Pielęgniarstwo
Neurologiczne i Neurochirurgiczne
THE JOURNAL OF NEUROLOGICAL AND NEUROSURGICAL NURSING
eISSN 2299-0321 ISSN 2084-8021 www.pnn.wshe.pl **Artykuł Oryginalny/Original**

Bedsores as Secondary Changes in Adult Patients Hospitalized on Neurologic Rehabilitation Ward

Odleżyny jako zmiany wtórne u dorosłych pacjentów hospitalizowanych na oddziale rehabilitacji neurologicznej

Emilia Mikołajewska

Clinical Ward for Post-Traumatic Paraplegia and Clinical Ward for Early Neurological Rehabilitation, Rehabilitation Clinic, Military Clinical Hospital No. 10 and Polyclinic, Bydgoszcz, Poland

Abstract

Background. Prevalence of bedsores in neurological patients is rather known, although needs for further deeper research and continuous supervision. Bedsores can significantly influence both to rehabilitation effectivity, patients' functional outcomes and quality of life.
Aim. Aim of this study was to assess and discuss occurence of bedsores in patients hospitalized on neurologic rehabilitation ward.
Materials and methods. The study was carried out among 36 adult patients hospitalized on neurological rehabilitation ward because of accidents resulting in neurological disorders. Patients were assessed using Torrance classification system and Norton Pressure Sore Risk-Assessment Scale Scoring System.
Results. Bedsores in patients with neurological deficits remain important problem despite increased consciousness both among medical staff, patients, and families/caregivers. Among 36 patiens involved in the study, decubitus ulcers were observed in 8.33%.
Conclusions. Bedsores are perceived as a significant issue influencing both efficiency of the therapy (including long-term rehabilitation), care, and quality of life of patients with neurological disorders. Larger research are necessary to further investigate both bedsores prevalence, and prevention strategies, especially in long-term rehabilitation and home care of patients with neurological deficits. **(PNN 2012;1(4):144-150)**
Key words: neurorehabilitation, neurological deficit, bedsore, quality of life

Streszczenie

Wprowadzenie. Częstotliwość występowania odleżyn u pacjentów neurologicznych jest raczej znana, pomimo to problem ten wymaga dalszych badań jak i ciągłego nadzoru. Odleżyny mogą mieć znaczący wpływ zarówno na efektywność rehabilitacji, wyniki funkcjonalne pacjentów, jak i ich jakość życia.
Cel. Celem niniejszego badania była ocena i dyskusja częstotliwości występowania odleżyn u dorosłych pacjentów neurologicznych hospitalizowanych na oddziale rehabilitacyjnym.
Materiał i metody. Badanie przeprowadzono wśród 36 dorosłych pacjentów neurologicznych, hospitalizowanych na oddziale rehabilitacji neurologicznej. Pacjentów poddano ocenie z wykorzystaniem klasyfikacji odleżyn według Torrance'a oraz Skali Norton.
Wyniki. Odleżyny pacjentów neurologicznych wciąż stanowią ważny problem pomimo rosnącej świadomości zarówno personelu medycznego, pacjentów oraz ich rodzin/opiekunów. Wśród 36 pacjentów objętych badaniem odleżyny zaobserwowano w 8,33%.
Wnioski. Odleżyny są postrzegane jako poważny problem wpływający zarówno na efektywność leczenia (w tym rehabilitacji długoterminowej), jak i opiekę i jakość życia pacjentów z zaburzeniami neurologicznymi. Zaleca się kontynuację badań celem dokładnego zbadania częstości występowania odleżyn jak i strategii prewencyjnych, zwłaszcza w długotrwałej rehabilitacji i opiece domowej pacjentów z deficytami neurologicznymi. **(PNN 2012;1(4):144-150)**
Słowa kluczowe: rehabilitacja neurologiczna, deficyt neurologiczny, odleżyna, jakość życia

Introduction

Despite well known rules of prevention, early identification of at-risk patients, accurate and timely assessment, and effective interventions, occurence of decubitus ulcers (bedsores, pressure ulcers – PrUs) is still significant. The estimated annual cost of bedsores is impressive: 11-17.2 billion (10^9) USD in the USA [1]. Skin integrity issues are perceived priority especially in long-term neurological rehabilitation, including post-stroke patients, patients with traumatic brain injury (TBI), patients with spine cord injury (SCI), etc. [2]. Bedsores can significantly influence both to rehabilitation effectivity, patients' functional outcomes and quality of life. Risk of bedsores in neurological patients is increased due to:

