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REDAKCJA | EDITORIAL OFFICE:
ul. Katowicka 68, 45-060 Opole
tel. (+48) 77 442 35 46
fax (+48) 77 442 35 25
e-mail: redakcja@wsm.opole.pl

Nakład: 200 egz.

Kontakt:
Z-ca redaktora naczelnego –
Bożena Ratajczak-Olszewska
tel. (+48) 77 442 35 46
e-mail: ratajczakb@wsm.opole.pl

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tel. (+48) 77 550 70 50

SPIS TREŚCI

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Ladies and Gentlemen, Faculty, Graduates and Students of Universities, Readers and Enthusiasts of *Medical Science Pulse*!

It is our pleasure to present this year's final issue of Medical Science Pulse, quarterly – item 6 on List B archived by the Ministry of Science and Higher Education (MSHE), Index Copernicus 100 evaluation. It has been a year of further development, which includes a change in the journal's official title (formerly Puls Uczelni) and of unrelenting work on the quarterly, especially in the scope of its internationalisation. Resources granted by MSHE within the framework of a subsidy – DUN application no 583/2016 – have made it possible to increase the percentage of the English papers published from nearly 13 in 2015 to the full 100 in 2017!

To date, the journal has published 205 academic articles by authors based in 73 different academic institutions, research and health centres, based in Poland and internationally, including Belarus, Ukraine, Ireland, Spain, United Kingdom, Slovakia, Greece and the USA. Seventy-five per cent of the members of the Academic Board are based at institutes abroad including, Belgium, Belarus, Greece, Spain, Lithuania, Germany, Norway, Portuguese, United Kingdom, Russia, and Sweden. The members of the academic board represent 20 different countries and the reviewers for the quarterly based 13 countries, even as far as Australia. Among the journal's linguistic reviewers are a native speaker with a medical background and a statistical editor with an education in this specific field.

We have completed the process of the full digitalisation of the journal – including the archival issues. All the articles published in individual issues are now freely available on the journal's website – medicalsciencepulse.com. – on Creative Commons licences, in line with the currently promoted strategy of an open access to publications containing results of academic research. Papers can be submitted via an unified website of the journal.

It is worth emphasising that Medical Science Pulse is the only academic journal specializing in medical sciences, health science and physical culture sciences in the academic region of Opole and in the Opolskie Voivodeship.

Thank you for all your interest and support, your cooperation and kind evaluations! We would like to thank all of our Reviewers, Members of the Academic Board, Editors and Members of the Editorial Committee for their unrelenting work and help in the year 2017!

We kindly ask you to submit the results of research projects: https://medicalsciencepulse.com/resources/html/cms/DEPOSITSMANUSCRIPT.

In the academic section of volume 4 we present the following original findings: Enrollment motives among candidates for nursing studies at the Medical University of Warsaw, Pressor amines in coronary artery bypass grafting procedure with and without the use of extracorporeal circulation, Analysis of periodic health examinations in the adult Polish community, Quantitative assesment of menus from nursing home, The standard of care of student nurses in hospital practice – a patient evaluation. We recommend reading interesting case reports on application of various physiotherapeutic methods in a conservative treatment of neurogenic scoliosis in a comatose patient and care plan of a child

with myelomeningocele and coexisting hydrocephalus. We encourage also to persue a review on mycotoxins in food products – health effects and methods of monitoring in Poland.

Traditionally, towards the end of the year, we invite our readers to another (fifth) edition of the Medical Science Pulse International Conference "Interdisciplinary Science & Research". The theme of the 5th International Medical Science Pulse Conference focuses on interdisciplinary science and research. The main theme focuses on biomedical science, understood as a form of scientific cooperation of academics using discipline-specific research methods to acquire new knowledge and build new interdisciplinary or multidisciplinary fields of research. Interdisciplinarity is becoming an important part of the research paradigm in all fields. This is visible in the multidirectional direction of research objectives and applied methodologies, connecting the hard sciences and humanities as well as technical and social sciences. Interdisciplinarity is of particular importance in the case of health sciences.

The main aim of the conference is to promote the scientific development of young researchers and students as well as to create a forum for scientific discussion and presentation of the research and achievements of young scientists to the national and international community.

The conference program includes: plenary sessions with lectures by invited speakers, academic debates on the presented speeches, presenting research projects within the framework of the Master Class module (poster session) as well as specialist seminars for young scientists and students

We are inviting you to Opole Medical School – 22–23.05.2018!

It is with great pleasure that we inform you of our university's outstanding achievement. Pursuant to the resolution of the Ministry of Science and Higher Education, issued on the 12th December 2016 on awarding academic categories to academic institutions, the Faculty of Physiotherapy, for the first time in the history of the university, has been formally evaluated by a panel of experts and awarded the prestigious A rating, the only such honour awarded to a physiotherapy faculty in Poland. We congratulate the Departmental heads and all members of staff at the faculty for this achievement and their academic excellence. We hope that the increased research and academic potential of the university will also further improve the quality of Medical Science Pulse.

On the occasion of the upcoming Christmas and New Year 2018 we wish you a lot of joy, relaxed atmosphere, satisfaction with personal and professional life, a constant sense of fulfilment and a lot of free time for your nearest and dearest!

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ENROLLMENT MOTIVES AMONG CANDIDATES FOR NURSING STUDIES AT THE MEDICAL UNIVERSITY OF WARSAW

MOTYWY PODEJMOWANIA KSZTAŁCENIA NA KIERUNKU PIELĘGNIARSTWO WŚRÓD KANDYDATÓW NA STUDIA W WARSZAWSKIM UNIWERSYTECIE MEDYCZNYM

Renata Kube-Brzozowska[1 A–G]
Ewa Kobos[2 A,C–F]

[1] Graduate of nursing, Medical University of Warsaw
[2] Social Nursing Institute, Faculty of Health Sciences, Medical University of Warsaw

A – przygotowanie projektu badania | study design, **B –** zbieranie danych | data collection, **C –** analiza statystyczna | statistical analysis, **D –** interpretacja danych | interpretation of data, **E –** przygotowanie maszynopisu | manuscript preparation, **F –** opracowanie piśmiennictwa | literature review, **G –** pozyskanie funduszy | sourcing of funding

SUMMARY

Background: Candidates for nursing studies should be aware of the specific nature, social expectations and vocation associated with their future occupation.

Aim of the study: To examine the enrollment motives among candidates for nursing studies at the Medical University of Warsaw.

Material and methods: This study was conducted in a group of 200 candidates for nursing studies as part of the recruitment process. The study data were collected using a proprietary questionnaire with motives for selecting nursing studies classified as autotelic, instrumental, or incidental. The results were statistically analyzed using PQStat software ver. 1.4.2.324.

Results: The most common autotelic motive reported by the candidates was the desire to help others (98%). Analysis of instrumental motives revealed that 89.5% of respondents identified guaranteed employment as a motivating factor whilst 70% stated the course was a means to achieve stable employment. The ease of enrollment was a motive for selecting nursing studies by 24.5% of respondents. The older the age of the candidates, the greater the contribution incidental motives for selecting nursing studies. Higher instrumental motives scores were more frequent among urban residents. Autotelic motives were stated more frequently by candidates choosing nursing as their first field of studies.

Conclusions: 1. Autotelic motives were predominant in the choices made by candidates for nursing studies. 2. The age of the candidates, urban vs. rural residential status and the choice of nursing as the first field of studies were factors that significantly differentiated the motives for selecting nursing studies. 3. As part of the curriculum, the university should ensure that newly enrolled students have adequate opportunities to expand their interests in the chosen profession and to satisfy their aspirations.

KEYWORDS: study motives, nursing, education

STRESZCZENIE

Wstęp: Kandydaci na studia medyczne powinni mieć świadomość specyfiki przyszłego zawodu, dużych oczekiwań społecznych i swoistej misji związanej z wykonywaniem zawodu.

Cel pracy: Poznanie motywów podjęcia kształcenia na kierunku pielęgniarstwo przez kandydatów na studia.

Materiał i metody: Badania przeprowadzono wśród 200 kandydatów na studia w toku rekrutacji. W celu zebrania materiału badawczego posłużono się autorskim kwestionariuszem ankiety, w którym motywy zostały sklasyfikowane jako: autoteliczne, instrumentalne oraz przypadkowe. Wyniki poddano analizie statystycznej z użyciem pakietu statystycznego PQStat ver. 1.4.2.324.

Wyniki: Wśród motywów autotelicznych najczęściej kandydaci wskazywali chęć niesienia pomocy innym – 98%. W grupie motywów instrumentalnych 89,5% badanych wskazało gwarancję zatrudnienia, 70% – możliwość zdobycia pracy dającej stabilizację życiową. Łatwość dostania się na kierunek pielęgniarstwo jako motyw wyboru kierunku wskazało 24,5% respondentów. Im starsi byli kandydaci, tym wyższy poziom motywacji przypadkowej występował w wyborze kierunku studiów. Ankietowani pochodzący z miast częściej wskazywali wyższe wartości w kategorii motywacji instrumentalnej. Motywy autoteliczne były częściej wskazywane przez kandydatów wybierających pielęgniarstwo jako pierwszy kierunek.

Wnioski: 1. W wyborze kierunku pielęgniarstwo u kandydatów na te studia przeważały motywy autoteliczne. 2. Wiek kandydatów, miejsce zamieszkania oraz wybór pielęgniarstwa jako pierwszego kierunku różnicują istotnie motywy podejmowania studiów. 3. W toku kształcenia uczelnia powinna zapewnić rozpoczynającym studia studentom możliwości rozwoju zainteresowań związanych z zawodem oraz zaspakajania ich aspiracji.

