The Journal of Neurological and Neurosurgical Nursing
Pielęgniarstwo Neurologiczne i Neurochirurgiczne

Wydawnictwo Państwowej Akademii
Nauk Stosowanych we Włocławku
ul. Mechaników 3, pok. 20
87-800 Włocławek

eISSN 2299-0321 ISSN 2084-8021
https://apcz.umk.pl/PNIN

DOI: 10.15225/PNN.2024.13.3.5 JNNN 2024;13(3):119–123 **Review**

Characteristics of the Functional Independence Measure (FIM) Scale in Terms of Neurological Conditions

Charakterystyka Skali Pomiaru Niezależności Funkcjonalnej (FIM) w aspekcie schorzeń neurologicznych

Karolina Filipska-Blejder[1], **Jakub Durszlewicz**[2], **Robert Ślusarz**[1]

❶ Department of Neurological and Neurosurgical Nursing, Department of Perioperative Nursing, Faculty of Health Sciences, Collegium Medicum in Bydgoszcz, Nicolaus Copernicus University in Toruń, Poland

❷ Student Scientific Association "NeuroScience", Department of Neurological and Neurosurgical Nursing, Department of Perioperative Nursing, Faculty of Health Sciences, Collegium Medicum in Bydgoszcz, Nicolaus Copernicus University in Toruń, Poland

Abstract

The Functional Independence Measure (FIM) scale is used to assess an individual's functional capacity. It covers a wide variety of areas of daily life: self-care, sphincter control, transfers, locomotion, communication and social cognition. This tool plays an important role in the professional and academic work of nurses. Therefore, the aim of this paper is to characterize the FIM scale and its use in the care of neurological patients. The FIM scale has been shown to be an accurate and reliable tool for assessing activities of daily living. The FIM consists of 18 items assessing 6 areas of function. The items fall into two domains: motor (13 items) and cognitive (5 items). The respondent can receive from 1 (total assistance — the respondent performs less than 25% of the activity independently) to 7 points (full independence — the analyzed activity is performed safely and quickly) for each activity to be assessed. Many researchers also use the FIM as one of their measurement tools when designing and conducting research. **(JNNN 2024;13(3):119–123)**
Key Words: care, Functional Independence Measure, measurement, neurological diseases

Streszczenie

Skala Pomiaru Niezależności Funkcjonalnej (FIM) jest wykorzystywana do oceny wydolności funkcjonalnej. Obejmuje ona wiele różnorodnych obszarów życia codziennego: samoobsługę, kontrolę zwieraczy, mobilność, niezależność w zakresie lokomocji, komunikację i świadomość społeczną. Narzędzie to odgrywa istotną rolę w pracy zawodowej i naukowej pielęgniarek. Dlatego też celem pracy jest charakterystyka skali FIM oraz wykorzystanie jej w opiece nad pacjentem neurologicznym. Wykazano, iż skala FIM jest dokładnym i rzetelnym narzędziem oceniającym czynności dnia codziennego. FIM składa się z 18 pozycji oceniających 6 obszarów funkcji. Pozycje należą do dwóch domen: motorycznej (13 pozycji) i poznawczej (5 pozycji). Za każdą czynność podlegającą ocenie badany może otrzymać od 1 (całkowita zależność — badany wykonuje samodzielnie mniej niż 25% czynności) do 7 punktów (pełna niezależność — analizowaną czynność badany wykonuje bezpiecznie i szybko). Wielu naukowców projektując i prowadząc badania naukowe również wykorzystuje FIM jako jedno z narzędzi pomiarowych. **(PNN 2024;13(3):119–123)**
Słowa kluczowe: opieka, Skala Pomiaru Niezależności Funkcjonalnej, ocena, schorzenia neurologiczne

Introduction

Neurological conditions statistically often lead to disability, which consequently limits patients' functioning on many levels. The most commonly observed are motor and cognitive disorders. They occur both suddenly and over a long period of time and in most cases are progressive [1]. Research indicates that in 2021, more than 3 billion people worldwide were struggling with neurological diseases [2]. The World Health Organization