1. Specificity of patients and their disorders (e.g. severe disorders in the area of mobility) – general prevalence of bedsores in patients treated on surgical, neurological, and orthopaedic wards is higher then patients hospitalized on other wards [3,4,5];
2. Increased threat:
   - up to 30-40% of bedsores develop during first week of the patient immobility,
   - up to 70% of bedsores develop during second week of the patient immobility [3,4,5].
3. Increased need for care quality (concerning both medical staff and families/caregivers) – general prevalence of bedsores in hospitalized patients is perceived lower than PrUs prevalence in institutions or in home care, what seems prove increasing consciousness in the area of decubitus ulcers' prevention among medical staff, but not among patients and their families/caregivers [2].

Thus research in the area of decubitus ulcers in patients seem be very important direction of further research.

Aim of this study was to assess and discuss occurence of bedsores in patients hospitalized on neurologic rehabilitation ward.

Material and methods

Sample and setting

Investigated group consisted of 36 adult patients hospitalized on neurologic rehabilitation ward because of accident resulting in neurological disorder. Inclusion criteria were as follows:

- age above 18 years,
- diagnosis: post-stroke patients, patients with TBI, patients with SCI,
- time accident: since 4 weeks to 18 months after accident.

To assess variability within involved group of patients three subgroups of twelve patients each were provided, each of them involved and assessed one month after preceding subgroup. Size and anatomical involvement of infarct varied depend on the patient. Inclusion of patients was each time confirmed by medical records. The patients' profiles are presented in Table 1.

Table 1. Patients' overall profile

	Number and percentage N=36 (100%)
Sex:	
Females	16 (44.44 %)
Males	20 (55.56 %)
Age [years]:	
Min	22
Max	72
SD	13.37
Mean	53.14
Median	56.5
Time after accident:	
4 weeks – 18 months	36 (100 %)

Procedure

Each participating patient's skin was assessed and pressure ulcers were classified according to the Torrance classification system. Pressure ulcer risk was assessed using the Norton Pressure Sore Risk-Assessment Scale Scoring System.

As basic tools for decubitus ulcers assessment are perceived Norton Pressure Sore Risk-Assessment Scale Scoring System (Table 2), Modified Norton Scale, Pressure Ulcer Card, and Short Form-Mini Nutritional Assessment.

Table 2. The Norton Pressure Sore Risk-Assessment Scale Scoring System [7]

Assessment		Score
Physical condition	Good	4
	Fair	3
	Poor	2
	Very bad	1
Mental condition	Alert	4
	Apathetic	3
	Confused	2
	Stuporous	1
Activity	Ambulant	4
	Walks with help	3
	Chairbound	2
	Bedfast	1
Mobility	Full	4
	Slightly impared	3
	Very limited	2
	Immobile	1
Incontinence	None	4
	Occasional	3
	Usually urinary	2
	Urinary and fecal	1
		TOTAL SCORE:

Assessment criteria:
Total score lesser than 10: very high risk
Total score between 10 and 14: high risk
Total score between 14 and 18: medium risk
Total score greater than 18: low risk

As basic tool for pressure ulcers classification are perceived Torrance classification system, Stirling Pressure Sore Severity Scale (SPSSS), and European Pressure Ulcer Advisory Panel (EPUAP) grading tool. Despite huge developmental potential there is no consistency between research in the area of tools and there is no alternative to the widely used risk assessment and classification grading tools [6].

As integral part of the documentation all aforementioned tools should be used by skilled medical staff, providing acurate and reliable risk factors assessment and wound assessment.

Data collection and analysis

The results, where available, are expressed as mean, median, minimal value (min), maximal value (max) and standard deviation (SD). A probability (p)value<0.05 was considered as statistically significant. Statistical analysis of data was performed using the Statistica 9 Software.

Results

Results among 36 patients (100%) involved in the study: decubitus ulcers were observed in 3 cases (8.33%). All of them were male, two with SCI and one post-stroke. In all of them score of the Norton Pressure Sore Risk-Assessment Scale Scoring System provided very high risk of bedsores (Table 3).