SŁOWA KLUCZOWE: motywy kształcenia, pielęgniarstwo, edukacja

Background

Motives are the driving forces behind human activities aimed at the pursuit of goal-directed behavior. The intensity, strength, and extent of motives may vary and thus reflect the effort an individual expends pursuing their goals and aspirations [1]. According to one classification system, motivations can be divided into autotelic (internal), instrumental (external), and incidental [2]. In autotelic motivation, the motives behind an activity are related to the activity *per se* being taken up voluntarily and not in order to achieve any potential benefits. Autotelic motivation reflects values as an end in themselves, such as the desire to help others [3]. Studying, when driven by internal motivation, leads to the feeling of satisfaction; an individual finds pleasure in learning new knowledge or skills, which in turn leads to the achievement of good results in the educational process [4]. Instrumental motivation are values used as a means to achieve goals and values other than the nature and the social role of the nursing profession; these may include, for example, guaranteed employment [3]. Concerning educational process, external motivation may be referred to when the achievements of the student are not subject to external control [4]. Incidental motivation is secondary to the unawareness of the actual motive for certain activity, e.g. ignorance with regard to course options or peer pressure during course selection. These types of motives behind the choice of the studies are the least desirable from the points of view of both the university and the student [5].

The underlying motives of human behavior and pursuits may vary and include, for example, decisions based on long considerations, momentary fascinations, or coincidence. Each of these motives may have certain consequences for the future of the individual. In addition, the motives behind the choice of future occupation may vary among young adults [6]. The choice of occupation is often the first, the most important and most difficult decision made by a young person, as it is associated with the choice of an individual's path of life. Candidates for nursing studies should be aware of the specific nature, social expectations and vocation associated with their future occupation [3]. Even though being a nurse is a high-risk occupation that involves high levels of stress and requires much sacrifice, an increase in the interest in nursing studies has been observed at the Medical University of Warsaw (MUW) in recent years [7]. This is particularly important for the future of the nursing profession. The decision to join the nursing profession is associated with the requirement of conscious development of the student's system of values and by adapting behavioral patterns that are desirable for the future occupation [1]. Nursing is directly related to human wellbeing. The experiences associated with being exposed to disease, pain, and death require key psychophysical and social predispositions for this occupation as well as strong motivation to carry out the role of nursing. Clinical decision making and occupational professionalism can contribute to improved patient care, leading to the satisfaction derived from this occupation [8]. Selecting nursing due to a "lack of other possibilities" leads to higher levels of future emotional and professional burnout; the risk of such burnout is significant in the nursing profession [6].

To learn the motives behind human activities is to learn the goals being pursued [9]. Identifying the motives underlying the decision to enroll in nursing studies and consideration of these motives within the recruitment process may have a positive impact on nursing workforce retention in Poland. Understanding the motives of prospective nursing studies students can assist in identifying the determinants of educational achievement associated with increased satisfaction and participation in professional knowledge and skills development, allowing nurses to achieve more robust professional skills. The decision to enroll in nursing studies may be influenced by peers, teachers and parents. Teachers and parents in particular might benefit from a deeper understanding of the motives of students wishing to adopt nursing studies, as a means of identifying candidates' areas of interest and providing support during the decision-making process [10].

Aim of the study

To examine and analyze the enrollment motives among candidates for nursing studies at the MUW.

Material and methods

The study was conducted as part of the recruitment process in a group of 200 candidates for first-level undergraduate nursing studies at the MUW. The study data were collected from candidates filing their applications in person at the MUW recruitment center. A total of 714 candidates took part in the recruitment process of which 230 were selected for document submission.

The study data were collected using a proprietary questionnaire, including the responders' demographic information, and a survey with scale-scored questions focused on: the role of other people in the decision-making process; self-assessment of personal predisposition for the nursing profession; and, the motives behind the choice of nursing studies. Autotelic, instrumental and incidental motives were identified and analyzed for study purposes.

The statistical analysis of the results was carried out using PQStat software ver. 1.4.2.324. Analyses of correlations and inter-group comparisons were made using Spearman's correlation coefficient , Mann-Whitney U-test, Kruskal-Wallis test and Student's t-test.

Results

Study group characteristics

The study population consisted of 96.2% women and 3.8% men in the age range of 18–28 years. The most populous group of candidates was aged 18–19 years (85.5%). Ninety-one percent of candidates had a general high-school level educational background. Urban residents accounted for 68.5% of the study group with rural residents comprising the remaining 31.5%. Mean grades in the range of 4.0–4.4 were declared by 35.5% of responders. Fifty percent of candidates declared nursing to be their first choice of studies. Thirty-two percent of responders applied for nursing only, while the other 68% declared applying for other health studies as well.

Motives behind taking up nursing studies

For 70.0% of candidates, the choice regarding the field of studies was entirely personal (rated 'surely yes' on the survey). The decision to take up studies to satisfy parental aspirations ('surely yes' or 'rather yes') was made by 4.5% of candidates. Peer opinions were taken into account by 6.5% of responders, while teachers' opinions were taken into account by 1.5% of responders. Ranking the factors according to the average values showed that the choice of nursing studies was mainly the candidates' decision (1.33) and was a decision made in the pursuit of their dreams (2.02) (Tab. 1).

The most important factor behind the choice of studies for 99% of candidates was pursuit of their personal interests. The character traits and predispositions to the occupation were influential for 97.5% and 97.5% of candidates, respectively. When ranked from the lowest to the highest mean values, the student-related factors show that the choice of nursing studies was dictated mainly by the candidates' personal interests (1.58) and personality traits (1.66) (Tab. 2).

The largest percentage of responders (98%) stated that a willingness to help others was a key motive for enrolling in nursing studies. The ability to satisfy personal aspirations was important for 69% of responders. Twenty-six percent of responders noted that the potential for development in the role was a clear reason for enrolling in nursing studies. The ranking of the auto-

Table 1. Individuals and factors supporting the decision to take up nursing studies

Individuals and factors	1	2	3	4	Mean	SD
	Surely yes	Rather yes	Rather not	Surely not		
	%	%	%	%		
Peers' opinions	0.5	6.0	43.5	50.0	3.43	0.63
Defiance of others' opinions	0.5	3.5	27.5	68.5	3.64	0.58
Pursuit of dreams	24.0	52.0	22.0	2.0	2.02	0.74
Personal decision	70.0	28.0	1.0	1.0	1.33	0.55
Friend's persuasion	0.5	1.5	38.5	59.5	3.57	0.55
Impact of teachers	0.0	1.5	26.0	72.5	3.71	0.49
Parental aspirations	2.0	2.5	41.5	54.0	3.48	0.65

Table 2. Student-related factors of importance in the choice of the nursing studies

Factor	1	2	3	4	Mean	SD
	Surely yes	Rather yes	Rather not	Surely not		
	%	%	%	%		
Personal interests	43.0	56.0	1.0	0.0	1.58	0.51
Character traits	37.0	60.5	2.5	0.0	1.66	0.53
Previous skills	12.0	21.5	56.0	10.5	2.65	0.83
Educational achievements	10.0	36.0	47.0	7.0	2.51	0.77
System of values	24.5	71.5	4.0	0.0	1.80	0.49
Predispositions to the job	31.0	66.5	1.5	1.0	1.73	0.54

telic motives shows that the choice of nursing studies was dictated mainly by the candidates' willingness to help others (1.66) as well as to expand personal interests and passions (1.66) (Tab. 3).

Regarding motives within the instrumental class, 89.5% of responders reported guaranteed employment as a motive behind choosing the field of studies. For 70% of responders, entering an occupation that ensured stability and security was equally important. The willingness to continue family traditions was declared by 15.5% of responders. When ranked from the lowest to the highest mean values, the instrumental motives show that the choice of nursing studies was dictated mainly by the possibilities of finding employment (1.90), acquiring a career that ensured stability (2.10) and continuing a professional career abroad (2.16) (Tab. 4).

In the incidental motivation category, obtaining a university diploma was an important motivation for 85.5% of candidates, while the ease of enrollment was declared a key motivation by 24.5% of responders. When ranked from the lowest to the highest mean values, obtaining a university diploma was the motive declared by the largest number of responders (1.93). 'Continued eligibility for financial benefits' (3.58) and the 'last chance of taking any type of studies' were of little importance (3.39) (Tab. 5).

Out of all three motivation categories considered in this study, the lowest mean score of 1.84 was obtained for autotelic motives while the lowest mean score for instrumental motives was 2.67. The highest mean score (3.14) was obtained for incidental motivations (Tab. 6).

