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## Northwick Park Dependency Score — a New Scale for Use in Nursing Practice

### Skala Northwick Park Dependency Score — nowe narzędzie do wykorzystania w praktyce pielęgniarskiej

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#### Abstract

**Introduction.** Evaluation of functional limitations in patients with ischemic stroke is essential in planning suitable nursing care. The main aim of all nursing procedures taken is to ensure the safety of patients, to provide the best, individualized care fulfilling patients' needs and to support recovery process, considering the necessary number of nursing staff and time needed for these procedures. A tool helpful in the process of diagnosis and planning care is the Northwick Park Dependency Score — NPDS.

**Aim.** The aim of the present study is to describe the Polish version of this scale and to assess its usefulness by comparing the NPDS with the Barthel Index — considered the “golden standard” for assessing patient's disability and dependency.

**Material and Methods.** The study included 100 elderly ischemic stroke patients aged 60 to 99 years (mean 76.1, SD 9.07). To assess patient's dependency and thus the need of nursing care, the NPDS Scale was used. Functional status of patients was assessed with the Barthel Index, and the neurological state using the NIHSS.

**Results.** Most items in NPDS, are similar to the items of the BI. However, the NPDS includes additional important questions regarding cognitive functions, communication and behavioral dysfunctions. It allows to estimate the number of nursing staff and their scope of competences necessary for providing care as well as time needed for particular nursing activities. There is a strong correlation between individual modules in the NPDS and the BI sales ( $r=0.90$ ). Nevertheless, these are not interchangeable. The high correlation coefficient confirms the validity of the Polish version of the NPDS.

**Conclusions.** NPDS is a simple and useful tool in nursing care allowing to plan the activities based on objective indicators. Despite many similarities it is not a substitute for the popular Barthel Scale. Therefore, the NPDS should be promoted in the nursing environment as a possible work tool. (JNNN 2018;7(1):4–11)

**Key Words:** nursing care, ischemic stroke, NPDS Scale

#### Streszczenie

**Wstęp.** Ocena ograniczeń funkcjonalnych u pacjenta z udarem niedokrwiennym mózgu jest podstawą zaplanowania odpowiedniej opieki pielęgniarskiej.

**Cel.** Celem podejmowanych działań pielęgnacyjnych jest zapewnienie bezpieczeństwa, zaspokojenie potrzeb chorego i pomoc w procesie zdrowienia z uwzględnieniem niezbędnej ilości personelu pielęgniarskiego oraz czasu koniecznego do realizacji tych działań. Narzędziem ułatwiającym zarówno proces rozpoznania pielęgniarskiego, jak i planowania opieki jest Skala Zależności Northwick Park (The Northwick Park Dependency Score — NPDS). Celem pracy była charakterystyka polskiej wersji tej skali oraz porównanie jej ze Skalą Barthel — tzw. „złotym standardem” do oceny niesprawności i zależności pacjenta.

**Materiał i metody.** Badaniem objęto 100 osób starszych z udarem niedokrwiennym mózgu w wieku od 60 do 99 lat (śr. 76,1, SD 9,07). Do określenia stopnia zależności pacjenta a tym samym zapotrzebowania na opiekę pielęgniarską wykorzystano skalę NPDS. Stan funkcjonalny chorych oceniono za pomocą Indeksu Barthel (BI), a stan neurologiczny za pomocą skali NIHSS.

**Wyniki.** Większość pytań w NPDS — BCN i BI jest tożsama. NPDS jest bogatsza o pytania dotyczące funkcjonowania poznawczego, komunikowania się i zaburzeń behawioralnych. Pozwala również określić liczbę personelu i zakres kompetencji niezbędnych do zapewnienia opieki oraz czas potrzebny na wykonanie określonych czynności przy chorym. Istnieje bardzo silna korelacja pomiędzy poszczególnymi modułami skali NPDS i BI ( $r \approx 0.90$ ) tym niemniej narzędzia te nie są całkowicie zamiennie. Wysoki współczynnik korelacji, będący miarą trafności teoretycznej jest wskaźnikiem poprawności psychometrycznej polskiej wersji skali NPDS.

