

Characteristics of the Barthel Scale in Terms of Neurological Care

Charakterystyka skali Barthel w aspekcie opieki neurologicznej

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Abstract

The Barthel scale assesses the ability of the tested person to function independently. It plays an important role in the professional work of nurses. Therefore, the aim of the work is to characterize the Barthel scale and use it in the care of a neurological patient. This tool measures the degree of independence in activities of daily living. Thanks to this, it also helps to determine the level of assistance required with care and activities of daily living. This scale evaluates 10 basic daily activities. In Poland, the Barthel Index is one of the most frequently used assessment scales for measuring activity limitations in patients with various diseases, e.g. nervous system. Many researchers also use BI as one of the measurement tools to conduct scientific research. That is why it is so important to deepen knowledge about this tool. (JNNN 2022;11(4):180–184)

Key Words: Barthel Index, care, measurement, neurology, patient

Streszczenie

Skala Barthel ocenia zdolność osoby badanej do samodzielnego funkcjonowania. Pełni ona istotną rolę w pracy zawodowej pielęgniarek. Dlatego też celem pracy jest charakterystyka skali Barthel oraz wykorzystanie jej w opiece nad pacjentem neurologicznym. Narzędzie to mierzy stopień niezależności w zakresie czynności dnia codziennego. Dzięki temu pomaga również określić stopień wymaganej pomocy w opiece oraz w zakresie czynności dnia codziennego. Skala ta ocenia 10 podstawowych czynności dnia codziennego. W Polsce Indeks Barthel jest jedną z najczęściej stosowanych skal oceny pomiaru ograniczeń aktywności u pacjentów z różnymi schorzeniami m.in. układu nerwowego. Wielu badaczy również wykorzystuje BI jako jedno z narzędzi pomiarowych do przeprowadzenia badań naukowych. Dlatego też tak istotne jest pogłębianie wiedzy na temat tego narzędzia. (PNN 2022;11(4):180–184)

Słowa kluczowe: Indeks Barthel, opieka, ocena, neurologia, pacjent

Introduction

World Health Organization defines neurological diseases as “diseases of the central and peripheral nervous system. In other words, the brain, spinal cord, cranial nerves, peripheral nerves, nerve roots, autonomic nervous system, neuromuscular junction, and muscles. These disorders include epilepsy, Alzheimer disease and other dementias, cerebrovascular diseases including stroke, migraine and other headache disorders, multiple sclerosis, Parkinson’s disease, neuroinfections, brain tumours, traumatic disorders of the nervous system due to head

trauma, and neurological disorders as a result of malnutrition” [1]. Many researchers, clinicians and doctors promote the division of neurological diseases into 4 categories: sudden onset conditions (e.g. spinal injury, stroke, meningitis, traumatic brain injury, Guillain-Barre Syndrome), intermittent conditions (cavernoma, epilepsy, migraine), progressive conditions (ataxia, dementia, Parkinson’s disease, motor neurone disease), stable with changing needs (cerebral palsy, narcolepsy, transverse myelitis, Tourette’s syndrome, fibromyalgia) [2]. Moreover, the nervous system is also affected by many viral (i.e. Human Immunodeficiency

Virus — HIV, Enteroviruses), bacterial (i.e. Mycobacterial tuberculosis, *Neisseria meningitidis*), parasitic (i.e. malaria, Chagas) and fungal (i.e. *Cryptococcus*, *Aspergillus*) infections. Nervous system symptoms may occur due to the immune response or due to the infection itself [1].

Nursing care and the choice of the appropriate method of treatment in a neurological patient are still a challenge for the medical staff and are a complex and progressively changing process. Classically conducted clinical trials are designed to answer questions about the effectiveness of the introduced medical intervention or treatment. For this purpose, primarily measurable physiological variables are used, such as the assessment of heart rate, blood pressure, blood glucose level, etc. In the overall assessment of patients, it is also necessary to conduct an interview and physical examination. Due to the fact that neurological diseases often lead to disability, it is also necessary to perform a functional examination to determine the scope of lost motor and/or cognitive functions, which is the purpose of clinimetrics. This assessment also helps to guide nursing care to a large extent [3].

