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The Use of Clinimetrics in the Practice of a Neurosurgical Nurse. Preliminary Reports

Zastosowanie klinimetrii w praktyce pielęgniarki neurochirurgicznej. Doniesienia wstępne

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Abstract

Introduction. Clinimetrics is a field of medical knowledge aimed at developing and using measuring tools (scales) to assess the condition of a patient. Using clinimetric scales, a nurse, based on her/his knowledge, skills and experience, is able to determine the patient's condition, potential health problems and establish a care plan based on a nursing diagnosis.
Aim. The main aim of the research was to analyse the use of measurement tools in the practice of a neurosurgical nurse.
Material and Methods. The study was conducted on a group of 93 nurses employed in 6 neurosurgical centres located in the Kuyavian-Pomeranian voivodeship. The study used the diagnostic survey method, using the survey technique. In order to obtain an answer to the main objective of the research, a questionnaire was constructed consisting of a general part (demographic data) and a detailed part (data concerning measurement tools).
Results. It was found that 68 (73%) neurosurgical nurses use measuring tools (scales) to assess the condition of the patient in their professional practice. The most popular scales are: Glasgow Coma Scale — GCS (93 — 100% of responses), Barthel Index — BI (56 — 60% of responses), Kurtzke Extended Disability Status Scale (43 — 46% of responses) and Mini Mental State Examination (MMSE) (38 — 40% of responses). A statistically significant relationship was found between the use of measuring tools (scales) and education (<0.0001) and specialization by nurses (<0.0001). There was no dependence on age ($p<0.05$) and seniority ($p<0.05$) of nurses.
Conclusions. More than half of the surveyed neurosurgical nurses use measuring tools (scales) in their professional practice to assess the patient's condition. The most popular measuring tool (scale) is the Glasgow Coma Scale (GCS). A relationship was observed between education and specialization and the use of measuring tools (scales) to assess the condition of a patient in professional practice. **(JNNN 2022;11(3):124–129)**
Key Words: clinimetrics, neurosurgery, nurse

Streszczenie

Wstęp. Klinimetria to dziedzina wiedzy medycznej mająca na celu opracowanie i zastosowanie narzędzi pomiarowych (skal) do oceny stanu chorego/pacjenta. Wykorzystując skale klinimetryczne, pielęgniarka na podstawie posiadanej wiedzy, umiejętności i doświadczenia potrafi określić stan chorego, jego potencjalne problemy zdrowotne oraz ustalić plan opieki oparty na diagnozie pielęgniarskiej.
Cel. Głównym celem badań była analiza zastosowania narzędzi pomiarowych w praktyce pielęgniarki neurochirurgicznej.
Materiał i metody. Badanie przeprowadzono na grupie 93 pielęgniarek zatrudnionych w 6 ośrodkach neurochirurgicznych zlokalizowanych w województwie kujawsko-pomorskim. W badaniach zastosowano metodę sondażu diagnostycznego, wykorzystując technikę ankietową. W celu uzyskania odpowiedzi na cel główny badań, skonstruowano kwestionariusz ankiety składający się z części ogólnej (dane demograficzne) oraz szczegółowej (dane dotyczące narzędzi pomiarowych).
Wyniki. Stwierdzono, że 68 (73%) pielęgniarek neurochirurgicznych używa w praktyce zawodowej narzędzi pomiarowych (skal) do oceny stanu chorego/pacjenta. Najbardziej popularnymi skalami są: Glasgow Coma Scale — GCS (93 —

100% odpowiedzi), Barthel Index — BI (56 — 60% odpowiedzi), Kurtzke Extended Disability Status Scale (43 — 46% odpowiedzi) oraz Mini Mental State Examination (MMSE) (38 — 40% odpowiedzi). Wykazano znamienną statystycznie zależność pomiędzy zastosowaniem w praktyce zawodowej narzędzi pomiarowych (skal) a wykształceniem (<0,0001) i posiadaniem specjalizacji przez pielęgniarki (<0,0001). Nie wykazano zależności od wieku (p<0,05) i stażu pracy (p<0,05) pielęgniarek.