**Wnioski.** Skala NPDS jest prostym i przydatnym w praktyce pielęgniarstwa narzędziem ułatwiającym planowanie opieki w oparciu o obiektywne wskaźniki. Pomimo zbliżonej zawartości, nie jest substytutem popularnej Skali Barthel. Zasadnym jest rozpropagowanie NPDS w środowisku pielęgniarstwa, jako potencjalnego narzędzia pracy. (PNN 2018;7(1):4–11)

**Słowa kluczowe:** opieka pielęgniarstwa, udar mózgu, skala NPDS

## Introduction

Assessment of a patient's independence in the basic daily activities is a part of the first stage of nursing care. Correct evaluation of patient's deficits is the basis of establishing potential problems and planning nursing activities aimed at satisfying physical and psychological needs of a patient as well as at rehabilitation. The effectiveness of these procedures depends on the appropriate number of qualified nursing staff. There are several scales evaluating functional ability of a patient, such as the Barthel Index (BI), or Katz Index of Independence in Activities of Daily Living (ADL). However, neither of them includes establishing the suitable number of nursing staff needed for providing care and extra impairments or disorders which are crucial, especially in neurological patients, such as communication, behavioral and cognitive dysfunctions. There is also no tool evaluating the demand for nursing staff in hospital wards. Such help is offered by Northwick Park Dependency Score (NPDS). Up to now the scale has been available in several language versions however there has been no experience of using this scale in nursing practice in Poland.

The aim of the paper is to:

1. Provide characteristics of Northwick Park Dependency Score (NPDS) as a tool assessing the demand for nursing care based on the functional condition of stroke patients during hospitalization.
2. Comparing NPDS Scale and the Barthel Index (BI) as tools used in the evaluation of the functional condition of patients—focusing on the structure and usefulness of the two scales.
3. Establishing the strength of correlation between the results of the NPDS and BI scales in ischaemic stroke patients during the acute hospitalization.

## Material and Methods

The study included 100 elderly stroke patients undergoing treatment in the Stroke Unit of the Provincial

Hospital in Poznań between January and December 2014, with at least moderate severity of neurological symptoms according to the National Institutes of Health Stroke Scale (NIHSS > 5 p.) [1]. It is a very special group, as the stroke — related limitations overlap with the limitations related to patients' advanced age.

The age of the patients ranged from 60 to 99 years (Mean 76.1, SD 9.07). The assessment was conducted during the first day of hospitalization. To assess patient's dependency and the need of nursing care the NPDS Scale was applied. Additionally, functional condition of the patients was assessed by the use of the Barthel Index, and the neurological state using NIHSS. The data were analyzed using the Statistica 10.

### *Characteristics of the Scales*

#### a. Northwick Park Dependency Score

NPDS is a tool created in Northwick Park Hospital in Harrow, Great Britain. The Polish translation of the scale was prepared previously by Anna Czernuszenko (MD, PhD) from the 2nd Neurology Department of the Institute of Psychiatry and Neurology in Warsaw. The scale is used for the individualized assessment of the nursing care demand among hospitalized patients. It includes four sections: Basic Care Needs (BCN), Special Nursing Needs (SNN), In-patient Nursing Needs (INN) and Care Needs Assessment (CNA) [2]. The sections consist of three parts: NPDS — Nursing Dependency Score (NPDS) including two sections: BCN and SNN; NPDS-H which is treated as the overall result of the scale, and consisting of the results of BCN and INN; and CNA which refers to the assessment of the need of providing nursing-social help to patients at home [2]. The CNA part has not been translated into Polish. In the studies the main focus have been the needs of a hospitalized patient. The analysis of the literature available has indicated that the CAN part is treated as a separate scale and is known as the Northwick Park Care Needs Assessment (NPCNA) [3–6].