Table 3. Results for whole group of patients

		Females	Males
Number of involved patients		16	20
Patients with diagnosed decubitus ulcers	– subgroup I	0	1 (5%) – with SCI
	– subgroup II	0	1 (5%) – with SCI
	– subgroup III	0	1 (5%) – post-stroke
All involved patients depend on sex		0	3 (15%)
All involved patients		3 (8.33%)	
Score of the Norton Pressure Sore Risk-Assessment Scale Scoring System for patients with decubitus ulcers		very high risk	

Discussion

According to the recent literature prevalence rates for bedsores varies from 12% to 38%, but pressure ulcer incidence in neurological patients within 2 weeks of admission can achieve even 47% [1,8]. Effective prevention and treatment procedures may lower this value up to 50% [3,4]. My findings provide evidence for low bedsores prevalence in involved group of patients with neurological deficits. Despite huge knowledge and experience in the area of bedsores prevention and treatment, analysis of publications shows, that common may be incorrect opinion, that bedsores are issue for nurses, not for whole multidisciplinary therapeutic team. Number of articles concerning rehabilitation and physiotherapy in patients with bedsores constitutes only 24.4% of number of articles concerning nursing in the same patients [2,9,10]. Unsettled ratios in publications concerning prevention and treatment of bedsores in neurological patients are significant: particular attention is paid to patients with SCI and post-stroke while research involving patients with TBI are rare [2]. Prevalence rates for PrUs in patients with neurological deficits are showed in Table 4.

Gélis et al. states there is lack of relevant research concerning prevalence of bedsores in patients with SCI, both in acute stage, rehabilitation stage and chronic stage [17,18]. What more prevalence of chronic wounds in this category is increasing despite standardized medical care [19]. According to the literature prevalence of bedsores in patients with SCI is associated rather with social support, injury severity, and race-ethnicity, than age, gender, years since injury, and education [20]. Wilczewski et al. described these risk factors as: fecal management systems, incontinence, acidosis, support surfaces, steroids, additional equipment use, and hypotension [21].

In the post-stroke patients risk of besores – in the case of patient immobility – may significantly increase with older age and time after cerebrovasular accident (CVA). Thus bedsores may be associated with poor short-term outcomes. Moreover risk factors of decubitus ulcers in post-stroke patients are perceived wheelchair using, inadequate home care [5], and lack of proper rehabilitation, because caregivers may be not conscious of its importance [22]. Use of wheelchair seems be not simple bedsores risk factor, but it can be significantly increased by incorrect wheelchair parameters' selection and incorrect wheelchair use [2]. Proper bedsores prevention and treatment can significantly influence effectivity of post-stroke rehabilitation, functional abilities and quality of life of post-stroke patients [5]. One of possible solutions in home care may be support of post-stroke out-patient care. Thus not only education of medical staff, but rather education of patients and they families/caregivers is important. Critical issue is continous home care supervision provided e.g. by experienced nurses. Frankly speaking significant dicrepancy may be stated between observations, what patients (family/caregivers) know about pressure ulcer prevention, and their activities in the area of this prevention. Their real ability to reduce risk of developing

Table 4. Prevalence retes for bedsores in patients with neurological deficits depend on source

Case	Source	Percentage [%]
Stroke survivors	Brola et al. [5]	3
	Ingeman et al. [11] – Danish National Indicator Project – National Registry of Patients	 1.4 (but unknown cases: 8.6) 0.25
	Kitisomprayoonkul et al. [12]	1.7
	Sackley et al. [13]	22 (one year after stroke)
SCI	Chen et al. [14]	11.5 (one year after injury) 21 (15 years after injury)
TBI	Safaz et al. [15]	6.9
	Zampolini et al. [16]	6.6-26.1
General neurologic patients (post-stroke, SCI, TBI)	Mikołajewska [2]	4.17
General in acute care patients	Gupta and Ichioka 2012 [1]	0.4-38
General in long-term care patients	Gupta and Ichioka 2012 [1]	2.2-24
General in home care patients	Gupta and Ichioka 2012 [1]	0-17

this serious complication seems be overestimated. No doubts this situation increases risk factors of secondary changes and return to the hospital. Thus role of all medical specialists within multidisciplinary therapeutic team in pressure ulcers prevention and treatment is perceived very important [23]. There is necessary to paid particular attention to bedsores prevention since bedsores healing is not simply the reverse sequence of repairing tissue ensuing from pressure ulceration [6].

