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Inter-Rater and Intra-Rater Reliability of the Repetitive Step Test in Community Dwelling Older Adults

Harold Merriman PhD, PT, CLT, Kurt Jackson PhD, PT, GCS, Kristin Beigel SPT, Sara Simpson SPT, Jennifer Smith SPT, Jamie Wynn SPT

Introduction

Each year one in every three adults over the age of 65 experience a fall resulting in serious injury and in some instances death. In this population, fall injuries are the leading cause of death and are associated with the greatest number of nonfatal injuries and trauma hospital admissions. Since balance and muscle performance decreases as one ages, it is vitally important to assess these factors as part of a comprehensive strategy to monitor and predict fall risk. The Repetitive Step Test (RST) has previously showed the ability in community dwelling older adults to differentiate recurrent fallers from non-fallers and to have excellent test-retest reliability.

Purpose/Hypothesis

To determine the inter-rater and intra-rater reliability of the RST in community dwelling older adults. We hypothesize that the RST will exhibit good or excellent inter-rater and intra-rater reliability in this population.

Subjects

18 community ambulators with and without a fall history (4 males, 14 females), ages ≥ 65 yo, mean age 78.5 years

Materials

Masking tape, goniometer, tape measure, gait belt and stop watch (see Fig. 1).

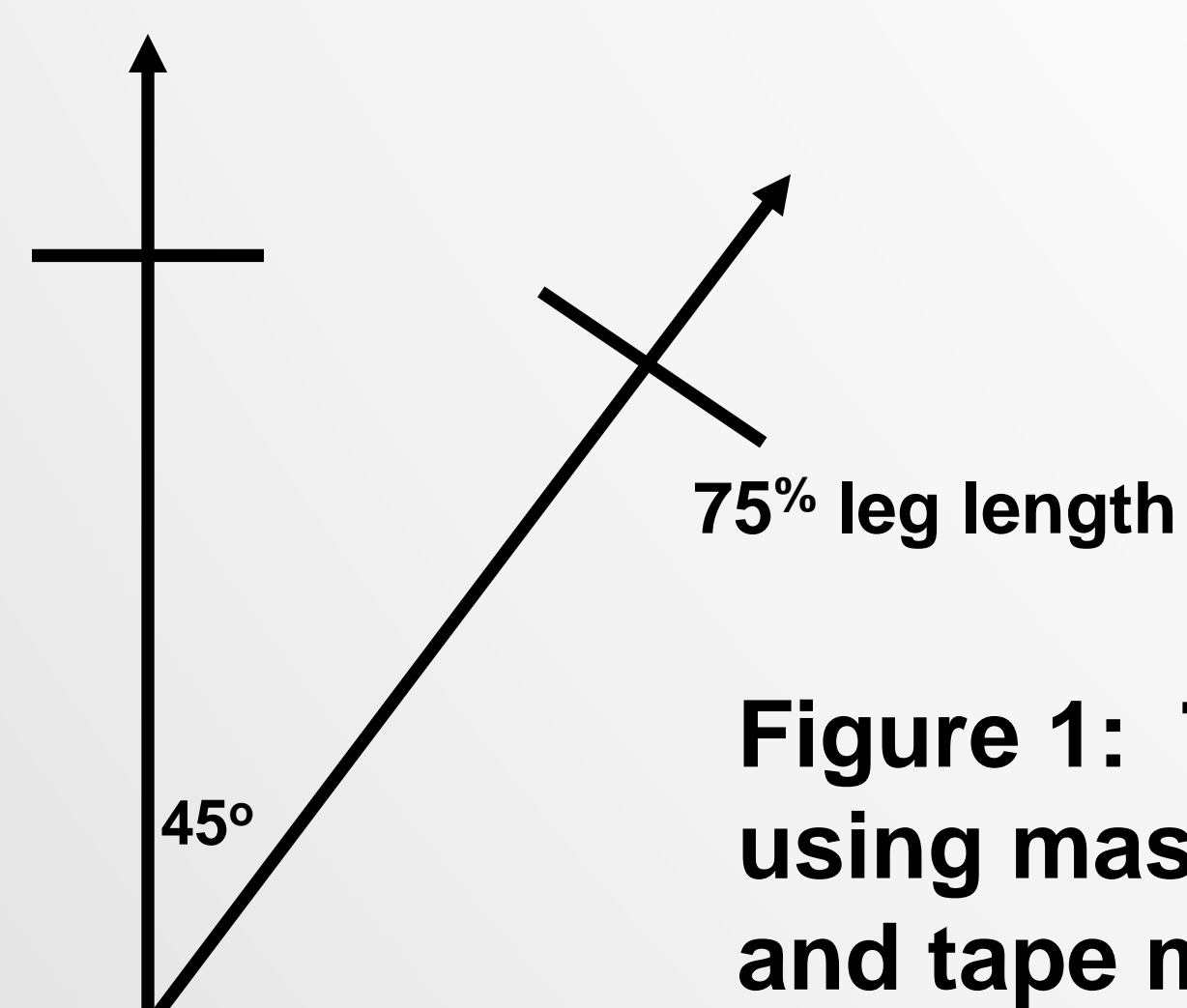


Figure 1: 75% RST grid design using masking tape, goniometer and tape measure.