The BCN section is partially similar to the Barthel Index. It includes 12 items describing everyday activities

(mobility, bed transfers, toileting bladder and toileting bowels, washing and grooming, bathing and showering, dressing, eating, drinking, enteral feeding-with a tube or PEG, skin pressure relief, safety awareness, communication, behavior). With every activity it is evaluated if the patient is independent or needs help of one nurse or two nurses and how much time the care takes. With multiple activities it is possible to mark on the scale how many times per day/night the help is provided. The item regarding toileting includes subsections related to the fecal and urinal inconstance as accidents making the care more difficult and requiring extra sanitary articles. The questions are scored on the scale 0–3, 0–4 or 0–5. The scoring range in the BCN section is 0–65 points, where 0 indicates no need of nursing care, while the maximum score-great need of nursing care [2,7].

The SNN section includes the factors determining additional, specialized care of a patient. These include: tracheostomy, open bedsore or wound requiring dressing, more than two interventions per night, patient or their family requiring psychological support, need to isolate the patient, additional medical condition or the need of constant, individual supervision. The scoring in the SNN section is 0 — lack of factor, 5 — presence of factor. The scoring range in the SNN section is 0–35 points [2,7].

The total sum of the BCN and SNN scores constitutes a part of the NPDS score — Nursing Dependency Score (NPDS — NDS) and amounts to 0–100 points [2,7].

The INN section evaluates some special needs of a patient which were mentioned before and additional needs connected with hospitalization. However, here the needs are not treated in a binary way. The questions evaluate the scope of help and time needed to perform a particular nursing activity, the frequency and time of providing care, number of people involved and the qualifications of nursing staff. This section includes: care of tracheostomy, providing dressing, administration of drugs, providing psychological support to patients and their family, using orthoses and shells, ability to keep one's position in bed/wheelchair, presence of additional medical condition and the need of constant individual supervision. The scoring in the section is 0–3, 0–4 or 0–5. The scoring range in the INN section is 0–35 points. The scores are interpreted identically to BCN section [2].

#### b. Barthel ADL Index (BI)

The Barthel Index is considered the “gold standard” for assessing patient's disability. The original version of the scale, with the scoring range 0–100 was developed in 1965. Afterwards the scale was modified several times, including Collin's et al. modification which included a simplified 20-point questionnaire. The scale is simple to use and no difference was noticed in the BI results

when the assessment was conducted by qualified and unqualified staff [8]. Wade and Collin advocated the use of a unified standard of daily activities as a way of raising the awareness and acceptability of disability and enhancing comparability of published research and suggested the Barthel Index as a standard scale for clinical and research purposes. [9]. The 20-question version of BI was first used for a study conducted in 1984 in Brisbane, Australia. It has, similarly to the original version, good psychometric characteristics, the correlation coefficient is 0.90 [10]. The Barthel Index, both the original, as well as the modified versions, includes 10 items describing everyday activities (feeding, bathing, grooming, dressing, toilet use, bowels and bladder control, transfers (bed to chair and back), mobility on level surfaces and stairs). Each activity has three possible answers: dependent, needs help, independent, or in case of bowels and bladder control: incontinent, occasional accident, continent. In our study we used the 100-point scale.

### *Results of the Studies*

#### a. Need of Nursing Care

In the study group the NIHSS score was 5–29 points (Mean 11.22, SD±6.15), which means that the patients experienced moderate to severe neurological impairment. The majority of the patients had moderate level of impairment. The BI score was 0–90 points (Mean 36.85, SD±27.42). The scores for the individual subscales of NPDS were as follow: NPDS: NPDS-BCN 1–50 points (Mean 26.06, SD±12.59), NPDS-NDS 11–72 points (Mean 38.25, SD±13.81) and NPDS-H 15–71 points (Mean 42.7, SD±14.97).

The scores of individual questions of BI and NPDS-BCN are presented in Table 2. The number of dependent patients requiring help and independent patients in ADL in both scales is presented in Table 3, and the comparison of the number of patients in particular groups of dependency, resulting from the accumulated values of the scales is included in Figure 1. The greatest functional limitations were found in mobility on stairs, bathing/showering, grooming, dressing and mobility on level surfaces. The least help was required with drinking, eating and behavior in social situations. Among the specialized nursing care (NPDS-INN) the most important was the need of constant individual supervision by a qualified nurse and the need to monitor life functions for more than 2 hours per day. Significant was also the time qualified staff spent on administering drugs (subcutaneous, intravenous, intramuscular, oral, sublingual administration).