Table 3. Motives behind the choice of studies – autotelic motivation

Autotelic motives	1	2	3	4	Mean	SD
	Surely yes	Rather yes	Rather not	Surely not		
	%	%	%	%		
Expanding one's interests and passions	25.0	69.5	5.0	0.5	1.81	0.53
Willingness to help others	36.5	61.5	2.0	0.0	1.66	0.52
Satisfying personal aspirations	18.5	69.0	11.5	1.0	1.95	0.58
Job offering a large potential for development	26.0	56.5	16.5	1.0	1.93	0.68

Table 4. Motives behind the choice of studies – instrumental motivation

Instrumental motives	1	2	3	4	Mean	SD
	Surely yes	Rather yes	Rather not	Surely not		
	%	%	%	%		
Family tradition	1.5	12.0	31.5	55.0	3.40	0.76
Ambition to get a job of high social prestige	10.0	53.0	33.5	3.5	2.31	0.70
Guarantee of employment	22.0	67.5	9.5	1.0	1.90	0.59
Willingness to continue family traditions	3.0	12.5	38.0	46.5	3.28	0.80
Ability to continue professional career abroad	28.0	32.0	36.5	3.5	2.16	0.87
Getting a well-paid job	12.0	40.5	44.5	3.0	2.39	0.73
Possibility of getting a job ensuring stability and security	21.0	49.0	29.0	1.0	2.10	0.73
Inability of finding a job in current occupation	1.0	2.5	4.5	92.0	3.88	0.47

Table 5. Motives behind the choice of studies – incidental motivation

Incidental motives	1	2	3	4	Mean	SD
	Surely yes	Rather yes	Rather not	Surely not		
	%	%	%	%		
Last chance of taking any type of studies	3.0	8.5	35.0	53.5	3.39	0.77
Random choice	0.0	1.5	39.0	59.5	3.58	0.52
Ease of enrollment	2.5	22.0	45.5	30.0	3.03	0.79
Failure to qualify for other studies	5.0	6.5	40.0	48.5	3.32	0.81
Getting a university diploma	25.5	60.0	10.5	4.0	1.93	0.72
Continued eligibility for pension, alimony, other benefits	2.5	5.5	24.0	68.0	3.58	0.71

Table 6. Mean scores in individual motivation categories

Motivation category	Mean	SD	Minimum	Lower quartile	Median	Upper quartile	Maximum
Autotelic	1.84	0.38	1.0	1.5	2.0	2.0	2.75
Instrumental	2.67	0.34	1.5	2.5	2.8	2.9	3.50
Incidental	3.14	0.39	1.5	3.0	3.2	3.3	4.00

Sociodemographic factors of importance in taking up nursing studies

Candidates of higher age scored higher in relation to incidental motivation ($p < 0.01$). Regarding autotelic or instrumental motivation, the results were not significantly correlated with the age of the responders. Higher scores in the instrumental motives category were more frequent among urban residents ($p < 0.05$). No significant correlations were observed in autotelic or instrumental motivations ($p > 0.05$). Higher scores in autotelic and instrumental motivations were obtained in the group of candidates for whom nursing was not the first choice of studies ($p = 0.026$ and $p = 0.049$, respectively). For incidental motivation, a statistically significantly ($p < 0.001$) higher score was obtained in the group of candidates for whom nursing was the first choice of studies. No significant difference in autotelic motivation ($p = 0.244$) was observed between candidates who applied for nursing studies only and candidates who applied for other studies as well. A significant ($p = 0.010$) difference was observed for instrumental motives, with higher scores in the group of candidates who applied for other studies, in addition to nursing studies. With regard to incidental motivation, a statistically significantly ($p < 0.001$) higher score was obtained in the group of candidates for whom nursing was the only choice of studies.

Discussion

The present analysis confirms a key finding in the literature: that most young adults make decisions regarding the field of studies or future occupation independently [1,8,11]. We were unable to confirm the results by Kropiwnicka et al. [11] or [8] who suggested a significant role of parents in the decision-making process. Satisfying parental aspirations was declared

Table 7. Sociodemographic variables versus motivation categories

Variable	Score	Motivation						Motivation		
		Autotelic		Instrumental		Incidental		A	Ins	Inc
Gender	Female	1.81	±0.44	2.65	±0.37	3.15	±0.44	0.995	0.779	0.133
	Male	1.80	±0.60	2.70	±0.19	3.33	±0.67			
Age	18–19	1.85	±0.36	2.68	±0.33	3.11	±0.37	-0.084	-0.059	0.201*
	20–21	1.62	±0.44	2.54	±0.27	3.20	±0.41			
	22–23	1.92	±0.55	2.76	±0.41	3.30	±0.53			
	24–25	1.67	±0.52	2.92	±0.47	3.78	±0.25			
	>25	1.87	±0.53	2.69	±0.44	3.50	±0.00			
Educational background	General high school	1.83	±0.37	2.67	±0.33	3.12	±0.38	0.201	0.932	0.226
	Post-secondary medical	1.75	±0.50	2.73	±0.45	3.33	±0.29			
	Vocational high school	–	–	–	–	–	–			
	Higher	2.02	±0.53	2.72	±0.34	3.25	±0.58			
Mean grade	6.0–5.5	–	–	–	–	–	–	0.073	0.078	0.075
	5.4–5.0	1.87	±0.30	2.61	±0.32	2.85	±0.46			
	4.9–4.5	1.79	±0.40	2.64	±0.35	3.13	±0.35			
	4.4–4.0	1.84	±0.37	2.71	±0.27	3.17	±0.39			
	3.9–3.5	1.87	±0.39	2.66	±0.36	3.15	±0.36			
	3.4–3.0	1.90	±0.38	2.78	±0.38	3.13	±0.50			
	2.9–2.5	1.00	±0.00	1.62	±0.00	3.50	±0.00			
Area of residence	Rural (not a municipality seat)	1.87	±0.34	2.64	±0.35	3.14	±0.34	0.051	0.175*	0.040
	Rural (a municipality seat)	1.68	±0.40	2.56	±0.36	3.08	±0.50			
	Urban (≤50,000 of inhabitants)	1.83	±0.47	2.62	±0.34	3.13	±0.43			
	Urban (>50,000 and ≤100,000 of inhabitants)	1.91	±0.31	2.69	±0.28	3.16	±0.31			
	Urban (>100,000 of inhabitants)	1.84	±0.37	2.75	±0.33	3.16	±0.39			
Was nursing your first choice of studies?	Yes	1.77	±0.39	2.63	±0.35	3.26	±0.29	0.025	0.048	0.001
	No	1.89	±0.36	2.72	±0.31	3.02	±0.43			
What other studies have you also applied for at the same time?	Only this one	1.79	±0.42	2.59	±0.37	3.27	±0.32	0.243	0.010	0.001
	More	1.86	±0.36	2.72	±0.31	3.08	±0.40			

* statistically significant correlation ($p < 0.05$).

as one of the motives behind the choice of studies by only 4.5% of candidates in the present study. Previous studies have shown that nearly half of nursing students declare social bonds to individuals in medical careers [11]. Some pressures and expectations of the families with medical traditions may be apparent in contemporary nursing studies students, as 6–15% of responders noted that family values were a consideration during their decision-making process [1,3].

Candidate-related factors were also of high importance in our study group. For nearly all candidates, their personal interests, personality traits and predispositions for the role guided the choice of studies. The percentage was significantly higher than that obtained by Waszkiewicz et al. [3]. It is worthwhile to provide opportunities for individuals who choose their studies according to their personal interests so that they may expand their interests in the profession,, potentially enhancing their professional role. It appears to be a legitimate claim that in disciplines that require more learning, skills and more time for personal learning, such as the medical sciences, motives such as personal interests and educational achievements to date may translate to future professional outcomes. One third of candidates declared that the previously obtained skills were important when making their decision. This may be associated with increased social involvement of young people, including in the charity or voluntary sector. Indeed, according to the literature, one-in-three Polish volunteers are less than 25 years old [12]. The present study, as well as the findings of Kropiwnicka et al., showed that the chosen the choice of nursing studies matched the aspirations of 80% of responders [11]. The ability to expand personal passion, pursue interests, and engage in a role offering a possibility for development were taken into account by many responders. It seems that such motivations would allow the candidates to further develop their passions, continue their education at higher levels, and ensure professional growth.

According to the expectations of today's recipients of health services, nurses are required to be fully professional as well as knowledgeable and capable of care that considers psychological aspects, as well as demonstrating diligence, patience, and understanding. These traits may largely impact the nurse's performance of his or her professional duties. In the study conducted by Cipora et al., being sensitive to the needs of individuals who require support was declared as the motive for enrolling in nursing studies by 27.7% of responders [1]. The results of the present study confirm the reports of other authors regarding the choice of studies being motivated by the willingness to help others [1,3,6,13].

Another group of motives analyzed in the present study consisted of instrumental motives aimed at the achievement of benefits and values other than those associated with the social role of the nursing profession. The high unemployment rates and the uncertainty of the employment market in the contemporary nursing field may explain why the main instrumental motive declared by responders was the guarantee of employment as well as the possibility of a career associated with stability and security. Many health centers in Poland face understaffing of nurses, while those already employed are overloaded with work. The finding that the choice of nursing studies was being guided by the possibility of acquiring an occupation and the security from unemployment was also highlighted by Kropiwnicka et al. [11].

A high level of awareness of the quality of the vocational aspects of the nursing role may be supported by the observation that half of the candidates declared the possibility of continuing their professional career abroad as one of the motives for engaging in nursing studies. However, as there is a shortage of nurses in Poland, it is very disturbing that the candidates look for improvement and development of their individual careers abroad. In the studies conducted by Kropiwnicka et al. [11], the percentage of nursing studies students expressing the desire to pursue their career aims abroad was lower than in the present study (37.5%).

Many responders declared the ambition to get an occupation of high social prestige as one of the motives guiding the choice of the studies. In a study conducted by Chmielewska and Krupienicz, this motive was declared by 36.9% of responders [14] as compared to 15.6% of responders in the study by Kropiwnicka et al.; the percentage rates were much lower among the nursing students as compared to the medical students. The societal demand for this professional group as well as a possibility of getting a financially rewarding occupation were other factors taken into account by the candidates (52.5%) [14]. According to the data of the Central Statistical Office of Poland, the mean gross salary of a nurse in Poland is PLN 3,300, corresponding to ca. PLN 18 per hour [15]. Therefore, a question arises whether the candidates for nursing studies are actually aware of the real incomes of Polish nurses.

