)	2-16 (3.8)
Mean Number of Medications	8.5

Table 1. Demographics
EOC= Episode of Care

RESULTS

Descriptive statistics were used to summarize the data collected from each record. This study included the records of 13 subjects who received care in the UPS onsite clinic between fall 2012 and spring 2015. Of the 23 initial cases selected, 3 were excluded due to patient diagnosis and 7 were excluded due to lack of follow-up on a named outcome measure.

The most commonly used outcome measures were the Berg Balance Scale (n=8), Dynamic Gait Index (DGI) (n=3), Timed Up and Go (TUG) (n=2), and the Mini-BESTest (n=2). In addition, 8 records identified that either static or dynamic balance or both were assessed using other methods (n=8). Demographic characteristics can be seen in Table 1.

Ten subjects had a referral diagnosis of CVA while 2 subjects had a referral diagnosis of hemorrhagic stroke and 1 diagnosis of TBI. The average number of balance measures per subject was 2.25 with all subjects having at least one measure taken. Four patients were excluded from the study due to being evaluated exclusively on general outcome measures (See Table 2).

Two of the three subjects evaluated with the DGI met the minimal detectable change (MDC), one of the two evaluated on the TUG met the MDC, one of the two evaluated on the Mini-BESTest met the MDC, and five of eight met the MDC on the BBS. Subjects who were evaluated solely on general measures of balance were unable to be assessed for and MDC. Of the 13 subjects, 9 improved on named balance outcome measures by a score greater than or equal to the MDC or minimal clinically important difference (MCID) (See Table 3).

Subject Number	Diagnosis	Onset to Rx (yrs)	Assistive Device	Outcome Measure(s)	Number of Visits	Number of Tests (excluding GSB)
3	R CVA	2	Yes	GSB, BBS	12	1
4	R CVA	3	Yes	GSB, MAS, TUG	14	2
5	L CVA	10	Yes	Tinetti, BBS, DGI	17	3
6	L CVA	8	Yes	GSB, BBS	19	1
9	Cerebellar CVA	3	Yes	BBS	17	1
10	B Frontal CVA	21	No	GSB, DGI, TUG	19	2
13	Hemorrhagic stroke (AVMs)	5	Yes	GSB, DGI	8	1
14	L CVA	2	No	GSB, BBS, FTSS	4	2
15	R CVA	2	Yes	BBS	10	1
17	Intracranial hemorrhage	1	Yes	BBS	16	1
18	R TBI	2	No	MBT	8	1
19	R CVA	7	Yes	GSB, FSST, MBT	8	2
20	R CVA	3	Yes	GSB, BBS (short)	9	1

GSB= General Standing Balance, FTSS= Five Time Sit-to-Stand, FSST= Four Square Step Test, MBT= Mini-BESTest, DGI= Dynamic Gait Index, TUG= Timed Up and Go, BBS= Berg Balance Scale, MAS= Motor Assessment Scale

Table 2. Diagnosis and Outcome Measures

Outcome Measure	Number of patients	Achievement of MDC
BBS	8	0.63
DGI	3	0.67
Mini-BESTest	2	0.50
TUG	2	0.50

Table 3. Achievement of Minimal Detectable Change.

DISCUSSION

Student physical therapists in the onsite clinic used a wide range of outcome measures to assess balance. The most commonly used assessment tool was the Berg Balance Scale, followed by the DGI, then the TUG and Mini-BESTest. Other outcome measures that were only used with no more than one participant inlcuded the Tinetti, Visual Analog Scale of Balance, Five Time Sit to Stand, and the Four Square Step Test. Eight patients completed what was defined as a "general balance measure" which evaluated some components of static or dynamic standing or seated balance. Four of these eight patients were exclusively evaluated on general balance measures without an additional balance outcome measure and therefore were not included in the final analysis.

Interestingly, the patients in the study made procgress while being seen for care only one or two times per week. This indicates that significant improvements are possible even in a chronic neurological population with a limited number of visits. This is significant because of the restrictions insurers are placing on number of visits allowed for skilled physical therapy.

CONCLUSION

Student physical therapists in this setting are primarily using validated outcome measures to assess balance, and those measures demonstrate that meaningful improvement is possible over a 1-2X weekly episode of care. Chronic neurological patients were shown to achieve significant outcomes in this frequency of scheduled appointments. Half of the study population had a "general balance measure" in their notes to assess balance. While this might be appropriate for initial screening, the results have not been normed across various populations and thus outcomes are difficult to interpret. While general balance measures might be appropriate to help inform a therapist's decision-making process to work on specific deficits, this retrospective review highlights the importance of also including a named outcome measure for the sake of detecting significant changes across many case studies.

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