

1-2019

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Recommended Citation

Ardolino, Elizabeth; Flores, Megan; Ferreira, Germaine; Jeantete, Susan; and Manella, Kathleen, "Interrater Reliability of the Pediatric Neuromuscular Recovery Scale in Children with Spina Bifida" (2019). *Physical Therapy Collection*. 46.
<https://soar.usa.edu/pt/46>

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Interrater Reliability of the Pediatric Neuromuscular Recovery Scale in Children with Spina Bifida

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BACKGROUND AND PURPOSE

- The prevalence of spina bifida among children in the United States is estimated to be about 0.3 per 1,000 births and 1.9 per 1,000 births worldwide (Shin 2010, Sawin 2015).
- Myelomeningocele (MMC), the most common and severe form of spina bifida, results in damage to the spinal cord and nerves at the level of the lesion.
- There are few outcome measures for assessing gross motor function and mobility in children with MMC (Smith 2015).
- A valid, reliable outcome measure is needed for children with MMC that assesses the child's gross motor functional abilities as well as the quality of the child's movement.
- The Pediatric Neuromuscular Recovery Scale (Peds NRS) is a valid and reliable measure of functional recovery without compensation in children with SCI aged one to 12 years (Ardolino 2016, Trimble 2016).
- The purpose of this study was to investigate the interrater reliability of the Peds NRS for children with MMC.**

RATERS

- Two PTs and two OTs who had at least two years of experience in the evaluation and treatment of children with neuromotor disorders participated in this study.
- Each rater completed a Peds NRS online training course and 2 live training sessions

Rater	Gender	Age	# years as a clinician	# years in pediatrics	Degrees
1	F	43	19	19	BS in OT; OTD
2	F	37	15	5	BS, MPT, MSPT, PhD
3	F	29	5	5	BS, MOT
4	F	47	18	17	BS, BSPT, DPT
Average		39	14.25	11.5	

CHILD PARTICIPANTS

A sample of 21 children with MMC were recruited from clinics and parent support groups within a 250-mile radius of Austin, TX.

CHILD DEMOGRAPHICS

Age in Years	N	Gender	N	Neurologic Impairment Level	N
1-5	11	M	11	Sacral,	3
6-10	10	F	10	Mid-low Lumbar,	7
Average = 5.3				High Lumbar/Thoracic	5
				Unknown	3

CHILD FUNCTIONAL MOBILITY

Modified Hoffer Scale Score	N	Assistive Device/Orthotic	N
5 Non-ambulatory	4	None	3
4 Household ambulation (w/c use indoors and outdoors)	4	BAFO	5
3 Household ambulation (w/c use outdoors only)	0	B Lofstrand Crutches/BAFO	2
2 Community ambulation (w/c use for long distances only)	8	4 W Reverse Walker/BAFO	3
1 Community ambulation	5	4 W Reverse Walker/BKAFO	1
		4 W Reverse Walker/BHKAFO	1
		Gait Trainer/BKAFO	3
		Standing Frame/BAFO	3

METHODS

- Each child with MMC was scored on the Peds NRS three times: two live testing sessions and one video recorded session.
- Every child was scored by two PTs and one OT.
- Interrater reliability was analyzed using intraclass correlation coefficients (ICC) for individual items and the summary score.



Item: In-hand Manipulation



Item: Sit Inside Base of Support

RESULTS

Table: Interrater Reliability for 16 Peds NRS items and Summary Score.

Item	ICC(2,1)	95% CI	p-value
Supine to sit	0.888	0.783-0.950	<0.005
Sit inside BOS	0.890	0.789-0.950	<0.005
Sit outside BOS	0.867	0.749-0.939	<0.005
Forward reach and grasp (right)	0.918	0.836-0.964	<0.005
Forward reach and grasp (left)	0.938	0.876-0.973	<0.005
In-hand manipulation (right)	0.768	0.583-0.891	<0.005
In-hand manipulation (left)	0.745	0.548-0.879	<0.005
Overhead reach (right)	0.858	0.729-0.936	<0.005
Overhead reach (left)	0.858	0.730-0.936	<0.005
Sit to stand	0.888	0.785-0.949	<0.005
Static Stand	0.954	0.908-0.979	<0.005
Dynamic Stand	0.870	0.754-0.940	<0.005
Walking	0.969	0.938-0.986	<0.005
Stand Adaptability	0.511	0.198-0.776	0.001
Step Retraining	0.765	0.541-0.905	<0.005
Step Adaptability	0.584	0.285-0.816	<0.005
Summary Score	0.894	0.796-0.952	<0.005

- The summary score had consistent reliability across age categories and groups defined by the modified Hoffer level
- There was no difference in the summary scores among all raters at $F(2,60) = .220, p = .804$.

CONCLUSION

Pediatric clinicians were able to reliably administer and score the Peds NRS on children with MMC, representing a wide range of ages and functional levels.

CLINICAL RELEVANCE

This is the first investigation of the use of the Peds NRS in children with MMC. This study adds to the literature regarding the psychometric properties of the Peds NRS.

ACKNOWLEDGEMENTS

The researchers would like to thank the child participants and their families for taking part in our study. We would also like to thank the raters and DPT and MOT students who assisted with the study.