Incidental motivation behind the choice of the studies is the least desirable for of motivation from the points of view of both the student and the university. These motivations may lead to one being dissatisfied with their studies or less involved in the pursuit of knowledge, which in turn may result in achieving lower skills. A low percentage of candidates in the present study emphasized the importance of these motivations. In previous studies, the respective percentage rates were higher (8–14%) [1,8]. As demonstrated by the analysis of responses to the question regarding personal identification with the profession, incidental choice of profession had a negative impact on identification levels [1]. Indeed, Dziubak and colleagues found that nearly 95% of nurses who had chosen their profession in an incidental manner were convinced of the appropriateness of their choice during practical training at health care centers [8].

For 85% of responders, obtaining a university diploma was one of the motives behind the decision to take up nursing studies. Starting from the beginning

of the 1990s, a growing trend in the number of college students has been observed in Poland [10]. Studies conducted in young responders by Zielińska demonstrated that education becomes an instrumental value in the young generation, facilitating the achievement of not only professional, but also of personal success [16]. In our study, the ease of enrollment was also included in the incidental motives; this factor was taken into account by a quarter of candidates. Personality traits have a huge impact on performance of professional duties as a nurse. Therefore, occupational preparation is important during the recruitment process, while it is essential to ensure that students' expectations regarding their future work are reasonable and realistic [13]. In 2016, the admission limit for nursing studies was 243 places to which a total of 654 candidates applied (an average of 2.7 per place). These data may suggest a large interest in nursing studies [7].

A total of 11.5% of the study group declared failure to qualify for other studies as a motive for taking up nursing. In the study conducted by Cipora et al. [1], the respective percentage was only 3.1%. However, it should be noted that all study fields applied for by the candidates fell within the category of health studies. This may suggest that young people guide their choice of studies based on a predisposition for health-related subjects. In the study conducted by Kropiwnicka et al., nursing students (65% of responders) declared that prior to being admitted to nursing studies, they had applied for admission to studies in other fields, with around half applying for medical studies. This confirms that nursing is not always the candidates' preferred field of studies, but demonstrates a general predisposition towards healthcare among prospective nursing students [11].

After analyzing the motives one may conclude that the decision of taking up studies in a certain field is guided by several factors of varied relative weight. To sum up the obtained results, it seems optimistic that the studies in nursing are chosen in line with personal interests, personality traits and the willingness to help others, despite the low levels of salaries in the profession. The Polish Nurses' Association has undertaken actions to promote the nursing profession, including the participation of nurses in radio and television shows, the "Nurse of the Year" contest, a movie contest for nursing students, and advice being provided through websites and journals available to the general public.

Conclusions

1. Autotelic motives were predominant in choices made by the candidates for nursing studies.
2. The age of the candidates, urban vs. rural residential status and the choice of nursing as the first field of studies were factors that significantly differentiated the motives for taking up the studies.
3. As part of the curriculum, the university should ensure that the newly enrolled students have adequate opportunities to expand their interests in the chosen profession and to satisfy their aspirations.

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Correspondence address:
Ewa Kobos
Zakład Pielęgniarstwa Społecznego,
ul. Erazma Ciołka 27, 01-445 Warszawa
E-mail: kobewa@interia.pl

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EVALUATION OF THE INFLUENCE OF SELECTED FASCIAL TECHNIQUES, BASED ON THE STECCO FASCIAL MANIPULATION, ON PAIN SENSATIONS AND REACTIVITY OF SOFT TISSUES

OCENA WPŁYWU WYBRANYCH TECHNIK POWIĘZIOWYCH, W OPARCIU O METODĘ MANIPULACJI POWIĘZI WG STECCO, NA POZIOM DOLEGLIWOŚCI BÓLOWYCH ORAZ REAKTYWNOŚĆ TKANEK MIĘKKICH

Mateusz Pawlukiewicz[1 A,B,D,E]
Kamila Kluczniok[2 A,B,D,E]
Michał Kuszewski[1 A,C,D]
Michał Biernat[2 B,F]
Ewelina Białas[2 B,F]

[1] Department of Physiotherapy, The Jerzy Kukuczka Academy of Physical Education, Katowice, Poland

[2] Student of the Jerzy Kukuczka Academy of Physical Education, Katowice, Poland

A – przygotowanie projektu badania | study design, **B –** zbieranie danych | data collection, **C –** analiza statystyczna | statistical analysis, **D –** interpretacja danych | interpretation of data, **E –** przygotowanie maszynopisu | manuscript preparation, **F –** opracowanie piśmiennictwa | literature review, **G –** pozyskanie funduszy | sourcing of funding

SUMMARY

Background: Recent reports show that changes in fascia may be a source of many disturbances in human functioning. The concept of fascial manipulation (FM) postulates that removing the changes in ground substance of fascia reestablishes a proper tensional balance, reducing pain. Assessment of reactivity of soft tissues acts as an objective indicator, allowing for the confirmation of changes to pain levels.

Aim of the study: The purpose of this study was to evaluate the influence of therapy using the FM method on pain sensations and change in reactivity of soft tissues.

Material and methods: The research was carried out on 15 people (12 women and 3 men; aged between 18–30 years) who were randomly divided into three equal groups. Patients from the first group were treated using the standard protocol of Stecco's method, while in the second group the modified protocol was used. The last group was the control group. All patients undergo the diagnostic process specific for FM method and had their pain level (using the visual analog scale [VAS]) and reactivity of soft tissues (with the MyotonPro device) measured. Measurements of reactivity of soft tissues were taken from 10 points in pelvis (specific for Stecco's method). All measurements were taken three times; before and after the first treatment and after the third treatment. Outcomes were gathered and inputted to the STATISTICA 12 database and analyzed using ANOVA with repeated measures and Post-Hoc Tukey's test.

Results: Statistical analysis showed statistically significant change in some parameters related to the reactivity of soft tissues in the first group. Statistically significant changes ($p < 0.05$) of VAS were observed in every group but the first group had the biggest and the most dynamic decrease in pain levels.

Conclusions: Therapy using FM method causes significant changes in some reactivity of soft tissue parameters and in pain sensations. The biggest changes were observed in the first group, who were treated with Stecco's method.

KEYWORDS: Fascial Manipulation, Stecco, MyotonPro, pain

STRESZCZENIE

Wstęp: Doniesienia ostatnich lat pokazują, że zmiany w powięzi mogą być powodem wielu zaburzeń funkcji organizmu ludzkiego. Koncepcja Manipulacji Powięziowej zakłada, że usunięcie zmian w substancji podstawowej powięzi pozwala przywrócić odpowiedni balans napięciowy, redukując jednocześnie poziom bólu. Ocena reaktywności tkanek miękkich posłużyła za obiektywny wskaźnik, umożliwiający weryfikację zmian zachodzących w badaniu poziomu bólu.

Cel pracy: Celem pracy było zbadanie wpływu terapii metodą FM na poziom dolegliwości bólowych oraz reaktywność tkanek miękkich.

Materiał i metody: Badaniu poddano 15 osób w wieku 18–30 lat (12 kobiet i 3 mężczyzn), które losowo przydzielono do trzech równolicznych grup. Badanych z grupy pierwszej poddano terapii wg standardowego protokołu leczenia metodą Stecco, natomiast z grupy drugiej – zmodyfikowanego protokołu. Grupa trzecia była grupą kontrolną. Wszyscy badani byli diagnozowani zgodnie ze standardami metody FM, zmierzono ich poziomu bólu (VAS) oraz reaktywność tkanek (przy użyciu urządzenia MyotonPro). Pomiar reaktywności dokonywany był w 10 punktach w obrębie miednicy (specyficznych dla metody Stecco). Wszystkie pomiary przeprowadzano trzykrotnie; przed pierwszą terapią i po niej oraz po trzeciej terapii. Zebrane wyniki zostały zestawione w bazie danych programu STATISTICA 12 i poddane analizie wariancji z powtarzanymi pomiarami, a także wykonano test Post-Hoc Tuckey'a.

Wyniki: Analiza statystyczna wykazała istotne zmiany niektórych parametrów reaktywności tkanek w grupie pierwszej. Istotne statystycznie zmiany ($p < 0.05$) w skali VAS zaobserwowano w każdej z analizowanych grup, jednak grupa pierwsza odznaczała się największym i najbardziej dynamicznym spadkiem poziomu dolegliwości bólowych.

Wnioski: Terapia metodą FM powoduje istotne zmiany w parametrach związanych z reaktywnością tkanek oraz w dolegliwościach bólowych pacjenta. Największe zmiany zaobserwowano w grupie pierwszej.

SŁOWA KLUCZOWE: Manipulacja Powięzi, Stecco, MyotonPro, ból

Background

The infinite network, which has been a customary name for the fascia, is a structure formed by dense connective tissue, comprising specific cell types and the extracellular matrix [1]. Numerous studies have demonstrated that not only does the fascia permeate every part of the human body [2], it also provides receptor feedback [3,4] and transfers the musculo-fascial loads [5]. It is currently a common consensus that lesions of the fascia may be susceptible to pain and discomfort, reduced mobility, and other musculoskeletal disorders [6]. Many therapeutic methods have been developed in recent years to restore proper physiological fitness of the human fascia; however, there still is no conclusive, scientific evidence of their efficacy.