Wnioski. Ponad połowa badanych pielęgniarek neurochirurgicznych używa w praktyce zawodowej narzędzi pomiarowych (skal) do oceny stanu chorego/pacjenta. Najbardziej popularnym narzędziem pomiarowym (skalą) jest skala oceny stanu przytomności — Glasgow Coma Scale (GCS). Zaobserwowano zależność pomiędzy wykształceniem i posiadaniem specjalizacji a zastosowaniem w praktyce zawodowej narzędzi pomiarowych (skal) do oceny stanu chorego/pacjenta.

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Słowa kluczowe: klinimetria, neurochirurgia, pielęgniarka

Introduction

Clinimetrics is a field of medical knowledge aimed at developing and using measuring tools (scales) to assess the condition of a patient. Using clinimetric scales, a nurse, based on her/his knowledge, skills and experience, is able to determine the patient's condition, potential health problems and establish a care plan based on a nursing diagnosis [1–3].

In the practice of a neurosurgical/neurological nurse, scoring scales are used to measure the degree of damage (determining the neurological deficit), to assess the patient's functional performance (mainly to determine the efficiency in everyday activities) and to assess the quality of life (psychosocial aspects of the disease) [4–7].

The results of studies in the field of clinical evaluation of diseases of the nervous system treated surgically (surgery, with the endovascular method) are quite well documented in the specialist literature, mainly in the assessment of long-term results (after 3, 6 and 12 months) after the procedure. However, there is a lack of data on functional assessment in the early postoperative period, which is very important due to the provision of proper nursing care.

According to the literature, most of the scales used in practice to assess the clinical, functional and quality of life require a significant amount of time to perform them. In most cases, individual scales can be used by specific professional groups (e.g. doctors, nurses, physiotherapists or psychologists) after appropriate training. The variety of functional scales used in practice makes it impossible to compare research results. Apart from the most popular tools, such as the Barthel Index (BI) and Glasgow Coma Scale (GCS), other scales are used to varying degrees by different authors [8,9].

The main aim of the research was to analyse the use of measurement tools in the practice of a neurosurgical nurse.

Material and Methods

The study was conducted on a group of 93 nurses employed in 6 neurosurgical centres located in the Kuyavian-Pomeranian voivodeship. The characteristics of the study group are presented in Table 1.

The study used the diagnostic survey method, using the survey technique. In order to obtain an answer to the main objective of the research, a questionnaire was constructed consisting of a general part (demographic data) and a detailed part (data concerning measurement tools).

In the detailed analysis of the issue, attention was paid to the use of measuring tools (scales) in professional practice to assess the clinical and functional status and the quality of life. The obtained answers were also compared with demographic variables such as: age, education, specialization and work experience in the profession.

Table 1. Characteristics of the study group (N=93)

Variable	N	%
Age*		
≤46.04 years	51	54.9
>46.04 years	42	45.1
Education		
Qualified nurse	32	34.4
Bachelor of nursing	36	38.7
Master of nursing	21	22.6
Other**	4	4.3
Specialization		
Yes	31	33.3
No	62	66.7
Internship in the department of neurosurgery		
≤21.09 years	45	48.4
>21.09 years	48	51.6

*NRPIP data for 2018 is 52.08 years — https://www.politykazdrowotna.com/40517,zmalas-coraz-wiecej-pielegniarek-w-zawodzie-niestety-srednia-wieku-wysoka; **Other — other discipline/doctor/professor

Ethical Considerations

The research was approved by the Bioethics Committee of the Nicolaus Copernicus University in Toruń at the Collegium Medicum of Ludwik Rydygier in Bydgoszcz.

Data Analysis

Statistical analysis was performed with the use of Microsoft Excel and STATISTICA version 10.0 (CM UMK licence). The material was developed using elements of descriptive statistics. In the statistical analysis of the material, the χ^2 test of independence was used to verify the hypotheses regarding the existence of a relationship between the variables under study. Statistical hypotheses were verified at the significance level of $p<0.05$.