Table 2. Functional state in the Barthel Index and NPDS-BCN

Activity daily living	Index Barthel		NPDS-BCN	
	Mean	SD	Mean	SD
Mobility	2.55	3.29	2.91	1.15
Bad transfers	3.70	3.45	1.41	0.99
Stairs	1.05	2.28	–	–
Toileting — bladder	2.45	2.89	1.34	0.96
Urinary incontinence	5.70	4.61	0.19	0.42
Toileting — bowels	–	–	1.85	1.70
Fecal incontinence	7.05	4.31	0.26	0.58
Washing and grooming	3.30	3.20	2.39	1.21
Bathing/Showering	2.65	2.70	3.50	1.51
Dressing	3.75	3.58	2.39	1.39
Eating/Feeding	4.60	2.99	1.13	0.98
Drinking	–	–	1.06	0.94
Skin pressure relief	–	–	1.51	1.53
Safety awareness	–	–	1.67	1.21
Communication	–	–	1.80	1.85
Behaviour	–	–	0.72	1.18

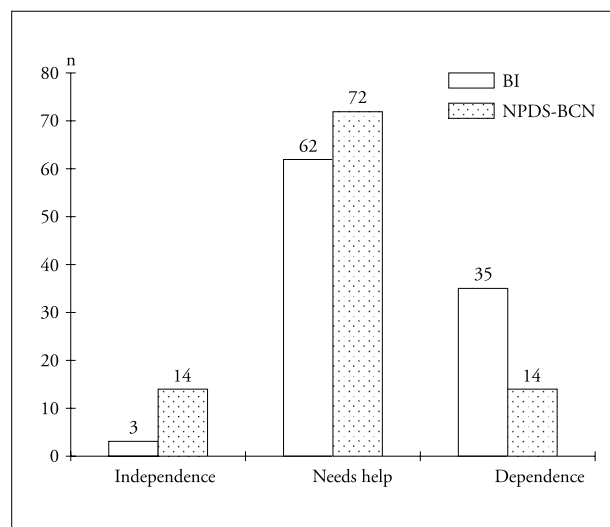


Figure 1. Categories of nursing care in the Barthel Index and NPDS-BCN

Table 3. Categories of nursing care in the Barthel Index and NPDS-BCN

Degree of dependence	Index Barthel (n=100)			NPDS-BCN (n=100)		
	Independent (10 point)	Needs help (5 point)	Dependent (0 point)	Independent (0 point)	Needs help (1,2 point)	Dependent (3,4,5 point)
	%	%	%	%	%	%
Activity daily living						
Mobility	9	33	58	6	28	66
Bad transfers	14	46	40	21	64	15
Stairs	2	17	81	–	–	–
Toileting — bladder	4	41	55	14	78	8
Urinary incontinence	50	14	36	82	18	–
Toileting — bowels	–	–	–	26	46	28
Fecal incontinence	66	9	25	80	19	1
Washing and grooming	9	48	43	5	60	35
Bathing/Showering	2	49	49	3	34	63
Dressing	16	43	41	9	53	38
Eating/Feeding	14	64	22	29	58	13
Drinking	–	–	–	33	59	8
Skin pressure relief	–	–	–	39	28	33
Safety awareness	–	–	–	23	38	39
Communication	–	–	–	35	30	35
Behaviour	–	–	–	60	33	7
Total	(100–86 p.) 3	(85–21 p.) 62	(≤20 p.) 35	(0–9 p.) 14	(10–40 p.) 72	(> 40 p.) 14

b. Comparison of the Scales

Comparison of the BCN section of the NPDS scale with the Barthel Index in particular questions and types of answers is provided in Table 1. The Barthel Index includes questions referring to everyday activities and controlling physiological needs. NPDS scale additionally includes problems with communication, adapting one's behavior to meet social norms and experiencing cognitive dysfunction. In both scales the scoring range is 0–100. In the case of NPDS scale, the more points a patient

scores the worse is their functional state and the greater need of nursing care. In the Barthel Index — the more points, the more independent a patient is, and thus, the less dependent on the nursing care.

