# ASSESSMENT AND VALIDATION OF THE UNB TEST OF PROSTHETICS FUNCTION

Eric Karosan[1], Usha Kuruganti[1], Wendy Hill[1-2], Peter Kyberd[2]
*1 Faculty of Kinesiology, University of New Brunswick, Fredericton, NB, Canada*
*2 Institute of Biomedical Engineering, University of New Brunswick, Fredericton, NB, Canada*

## INTRODUCTION

This paper focuses on the assessment and validation of the UNB test of prosthetics function. There is a constant need to stay up to date with forms of assessment, as assistive devices become more intuitive and precise enabling better control and movement. Due to these advancements in therapy, technology, and education, the UNB test of prosthetics function is subject to redesign in order to better evaluate the usage, function, and training of present day users of prosthetic arms. The aim of this study is to re-evaluate the current protocol to determine any modifications that may be necessary to comply with current standards of practice. The revised test will then be validated through the use of various clinics and users.

## THE UNB TEST

The UNB test assesses function with upper limb prostheses and was designed to be simple, quick to administer, taking approximately 30-45 minutes to set up, complete and score a subtest. There are three subtests of 10 tasks allowing test retest which removes concerns over learning effects. The test allows the child to perform his/her task at an unhurried pace. The UNB test is well known clinically and makes an assessment using 10 developmentally based, age-appropriate activities for children aged from 2-13 years. It measures the spontaneity and skill of use with either conventional (body-powered, passive) or myoelectric prostheses, by a trained observer. This particular test was created in 1985, and has been employed by clinicians and researchers, and used as a standard of comparison to newly created evaluations of upper limb prosthetic use [1]. Upper limb prosthetic assessments are integral to the rehabilitation process where maximal functional ability and independence at home, in school, and in the community are the primary concerns.

The new analysis of the UNB test will be broken down to reviewing single components including; culture bias, gender bias, types of grasps, task classification and distribution, progression of child development between age groups, and ceiling effects within age groups. These are variables that influence the functional outcomes of a test. One of the main criticisms of outcome measures that classify categories of function, assessed by clinicians' observed reports, is that categories may not have specific relevance to the individuals' lifestyles or daily routines [2]. Some activities of daily living have changed over the last two decades, and so should the methods of assessing these activities be altered as well.

Choosing the most appropriate outcome measure(s), and having a clear understanding of their strengths and limitations, is important in both clinical and research terms[3] The scoring method will most likely remain as evaluations of skill and spontaneity. An outcome of successful prosthetic use is defined as a person who displays excellent proficiency (skill = 4) and willingness (spontaneity = 4) when using their prosthetic limb. A poor outcome of prosthetic use is defined as a person who displays severe difficulty when attempting to perform the task at hand (skill = 0) and/or refusal to engage (spontaneity = 0) the prosthetic limb to complete the required task.

In the period before 6 years of age there is rapid development and practice of many new skills, whereas after this age the focus tends to be on perfection of skills [4]. Thornby et al [5] also found delay in development of bimanual skills in children with below elbow amputation. Once the modified age ranges have been established, there will be the need to identify any discrepancies in transition phases from one age group to the next. A ceiling effect should be included in each subtest to decrease the likelihood of a younger child performing tasks found in an older age group with ease.

After feedback from clinical practitioners, modifications to the activities for each age-specific subtest will be made while maintaining equality in task distribution between the three subtests of the corresponding age groups. Different patterns of prehensile motion will be classified;

1. Passive use of the hand
2. Maintained grasp of an object
3. Maintenance of the grasp while the person is in motion
4. Repetitive grasp and release of an object during activities
5. Performing grasp and release of the object in any position
6. The ability to grasp and release delicate object
7. The grasp and release of heavy objects

The aim is an even distribution of these activities within and between subtests. The tests will be modified, if necessary, to ensure this distribution. Following this it will be checked for validity. Alterations to the age ranges may be considered, along with the possible broadening of the scope of evaluation through to teens and adults.

## CONCLUSION

Accurate and appropriate tests are critical in enabling the correct design of prostheses to be matched to the user or for development of new designs. Its use in prosthetic practice and research enables stake holders to understand more fully their choices for training and prescription. Therefore investigating the validity of a modified UNB test of prosthetic functional outcomes is necessary.

## REFERENCES

[1] E.R. Sanderson and R.N. Scott, (1985). "UNB test of prosthetics function: a test for unilateral amputees" [test manual]. Fredericton, NB, Bio-Engineering Institute, University of New Brunwsick

[2] V. Wylde, S. Hewlett, I.D. Learmouth, V.J. Cavendish, (2006). "Personal impact of disability in osteoarthritis: Patient, professional and public values." *Musculoskeletal Care*. 4(3): 152-66

[3] A. Long,, D. Scott, (1994). "Measuring health status and outcomes in rheumatoid arthritis within routine clinical practice." *Brit. J. Rheumatology*. 33(7): 682-85

[4] K.S. Holt, (1991). "Child Development: Diagnosis and Assessment." London Butterworth-Heinemann.

[5] M.A. Thornby, D.E. Krebs, (1992). "Bimanual skill development in paediatric below-elbow amputation: A multicenter, cross-sectional study." *Archives of Physical Medicine and Rehabilitation*. 73: 697-702.