Risk factors for time frames 90-day and 180-day mortality in hospitalized patients with pressure ulcers identified as follows:

- diabetes, chronic renal failure, congestive heart failure, and metastatic cancer were risk factor associated with mortality in both time frames,
- myocardial infarction, cerebrovascular disease, liver disease, and human immunodeficiency virus/AIDS were risk factors in the 90-day time frame only,
- dementia, hemiplegia/paraplegia, rheumatic disease, chronic pulmonary disease, and peripheral vascular disease were not risk factors [24].

Research of Justo et al. reported low admission Norton scale scores predicting long-term mortality (within one year or more) [25]. Development in the area of mortality risk factors and their predicting among patients with bedsores (including patients with neurological deficits) may provide useful prognostic data for further counselling and treatment planning.

Aforementioned papers seem provide significant value in identification of barriers to bedsores' prevention and treatment in neurological patients. According to my knowledge and experience old age is not simple prognosic sign in the area of bedsores. Important prognostic signs seem be functional status of the patient (assessed e.g. using clinical scores and scales), mobility (including use of assistive technology), education and engagement of the patient and her/his family/caregivers. No doubts reasonable prevention may significantly lower bedsores incidence even in elderly patients.

Taking into consideration aforementioned issues research targeting pathophysiology, prevention, and treatment of bedsores seem be priority for clinical and basic science research, including neurology, rehabilitation, and nursing. Due to practical, ethical, and safety considerations, bedsores research in the human environment are limited to studies involving patients with pre-existing ulcers. Induction and exploring bedsores in animals can address all the aspects of their pathology. Certain types of animal models can (even selectively) identify specific aspects of bedsores development, assessement of the extent of lesion(s), and discuss outcomes from interventions. The appropriate interpretation may be significant for proper study design, deeper explaining of the outcomes, and extrapolation to clinical use (clinical guidelines, etc.) [19,26,27].

Quick and correct bedsore assessment seems be critical. Causes of the majority of chronic wounds are prolonged pressure, vascular insufficiency, or neuropathy. Wounds caused by other underlying health conditions or external factors (radiation, spider bite, etc.) are usually referred as atypical. Their number is increasing – according to the research of Tang et al. even 29.7% chronic wounds were due to atypical causes [28].

Limitations of my study include patients population which may not reflect patients hospitalized on other wards due to neurological issues. Some neurologic patients can be hospitalized on another wards because of associated (caridiologic, orthopaedic, etc.)

diseases. Significantly high age median (56.5 years) shows generally high number of elderly people among hospitalized patients with neurological deficits, but it does not mean increased bedsores incidence in elderly. Lower occurence of neurological deficits (e.g. strokes) in younger adults (18-40 y.o.) can provide misunderstanding in the area of bedsores prevalence depends on age. No doubts this issue needs another research on much bigger sample. Despite aforementioned limitations my findings have significant implications for knowledge in the area of bedsores occurence in neurological patients. Discussion suggests further improvements in clinical practice (protocols) and need for continuous supervision of bedsores incidence.

Conclusions

Bedsores are perceived significant issue influencing both efficiency of the therapy (including long-term rehabilitation), care, and quality of life of patients with neurological disorders. Larger research are necessary to further investigate both bedsores prevalence, and pre-

Table 5. General concept of co-operation of selected health professionals in bedsores prevention and treatment in patients with neurological deficits (version). Engagement of other members of the multidisciplinary theraputic team – if possible [9,10]

Subgroup of health professionals	Tasks
	Bedsores prevention
Physicians	1. Assessment (including blood tests) and diagnosis. 2. Patients' and family/caregivers education. 3. Nutrition recommendations. 4. Activity recommendations. 5. Smoking quit assistance.
Nurses	1. Patients' and family/caregivers early education. 2. Repositioning in a bed. Proper positions in a bed. 3. Repositioning in a wheelchair, etc. 4. Skin protecting and inspecting. 5. Bony areas protecting. 6. Blood circulation improvement.
Physiotherapists	1. Patients' and family/caregivers early education. 2. Proper positions in a bed. 3. Blood circulation improvement (massage, movement exercises, selected kinds of hydrotherapy, selected kinds of electrotherapy, etc.). 4. Mattresses, cushions and surfaces relieving presure.
	Bedsores treatment
Physicians	1. Evaluating of the bedsore (including blood tests, etc.) 2. Assessment (including primary causes) and diagnosis. 3. Treatment plan. 4. Patients' and family/caregivers education. 5. Non-invasive treatment (including nutrition recommendations, pain management, wound dressing, etc.) 6. Surgical treatment (classical, ultrasound, other).
Nurses	1. Primary causes assessment. 2. Patients' and family/caregivers education. 3. Repositioning in a bed, wheechair, etc. Proper positions in a bed. 4. Wound dressing. 5. Vacuum assisted closure (VAC).
Physiotherapists	1. Primary causes assessment. 2. Patients' and family/caregivers education. 3. Kinezytherapy: movement exercises, proper positions in a bed. 4. Physicotherapy: electrotherapy (selected kinds), LASER therapy, IR rays, UV rays, hyperbaric chamber. 5. Massage. 6. Mattresses, cushions and other assistive technology (AT) relieving presure.

