

Why are clinicians still using the Modified Ashworth Scale?

A systematic review of the diagnostic levels of evidence of robotic devices for measuring viscoelastic joint properties and spasticity

M.A.C. de Koff MSc^{1,2}, L.L. van der Velden MSc², B. Onneweer PhD², Prof. G.M. Ribbers (MD) PhD^{1,2}, R.W. Selles PhD²

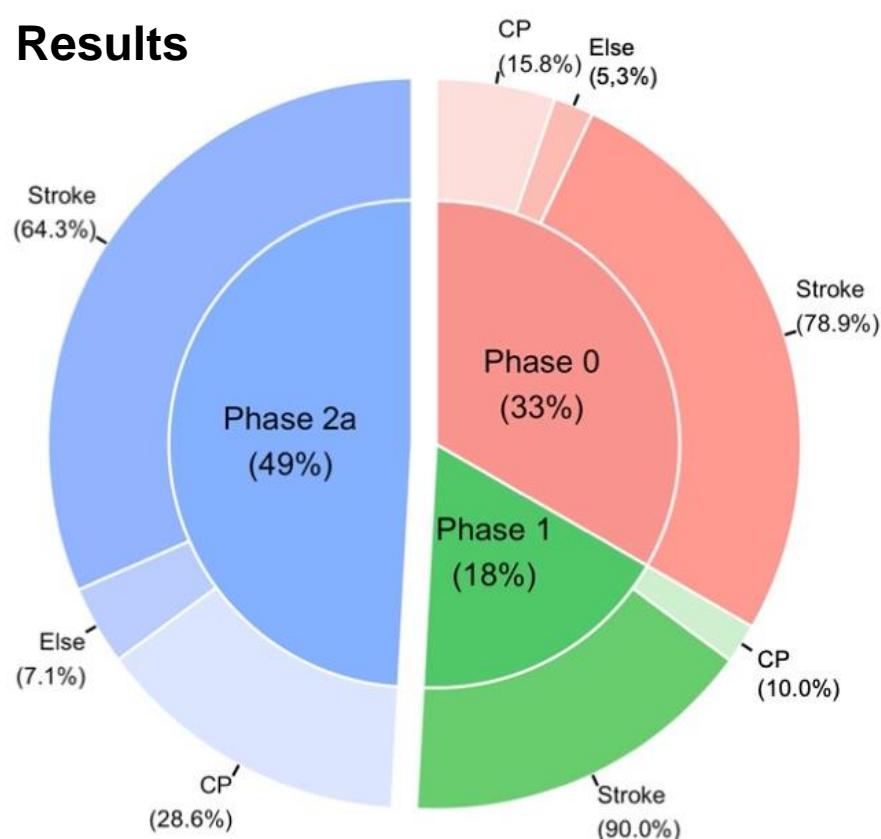
¹Rijndam Rehabilitation Center Rotterdam, The Netherlands; ²Erasmus MC University Medical Center Rotterdam, The Netherlands

Objective To increase our understanding of why diagnostic robotic devices are not used in clinical practice, we review the diagnostic level of evidence of studies using robotic devices to assess viscoelastic joint properties and spasticity.

Background

In the last decades many different robotic devices are developed for measuring viscoelastic properties and spasticity. Presumably, multiple factors discourage their use among clinicians. One important factor could be the use of inappropriate research designs for implementing the devices in clinical practice.

Results



Methods

- Children and adults
- Cerebral stroke or hemorrhage; cerebral palsy
- Mechanically driven robotic devices, quantifying viscoelastic joint properties and/or spasticity

Levels of diagnostic evidence

Phase 0	Including less than ten participants
Phase I	Reporting or comparing patients or healthy controls
Phase II	Determining the diagnostic accuracy
IIa	Correlating the outcomes with a reference test, comparing patients and controls, or analyzing change over time
IIb	Comparing patients with and without abnormal viscoelastic joint properties or spasticity and reporting sensitivity or specificity
Phase III	Evaluating the clinical consequences of using the device by evaluating the clinical added value of the patients who were measured with the device
Phase IV	Determining the long-term clinical consequences in daily care by surveillance of the patient outcomes after introducing the device into clinical practice

*Sackett DL, Haynes RB. The architecture of diagnostic research. BMJ. 2002;324(7336):539-541.

Conclusion We show that the type of diagnostic evidence needed for implementing diagnostic robotic devices in clinical practice, phase 2b, 3 or 4 studies, is currently lacking.

Future perspective Further research should focus more on providing diagnostic evidence by using study designs to determine diagnostic accuracy, clinical added value, or long-term clinical consequences.