The Stecco fascial manipulation (FM) method has a high clinical efficacy and robust theoretical principles [7]. The theoretical principle of the Stecco FM process states that repeated motion patterns or traumas may contribute to the so-called densifications [8] (i.e. accumulation of hyaluronic acid, metabolites, etc.) which affect muscular fitness and become root causes of multiple systemic disorders. Densification may reduce the slip between individual fascia layers, and increase fascial stiffness. Lesions within the fascial tissue, which is a dense array of receptors [3,4] result in disorders of neuromuscular coordination, whereas mechanical fascial receptors begin to act as nociceptors. Research into the fascia [3] suggests that it is formed by a plastic tissue that is prone to mechanical, thermal and metabolic stresses; moreover, it is claimed that the fascia can be restored to its proper physiological fitness by exterior intervention [8]. The essence of the Stecco FM is to find the locations affected by densification and subject them to deep chafing, or massage [6], which results in a localized inflammation, and helps the fascial ground substance transform from a gel state to a solid state [9]. The selection of the right densification points is intended to restore the proper fascial tension balance, improve the transfer of musculo-fascial loads, and reduce the pain or discomfort experienced by the patient [8].

Aim of the study

The main objective of this study was to investigate the effect of a Stecco FM therapy on the Visual Analog Scale (VAS) pain level and the reactivity of soft tissues, as measured by a MyotonPro tester. Another aim of this study was to verify the variation of investigated fascial parameters between the standard Stecco FM protocol and a modified FM protocol.

Material and methods

The study was a randomized double-blind clinical trial. The test subjects included 15 people aged 21 to 29 years, with 12 females and 3 males. The test subject inclusion criteria were: age between 18 and 30 years, and motor organ pain discomfort present for a minimum of one week. The test subject exclusion criteria were: concomitance of a chronic or systemic disorder, pregnancy, administration of steroids, anti-inflam-

matory medications or blood coagulability modifying medications, other therapies in progress, and severe neurological disorders. Each test subject provided a written voluntary agreement to participate in the randomized double-blind clinical trial, and understood the therapeutic contraindications. The clinical trial period was preceded by six months of training. The research project was approved by the University Commission of Bioethics (1/2017).

Table 1. Basic anthropometric data of test subjects

Variable	N	Minimum	Maximum	Mean	Standard deviation
Age	15	21	29	22,93	2,01
Weight [kg]	15	48,5	77	60,37	9,63
Height [cm]	15	160	190	169,13	9,23

The test subjects were assigned to three groups. Group 1 underwent the therapy per the standard Stecco FM protocol (specific points on a single plane). Group 2 underwent the modified Stecco FM protocol (non-specific points on various planes). Group 3 constituted the controls which did not undergo any FM-based therapeutic activity. Each test subject was diagnosed according to the Stecco FM protocol and by a certified Stecco FM therapist. Based on this diagnosis, the points termed ‚coordination centres' (CC) were selected for further diagnostics and therapy. Each test subject completed their trial questionnaires three times (before and after the first therapeutic session and after the third therapeutic session) to specify: the locations of pain disorders on their body and their VAS levels; the same sequence was applied to complete the soft tissue reactivity tests with the MyotonPro.

To summarize, the research project specified three sessions with each test subject every 7 to 10 days. The first and third therapeutic session included diagnostics and the therapy, as applicable to each of the groups; the second session was therapeutic only. During the first therapeutic session, group 3 (the controls) had a 45-minute break between each soft tissue reactivity test and completing their trial questionnaires; group 3 was not asked to appear for the second therapeutic session, and during the third therapeutic session, group 3 was only diagnosed with the MyotonPro and asked to complete their trial questionnaire.

The MyotonPro is intended for an impartial, non-invasive and painless measurement of biomechanical and viscoelastic properties of tissues. The MyotonPro applies a mechanical pulse at 0.58 N of force for 15 ms, which propels the tested tissue, and measures the following parameters from the measurement of oscillation damping by the tissue:

- F – natural oscillation frequency, which characterizes the tone [Hz]
- D – logarithmic decrement of natural oscillation, which characterizes the flexibility, a measure inversely proportional to the decrement of oscillation
- S – dynamic stiffness [N/m]
- C – creep, which is the relaxation to deformation time
- R – mechanical stress relaxation time [ms]

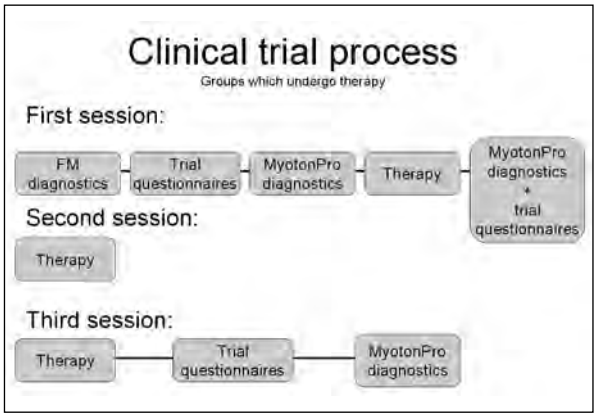

Figure 1. Clinical trial process flow for groups 1 and 2 (therapeutic)

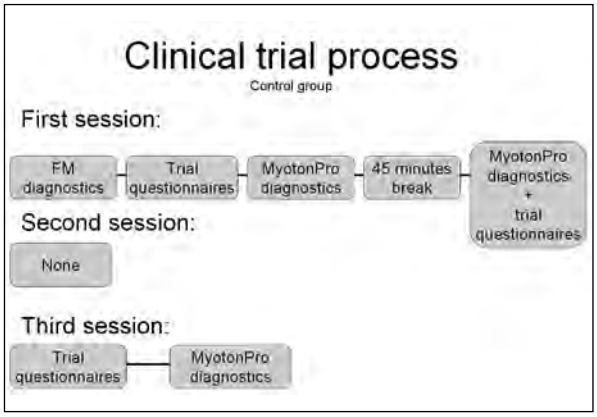

Figure 2. Clinical trial process flow for group 3 (controls)

The MyotonPro tests were done on 20 CCs specific to the Stecco FM: 10 CCs within the pelvis, 6 CCs within the scapulae, and at 4 CCs where the FM therapy was applied. Prior to the MyotonPro test, each test object was instructed about its form and process. During each MyotonPro test, each test object was prone or sitting (depending on the CC tested) as relaxed as possible. A triple scan mode of the MyotonPro was used to improve the reliability of test results. If the difference between any two tests exceeded 3%, the test was repeated.

The FM therapy was applied to 6 CCs qualified according to the diagnostic results from the first therapeutic session. In group 1, the CCs qualified exhibited the highest densification; however, a balance was retained between antagonistic sequences. In group 2, the CCs were qualified at random. Each CC was therapeutically processed twice, for 3 minutes long per iteration.

All the outcomes were gathered and inputted to the STATISTICA 12 database and analyzed using ANOVA with repeated measures and Post-Hoc Tukey's test. The assumed statistical significance level was $p < 0.05$.

RESULTS

For the sake of clarity, the clinical trial and specific test results obtained are shown on figures. The following figures show the mean VAS levels (Fig. 3) and the soft tissue reactivity (Fig. 4 to 10) measured before and after the first therapeutic session and after the third therapeutic session:

- Group 1 (TW);
- Group 2 (MIX);
- Group 3 (K).

Fig. 3 shows the mean VAS levels experienced by the test subjects before and after the first therapeutic session and after the third therapeutic session. In each group, a statistically significant change of VAS pain levels was found ($p = 0.007$). However, the most pronounced and dynamic reduction in the experienced pain discomfort was found in group 1 (TW), processed with the standard Stecco FM protocol ($p < 0.001$).

Fig. 4 shows the values of the Logarithmic Decrement measured at LA PV on the left-hand side of the body. Statistically significant variations of this parameter were found only in Group 1. Post-Hoc Tukey's test showed $p = 0.014$.

Fig. 5 shows the mean values of the Logarithmic Decrement measured at LA PV on the right-hand side of the body. Statistically significant variations of this parameter were, yet again, found only in Group 1 (Post-Hoc Tukey's test showed $p = 0.05$).

Fig. 6 shows the mean values of the Creep (deformation) measured at LA PV on the left-hand side of the body. Group 1 revealed a statistically significant reduction of this parameter Post-Hoc Tukey's test showed $p = 0.037$).

Fig. 7 shows the mean values of the Relaxation parameter measured at LA PV on the left-hand side of the body. The changes of this parameters showed statistical significance in Group 1 (Post-Hoc Tukey's test showed $p < 0.001$).

Fig. 8 shows the variations of the mean values of the Frequency parameter measured at RE PV on the left-hand side of the body. Group 1 revealed a statistically significant change of this parameter (Post-Hoc Tukey's test showed $p = 0.045$).

Fig. 9 shows the mean values of the Stiffness parameter measured at RE PV on the left-hand side of the body. The value changed with statistical significance in group 1 (Post-Hoc Tukey's test showed $p = 0.05$).

Fig. 10 shows the mean values of the Frequency parameter measured at IR PV on the left-hand side of the body. Only group 1 revealed statistically significant differences (Post-Hoc Tukey's test showed $p = 0.05$).

