Evidence Summary for Pediatric Rehabilitation Professionals

Outcome Measures: The Alberta Infant Motor Scale (AIMS)

1. Summary

Type: Norm-referenced  
Purpose: Discrimination, evaluation  
Population: Pre and full-term infants, who are developing typically but are “at-risk” due to pre, peri, or post-natal factors, and display typical patterns of movement although these may be delayed/immature (for e.g. Downs Syndrome).  
Age: 0 – 18 months or walking but decreased accuracy at 3 months of age and decreased precision after 9 months of age (See 5. Further Considerations).  
Time to Complete: 20 – 30 minutes  
Equipment Needed: Book, form, pen, and observation surface

2. Overview

The AIMS is a quick, reliable and valid measure of motor development for infants at risk for motor delay. The AIMS was developed to assist physiotherapists and occupational therapists to measure motor development in infants at high risk of motor delay.1 The AIMS focuses on attainment of motor milestones as well as the components needed to attain these milestones (for e.g. posture, weight-bearing, anti-gravity movements) and can be used to assess infants from birth until the attainment of independent walking. A 58-item, observational assessment requiring minimal handling and 20-30 minutes’ administration time, the AIMS assesses infant movement in four positions: prone (e.g., reciprocal crawling), supine (e.g., moving hands to feet), sitting (e.g., sitting with arm support), and standing (e.g., pulls to stand).1,2 For each subscale, items are scored as “observed” or “not observed”. The items in the observed range create a motor window. When scoring, subscale scores are calculated by giving the child credit for the observed items within the motor window in addition to being given credit for all of the less mature items before the motor window. The AIMS total score is calculated by summing the scores for the 58 items with a range of scores between 0 and 58. Higher scores indicate more mature motor development. The infant’s score can then be converted to a percentile and compared with age-equivalent peers from the normative sample.3

3. Standardization Sample

The AIMS was standardized on a normative sample of 2202 infants between the ages of 1 week to 18 months living in the province of Alberta between 1990 and 1992. Stratification was based on age, gender, and geographical area. No information is provided regarding infant ethnicity or socioeconomic status in the original manual.3

4. Measurement Properties

a. Reliability

Reliability of the AIMS has been established. Interrater reliability was assessed using two therapists who assessed 221 typically developing infants. r values from a Pearson Product
Moment Correlation Coefficient ranged from 0.96 to 0.99. Test-retest reliability was assessed by administering the AIMS twice, with seven days between assessments, to 233 infants. $r$ values from a Pearson Product Moment Correlation Coefficient ranged from 0.86 to 0.99 when the same assessor scored the AIMS on both assessment days.

b. Validity

The AIMS has established concurrent and predictive validity. Concurrent validity was established by correlating scores from the AIMS for 120 typically developing infants between the ages of 0 and 13 months with the Peabody Developmental Motor Scales (PDMS) gross motor raw scores as well as with the Bayley Scales of Infant Development (BSID) motor scales' scores. Correlation coefficients were $r = 0.97$ for the PDMS and $r = 0.98$ for the BSID. Additionally, 68 atypically developing or at-risk infants were assessed using the above listed outcome measures. Results indicate correlation coefficients that were between $r = 0.85$ to 0.97.

Predictive validity was established in a sample of 164 high-risk infants by comparing the AIMS to the Movement Assessment of Infants (MAI) and the PDMS. All three tools were administered by a physiotherapist at 4 and 8 months of age. At 18 months of age, a pediatrician classified each of the children's motor development as typical, suspect or abnormal. Results indicated that the MAI and the AIMS demonstrated similar sensitivity at 4 months but the MAI demonstrated better specificity; however, at 8 months of age, the AIMS had better specificity than the MAI. The PDMS showed a poor combination of sensitivity and specificity.

By grouping children classified as having suspect motor development with those with abnormal motor development, sensitivity and specificity of the AIMS was maximized to 77.3% and 81.7% respectively at 4 months and 86.4% and 93.0% at 8 months. Positive predictive value for the AIMS was 39.5% at 4 months and 65.5% at 8 months. The values at 8 months compare favourably with the preferred values recommended by Glascoe and colleagues, i.e. sensitivity of 80%, specificity of 90%, and positive predictive value of 70%.

5. Further Considerations

When using the AIMS, it is important to note that although recommended cut-off scores for atypical development are the 10th percentile at 4 months of age and the 5th percentile at 8 months of age, Darrah and colleagues indicate that even typically developing infants do not acquire their gross motor skills at a stable rate and may, at one point in time, have a score that places them below the “cut-off” score. Also, the results of a study that assessed infants using the AIMS at 10 months of age found that, although children with low 10 month AIMS scores had lower 15 month PDMS scores than children who did better on the 10 month AIMS, all children but one with low 10 month AIMS scores were functioning within the range of typical at 15 months and had typical neurological exams at 18 months. These studies reinforce the importance of completing serial assessments and not simply identifying a child as being delayed based on a one time screening.
it is also important to consider that although the AIMS is thought to be appropriate for children between 0 and 18 months, it has been shown to have a ceiling effect with low precision of measurement after approximately 9 months of age or when children are able to lower themselves from standing with control.\textsuperscript{10} Also, Kolobe and colleagues found that the AIMS is much better at identifying infants with motor disabilities at 6, 9, and 12 months than at 3 months of age.\textsuperscript{11} The AIMS misclassified a high percentage of 3 month old infants later diagnosed with cerebral palsy (CP) where as it did much better at identifying children later diagnosed with CP when using the 5\textsuperscript{th} percentile as a cut-off at 6, 9, and 12 months of age.\textsuperscript{11} These studies results should encourage clinicians to use caution when interpreting AIMS scores for infants 3 months of age as well as infants who are 9 months of age or older.

Lastly, the only study researching the use of the AIMS in typical children of non-North American descent has called into question the appropriateness of the AIMS normative data for use with infants of Dutch origin.\textsuperscript{12} Further research is needed to determine whether the AIMS norms from 1992 need to be updated or whether the AIMS is simply not appropriate for children living in countries such as the Netherlands.

Further research results regarding the use of the AIMS with infants born preterm,\textsuperscript{13-15} exposed to substances such as cocaine,\textsuperscript{16,17} or diagnosed with CP\textsuperscript{18} are available.

References


This evidence summary is one part of a series on pediatric rehabilitation outcomes measures. Other summaries in this series include:

- Outcome Measures: A Primer
- Outcome Measures: The Bayley Scales of Infant Development, 3rd Ed. (BSID-III)
- Outcome Measures: The Bruininks-Oseretsky Test of Motor Performance, 2nd Ed. (BOT-2)
- Outcome Measures: The Developmental Test of Visual Perception, 2nd Ed. (DVPT-2)
- Outcome Measures: The Gross Motor Function Measures (GMFM)
- Outcome Measures: The Movement Assessment Battery for Children, 2nd Ed. (MABC-2)
- Outcome Measures: The Peabody Developmental Motor Scales, 2nd Ed. (PDMS-2)
- Outcome Measures: The Sensory Profile (SP)