Validity and reliability of the NOD device to assess deep neck flexors performance during the craniocervical flexion test in patients with temporomandibular disorders

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Objective

To investigate the convergent validity and reliability of the NOD device when evaluating the performance of the deep neck flexor muscles during the Craniocervical Flexion Test (CCFT).

Methods

- Approved by the ethics committee.

- Inclusion: Patients with temporomandibular disorders, according to the diagnostic criteria for temporomandibular disorders and chronic pain.

All patients were assessed with the CCFT using two different devices (NOD and Stabilizer) at day 1 and day 2 (one week apart). The data collected were the activation score (AS) and the performance index (PI). The data collection procedures, as well as the randomization of assessors and devices, are described in Figure 1.

- Statistical analysis: STATA software version 17.0.

- **Convergent validity:** Correlation.

- **Reliability:** Kappa coefficient (categorical data - AS) and the Intraclass correlation coefficient (ICC) were used (continuous data - PI and strength).

- The standard error of the measurements (PI) and percentage of agreement (AS) were calculated.

- Data are presented using mean and standard deviation (SD).

Results

- Twenty-seven patients; Age of 29.97 (11.28) years; Height of 169.35 (6.89) centimeters; Weight of 66.51 (13.79) kilograms; Jaw function limitation scale score of 16.64 (25.04) points

Table 1. Results for the convergent, reliability, and standard error measurement analysis.

	AS	PI	Strength
Convergent validity (NOD and Stabilizer)	r = 0.69	r = 0.69	Not applicable
Reliability intra-rater	Kappa: 0.26 45.45% of agreement	ICC: 0.57 95% CI: 0.13 - 0.79	ICC: 0.27 95% CI: -0.45 - 0.64
Reliability inter-rater	Kappa: 0.26 50% of agreement	ICC: 0.77 95% CI: 0.53 - 0.88	ICC: 0.66 95% CI: 0.32 - 0.83
SEM	Not applicable	52.87 points	Not applicable

Conclusion

The NOD device showed a **moderate positive correlation** with the Stabilizer. Fair agreement for the AS and **a moderate to good reliability** for the PI and strength (intra and inter-rater). Strength of the neck flexors had poor intra-rater reliability. The NOD device could be a promising tool for evaluating neck flexors during the CCFT.

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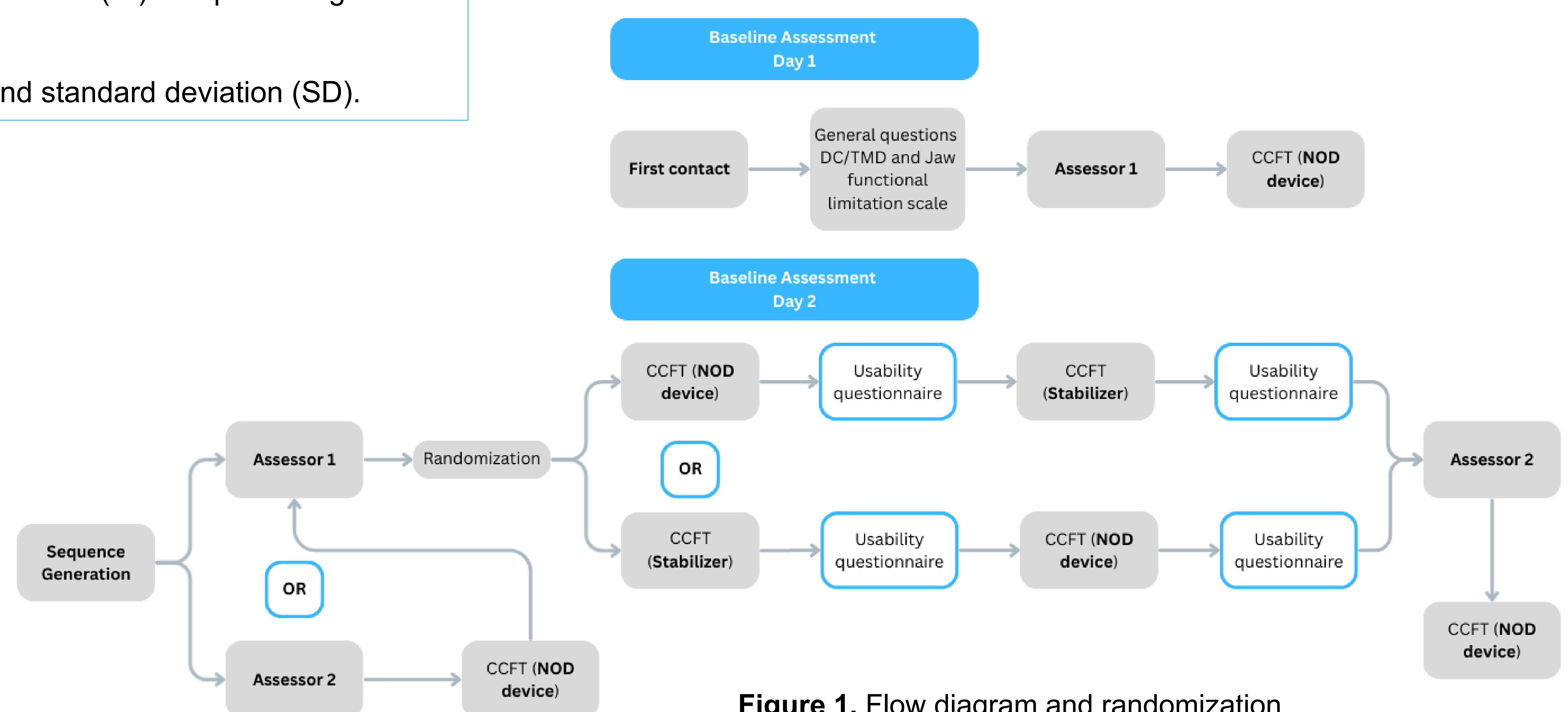
Figure 1. Flow diagram and randomization

Figure 2. Data collection of the craniocervical flexion test (CCFT) using the Stabilizer (left side) and NOD device (right side).