(WHO) reports that the overall number of disabilities, illnesses and premature deaths (known as disability-adjusted life years, DALYs) caused by neurological conditions has increased by 18% since 1990. In 2021, the 10 most common neurological conditions that contributed to health loss were highlighted: stroke, meningitis, epilepsy, neurological complications from preterm birth, neonatal encephalopathy (brain injury), migraine, dementia, diabetic neuropathy (nerve damage), autism spectrum disorder, and nervous system cancers [3]. In addition, the progressive ageing of the population is contributing to an increasing incidence and high burden of neurological diseases. Therefore, these diseases are recognized as a global public health and medical care challenge. It should be noted that most of these disorders are incurable and consequently encompass all aspects of human functioning, including language, emotion, movement, vision and memory, among others. Neurological patients require continuous and long-term specialized treatment [4,5]. Patients also experience many other symptoms that significantly impact their quality of life A study by Vinod et al. [6] found a significant difference in sleep efficiency between patients with multiple sclerosis and a control group. Additionally, in a systematic review with meta-analysis, Silva et al. [7] observed that in the first 11.5 weeks after stroke, patients with better balance, fewer limitations in daily activities, and greater functional independence reported a higher quality of life. Therefore, all modifiable and predictive factors should be taken into account when planning patient care and during the rehabilitation process. Measurement tools can be used to identify any type of dysfunction. One popular tool used to assess functional status is the FIM (Functional Independence Measure) scale. Thus, the aim of this paper is to discuss and describe the FIM scale from a neurological perspective.

Purpose of the Functional Independence Measure

The FIM scale is used to assess functional performance in terms of self-care, sphincter control, transfer, locomotion, communication and social cognition. It is considered to be much more accurate in assessing activities of daily living in comparison to some other scales. The FIM was developed to provide a unified system for measuring disability based on the International Classification of Functioning, Disability and Health (ICF) for use in the medical system. The results of the FIM are used to assess the effectiveness of ongoing therapy, the progress of rehabilitation and to estimate the length of hospital stay. In addition, use of this scale enables decisions to be made about discharge planning and the extent of care provided at home, or whether to refer the patient to a nursing or residential care facility [8].

Authors of the Original Version and Psychometric Properties

The FIM scale was developed between 1984 and 1987 by a national task force sponsored by the American Academy of Physical Medicine and Rehabilitation and the American Congress of Rehabilitation Medicine. One of the first publications on the FIM scale was produced by Granger Carl and Gresham Glen [9]. Subsequently, the scale was published in 1987 by Keith Robert et al. [10]. A study published by Hsueh et al. [11] assessed the internal consistency of the FIM scale using it to assess stroke patients on admission and discharge from a hospital rehabilitation unit. The study demonstrated an excellent internal consistency — Cronbach's alpha = 0.88 admission; 0.91 discharge (FIM Motor Subscale). The results also indicate that the motor subscale of the Barthel scale and the FIM showed high concurrent validity (Spearman's correlation coefficient > or = 0.92), high responsiveness (standardized response mean > or = 1.2, $p<0.001$), intraclass correlation coefficient (ICC) > or = 0.83), and acceptable distribution [11]. Furthermore, it should be noted that the reliability and accuracy of the FIM scale are generally rated as good. A study by Hamilton et al. [12] reported good interrater reliability for the total score (0.96), motor score (0.96) and cognitive score (0.91); subscale score range: 0.89 (social cognition) to 0.94 (self-care). FIM item Kappa range: 0.53 (memory) to 0.66 (stair climbing) [12]. A license to use the FIM scale in one's own research can be obtained from the website of the Uniform Data System [13].

Characteristics of the FIM

The FIM consists of 18 items assessing 6 activity domains. There are two domains: motor (13 items) and cognitive (5 items). The questions on motor function are based on the items of the Barthel Index [13,14].