The results of the studies indicate a strong correlation in hospitalized stroke patients between the results of BI and BCN ( $r=-0.88$ ,  $p<0.05$ ), NPDS-NDS ( $r=-0.87$ ,  $p<0.05$ ) i NPDS–H ( $r=-0.89$ ,  $p<0.05$ ). Visual presentation of these correlation — Figures 2–4.

Table 1. A comparison NPDS-BCN and the Barthel Index

The Barthel Index	Northwick Park Dependency Score — Basic Care Needs
1	2
Mobility 0 — immobile 5 — walk with help of one person 10 — independence	Mobility a) Walk fully independently — 0 b) Independent in electric/self-propelled chair — 1 c) Walk with assistance/supervision of one — 2 d) Uses attendant-operated wheelchair — 3 e) Bed-bound (unable to sit in wheelchair) — 4 f) Walk with assistance/supervision of two — 4
Bad transfers 0 — unable, no sittig balance 5 — needs help of 1 or 2 people 10 — independent	Bad transfers a) Fully independent/bad bound — 0 b) Requires help from one people — 1 c) Requires help from two people — 2 d) Requires hoisting by 1, and takes < ½ hr — 2 e) Requires hoisting by 2, and takes < ¼ hr — 3  Frequency of bad transfer: 0 1 2 more than 2
Toilet use 0 — dependent 5 — needs some help, but can do something alone 10 — independent (on and off, dressing, wiping)	Toileting bladder  Mode of emptying: toilet, commode, bottles, catheter/convene, bed-pan, pads  Need for assistance: a) Able to empty their bladder independently — 0 b) Set-up only (e.g. copes if bottles left within reach) — 1 c) Has in-dwelling catheter/convene — 1 d) Needs help/supervision of 1 and takes < ¼ hr. — 2 e) Needs help of 1, and takes > ¼ hr. — 3 f) Needs help of 2, and takes < ¼ hr. — 4  Frequency of assistance for emptying bladder During the day (7–23): <4 times/5–6 times/>6 times/help at night only During the night: 0 1 2 >2
Bladder 0 — incontinent, or catheterized and unable to manage alone 5 — occasional accident 10 — continent	Urinary incontinence: a) No accidents or leakage from catheter/convene — 0 b) Continent if toilet regularly. Occasional accidents — 1 c) 1–2 episodes of incontinence/leakage in 24 hrs. — 2 d) >2 episodes of incontinence/leakage in 24 hrs. — 3
	Toileting bowels  Need for assistance a) Able to empty their bowels independently — 0 b) Set-up only (eg giving suppositories/enema) — 1 c) Needs help of 1, and takes < ¼ hr. — 2 d) Needs help of 1, and takes > ¼ hr. — 3 e) Needs help of 2, and takes < ¼ hr. — 4 f) Needs help of 2, and takes > ¼ hr. — 5  Frequency of opening bowels or trial of evacuation: 2–3/week 4–5/week 1/day 2/day >2/day