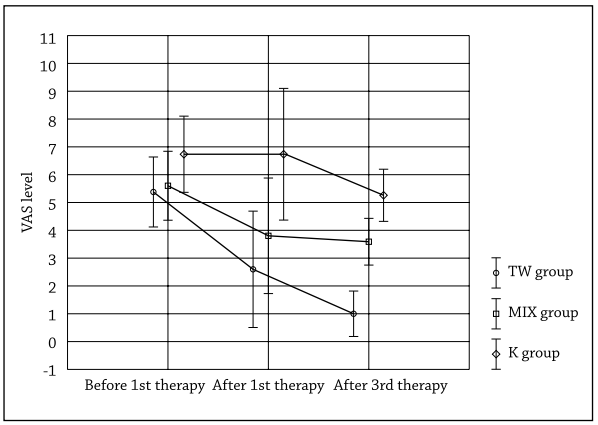

Figure 3. Variation of the VAS levels in the test subjects, $F(4,22) = 18.8509$; $p < 0.001$

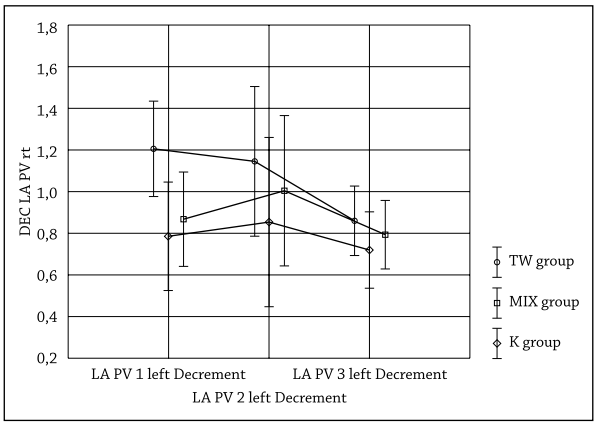

Figure 5. Variation of the Logarithmic Decrement at LA PV, right-hand side of the body, $F(4,22) = 1.1132$; $p < 0.05$

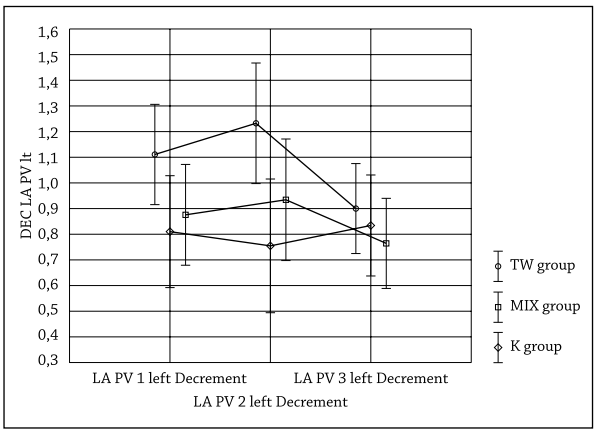

Figure 4. Variation of the Logarithmic Decrement at LA PV, left-hand side of the body, $F(4,22) = 2.8262$; $p < 0.05$

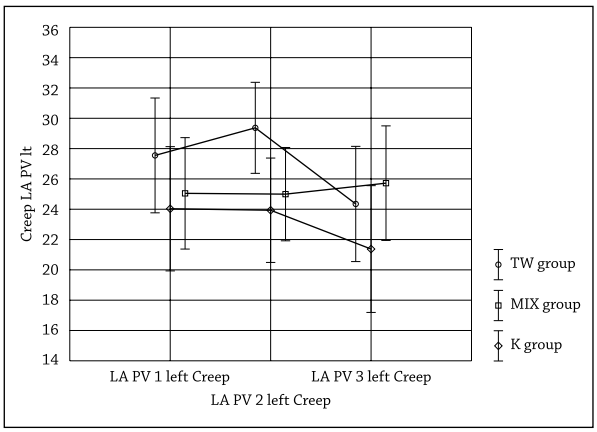

Figure 6. Variation of the Creep at LA PV, left-hand side of the body, $p < 0.05$; $F(4,22) = 2.3141$

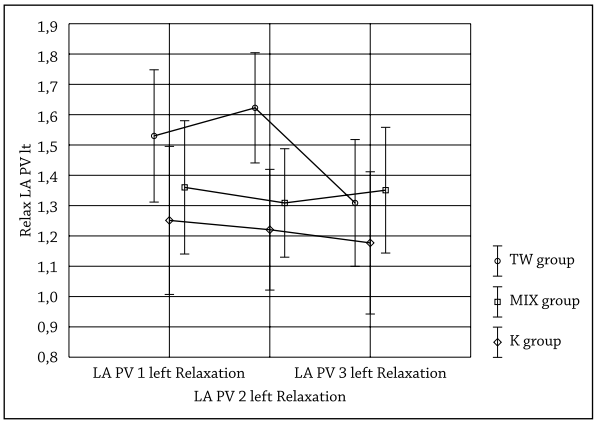

Figure 7. Variation of the Relaxation parameter at LA PV, left-hand side of the body, F(4,22) = 5.2975; p < 0.004

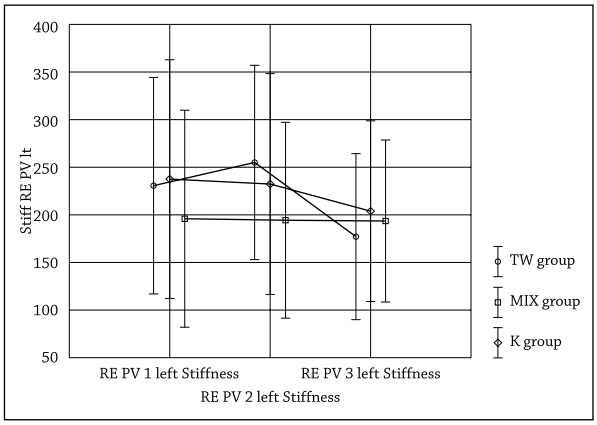

Figure 9. Variation of the Stiffness parameter at RE PV, left-hand side of the body, F(4,22) = 3.667; p = 0.042

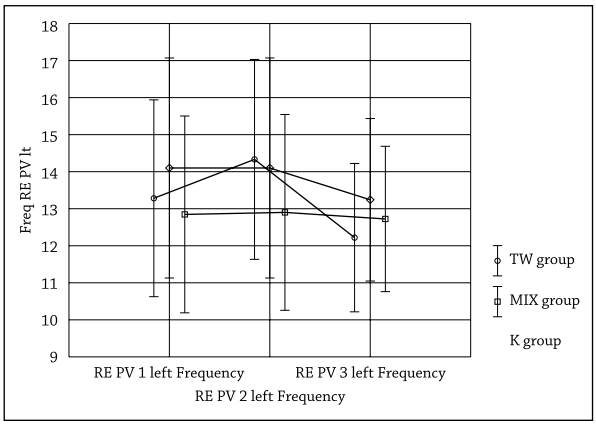

Figure 8. Variation of the Frequency parameter at RE PV, left-hand side of the body, F(4,22) = 4.2722; p = 0.027

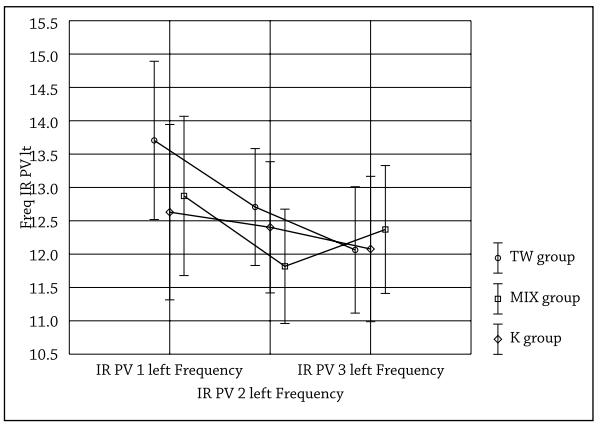

Figure 10. Variation of the Frequency parameter at IR PV, left-hand side of the body, F(4,22) = 5.151; p < 0.014

The soft tissue reactive tests revealed statistically significant variations of the test values in group 1 only (subject to the standard Stecco FM protocol). Pronounced variations were found in each of the parameters tested, with the highest variation of the Logarithmic Decrement. In five of out of the seven parameters described above there was a noticeable trend of initial increase in mean values, followed by their reduction after the third therapeutic session in group 1. The predominant part of these results applied to the left-hand side of the test subjects' bodies. Moreover, most of variations occurred in the frontal plane.

Discussion

The results obtained during the randomized double-blind clinical trial signify a reduction of the tone and dynamic stiffness in the tested tissues with improved flexibility and reduction in relaxation time after administration of the standard Stecco FM protocol therapy.

This is one of the first research projects to apply measurement of tissue tone and biomechanical and viscoelastic properties of tissues as an impartial, objective determinant of therapeutic efficacy of the Stecco FM. The research project is also the only one known to the authors to compare the standard therapeutic protocol of the Stecco FM to its modified version.

Research completed in the recent years demonstrates that application of the MyotonPro to evaluate different tissue reactivity parameters provides highly reliable results [10] with a high repeatability coefficient [11]. The reference literature findings revealed that the main parameters evaluated in similar research projects include tissue tone, tissue dynamic stiffness, and tissue elasticity. Park et. al [12] objectively noted that dysfunctional soft tissues were characterized by increased dynamic stiffness and tone. Wang [13] showed that muscle fatigue also increased muscular dynamic stiffness and tone, whereas administration of a properly designed therapeutic regime reversed this condition and reduced the values of these parameters, as measured with the MyotonPro. The charts featured above show similar relations. The largest reduction of the Natural Frequency Oscillation (as related to tissue tone) and Dynamic Stiffness (as related to muscular stiffness) between the initial and final states of the whole clinical trials were displayed in group 1 (TW). Groups 2 and 3 did not reveal significant changes in the same parameters. It was also noted that the values of Logarithmic Decrement (D), which are inversely propor-

tional to tissue elasticity. The reduction in (D) shall be then interpreted as an improvement in soft tissue elasticity, a phenomenon found in group 1 only.

