

Application and Implementation of the High-Level Mobility Assessment Tool (HiMAT): An Overview

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ABSTRACT

Levels of mobility that are more advanced or 'high-level' that independent walking are required for participation and play in many social, leisure and social activities. These activities are important for quality of life. In recent years there has been a shift towards clinical research and programs that are aimed to improve a person's capacity for high-level mobility. In order to evaluate the effectiveness of such programs, the High-level Mobility Assessment Tool (HiMAT) was developed. This short commentary discusses the development and application of the HiMAT in children and adults with health conditions that lead to mobility limitations.

Keywords: High-level mobility; Rehabilitation; Gait disorders; Outcome assessment

INTRODUCTION

Normative values for the High-level Mobility Assessment tool (HiMAT) for 5-12 year old children were recently published [1]. This paper continues a theme of research in the assessment of people with high-level mobility limitations. Until recently high-level mobility had received little attention in neurological rehabilitation as the focus of most research had been lower levels of mobility, such as the ability to transfer, independent walking and walking speed [2]. Yet higher levels of mobility are important for participation and quality of life in adults with neurological conditions [3,4], as well as play and social integration for younger children and adolescents [5].

HIGH-LEVEL MOBILITY

The past 5-10 years has seen a rapid rise in research papers reporting on running and high-level mobility in children and adults with neurological conditions. This is consistent with the gradual refocusing of the traditional provision of healthcare towards that which is patient-centred. Higher levels of mobility, beyond that required for independent level walking, may not be relevant in an inpatient rehabilitation setting. However, the ability to run and capacity to perform higher-level mobility tasks is important for many social, leisure, sporting and employment activities [3,6]. As the importance of higher levels of mobility for community integration has become an area for targeted

interventions [6,7], the accurate assessment of high-level mobility limitations is critical to evaluate rehabilitative outcomes.

THE HIGH-LEVEL MOBILITY ASSESSMENT TOOL (HiMAT)

The HiMAT was originally developed for the assessment of mobility limitations in adolescents and adults with traumatic brain injury (TBI) [8,9]. This was due to the ceiling effects of outcome measures for mobility used in adult neurological rehabilitation [2,10]. The original HiMAT was a 13-item tool that includes items such as running, jumping and hopping and stairs. More recently, a revised 8-item HiMAT was developed as a result of advances in Rasch analysis [11]. Briefly, performances are timed (eg, walking, running or stair items) or measured (eg, bounding item) and scored according to performance quartiles (i.e. a score of 0 if unable to perform, or 1-4). Higher scores on each item indicate better performance, and each item is summed for an overall HiMAT score. Maximum scores for the original and revised HiMAT are 54 and 32 respectively. The HiMAT was developed with several important clinimetric properties in mind. For use in clinical practice, it had to be valid and reliable [10,12], but also discriminative, responsive, not susceptible to a ceiling effect, and have high clinical utility [5,9,10].

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Received date: February 10, 2021; **Accepted date:** February 24, 2021; **Published date:** March 03, 2021

Citation: Williams G, Eldridge JB (2021) Application and Implementation of the High-Level Mobility Assessment Tool (HiMAT): An Overview. Int J Phys Med Rehabil. 9:591.

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CLINIMETRIC PROPERTIES OF THE HiMAT

Many physical activities may be considered high-level, such as climbing a ladder, or running whilst throwing or catching a ball. These tasks are multi-dimensional as performance is affected by other attributes including the use of the upper-limbs and eye-hand coordination. People with TBI may also have upper-limb and cognitive impairments that limit the ability to multi-task or perform multi-dimensional activities. The HiMAT was specifically developed to quantify the mobility requirements for participation in higher-level activities, rather than measure participation in higher-level activities itself. As such, it is a unidimensional measure of mobility and has negligible upper-limb and cognitive demands. It was developed with Rasch analysis to ensure it only measured high-level mobility, i.e. its construct validity [9]. Rasch analysis is also important for discriminability, or the ability of a measure to discriminate between different levels of ability [13]. The discriminative ability of the HiMAT enables it to be used for people who are just beginning to walk independently through to those returning to social, leisure and sporting activities.

