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8. Intra-rater reliability of the Spinal Mouse for measuring spinal morphology

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Assessment of full range of motion and curvature of the spine is a highly useful tool for clinicians to aid their objective assessments for investigating entities such as posture and function. However, the use of repeated radiographic techniques to examine the spine may expose persons to levels of ionising radiation that might considered dangerous (Mannion et al., 2004, *Euro Spine Journal*, 13, 122–136). The Spinal Mouse (SM) (Idiag, Voletswil, Switzerland) is a skin-surface device that has been used to measure sagittal and frontal planes (SP, FP) in flexion and extension. There is, however, limited evidence on the reliability and validity of SM measures for all spinal motions. Furthermore, there are no such guidelines advising how much training is required to be competent in using the SM. This study aimed to assess the intra-rater reliability of the spinal mouse with novice raters and provide guidelines to become competent in using the device. With institutional ethics approval, University students (n = 10), (20.2 ± 1.1 years, 172.2 ± 7.41 m, 70.6 ± 8.58 kg) volunteered for the study. On 3 consecutive days SP measurements were taken 3 times in upright, flexed and extended positions of the spine. FP measurements were repeated 3 times in upright, right sided flexion and left sided flexion. Intra-rater reliability for two raters was calculated using typical error (TE) and Intra-Class Correlations (ICCs) for each spinal segment (Thoracic, Lumbar and Sacral-Hip) and spinal position. Currier's (1990, Elements of research in physical therapy. 3rd edn., Baltimore, Williams and Wilkins) criteria for ICC's was adopted for analysis. 83% of the ICC's in the SP demonstrated fair to high reliability. SP Flexion ICC = 0.92 (0.90-0.98), SP Upright ICC = 0.82 (0.66-0.95) and SP Extension ICC = 0.74 (0.57-0.92). In contrast, FP had 33.3% of its values range from fair to high (with all Upright measurements showing poor reliability (ICC 0.36). This suggests the SM is a reliable tool for SP measurements supporting the research of Manion et al. (2004). However, in contrast FP measurements are less reliable. TE reduced between the first and third trials for SP Thoracic Upright (4.90° to 2.56°) and Lumbar Upright (5.06° to 3.32°) on day 1. However, no clear reduction in TE over three days was observed for both raters in the SP. Novice raters may therefore need more training time or accept measurements with TE ranging from 2.49°- 8.95°.