Naturally, certain changes in VAS levels of pain discomfort and soft tissue reactivity was also found in groups 2 and 3. The reason for these findings in group 3 (the controls) would primarily be the systemic ability to compensate for disorders and partial self-recovery. There seems to be several reasons for changes of the parameters in group 2. The therapeutic effects, as they were, stimulated the body with an inflammatory condition, which was a prerequisite for tissue reconstruction and changes in the tone of the musculofascial system. The bodies of group 2 test subjects could employ another compensation strategy; hence the noticeable differences in test results before and after the therapeutic sessions. Psychological factors could be yet another reason for the variations found in group 2. The test subjects would undergo three therapeutic sessions, 45 minutes each, during which therapeutic effects were administered following a thorough diagnosis and concerned specific points of the human body. The reference literature relates to the effect of the therapist and patient relation on the pain levels experienced by the patient [14].

The most dynamic pain reduction and the only statistically significant variations in soft tissue reactivity were found in group 1, where the standard Stecco FM therapeutic protocol was administered. The results discussed herein suggest that the standard protocol of the Stecco FM is preferable, if one desires maximum efficacy. This research project, however, is a pilot project. Final conclusions will require continued clinical trial experiments and testing a larger number of test subjects (patients with pain), including a detailed follow-up.

Conclusions

A therapy administered following the standard protocol of the Stecco FM reduced pain discomfort. There was also a variation in the objective measurement of soft tissue reactivity, which can be viewed as a proof of the results provided by VAS pain level testing.

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Correspondence address:
Mateusz Pawlukiewicz
Wydział Fizjoterapii
Akademia Wychowania Fizycznego im. Jerzego Kukuczki w Katowicach
ul. Mikołowska 72b, 40-065 Katowice
E-mail: pawmat93@gmail.com

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PRESSOR AMINES IN CORONARY ARTERY BYPASS GRAFTING PROCEDURE WITH AND WITHOUT THE USE OF EXTRACORPOREAL CIRCULATION

AMINY PRESYJNE W ZABIEGU POMOSTOWANIA NACZYŃ WIEŃCOWYCH SERCA BEZ ZASTOSOWANIA I Z ZASTOSOWANIEM KRĄŻENIA POZAUSTROJOWEGO

Anna Jurkiewicz-Śpiewak[1 B,E]
Dariusz Szurlej[2 A,C–E]
Justyna Sejboth[2 B,D,F]
Piotr Gurowiec[3 B,F]
Aleksandra Romaska[4 B]
Joanna Wanot[4 B]
Tomasz Śpiewak[1 B]

[1] St. Luke Province Hospital in Tarnów, Independent Public Complex of Health Care Facilities in Tarnów, Poland

[2] Department of Anaesthesia and Intensive Therapy, School of Health Sciences, Medical University of Silesia in Katowice, Poland

[3] Nursing Faculty, Opole Medical School, Poland

[4] Department of Anaesthesia and Intensive Nursing Care, School of Health Sciences in Katowice, Medical University of Silesia in Katowice, Poland

A – przygotowanie projektu badania | study design, **B –** zbieranie danych | data collection, **C –** analiza statystyczna | statistical analysis, **D –** interpretacja danych | interpretation of data, **E –** przygotowanie maszynopisu | manuscript preparation, **F –** opracowanie piśmiennictwa | literature review, **G –** pozyskanie funduszy | sourcing of funding

SUMMARY

Background: Myocardial revascularization is the most commonly performed procedure in cardiac surgery. The development of coronary artery bypass grafting techniques without the use of extracorporeal circulation lead to the modification of anaesthetic techniques. When conducting anaesthesia for the OPCAB-type of procedure, an anaesthesiologist must respond quickly, particularly to frequent and sometimes unpredictable changes to hemodynamic stability.

Aim of the study: The purpose of this study was to compare the use of pressor amines among patients undergoing myocardial revascularization with and without extracorporeal circulation.

Material and methods: The study was retrospective. It included 80 patients, who underwent coronary artery bypass surgery. They were divided into two groups, and the criterion of selection was the non-application (group I – OPCAB Off-Pump Coronary Artery Bypass) or the use (group II – CPB) of extracorporeal circulation. The patients were subjected to multivariate statistical analysis in the preoperative period, which involved taking measures of selected clinical parameters at fixed points in time. The changes in the heart rate, mean arterial pressure and central venous pressure were also analysed. The daily balances of transfused colloid and crystalloid fluids, blood loss, given blood products and daily diuresis were compared.

Results: Ephedrine was frequently administered during OPCAB procedures, but not even once in the CPB group. Dopamine was administered to all patients in the CPB group, while in the OPCAB group it was required by only 25% of patients. There were no statistical differences between the two groups in the use of epinephrine in the operating room and during the postoperative period.

Conclusions: Off-pump coronary artery bypass surgery provides better haemodynamic stability and requires administration of smaller amounts of catecholamine.

KEYWORDS: pressor amines, cardiopulmonary bypass, off-pump coronary artery bypass procedure, coronary revascularization

STRESZCZENIE

Wstęp: Operacje rewaskularyzacji mięśnia sercowego są najczęściej wykonywanymi procedurami w praktyce kardiochirurgicznej. Rozwój technik pomostowania tętnic wieńcowych bez użycia krążenia pozaustrojowego spowodował, iż modyfikacjom uległy również techniki znieczulenia. W prowadzeniu znieczulenia do zabiegów typu OPCAB anestezjolog musi szczególnie szybko reagować na częste, czasem nieprzewidywalne zmiany sytuacji hemodynamicznej.

Cel pracy: Celem pracy było porównanie zastosowania amin presyjnych wśród pacjentów poddanych chirurgicznej rewaskularyzacji mięśnia sercowego z krążeniem pozaustrojowym i bez niego.

Materiał i metody: Badanie miało charakter retrospektywny. Badaniem objęto 80 chorych, u których przeprowadzono zabieg pomostowania naczyń wieńcowych. Podzielono ich na dwie grupy, a kryterium doboru było niezastosowanie (grupa I – OPCAB Off Pump Coronary Artery Bypass) lub zastosowanie (grupa II – CPB) krążenia pozaustrojowego. Chorych poddano wieloczynnikowej statystycznej analizie porównawczej w okresie okołooperacyjnym, obejmującej wybrane parametry kliniczne oznaczane w określonych punktach czasowych. Analizie poddano zmiany wartości częstości akcji serca, średniego ciśnienia tętniczego i ośrodkowego ciśnienia żylnego. Porównano bilanse dobowe przetoczonych płynów koloidowych i krystaloidowych, utratę krwi, podane preparaty krwiopochodne a także diurezę dobową.

Wyniki: Efedrynę podawano często w trakcie zabiegów OPCAB i nie podano jej ani raz w grupie CPB. Dopaminę podano u wszystkich pacjentów z grupy CPB, natomiast w grupie OPCAB wymagało jej tylko 25% pacjentów. Nie stwierdzono różnic statystycznych w badanych grupach w stosowaniu adrenaliny na sali operacyjnej i w przebiegu pooperacyjnym.

Wnioski: Zabiegi bez użycia krążenia pozaustrojowego zapewniają większą stabilność hemodynamiczną i wymagają podawania mniejszych ilości amin katecholowych.

SŁOWA KLUCZOWE: aminy presyjne, krążenie pozaustrojowe, zabiegi typu OPCAB, rewaskularyzacja naczyń wieńcowych

Background

Cardiovascular diseases are the most common cause of mortality in Poland. Among them, the first position is occupied by an ischaemic heart disease. For this reason, the number of cardiac revascularization procedures has been constantly increasing, and recent trends have seen a steady decline in the extent and invasiveness of such surgeries, as demonstrated by OPCAB-type (off-pump coronary artery bypass grafting) procedures.

The first attempts to increase blood supply to the hypoxic areas of the myocardium were described by Claude Beck in 1935 [1]. In the second half of the twentieth century, vascular anaesthesia began to be performed directly in the myocardium. There is a probability that the first vascular anastomosis with the own saphenous vein was done in 1962 by Sabiston, and one year later by Edward Garret. It was performed under the cover of extracorporeal circulation, which was introduced into clinical practice several years earlier by John Gibbon [2,3]. Since the end of the 1970s, coronary bypass surgery has become a standard procedure in the treatment of polyvascular ischemic heart disease [2–4].

In Europe, Kolessov was the precursor of coronary bypass surgery without the use of extracorporeal circulation. In 1967, he performed a heart anastomosis using an internal thoracic artery [3,4]. Further attempts of revascularization of the coronary arteries, which were performed on a beating heart, were published in 1975 by Trapp and Bisarya, and the beginning of the 80s by Buffolo and Benetti. In the mid-90s, the OPCAB method became more common and it aimed at reducing both the postoperative complications and the length of hospitalization. Nowadays, the number of patients treated using this technique is growing year by year, and the indications for OPCAB are being expanded. This is especially true for high-risk patients (EuroSCORE > 6) with coexisting relative or absolute contraindications to use extracorporeal circulation or cardioplegia [4].

It is currently believed that up to 70% of extracorporeal circulation procedures, may be responsible for the occurrence of complications after cardiac surgery, both local (thrombosis, embolism, dissection of a vessel, haemorrhage, infection) and general (coagulation, gastro-intestinal, neurological, pulmonary and kidney disorders), therefore eliminating this factor, as well as the lack of need for cardiac arrest seems to be a clear benefit for patients [5,6].

However, OPCAB procedures have other limitations – more difficult conditions for an operation or haemodynamic disturbances during stabilization of the heart, as well as the insertion of the side clamp on the aorta. These actions cause a drop in the heart rate and the related mean arterial pressure.

To ensure the haemodynamic stability during a surgery, anaesthesiologists use mechanical methods, such as placing the patient in Trendelenburg position, efficient fluid administration and support of the circulatory system of patients with fractionated doses or continuous infusion of pressor amines [7,8].