vention strategies, especially in long-term rehabilitation and home care of patients with neurological deficits.

Implications for Nursing Practice

1. Bedsores in patients with neurological deficits remain important problem despite increased consciousness both among medical staff, patients, and families/caregivers.
2. Prevalence of bedsores in neurological patients is rather known, although needs for contionous supervision.
3. Bedsores prevention and treatment in patients with neurological deficits are common plane of co-operation of whole medical staff, e.g. within multidisciplinary therapeutic team on neurologic rehabilitation ward (Table 5).
4. Education of patients and their families/caregivers is key issue, but self-care abilities in patients with neurological disorders depends inter alia on preserved cognitive functions.

References

[1] Gupta S., Ichioka S. Optimal use of negative pressure wound therapy in treating pressure ulcers. *International Wound Journal.* 2012;Aug9,Suppl1:8-16. doi: 10.1111/j.1742-481X.2012.01012.x.

[2] Mikołajewska E. Incidence of bedsores in adult patients with neurological disorders. *Journal of Health Sciences*. 2012;2(2):51-59.

[3] EPUAP-NPUAP. *Profilaktyka odleżyn.* Retrieved 13.02.2012, from http://www.epuap.org/guidelines/QRG_Prevention_in_Polish.pdf

[4] Szewczyk M.T., Cwajda J., Cierzniakowska K. Zasady prowadzenia skutecznej profilaktyki ran odleżynowych. *Wiadomości Lekarskie*. 2006;59(11-12):842--847.

[5] Brola W., Fudala M., Przybylski W., Czernicki J. Profilaktyka późnych powikłań udaru mózgu. *Studia Medyczne*. 2008;9:21-26.

[6] Bell J. Are pressure ulcer grading & risk assessment tools useful? *Wounds.* 2005;1(2):62-69.

[7] Norton D., McLaren R., Exton-Smith A.N. *An investigation of geriatric nursing problems in hospital*. Churchill Livingstone, London 1962.

[8] Sae-Sia W., Wipke-Tevis D.D., Williams D.A. Elevated sacral skin temperature (T(s)): a risk factor for pressure ulcer development in hospitalized neurologically impaired Thai patients. *Applied Nursing Research*. 2005;18(1):29-35.

[9] Malinowska K., Mikołajewska E. Odleżyny – wspólna płaszczyzna działań pielęgniarskich i rehabilitacyjnych u pacjenta leżącego. *Pielęgniarstwo Chirurgiczne i Angiologiczne*. 2009;2:60-64.

[10] Mikołajewska E. Miejsce fizjoterapii w zapobieganiu i leczeniu ran odleżynowych. *Praktyczna Fizjoterapia i Rehabilitacja*. 2010;3:54-56.

[11] Ingeman A., Andersen G., Hundborg H.H., Johnsen S.P. Medical complications in patients with stroke: data validity in a stroke registry and a hospital discharge registry. *Clinical Epidemiology.* 2010;2:5-13.

[12] Kitisomprayoonkul W., Sungkapo P., Taveemanoon S., Chaiwanichsiri D. Medical complications during inpatient stroke rehabilitation in Thailand: a prospective study. *Journal of the Medical Association of Thailand*. 2010;93(5):594-600.

[13] Sackley C., Brittle N., Patel S., et al. The prevalence of joint contractures, pressure sores, painful shoulder, other pain, falls, and depression in the year after a severely disabling stroke. S*troke.* 2008;39(12):3329--3334.