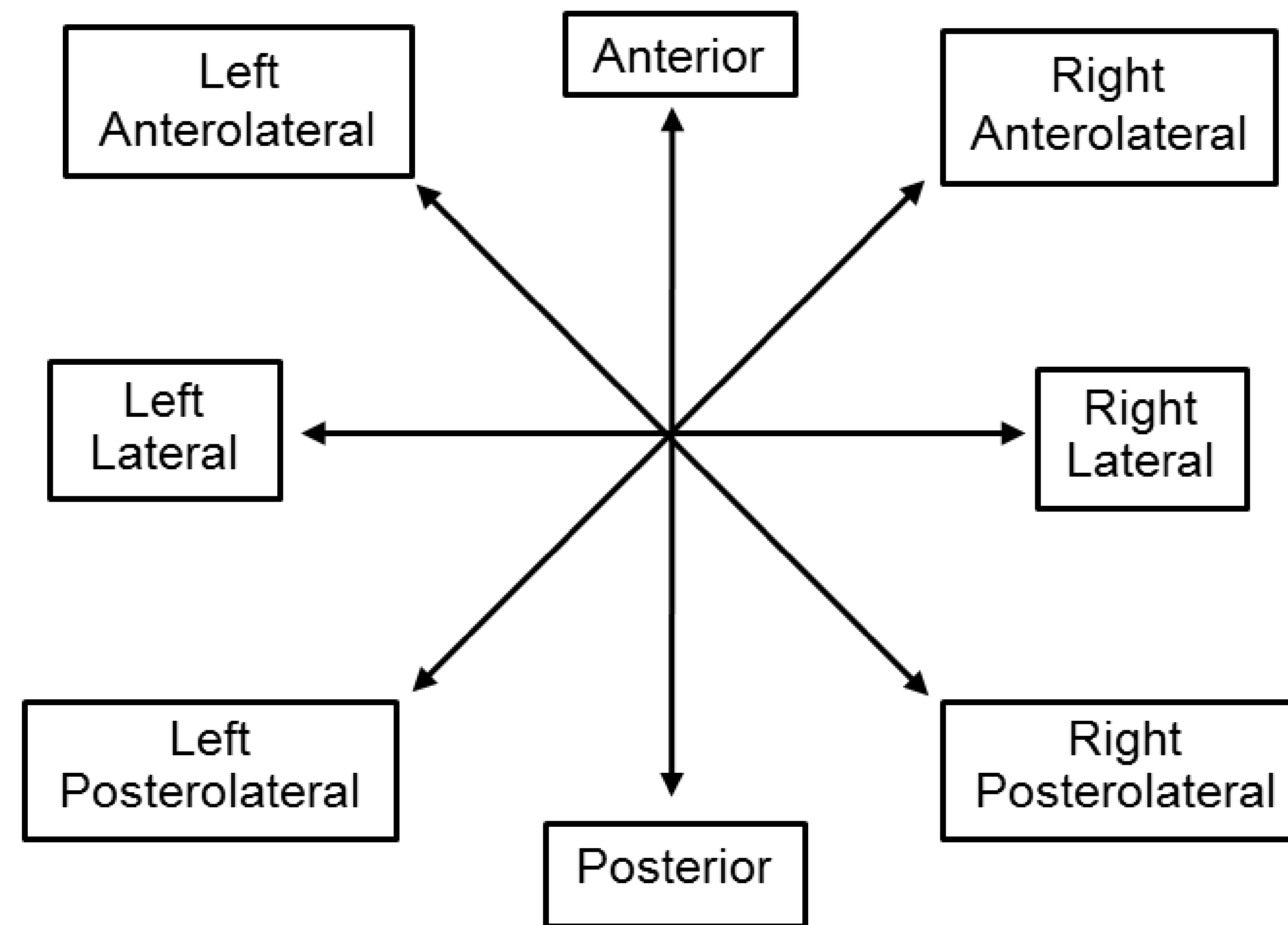


Figure 2: All RST step directions.

Direction	Inter-Rater		Intra-Rater	
	50% Leg Length	75% Leg Length	50% Leg Length	75% Leg Length
Angular Summed	0.87	0.91	0.99	0.98
Linear Summed	0.98	0.92	0.99	0.99
Total Summed	0.98	0.92	0.99	0.99

Figure 3: Intraclass correlation coefficient (ICC 2,2) was used to calculate the inter-rater and intra-rater reliability.

Methods

Each subject performed a dynamic balance stepping protocol bilaterally in 10 directions at 50% and 75% of their right leg length (see Fig. 2). Leg length was determined by measuring the distance from the R ASIS to the R medial malleolus. Subjects were asked to safely step with full weight shift to a marked line as many times as possible in 15 seconds. Step direction was randomized. For inter-rater reliability two raters simultaneously counted steps completed for each participant visually in real time. For intra-rater reliability one rater counted steps using video footage by a subset of seven subjects and then repeated the video step counting a minimum of four weeks later.

Results

An Intraclass Correlation Coefficient (ICC 2,2) was used to calculate inter-rater and intra-rater reliability for the 50% and 75% leg length after summing the four angular, six linear, and ten total directions. ICC inter-rater results for 50% and 75% leg lengths are as follows, respectively: angular directions 0.87 and 0.91, linear directions 0.98 and 0.92 and total directions 0.98 and 0.92. ICC intra-rater results for 50% and 75% leg lengths are as follows, respectively: angular directions 0.99 and 0.98, linear directions 0.99 and 0.99 and total directions 0.99 and 0.99.

Conclusion

The RST shows excellent inter-rater and intra-rater reliability in all three forms. These findings indicate that the RST is a reliable dynamic balance measure to implement into clinical practice including its streamlined form.

Clinical Relevance

The ability to quickly assess fall risk in older adults is extremely important in order to develop an appropriate PT plan of care in a timely manner. This study has shown that the streamlined angular version of the RST taking less than two minutes to administer has excellent inter-rater and intra-rater reliability.