Table 1. Continued

1	2
Bowels 0 — incontinent (or needs to be given enemas) 5 — occasional accident 10 — continent	Faecal incontinence a) No faecal accidents — 0 b) Requires regular bowel regimen — suppositories/enemas in order to remain continent — 1 c) Occasional faecal accidents (less than daily) — 2 d) Regular incontinence of faecals — 3
Grooming 0 — dependent 5 — needs help 10 — independent face/hair/teeth/shaving (implements provided)	Washing and grooming a) Able to wash and groom independently — 0 b) Needs help of set up only — 1 c) Needs help of 1, and takes < ¼ hr. — 2 d) Needs help of 1, and takes > ¼ hr. — 3 e) Needs help of 2, and takes < ¼ hr. — 4 f) Needs help of 2, and takes > ¼ hr. — 5
Bathing 0 — dependent 5 — needs help 10 — independent	Bathing/showering a) Able to bath/shower independently — 0 b) Needs help to set up only (e.g. running bath, soaping flannel etc.) — 1 c) Needs help of 1, and takes < ½ hr. — 2 d) Needs help of 1, and takes > ½ hr. — 3 e) Needs help of 2, and takes < ½ hr. — 4 f) Needs help of 2, and takes > ½ hr. — 5
Dressing 0 — dependent 5 — needs help but can do about half unaided 10 — independent	Dressing a) Able to dress independently — 0 b) Needs help set up only — 1 c) Needs incidental help from 1 — 1 d) Needs help of 1, and takes < ¼ hr. — 2 e) Needs help of 1, and takes > ¼ hr. — 3 f) Needs help of 2, and takes < ¼ hr. — 4 g) Needs help of 2, and takes > ¼ hr. — 5
Feeding 0 — unable 5 — needs help cutting, spreading butter, etc., or requires modified diet 10 — independent	Consumptions of meals Eating a) Entirely gastrostomy/nasogastric fed — 0 b) Able to eat independently — 0 c) Needs help to set up only — 1 d) Needs intermittent check/supervision from 1 — 1 e) Needs help from 1, and takes < ½ hr. — 2 f) Needs help from 1, and takes > ½ hr. — 3 Drinking a) Entirely gastrostomy/nasogastric fed — 0 b) Able to pour own drink and drink it independently — 0 c) Able to drink independently if left within reach — 1 d) Able to drink independently but needs prompting to do so — 1 e) Needs help/supervision, and takes < ½ hr. — 2 f) Needs help/supervision, and takes > ½ hr. — 3 How many Times in 24 hrs? 3      4–6      >6 Enteral feeding (gastrostomy or nasogastric tube) a) No enteral feeding/manage feeds independently — 0 b) Needs help to set up feed just once a day — 1 c) Needs help to set up feed twice a day — 2 d) Needs help to set up feed 3 times a day — 3 e) Needs help to set up feed and extra flushes during the day — 4 f) Needs help to set up feed and extra flushes both the day and night — 4
Stairs 0 — unable 5 — needs help (verbal, physical, carrying aid) 10 — independent	No counterpart
No counterpart	Skin pressure relief a) Able to relieve pressure independently — 0 b) Needs prompting only to relieve pressure — 1 c) Needs help from 1 to relieve pressure/turn (4 hrly) — 2 d) Needs help from 2 to relieve pressure/turn (4 hrly) — 3

Table 1. Continued

1	2
	e) Skin marked or broken, needs 1 to relieve pressure/turn (2 hrly) — 4 f) Skin marked or broken, needs 2 to relieve pressure/turn (2 hrly) — 5
No counterpart	Safety awareness a) Fully orientated, aware of personal safety — 0 b) Requires some help with safety and orientation but safe to be left for more than 2 hrs and could summon help in emergency — 1 c) Requires help to maintain safety. Could not be left for 2 hrs and could not summon help in emergency — 2 d) Requires at least hourly checks or constant supervision — 3
No counterpart	Communication a) Able to communicate needs without help — 0 b) Able to communicate basic needs with little help or by using a communication aid or chart (< ¼ hr.) — 1 c) Able to communicate basic needs with little help or by using a communication aid or chart (> ¼ hr.) — 2 d) Able to respond to direct questions about basic needs — 3 e) Responds only to gestures and contextual cues — 4 f) No effective means of communication — 5  How many Times does communication occur within 24 hours? <2 times      2-4 times      >4 times
No counterpart	Behaviour a) Compliant and socially appropriate — 0 b) Needs verbal/physical prompting for daily activities — 1 c) Needs persuasion to comply with rehab or care — 2 d) Needs structured behavioural modification programme — 3 e) Disruptive, inclined to aggression — 4 f) Inclined to wander off ward — 5