[14] Chen Y., DeVivo M.J., Jackson A.B. Pressure ulcer prevalence in people with spinal cord injury: age-period-duration effects. *Archives of Physical Medicine and Rehabilitation*. 2005;86(6):1208-1213.

[15] Safaz I., Alaca R., Yasar E., Tok F., Yilmaz B. Medical complications, physical function and communication skills in patients with traumatic brain injury: a single centre 5-year experience. *Brain Injury*. 2008;22(10):733-739.

[16] Zampolini M., Zaccaria B., Tolli V., Frustaci A., Franceschini M., GISCAR Group Rehabilitation of traumatic brain injury in Italy: a multi-centred study. *Brain Injury.* 2012;26(1):27-35.

[17] Gélis A., Dupeyron A., Legros P., Benaďm C., Pelissier J., Fattal C. Pressure ulcer risk factors in persons with SCI: Part I: Acute and rehabilitation stages. *Spinal Cord.* 2009;47(2):99-107.

[18] Gélis A., Dupeyron A., Legros P., Benaďm C., Pelissier J., Fattal C. Pressure ulcer risk factors in persons with spinal cord injury part 2: the chronic stage. *Spinal Cord.* 2009;47(9):651-661.

[19] Salcido R., Popescu A., Ahn C. Animal models in pressure ulcer research. *Journal of Spinal Cord Medicine*. 2007;30(2):107-116.

[20] Saladin L.K., Krause J.S. Pressure ulcer prevalence and barriers to treatment after spinal cord injury: comparisons of four groups based on race-ethnicity. *NeuroRehabilitation*. 2009;24(1):57-66.

[21] Wilczewski P., Grimm D., Gianakis A., Gill B., Sarver W., McNett M. Risk factors associated with pressure ulcer development in critically ill traumatic spinal cord injury patients. *Journal of Trauma Nursing*. 2012;19(1):5-10.

[22] Mikołajewska E. Wpływ rehabilitacji i fizjoterapii na poprawę jakości życia. *Niepełnosprawność i Rehabilitacja*. 2012;1:5-12.

[23] Samuriwo R. Pressure ulcer prevention: the role of the multidisciplinary team. *British Journal of Nursing*. 2012;21(5):S4, S6, S8.

[24] Flattau A., Blank A.E. Risk factors for 90-day and 180-day mortality in hospitalised patients with pressure ulcers. *International Wound Journal*. 2012 Jun 28. doi: 10.1111/j.1742-481X.2012.01032.x.

[25] Justo D., Fridman V., Borodin O., Rozenberg F., Rabinovich A., Lerman Y. Admission Norton scale scores correlate with rehabilitation outcome and length in elderly patients following cerebrovascular accident. *Aging Clinical and Experimental Research.* 2011;23(5-6):445-449.

[26] Ślusarz R., Śniegocka A., Śniegocki M. Czynniki wpływające na częstotliwość występowania problemów pielęgnacyjnych u chorych w stanie wegetatywnym przetrwałym. W: Rosińczuk-Tonderys J., Uchmanowicz I. (Red.), *Chory przewlekle – aspekty pielęgnacyjne, rehabilitacyjne, terapeutyczne*. MePharm, Wrocław 2011,403-413. Materiały z niepublikowanej pracy magisterskiej autorstwa: Skibińska N. (promotor: Ślusarz R.).

[27] Jabłońska R., Ślusarz R., Królikowska A. Subjective assessment of selected aspects of care quality in neurosurgical wards. *Family Medicine & Primary Care Review***.** 2011;13(4):686-694.

[28] Tang J.C., Vivas A., Rey A., Kirsner R.S., Romanelli P. Atypical ulcers: wound biopsy results from a university wound pathology service. *Ostomy Wound Manage*. 2012;58(6):20-29.

Corresponding Author:
Emilia Mikołajewska
Rehabilitation Clinic, Military Clinical Hospital No. 10 with Polyclinic
Powstańców Warszawy 5, 85-681 Bydgoszcz
e-mail: e.mikolajewska@wp.pl
website: http://e.mikolajewska.prv.pl

Conflict of interests: None
Funding: None
Contributions: Emilia Mikołajewska [A,B,C,D,E,F]
(A – Study Design, B – Data Acquiring, C – Data Analysis, D – Statistical Analysis, E – Manuscript Preparation, F – Literature Search)
Received: 12.07.2012
Accepted: 19.09.2012