UPMC Rehabilitation Institute

University of Pittsburgh

Establishing Validity Evidence of the Pittsburgh Impairment Testing Tool (PITT) for Adults with Spina Bifida

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Background

- The motor level, determined by manual muscle testing (MMT), is inversely associated with ambulatory status.
- However, published motor impairment scales vary in their complexity and correlation with ambulation ability.
- A practical scale based on clearly defined MMT grades is needed for busy clinic settings and research.
- Content validity describes the relevance and representativeness of items of a scale to the underlying construct.
- Therefore, content validity is essential to instrument development.

Objectives

- To measure the content validity ratio (benchmark ≥ 0.8) of the Pittsburgh Impairment Testing Tool (PITT)

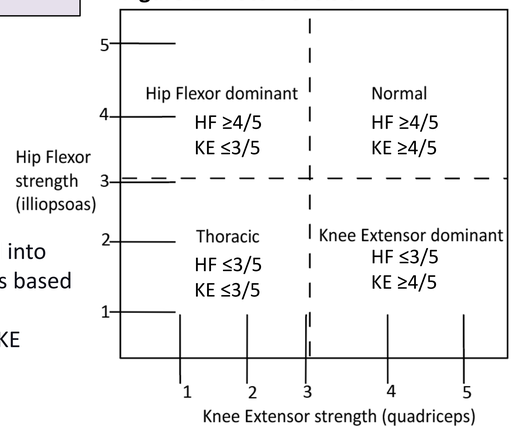
Methods

Development of the tool

PITT developed in prior work using specific muscle strength patterns seen in patients at the UPMC Adult Spina Bifida (SB) Clinic.

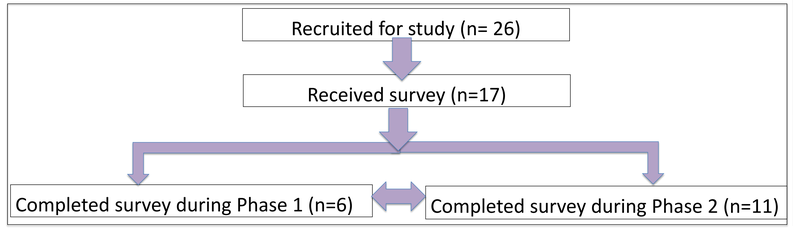
- Individuals are grouped into one of four motor levels based on MMT grades:
- Normal, HF Dominant, KE dominant and Thoracic

Figure 1. Motor levels of PITT



Recruitment of expert panel

Figure 2. Experts with experience in the SB population and an understanding of motor level testing were recruited.



- A total of 26 subject-matter experts were invited to participate in the study, with 17 ultimately participating in the study.

Content Validity Analysis

- In Phase 1, all experts expressing interest received the survey and a document describing the scale's content validity study.
- In Phase 2, the revised survey was re-distributed to all participants.
- Data from Phase 2 were used to calculate the content validity ratio (CVR) with critical values recommended by Wilson and colleagues.

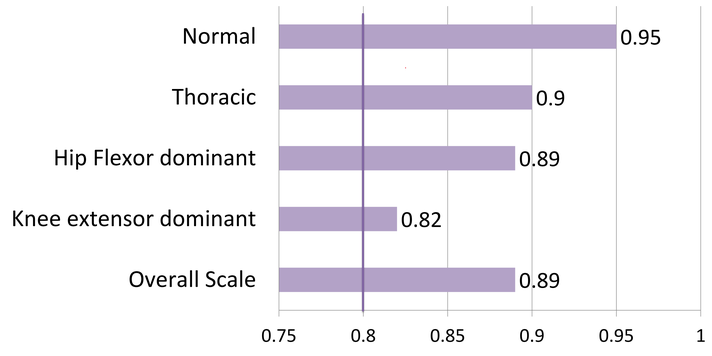
Figure 3. Lawshe's formula for calculating content validity.

$$CVR = \frac{n_e - \frac{N}{2}}{\frac{N}{2}}$$

Results

Summary of Content Validity Ratio for Phase 2 of PITT study

Figure 4. The target benchmark of CVR ≥ 0.8 for each impairment level and the overall scale was exceeded.



Qualitative feedback on PITT Scale

- Expert feedback included limitations, suggestions for improvement and strengths of the PITT Scale .

Table 1. Theme dependent quote examples.

Theme	Expert Quote
Limitations of PITT	"I understand your purpose in using such a scale to predict ambulation, but as a neurosurgeon I'm concerned about more subtle change in muscle strength…that may not be able to be captured in such a scale"
	"This type of categorization assumes that a person can follow directions for MMT, which does not include all people in a clinic"
Strengths of PITT	"I think this classification should be relatively simple to apply and has merit. Much less cumbersome than other scales"

Conclusions

- The high content validity (CVR ≥ 0.8), coupled with expert feedback, suggests the scale may give clinicians and researchers a more practical method of assessing an individuals' motor level.
- The scale's high content validity originates from the muscle strength patterns it uses to categorize individuals.
- Expert feedback revealed ways to improve the scale and the value in preserving the ease and simplicity of the scale.
- The scale is not meant to replace a thorough neurologic examination.

Future directions

- Address the tool's additional psychometric properties with a focus on construct validity.
- Determine if the scale can be used in a pediatric population.
- Develop techniques for sharing this information with providers and facilitating the use of motor scales.

References

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