The HiMAT is user friendly. It has high inter-rater and retest reliability meaning it is stable and different clinicians using it will obtain the same score when testing the same patient. Further, minimal detectable change (MDC) scores have been established for adults and children to inform clinicians how much change in performance is indicative of real improvement or deterioration, as opposed to day-to-day variability [5,12]. In clinical practice, the ability of a tool to accurately detect change, i.e. its responsiveness, is important for program evaluation, to measure a patient's recovery, or studying cost effectiveness. Investigations show the HiMAT is responsive in adults and children with brain injury [5,10]. The clinical utility of an outcome measure is often overlooked in development, but is vital for clinical implementation and uptake [14]. Clinical utility considers the 1) time taken to administer the measurement tool, 2) costs, 3) requirement for specialist equipment and training, and 4) portability of the measurement tool. The HiMAT has good clinical utility as it can be performed in 5-10 min, is free to use and requires little equipment or training.

Normative values may also be important for interpreting a person's score. The HiMAT is often used in the rehabilitation or recovery phase following injury, determining when a person is ready to resume activity. Responsiveness may determine recovery but patients and families often enquire about 'getting back to normal'. Normative HiMAT values have been developed for young adults [15], and more recently, young children [1]. Importantly for young children, the normative values take into consideration sex, age, height, weight, and BMI to explain the variability in scores for 5-12 year-olds.

IMPLEMENTATION AND IMPACT

The clinical utility and robust clinimetric properties have seen widespread dissemination and implementation of the HiMAT. Further, it is free to use and is available for download from numerous websites. It has been translated into at least 10 languages and is used in adult and paediatric RCTs [6,7]. Although walking speed may be the most common primary

outcome measure used in clinical trials that are aimed to improve mobility [16], many people with health conditions may have goals that require advanced levels of mobility. Walking speed has a natural ceiling effect [9] whereby people transition to running because faster walking speeds are not achievable. Therefore, children and adults who wish to play and participate in a range of social, leisure and sporting activities require higher levels of mobility, and interventions aimed to facilitate this must be aligned with an outcome measure, such as the HiMAT, that can quantify the physical capacity for these activities. Its widespread use in populations other than TBI has led to its validation in stroke, cerebral palsy, orthopaedic trauma, premature birth and developmental delay [5,17-19]. It is recommended for use by the American Physical Therapy Association for TBI and multiple sclerosis [20,21]. Further advances in Rasch analysis have also led to the refinement of the HiMAT and a shortened version of the tool appropriate for community settings where a flight of stairs is not available [11].

FUTURE DIRECTIONS

The importance of physical activity for general health is important for the wider public and groups with health conditions. Therefore, several avenues for further investigations on the HiMAT are currently underway or warranted. Although normative values have been published for young children and young adults, they are not yet available for children 13-18 years or older adults. Rasch analysis of adults with neurological conditions and orthopaedic multi-trauma has supported the construct validity of the HiMAT [9,22,23], but has yet to be conducted with normative data or with other clinical groups. The HiMAT might quantify mobility differently (i.e. differential item functioning) for people who are unilaterally affected compared to those with bilateral impairment. This is because several of the items (eg hopping and bounding) require nomination of the 'more-affected' lower-limb. This may be difficult for conditions such as spastic diplegia in cerebral palsy or for those with bilateral lower-limb amputations. Although initial indications are that the clinimetric properties of the HiMAT appear to be robust, thorough evaluation of the performance of the HiMAT should be undertaken when applied to new clinical populations or their sub-groups.

CONCLUSION

The HiMAT is a unidimensional measure of high-level mobility with robust clinimetric properties. It is able to measure advanced mobility skills that are important for play, participation and quality of life. It has been validated for use in a range of adult and paediatric rehabilitation populations, but further development is required prior to more widespread dissemination and use.

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