The scale assesses functional ability in the following areas:

- self-care (eating, grooming, bathing, dressing, upper body, dressing, lower body, toileting — 6 activities, scoring from 6 to 42 points),
- sphincter control (bladder and bowel — 2 activities/functions, scoring from 2 to 14 points),
- transfers (bed/chair/wheelchair, toilet,
- bath/shower — 3 activities, scoring from 3 to 21 points),
- locomotion (walk/wheelchair, stairs — 2 activities, scoring from 2 to 14 points),

- communication (comprehension, expression — 2 activities, scoring from 2 to 14 points),
- social cognition (social interaction, problem solving, memory — 3 activities/functions, scoring from 3 to 21 points) [15].

Each item is scored on a 7-point scale, and the score indicates the amount of assistance required to perform each activity:

- 7 points — complete independence of the subject (performs the analysed activity safely and quickly),
- 6 points — modified independence of the subject (auxiliary devices are used),
- 5 points — supervision (supervision or assistance is needed while performing the activity),
- 4 points — minimal assistance (the subject performs more than 75% of the activity independently),
- 3 points — moderate assistance (the subject performs 50 to 74% of the activity independently),
- 2 points — maximal assistance (the subject performs 25 to 50% of the activity independently),
- 1 point — total assistance (the subject performs less than 25% of the activity independently) [16].

The scores are based on performance rather than ability and can be obtained through observation, patient interview, telephone interview or medical records. The authors of the FIM recommend that scoring be determined after final consultations with the multidisciplinary team. A final summed score is created by adding up the points from the assessment of all functions. The maximum score is 126 and the minimum score is 18, where 18 indicates complete dependence/total assistance and 126 indicates complete independence [13,14]. The FIM scale was designed to assess areas of dysfunction in activities that commonly occur in people with any progressive or reversible neurological, musculoskeletal or other disorder, i.e. patients with impaired functional mobility. In addition, the scale can be used to assess patients with stroke, traumatic brain injury, spinal cord injury, multiple sclerosis and the elderly receiving rehabilitation care. It is estimated that the FIM questionnaire can take an average of 30–45 minutes to complete [13–15].

The FIM Scale in Neurological Assessment

The ever-increasing number of older adults, especially those diagnosed with neurological diseases, leads to a progressive increase in the number of potential needs of this group, which should be met by health and social care. Therefore, tools are needed to survey the needs of people with neurological diseases and their level of functionality, which will help to outline the necessary practical solutions in health and social care. In patients following a stroke, for example, the assessment of functional capacity makes it possible to determine, among other things, the care needs, the correct qualification for rehabilitation and the effectiveness of the therapies used. Some of the most common sequelae of neurological diseases are motor disorders and dysfunctions. Therefore, both in Poland and around the world, the FIM scale is one of the most commonly used tools for measuring functional capacity in patients with a variety of nervous system disorders. Many scientists also use FIM as one of the measurement tools when designing and conducting research [17,18].

The FIM scale was used in a study by Jacq et al. [19]. The study assessed patients following convulsive status epilepticus (CSE) who required hospitalization in an intensive care unit. In this study, indicators of functional and cognitive status were collected. It was found that at 90 days after CSE, the median FIM and Mini-Mental State Examination (MMSE) scores were 121 and 26.0, respectively. The Glasgow outcome scale (GOS) score was also evaluated and correlated with the FIM and MMSE scales. Worse GOS scale scores were shown to correlate with worse FIM and MMSE scale scores. Pauli et al. [20] in their retrospective cohort study assessed functional independence and agitation outcomes following inpatient rehabilitation after structural brain injury. The analysis involved 85 patients — 56 patients were discharged home, while 29 were institutionalized. The study found that the intended discharge destination from the hospital was correlated with, among other things, the FIM score on admission (r_S=0.25, p=0.022) and on discharge from the hospital (r_S=0.25, p=0.022). In addition, the multivariate analysis conducted showed that FIM scores at discharge (OR=1.03, p=0.008) significantly predicted the patient's final hospital discharge destination. In addition, Kushner et al. [21] also assessed the prediction of hospital discharge using stepwise linear regression. They found that change in FIM-Bed/chair/wheelchair-Transfers proved to be the most significant and accurate predictor of discharge destination (Wald =42.2; p<0.001). The FIM scale in the study by Ogino et al. [22] was used to assess the impact of the presence of possible sarcopenia on admission on functional performance in acute stroke patients at discharge. A total of 456 patients (median age 80 years) were included in the study. Respondents without possible sarcopenia scored higher on the FIM scale in contrast to patients with possible sarcopenia (p<0.001). Studies based on the FIM scale have also been conducted in Poland. Rynkiewicz et al. [23] assessed the variability of functional performance in people in the early period following ischemic stroke. A total of 85 people were included in the study. The Rankin scale, the Barthel Index and the FIM tool were used to assess functional performance. Patients were assessed twice: at the start of rehabilitation and at its end. An improvement in functional status at the end of the rehabilitation process was observed, and