It is believed that “clinimetrics” was pioneered by Alvan R. Feinstein in the early 1980s and referred to an indication of a field closely related to indicators, rating scales and other expressions used to describe or measure symptoms, physical signs or other clinical phenomena [4,5]. Currently, clinimetrics is considered a field of science dealing with the construction of research tools for the quantitative assessment and analysis of clinical phenomena. It plays a very important role in medicine, as it is a specific field of medical knowledge focusing on the construction and assessment of clinical indicators, using numerous specific methods closely related to the strategy of psychometrics [6–8].

Nurses also very often use clinimetrics in their work. Using various types of measuring tools, their skills, knowledge and experience, they can determine the condition of the patient, his care problems and plan a care plan based on the nursing diagnosis. The Barthel scale is an extremely frequently used tool for assessing activities of daily living [9]. Thus, the aim of the work is to discuss and describe the Barthel scale in the neurological aspect.

Purpose of the Barthel Index

The Barthel Index (BI) is a scale assessing the ability of the tested person to function independently. It measures the degree of independence in activities of daily living (ADL). Thanks to this, BI also helps to determine the degree of assistance required in care and activities of daily living. Undoubtedly, it is a widely used

scale evaluating the measure of functional disability. This tool has been developed for use in the rehabilitation of patients after stroke and other musculoskeletal or neuromuscular disorders. In addition, this scale can also be used in the care of oncological patients [10]. In Poland, BI is the basis for referring a patient to long-term care under the Regulation of the Minister of Health on guaranteed benefits in the field of nursing and care services under long-term care. Pursuant to the Ordinance of the Minister, “Guaranteed benefits are granted to a beneficiary who received 40 points or less on the Barthel scale” [11].

Authors of the Original Version and Psychometric Properties

The Barthel Index (BI) was developed in 1965 by Mahoney and Barthel [12]. In addition, several alternative versions of BI have been created. Subsequently, this scale was modified, e.g. by Granger, Dewis, Peters, Sherwood and Barrett [13] and by Collin, Wade, Davies, and Horne in 1988 [10,14]. Further refinements were introduced by Shah, Vanclay, and Cooper [15]. According to the conducted research, BI is characterized by high inter-rater reliability (0.95) and test-retest reliability (0.89) as well as high correlations (0.74–0.8) with other measures of physical disability [16]. Dos Reis et al. [17] assessed the internal consistency, reliability, measurement error, and construct validity of the BI. Cronbach’s alpha coefficient was — 0.81, the intraclass correlation coefficient — 0.98, the standard error of measurement — 7.22. In addition, medium to high correlations with other scales evaluating the level of physical functioning were also shown ($\rho=0.57$ to 0.88 ; $p<0.001$). Therefore, BI can be considered a reliable and accurate tool. Zhang et al. [18] also assessed the psychometric properties of the BI among oldest-old and centenarian populations with a considerable sample size. Cronbach’s α coefficient of the BI was 0.902. Significant correlations were found between the BI score and symptoms of depression ($r=-0.36$, $p<0.001$), subjective well-being ($r=0.23$, $p<0.001$) and self-assessment of health ($r=0.22$, $p<0.001$). It has been demonstrated that the BI has appropriate reliability, validity and measurement precision.

BI Characteristics

The Barthel scale is an international questionnaire assessing the patient’s fitness. It belongs to the group of tools evaluating basic life functions (ADL). It allows to measure the degree of independence and determine which activities the patient can perform independently (10 points), with assistance (5 points) or cannot perform

them at all and is dependent on another person (0 points). The following 10 activities are assessed: feeding, bathing, grooming, dressing, bowel control, bladder control, toileting, transfers (bed to chair and back), ambulation, stair climbing. Points are allocated as follows: 0 or 5 points per item for grooming and bathing; 0, 5, 10 points per item for dressing, feeding, bowel and bladder control, toilet use, stair climbing; 0, 5, 10, 15 points per item for transfers and mobility (on level surfaces). The final score is calculated by adding up the points from all items. The higher the score, the greater the degree of functional independence [10,19]. In turn, Shah, Vanclay and Cooper [15] developed a modified scoring system by implementing a 5-point ordinal scale for each BI item (1=unable to perform task, 2=attempts task but unsafe, 3=moderate help required, 4=minimal help required, 5=fully independent). The rating scores were also published that indicated the individual degrees of functional dependence, i.e. score of 0–20 — suggests total dependence, 21–60 — severe dependence, 61–90 — moderate dependence and 91–99 — slight dependence, and 100 — independence [10,15]. In turn, Sinoff and Ore [20] indicated that scoring on the BI can be interpreted as follows: score of <20, totally dependent, 20–39 — very dependent, 40–59 — partially dependent, 60–79 — needs minimal help with ADL, 80–100 — independent.

