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Assignment 5

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**Pediatric Arnold Chiari Malformation Assessment Toolbox**

**Children with ACM can have a variety of clinical presentations depending on the severity of their malformation and the presence of common co-occurring conditions. Much of the research on the types of Chiari malformation focuses on Chiari type 1 malformations and the Chiari malformation specific outcome measures available were created specifically for Chiari type 1 malformations. It’s important for physical therapists to thoroughly assess children with ACM with regards to every domain of the ICF model. Some helpful outcome measures and assessment tools are listed below.**

**Body Structure and Function**

1. ***Wong-Baker FACES Pain Rating Scale:* The Wong-Baker FACES Pain Rating Scale is a pain scale often used in pediatric populations. It is made up of 6 different faces that show varying grades of pain from “no hurt” to “hurts worst”.1 This measure has been validated for children ages 3 and up.2 Children with ACM often experience neck pain and headaches so assessing their pain is important for evaluation and measuring progress. Obtaining a detailed history of headache and neck pain history is also beneficial to the assessment of pain in children with ACM. The Wong-Baker FACES Pain Rating Scale has also been shown to correlate well with the more widely used and accepted Visual Analog Scale pain rating in older children.1**
2. ***The Face, Legs, Activity, Cry, and Consolability (FLACC) scale:* The FLACC scale is an observational pain scale used for individuals from birth to 18 years old.3 It has been validated for use in infants and children aged 2 months to 7 years old.3 The FLACC scale scores each of the 5 behaviors (facial, leg position, body movement activity, cry, and consolability) on a scale of 0-2 with a maximum score of 10 indicating the maximum amount of pain.3 This scale could be useful for assessing pain in younger children who aren’t yet verbal or have trouble understanding the Wong-Baker FACES Pain Rating Scale. The psychometric properties of the FLACC scale has been studied in a variety of populations and has been proven reliable in the pediatric emergency department setting among others for children as young as 6 months old.4 ACM is often diagnosed before birth or at birth so it’s important to be able to assess pain at any age.**
3. ***Pediatric Balance Scale (PBS):* The Pediatric Balance Scale is a 14-item outcome measure that assesses balance in pediatric patients based off of their performance on functional everyday activities.5 These activities include transfers, static balance, gait, and reaching.6 Each item is scored on a scale of 0-4 with 4 indicating the best performance.5 The test has been validated for school age children and has demonstrated good test-retest reliability as well as interrater reliability in children with mild to moderate motor dysfunction.6 Children with ACM often have balance difficulties and the PBS can be used on these children with varying levels of mobility.**
4. ***Peabody Developmental Motor Scales-Second Edition (PDMS-2):* The PDMS-2 is an assessment of motor function that is validated for children from birth to 5 years old.7 It is made up of 6 subtests: Reflexes, Object Manipulation, Grasping, Stationary, Locomotion, and Visual-Motor Integration.7 Each subtest has a varying number of items included in it and each item is scored on a scale of 0-2 with 2 being the best performance.7 From the results, each child receives a Gross Motor Quotient, Fine Motor Quotient, and Total Motor Quotient and from these quotients one can assess standard scores and age equivalents.7 The criterion validity for the PDMS-2 is great for children with developmental delays and children with ACM are often developmentally delayed.7 The PDMS-2 also has great test-retest reliability and interrater reliability.7**
5. ***Bruininks-Oseretsky Test of Motor Proficiency-Second Edition (BOT-2):* The BOT-2 measures motor performance, both gross and fine, in children ages 4-21 years old.8 It can be used to assess motor performance in children who have aged out of the PDMS-2. It includes 4 different motor areas: Fine Manual Control, Manual Coordination, Body Coordination, and Strength and Agility.8 Each area is split into two sections and each area is made up of varying numbers of test items.8 The total score can range from 0-320 with a higher score indicating better motor performance.9 From there, standard scores can be obtained and compared to age equivalents.9 The BOT-2 has good face validity, construct validity, test-retest validity, and interrater validity.8,9**
6. ***Rotary chair test:* The rotary chair test is a test of vestibular function that can be used for adults and children. The test involves rotation in a chair at different frequencies and measuring for the presence and persistency or nystagmus afterwards as well as the vestibulo-ocular reflex.10,11 The Rotary chair test can be performed on children as young as 3 months old with them seated in their caregiver’s lap.10 The test specifically assesses for bilateral vestibular function loss or dysfunction in cerebellar control of ocular motion.12 The time it takes for nystagmus to resolve or for the vestibulo-ocular reflex to take place is compared to to normative data.11 The test has also been adapted to better suit children by adding a fun background or playing children’s songs during administration.10 Children with ACM often have vestibular issues due to the malformation of their cerebellum so this test can assess the level of impairment present.**

**Activity and Participation**

1. ***Functional Independence Measure for Children (WeeFIM):* The WeeFIM is an outcome measure of functional independence that can be given through observation, interview, or a mixture of both.13 It contains 18 items that are divided into 6 sections: self care, locomotion, transfers, sphincter control, communication, and social cognition.13 It has been validated for use in children with developmental disabilities from 6 months to 12 years old and for typically developing children from 6 months to 8 years old.14 Each item of the measure is rated on a scale of 1-7 with 1 indicating total independence and 7 indicating total dependence.13 The WeeFIM has excelled validity and interrater reliability.13 Children with ACM can have difficulties and require assistance in any of the sections of the WeeFIM and the measure can provide a comprehensive assessment of activity limitations.**
2. ***Pediatric Quality of Life Inventory (PedsQL):* The PedsQL is a 23 item self-report measure used to assess quality of life in children from 2 to 18 years old.15,16 The measure covers physical, emotional, and social health with questions that are ranked on a scale of 0 to 4.15 A score of 0 corresponds with “never being a problem” and 4 corresponds with “almost always a problem.”15 Three different scores are gathered from the final score: psychosocial health summary score, physical health summary score, and total scale score.15 The PedsQL is a valid and reliable tool with good internal consistency.15 The effects of the potential activity limitations and participation restrictions can greatly impact quality of life in children with ACM. It’s important for physical therapists to assess quality of life in these patient in order to best treat the whole patient.**
3. ***Miller Function and Participation Scales (M-FUN):* The M-FUN is an outcome measure that focuses on functional performance at home and in the school setting.17 It includes 15-16 “games” that assess the performance of gross motor skills, fine motor skills, and visual-motor skills as well as an observational component.17 Each “game” or item is scored on a scale of 0 to 2 or 0 to 3 with a higher score indicating better performance.17 The observations take place in the classroom, at home, and with specific tasks.17 The test can be used for children from 2 to 12 years old and has excellent reliability, validity, and internal consistency.17 The M-FUN’s games focus primarily on use of the upper extremities and in my personal experience it really is fun to administer. Children with ACM may have participation restrictions in the school setting as well as at home so the M-FUN is a good measure to use in assessing them.**
4. ***Test of Everyday Attention for Children (TEA-Ch):* The TEA-Ch is a measure of attention used for children from age 6 to 16 years old.18 It is designed like a game to assess sustained attention, selective attention, and attention control with 9 different “games” that are all scored differently.18,19 This measure has been proven valid for assessing attention in typically developing children as well as those with attention deficits in eastern and western cultures.19 Children with ACM may have attention deficits and this measure assesses different types of attention.**

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