a high correlation was found between the scales used (from r=0.7 to r=0.9). In addition, the authors emphasized the validity of the FIM scale especially in terms of rehabilitation, as it provides an assessment of psychosocial functioning, which enables a complete analysis of rehabilitation outcomes. Przychodzka et al. **[17]** assessed functional capacity among 102 patients hospitalized for ischemic stroke. The level of functional capacity was low. In the area of self-care, the most difficult tasks were toileting and bathing, in the area of sphincter control: bowel, in the area of transfers and locomotion: transferring from bed to a chair or wheelchair and sitting on the toilet, in the area of communication: expression, and in the area of social cognition: social interaction.

Conclusions

The assessment of functional capacity should be multifaceted and based on a thorough history and observation of the patient. It is recommended that a holistic view of the individual should be the outcome of the assessment. The FIM tool makes it possible to assess functional capacity by taking into account many, diverse variables: self-care, sphincter control, transfer, locomotion, communication and social cognition. It is therefore recommended for nurses' professional and academic work.

Implications for Nursing Practice

Functional capacity defines the ability to perform daily activities safely and independently. Fitness and autonomy have significant emotional and practical implications for the patient, correlate positively with physical and mental health, and promote a sense of independence. The assessment of patients' functional capacity is a fundamental element of nursing practice, a component of nursing diagnosis. The FIM scale has been used with great success to assess the functional capacity of neurological patients. This questionnaire should be implemented in the daily work of nurses.

References

[1] Baricich A., Spitoni G.F., Morone G. Editorial: Long term disability in neurological disease: A rehabilitation perspective. *Front Neurol*. 2022;13:964664.

[2] GBD 2021 Nervous System Disorders Collaborators. Global, regional, and national burden of disorders affecting the nervous system, 1990–2021: a systematic analysis for the Global Burden of Disease Study 2021. *Lancet Neurol*. 2024;23(4):344–381.

[3] World Health Organization. *Over 1 in 3 people affected by neurological conditions, the leading cause of illness and disability worldwide*. Retrieved April 14, 2024, from https://www.who.int/news/item/14-03-2024-over-1-in-3-people-affected-by-neurological-conditions--the-leading-cause-of-illness-and-disability-worldwide

[4] Feigin V.L., Vos T., Nichols E. et al. The global burden of neurological disorders: translating evidence into policy. *Lancet Neurol*. 2020;19(3):255–265.

[5] Gandy M., Heriseanu A.I., Dudeney J. et al. Disability and life satisfaction in neurological disorders: The role of depression and perceived cognitive difficulties. *Gen Hosp Psychiatry*. 2021;73:16–23.

[6] Vinod V., Saegner K., Maetzler W. et al. Objectively assessed sleep quality parameters in Multiple Sclerosis at home: Association to disease, disease severity and physical activity. *Sleep Med*. 2024;118:71–77.

[7] Silva A.C., Menezes K.K.P., Scianni A.A., Avelino P.R., Faria C.D.C.M. Predictors of health-related quality of life one year after stroke: a systematic review with meta-analysis. *Int J Rehabil Res*. 2024;47(2):53–63.

[8] Głowacka M., Słodki M. *Klinimetria w świadczeniach zdrowotnych i kształceniu na kierunkach medycznych*. Wyd. Naukowe Akademii Mazowieckiej w Płocku, Płock 2023.

[9] Granger C.V., Gresham G.E. Functional Assessment in Rehabilitation Medicine: Introduction and Brief Background. *Phys Med Rehabil Clin N Am*. 1993; 4(3):417–423.