Results

Table 2 presents a general analysis of the use of measurement tools in the practice of a neurosurgical nurse. It can be noticed that in most cases (68 people — 73%), nursing teams use scales to assess the condition of the patient. Among the most popular measurement tools is the Glasgow Coma Scale (GCS) for assessing the state of consciousness of neurosurgical patients. Other scales used by neurosurgical nurses are scales used in the prevention of bedsores (among others: the Norton scale, the Waterlow scale, the Braden scale). Among other measurement tools, the following were also mentioned: the Lovett's scale, the Beck's depression scale, the Baxter's scale (27 people — 29%).

When performing a detailed analysis of the use of measurement tools (Table 3), it can be seen that among the most useful scales for assessing the functional status of a patient are the Barthel Index (BI) (56 people — 60%) and the Rankin Scale (RS) (16 people — 17%). Respondents also pointed to other scales, including the Katz's ADL and Lawton's IADL scales (7 people — 7%). Among the measurement tools considered the most useful for assessing the patient's clinical condition, nurses indicated the Glasgow Coma Scale (GCS) (93 people — 100%) and Kurtzke Extended Disability Status Scale (43 people — 46%) and Mini Mental State Examination (MMSE) (38 people — 41%). Other scales included, among others, the Hunt and Hess scale or the Hoehn and Yahr scale (7 people — 7%). According to the respondents, the most useful scale for assessing the quality of life of a patient is the World Health Organization QOL scale (WHOQoL) — (28 people — 30%).

Table 2. General analysis of the use of measurement tools

Variable	Yes	No	I don't know	Total
Do you use professional measuring tools (scales) to assess the patient's status.	68 (73.1)	19 (20.4)	6 (6.5)	93 (100)
Which measurement tools (scales) do you use most often (please specify):	Number of responses (%)			
a. Glasgow Coma Scale (GCS)	93 (100)			
b. Prevention of bedsores scales	93 (100)			
c. Other	27 (29.0)			

Table 3. Detailed analysis of the use of measurement tools

Variable	Number of responses (%)
Which measurement tools (scales) do you consider most useful for assessing the functional status of the patient	
Barthel Index (BI)	56 (60.2)
Functional Independence Measure (FIM)	6 (6.5)
Functional Assessment Measure (FAM)	4 (4.3)
Rankin Scale (RS)	16 (17.2)
Glasgow Outcome Scale (GOS)	8 (8.6)
Other	7 (7.5)
Which measurement tools (scales) do you consider most useful for the assessment of the patient's clinical status	
Mini Mental State Examination (MMSE)	38 (40.9)
Glasgow Coma Scale (GCS)	93 (100)
Kurtzke Extended Disability Status Scale	43 (46.2)
National Institutes of Health Stroke Scale	4 (4.3)
Karnofsky Performance Scale (KPS)	8 (8.6)
Other	7 (7.5)
Which measurement tools (scales) do you consider most useful for assessing the patient's life quality	
World Health Organization QOL (WHOQoL)	28 (30.1)
The Sickness Impact Profile	4 (4.3)
Short Form 36 (SF-36)	4 (4.3)
Quality — adjusted life years (QALYs)	2 (2.1)
Nottingham Health Profile	2 (2.1)
Other	1 (1.1)

Table 4 presents the impact of sociodemographic variables on the use of measurement tools in nursing practice. By statistically analysing the age of the respondents and work experience in the neurosurgery ward and their impact on the use of measurement scales in practice, it was found that these factors did not differentiate statistically significantly (for age χ^2=0.071; p<0.05, for seniority χ^2=0.321; p<0.05). However, a correlation was found between education (χ^2=0.027; p<0.0001) and having specialization by nurses (χ^2=0.032; p<0.0001) and the use of measurement scales in practice. It was found that all people with higher education in the field (other 4 — 100%) use scales to assess the patient's condition in practice. Only in the case of people with a qualified nurse education, 6 responses (19%) regarding "I don't know" were noticed. Also in this group there were the most people (9 — 28%) who do not use the scales in everyday practice. It was also found that all nurses with a specialization (31 people — 100%) use the scales in clinical practice. On the other hand, 19 nurses (30%) in the group of people without specialization stated that they did not use the scales.