Copyright Information for BI: “The Maryland State Medical Society holds the copyright for the Barthel Index. It may be used freely for non-commercial purposes with the primary reference cited: [Mahoney F.I., Barthel D.W. Functional evaluation: the Barthel Index. *Md State Med J.* 1965;14:61–65. Used with permission]” [12,21]. BI administration does not require training and courses. It has been observed that this scale is equally reliable and valid both when used by skilled and unskilled people [10,14]. What’s more, patients themselves can complete the BI scale [10,22]. However, it is not recommended to fill in the scale on your own in patients over 75 years of age [10,20]. It is assumed that completing the BI questionnaire may take only 2–5 minutes in the case of self-description and up to 20 minutes in the case of direct observation [23]. There are many alternative forms of BI, among others, modified 10-item version (MBI) [14], 5-item short form [24], The expanded 15-item version [13,25], the extended BI (EBI) [26] and many others [10].

The Barthel Scale in Neurological Assessment

In Poland, the Barthel Index is one of the most frequently used assessment scales for measuring activity limitations in patients with various diseases, e.g. nervous system. Many researchers also use BI as one of the

measurement tools to conduct scientific research. Jabłońska et al. [27] assessed the functional status of patients after ischemic stroke qualified for endovascular and thrombolytic therapy. According to the Barthel scale, the results were average on the first day of treatment, and improvement was noted on the ninth day of hospitalization. Patients qualified for thrombolysis alone showed better results in fitness tests and had a lower degree of disability than those treated with thrombolysis and thrombectomy. What is more, it was observed that the functional state of the subjects was affected by a stroke in the past and the presence of a neurological deficit. In her research, Biercewicz [28] performed a functional assessment of 88 elderly people after a stroke and verified whether selected demographic and clinical factors had a significant impact on functional capacity. Functional state on the day of admission BI was 83.13 (SD 19.75). It was noted that gender, age and the number of comorbidities had a statistically significant effect on the functional status of the subjects. Moreover, a statistically significant correlation was also observed between depressive disorders (Spearman’s rank -0.438 ; $p < 0.05$) and higher cognitive disorders (Spearman’s rank -0.548 ; $p < 0.05$) and functional capacity. The study of Ślusarz [29], which was significant from the point of view of the practical use of the BI scale, was conducted. The main aim of the work was to analyse the use of measurement tools in the practice of a neurosurgical nurse. The study was conducted on a group of 93 nurses employed in 6 neurosurgical wards. It was shown that 68 (73%) neurosurgical nurses use measurement tools in their professional practice to assess the patient’s condition. The most popular and widespread scales included: Glasgow Coma Scale — GCS (100% of responses), Barthel Index — BI (60%), Kurtzke Extended Disability Status Scale (46%) and Mini Mental State Examination (MMSE) (40%). A statistically significant relationship was noted between the use of measurement tools in professional practice and education (< 0.0001) and having a specialization by nurses (< 0.0001).

Conclusions

The Barthel scale plays a very important role in Poland, i.e. it is a tool qualifying patients for long-term care. It allows you to assess the patient’s fitness and ability to self-care. The index was developed according to an international scoring scale, which takes into account activities of daily living that the patient can perform alone or with the help of others or cannot perform them alone. It is necessary to know the Barthel scale in the professional and scientific work.


Implications for Nursing Practice

The Barthel scale is successfully used to assess the functional capacity of neurological patients. Many studies confirm the great usefulness of the Barthel questionnaire for assessing physical independence. This questionnaire is often used in the daily work of nurses. It should also be considered whether in the process of undergraduate and postgraduate education of nurses more attention should be paid to issues in the field of clinimetrics.

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Conflict of Interest: None

Funding: None

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C — Analysis and interpretation of data, E — Writing an article, F — Search of the
literature, G — Critical article analysis, H — Approval of the final version of the
article

Received: 17.10.2022

Accepted: 24.11.2022