[10] Keith R.A., Granger C.V., Hamilton B.B., Sherwin F.S. The functional independence measure: a new tool for rehabilitation. *Adv Clin Rehabil*. 1987;1:6–18.

[11] Hsueh I.P., Lin J.H., Jeng J.S., Hsieh C.L. Comparison of the psychometric characteristics of the functional independence measure, 5 item Barthel index, and 10 item Barthel index in patients with stroke. *J Neurol Neurosurg Psychiatry*. 2002;73(2):188–190.

[12] Hamilton B.B., Laughlin J.A., Fiedler R.C., Granger C.V. Interrater reliability of the 7-level functional independence measure (FIM). *Scand J Rehabil Med*. 1994;26(3):115–119.

[13] Uniform Data System. *International*. Retrieved April 27, 2024, from https://www.udsmr.org/products/international

[14] Zeltzer L. *Functional Independence Measure (FIM)*. Retrieved May 8, 2024, from https://strokengine.ca/en/assessments/functional-independence-measure-fim/

[15] Biuletyn Informacji Publicznej. *Program „Opieka wytchnieniowa" — edycja 2021*, https://mops.bip.legnica.eu/lop/ogloszenia/26546,Program-quotOpieka-wytchnieniowaquot-edycja-2021.html [dostęp: 23.08. 2020].

[16] Wagner A.K., Franzese K., Weppner J.L. et al. Traumatic Brain Injury. In Cifu D.X. (Ed.), *Braddom's Physical Medicine and Rehabilitation* (6th ed.). Elsevier, 2021;916–953.

[17] Przychodzka E., Grudzień A., Celej-Szuster J., Turowski K. Ocena wydolności funkcjonalnej chorych po udarze mózgu. *Gerontol Pol*. 2019;27:272–279.

[18] Huhtakangas J.K., Saaresranta T., Huhtakangas M., Haapea M., Huhtakangas J. Thrombolysis treatment protected impairment of functional ability, quality of life and fatigue seven years after stroke. *J Stroke Cerebrovasc Dis*. 2024;33(6):107707.

[19] Jacq G., Crepon B., Resche-Rigon M. et al. Clinician-Reported Physical and Cognitive Impairments After Convulsive Status Epilepticus: Post Hoc Study of a Randomized Controlled Trial. *Neurocrit Care*. 2024; 40(2):495–505.
[20] Pauli E., Debecker I., Hund-Georgiadis M. Functional independence and agitation outcomes following inpatient rehabilitation after structural brain injury: A retrospective cohort study. *Neuropsychol Rehabil*. 2024;1–18.
[21] Kushner D.S., Johnson-Greene D., Felix E.R., Miller C., Cordero M.K., Thomashaw S.A. Predictors of discharge to home/community following inpatient-rehabilitation in a US national sample of Guillain-Barre-Syndrome patients. *PLoS One*. 2023;18(5):e0286296.
[22] Ogino T., Nozoe M., Inoue T., Ishida M., Yamamoto K. Impact of possible sarcopenia on functional prognosis in patients with acute stroke with premorbid disability. *Geriatr Gerontol Int*. 2024;24(4):359–363.
[23] Rynkiewicz M., Rogulska U., Czernicki J. Ocena zmian sprawności funkcjonalnej osób we wczesnym okresie po udarze mózgu. *Prz Med Uniw Rzesz Inst Leków*. 2011;2: 325–339.

Corresponding Author:
Karolina Filipska-Blejder
Department of Neurological and Neurosurgical Nursing,
Faculty of Health Science,
The Ludwik Rydygier Collegium Medicum in Bydgoszcz,
The Nicolaus Copernicus University Toruń, Poland
Łukasiewicza 1 street, 85-821 Bydgoszcz, Poland
e-mail: karolinafilipskakf@gmail.com

Conflict of Interest: None
Funding: None
Author Contributions: Karolina Filipska-Blejder[A–C, E, F], Jakub Durszlewicz[C, E, F], Robert Ślusarz[E, G, H]

A — Concept and design of research, B — Collection and/or compilation of data, 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: 27.05.2024
Accepted: 1.07.2024