Table 4. Sociodemographic variables and measurement tools in nursing practice

Variable	Do you use professional measuring tools (scales) to assess the patient's status			
	Yes (68 — 73%)	No (19 — 20%)	I don't know (6 — 7%)	Test value-p
Age				
≤46.04 years (51 — 100%)	36 (70.6)	11 (21.6)	4 (7.8)	0.071; >0.05
>46.04 years (42 — 100%)	32 (76.2)	8 (19.0)	2 (4.8)	
Education				
Qualified nurse (32 — 100%)	17 (53.1)	9 (28.1)	6 (18.8)	0.027; <0.0001
Bachelor of nursing (36 — 100%)	30 (83.3)	6 (16.7)	0 (0.0)	
Master of nursing (21 — 100%)	17 (80.9)	4 (19.1)	0 (0.0)	
Other (4 — 100%)	4 (100)	0 (0.0)	0 (0.0)	
Specialization				
Yes (31 — 100%)	31 (100)	0 (0.0)	0 (0.0)	0.032; <0.0001
No (62 — 100%)	37 (59.7)	19 (30.6)	6 (9.7)	
Internship in the department of neurosurgery				
≤21.09 years (45 — 100%)	31 (68.8)	11 (24.5)	3 (6.7)	0.321; >0.05
>21.09 years (48 — 100%)	37 (77.1)	8 (16.7)	3 (6.2)	

Discussion

The aim of the research was to analyse the use of measurement tools in the practice of a neurosurgical nurse.

Research shows that most neurosurgical nurses use measurement tools in their professional practice. Among the most commonly used scales was the Glasgow Coma Scale (GCS) to assess the patient's state of consciousness. This scale is the most common scale used to assess the depth of disturbances of consciousness, a clinical feature of acute brain injury. The scale has been designed to be easy to use in clinical practice in general and speciality departments. It is currently used by emergency medical teams, nurses and doctors to assess all patients [10]. Other scales used by neurosurgical nurses are scales used in the prevention of pressure ulcers (among others: the Norton scale, the Waterlow scale, the Braden scale) [11]. The respondents also pointed to other measurement tools, such as the Lovett scale, also called the MRC test (Medical Research Council) [12]. The scale is used to assess muscle strength. The test involves manual testing of a selected muscle in specific positions and with a selected movement. It is commonly used in kinesiotherapy to study each muscle group. The muscle strength of the upper and lower limbs can be assessed according to the following criteria: no active muscle concentration — 0°; trace of active muscle contraction — 1°; pronounced muscle contraction and the ability to perform movement with the help and relief of the movable section — 2°; ability to perform independent active movement overcoming the gravity of a given section — 3°; the ability to make an active movement with some resistance — 4°; correct strength, i.e. the ability to perform active movement with full resistance — 5°.

According to the respondents, the most useful scales for assessing the patient's functional status are the Barthel Index (BI) and the Rankin Scale (RS). The Barthel scale was published in 1965 and is by far the most widely used method for assessing the Activities of Daily Living (ADL). In the literature, it is also known as: Barthel Score or Maryland Disability Index. By awarding a certain number of points 0, 5, 10, 15, the ability to self-service is assessed. The score is based on 10 activities of daily living, such as: eating meals, moving from bed to chair, maintaining personal hygiene, using the toilet, bathing, moving around on a flat surface, going up and down the stairs, dressing, checking bowel movements and urine. This scale has also undergone several modifications, and in Poland it is used by the National Health Fund in relation to long-term care patients [13]. The Rankin Scale (RS) or the Modified Rankin Scale (mRS) — is considered a measure of global disability. Commonly used as a descriptive categorization of the functional recovery of patients with neurosurgical diseases, and cerebrovascular disease in particular. This scale covers the entire range of functional outcomes from asymptomatic to death. Its categories are intuitive and easy to grasp by both medical staff and patients themselves. The Rankin tool evaluates patients on a 5-point scale. A score of 0 means no complaints or symptoms, 1 — minor complaints are recorded that do not significantly affect lifestyle, 2 — slight degree of disability, the current lifestyle changes slightly, 3 — moderate degree of disability, symptoms appear in a significant way changing the current lifestyle and affecting the patient's independence, 4 — moderately severe disability, the present symptoms make it impossible to maintain independence in everyday life, 5 — severe disability, complete deficit of self-care, the patient is dependent on the help of a caregiver [14].