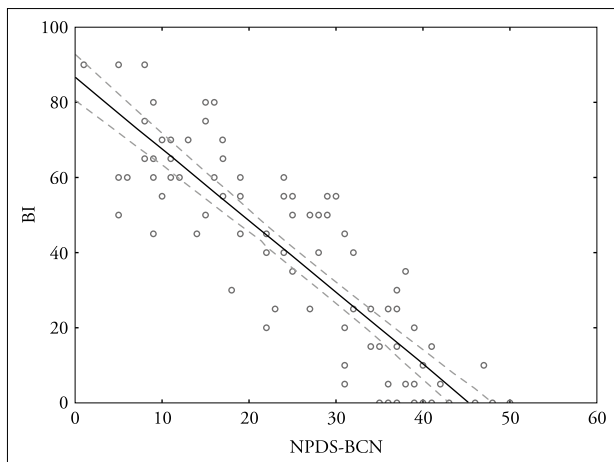


Figure 2. Dependence between BI a NPDS-BCN in the study group

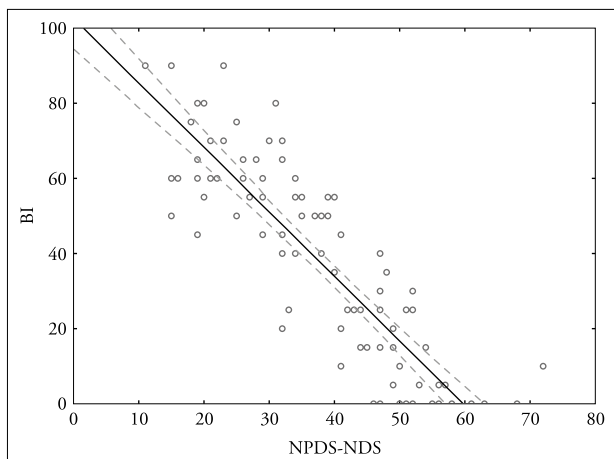


Figure 3. Dependence between BI a NPDS-NDS

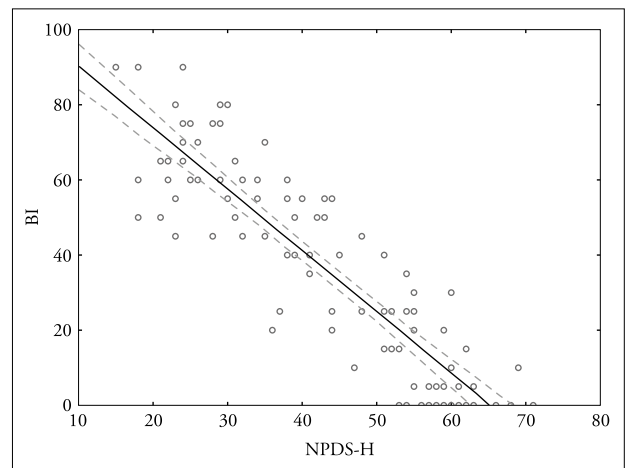


Figure 4. Dependence between BI a NPDS-H in patient with stroke

## Discussion

Scales NPDS-BCN and BI overlap in the majority of questions, thus the conversion of these scales is possible in both directions [3,11]. The confirmation of their equivalence are the results of correlation analyses of BI with BCN and NPDS obtained in this study, as well as conducted by other researchers [7,12,13]. The BCN Scale includes the questions concerning skin pressure relief, safety awareness, communication and behaviour, which, according to patients are important aspects of the nursing care [11]. Thus, the disadvantage of the conversion of scales NPDS-BCN to BI is the loss of several aspects important for the patients, especially the changes occurring in cognitive processes, communication and behaviour [3]. Scale NPDS-BCN, contrary to BI, makes it possible to establish the number of nursing staff and the qualifications necessary for providing care of a patient, as well as the amount of time needed for performing these activities — and also their cost [3].

## Conclusions

Our study as well as studies conducted by other authors and the comparison of the scales indicate that the Barthel Index, despite its similarity to NPDS scale, includes fewer important pieces of information about a patient. The data are important in planning optimal care for a stroke patient. Therefore, it is legitimate to promote the use of NPDS scale as a tool useful in establishing the demand for nursing care, particularly for neurological patients.

## Implications for Nursing Practice

The Northwick Park Dependency Score is easy to use scale in nursing practice on hospital ward. It is helpful on planning optimal patient care and sufficient nursing staff to provide proper care.

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