Among the measurement tools considered the most useful for assessing the patient's clinical condition, nurses indicated the Glasgow Coma Scale (GCS) and the Kurtzke Extended Disability Status Scale and the Mini Mental State Examination (MMSE). The Kurtzke Extended Disability Status Scale (EDSS), and more precisely its extended version, is one of the most widespread and well-known tools used to assess disability among people with multiple sclerosis [15]. The EDSS tool consists of the following functional subscales: vision, brainstem, pyramidal system, cerebellum, sensory system, sphincters and higher cerebral functions, also includes an assessment of mobility and self-care. The EDSS total score is determined by two factors: gait and scores on the functional subscales. The final result of the EDSS scale can be up to 10 points, where 0 means no disability and 10 means death. The higher the final score, the greater the degree of disability of the patient. The Mini-Mental State Examination (MMSE) consists of 30 questions that allow for a quantitative assessment of various aspects of cognitive functioning. The areas assessed are: orientation in time, orientation in place, remembering, attention and counting, recalling, naming, repeating, understanding, reading, writing and drawing. The test is used to perform a screening test of cognitive dysfunctions. Make sure that the person being tested can hear and see well enough to be tested; if necessary, provide him/her with glasses and/or a hearing aid. In a situation where the examiner has the impression that the examined person did not hear, did not understand or for other reasons did not make an attempt to answer, there is a possibility of repeating a given question or command at most three times [16]. Other scales mentioned by nurses included the Hunt and Hess scale and the Hoehn and Yahr scale [17]. The Hunt and Hess scale (H&H) was developed for the initial assessment of the clinical status and prognosis in a patient with subarachnoid haemorrhage. Most often it is used in a modified version. The severity of a subarachnoid haemorrhage is defined as follows: 0 — Neurological condition normal, aneurysm not ruptured; I° — Asymptomatic or mild headache and mild neck stiffness; II° — Cranial nerve palsy, moderate or severe headache, neck stiffness; III° — Slight focal symptoms, patient falling asleep or confused; IV° — Significant disturbance of consciousness, moderate or severe focal symptoms, possible cerebellar symptoms; V° — Deep coma, cerebral rigidity, vegetative dissociation. The Hoehn and Yahr scale is used to assess the clinical severity of Parkinson's disease. This is a five-point scale used in patients with Parkinson's disease to determine the severity of Parkinson's symptoms and the natural history of the disease. Grade one means the least severity of symptoms.

According to the respondents, the most useful scale for assessing the quality of a patient is the World Health Organization QOL (WHOQoL) scale, namely the Polish abbreviated version WHOQoL-BREF by Krystyna Jaracz [18]. It is a research tool for evaluating a general measure of quality of life, not related to a specific disease. It is used to assess the quality of life in the following areas: physical, mental, social functioning and being in the environment. According to the author of the publication, the validation analysis of the Polish version on a large group of patients and healthy subjects convinces of the reliability and value of this research tool.

Conclusions

1. More than half of the surveyed neurosurgical nurses use measuring tools (scales) in their professional practice to assess the patient's condition.

2. The most popular measuring tool (scale) is the Glasgow Coma Scale (GCS).
3. A relationship was observed between education and specialization and the use of measuring tools (scales) to assess the condition of a patient in professional practice.

Implications for Nursing Practice

The conducted research diagnoses the area of application of measuring tools in the practice of a neurosurgical nurse. Based on the obtained results and conclusions, it should be stated that the issue of clinimetrics is still not very popular among nursing teams. It should also be considered whether in the process of pre- and post-graduate education of nurses, more attention should be paid to issues in this area.

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