Aim of the study

The aim of the study was to compare the use of pressor amines among patients undergoing myocar-

dial revascularization with and without extracorporeal circulation during the procedure, and within the first day after the operation.

Material and methods

A retrospective study was performed in the II Department of Cardiac Surgery of the Silesian Medical University in Katowice. The research was conducted with the consent of the management of the Upper Silesian Cardiology Center in Katowice, the consent of the bioethics committee was not necessary for its implementation. The study included a total of 80 patients operated from December 2001 to July 2002, who underwent coronary artery bypass grafting surgery. They were divided into two groups, and the criterion of selection was the non-application (group I – OPCAB) or the use (group II – CPB) of extracorporeal circulation.

The results were subjected to a statistical comparative study in the preoperative period, which included the selected clinical parameters. The study was performed in patients with the following intervals:

- T1: before induction of anaesthesia,
- T2: after induction of anaesthesia,
- T3: 6 hours after surgery,
- T4: 18 hours after surgery.

The criteria for inclusion were:

- patient's age below 40 and over 80 years,
- occurrence of a heart attack in the last 3 months,
- instability of the cardiovascular system requiring pharmacological or mechanical support prior to the surgery,
- coexistence of other systemic diseases or conditions of a productive or chronic nature (with the exception of diabetes);
- reoperation,
- conversion, i.e. the need to switch from OPCAB to CPB during the surgery,
- emergency operation.

The data collected in the MS Excel spreadsheet format was entered into STATISTICA v.5.1 (SN: SP9018050221MU5). They were subjected to initial verification by calculating the mean, minimum, maximum, standard deviation, skewness, and kurtosis of the categorical variables. The Kolomogorov-Smirnov test evaluated the nature of the data distribution. In the case of normal distribution the data were presented as a mean with standard deviation (OS), the values of variables were compared using the T-Student test for parametric data, and for non-parametric U-Mann-Whitney U tests were used. The $p < 0.05$ value [9–11] was taken as a statistically significant one.

All patients were prepared, anaesthetized and treated in the preoperative period in a similar way, according to current standards. Anaesthesia was performed by an anaesthesiologist who cooperated with surgical teams from the clinic where the study was performed. Patients stopped taking anti-diabetic drugs 7 days before their admission to the hospital. Other routinely administered medications were continued up to the day of operation, except for hypoglycaemic medications. Patients were orally premedicated with midazolam in the doses of 7.5 mg (<60 kg or >70 years of age) and 15 mg (remaining patients), 30 min before the surgery. Upon arrival to the operating room two superficial veins were cannulated for the non-dominant limb, with 18G and 16G venous flaps, and 0.9% NaCl crystalloid infusion was started. Under local anaesthesia, a 20G cannula was inserted into the radial artery, while making a continuous measuring of blood pressure using the direct method. In patients classified as Group I (OPCAB), the active thermal treatment therapy was started using a hot air supply (Warm Touch, Mallinckrodt Medical) on the area of the head and the flow heaters of infusion fluid (Animec BIO MS).

The standard diagram of the monitoring included direct measurement of blood pressure, ECG monitoring of lead II and V5, the measurement of arterial oxygen saturation, the measurement of end-tidal concentration of carbon dioxide (CO2), oxygen concentration (O2) and the measurement of the concentrations of inhaled anaesthetics in anaesthetic respiratory system and continuous measurement of the ventilation parameters. A catheter into the bladder was inserted in order to measure hourly diuresis and make continuous measurement of the temperature in the oesophagus. The measurement of central venous pressure was also a component of standard monitoring with the catheter inserted through the internal jugular vein only after induction of general anaesthesia.

The anaesthesiologists had intravenous anaesthetic drugs at their disposal, which are used in the centres around the world. The monitoring anaesthesiologists could choose between the most popular ones: etomidate 0.2 mg/kg or propofol 1–1.5 mg/kg m.c.i.v. All patients in the CPB group received etomidate, while in the OPCAB group 95%, the remaining 5% received propofol. As pancreatic drug, pancuronium was used in all anesthetized patients in both groups. For the purposes of the analgesic fentanyl was used in 100% of cases at the dose of 0.005–0.01 mg/ kg bw. After induction of anaesthesia and stabilization of the circulatory system, continuous infusion of nitroglycerin at a concentration of 20 mg NTG/50 ml was started at a rate of 1–10 ml/hr.

In order to maintain anaesthesia, the anaesthesiologists used a technique of total intravenous anaesthesia, inhalation anaesthesia or a combination of the above. In intravenous anaesthesia, infusion of fentanyl with midazolam (40 ml+30 mg) was administered with 1–3 ml/kg bw/hr. or continuous infusion of propofol 5–8 mg/kg bw/h. In inhalation anaesthesia, the anaesthetics were isoflurane or sevoflurane. The possibility of supporting intravenous anaesthesia with periodic administration of inhalation anaesthetics was completely acceptable and fully accommodated into the standard of anaesthetic intraoperative procedure.

1,500 ml of crystalloids were used to fill the system for extracorporeal circulation. Routinely the effect of heparin was inverted using protamine, with the provision that in the OPCAB group only half of the due dose was administered.

After the surgery the patients were transported to a postoperative unit, heated to the physiological temperature, and after ensuring that there was no excessive drainage for postoperative bleeding and that the patients' circulatory and respiratory systems were stable; the decision on their extubation was taken.

Results

The study groups did not differ significantly in terms of from sex, age, body weight, pre-treatment ejection fraction, duration the surgery and hospitalization.

In the CPB group more anastomoses were performed, on average 2.95 (SD 0.78) in one patient, comparing to the OPCAB group, in which an average was 1.97 (SD 0.89) in one patient and there were more multiple sclerosis in one patient. In the OPCAB group mainly one or two-vessel anastomoses were performed, whereas in the CPB group, the most common one was the performance of three anastomosis during one surgery (25 patients).

An anaesthesiologist supervising anaesthesia could broaden the scope of intraoperative haemodynamic monitoring and opt for a Swan-Ganz catheter, continuous cardiac monitoring using PiCCO method or transoesophageal echocardiography (TEE). However, it was decided to be done in a negligible number of patients. One PiCCO line and one Swan-Ganza catheter were used in the OPCAB group. The CPB was exactly the same with the fact that the Swan-Ganz catheter was not fully utilized and no haemodynamic measurements were made and it was only limited to taking pulmonary arterial pressure measurements.

During and after the surgery the heart rate was similar in both groups.

Table 1. Frequency of heart rate among patients studied

Variables	Group	CPB	Group	OPCAB	PI
	Mean	OS	Mean	OS	
HR T1	67.93	11.30	69.93	15.1	0.63
HR T2	74.43	14.70	70.56	11.7	0.15
HR T3	97.88	11.49	92.65	14.0	0.04
HR T4	95.18	10.90	89.70	12.7	0.02

HR – heart rate; T1 – before induction of anaesthesia, T2 – after induction of anaesthesia, T3 – 6 hours after surgery, T4 – 18 hours after surgery, CPB – cardiopulmonary bypass, OPCAB – coronary artery disease without extracorporeal circulation, OS – standard deviation, PI – level of ignificance.

Mean arterial pressure in similar periods underwent a greater reduction in CPB group than in the OPCAB. This was due to the use of extracorporeal circulation as well as the increased demand for catecholamine.

Table 2. Mean arterial pressure

Variables	Group	CPB	Group	OPCAB	PI
	Mean	OS	Mean	OS	
MAP T1	89.80	17.59	86.68	14.20	0.720
MAP T2	81.28	15.87	79.65	15.43	0.950
MAP T3	74.63	9.00	80.92	8.36	0.005
MAP T4	84.00	9.89	83.05	13.47	0.420

MAP – mean arterial pressure; T1 – before induction of anaesthesia, T2 – after induction of anaesthesia, T3 – 6 hours after surgery, T4 – 18 hours after surgery, CPB – extracorporeal circulation, OPCAB – coronary artery disease without extracorporeal circulation, OS – standard deviation, PI – level of significance.

Central venous pressure was also similar in both groups and the demonstrated difference was non-significant statistically.

Table 3. Central venous pressure

Variables	Group	CPB	Group	OPCAB	PI
	Mean	OS	Mean	OS	
CVP T2	9.605	2.955	7.425	3.426	0.002
CVP T3	8.410	3.322	8.514	3.229	0.760
CVP T4	7.906	3.684	7.120	3.232	0.400

OCZ – central venous pressure; T1 – before induction of anaesthesia, T2 – after induction of anaesthesia, T3 – 6 hours after surgery, T4 – 18 hours after surgery, CPB – extracorporeal circulation, OPCAB – coronary artery disease without extracorporeal circulation, OS – standard deviation, PI – level of significance.

Table 4. Fluid therapy in the perioperative period

Variables	Group	CPB	Group	OPCAB	PI
	Mean	OS	Mean	OS	
Crystalloid Operating room (ml)	833.25	202.9	1041.92	446.03	0.02
Colloid Operating room (ml)	60	165	135	250	0.32
Blood loss operating room (ml)	147.94	46.8	163	101.12	0.61
Crystalloid balance in T4 (ml)	-497.28	1384.85	700.42	896.52	0
Colloid balance in T4 (ml)	696.15	533.93	118.5	562.28	0
Blood loss in T4 (ml)	594.5	298.21	604.75	274.03	0.92
Diuresis in "O" day (ml)	3582	1431.96	2286.51	665.78	0
Plasma in "O" day (no. of units)	0.17	0.59	0.12	0.64	0.7
Kkcz in "O" day (no. of units)	0.27	0.67	0.2	0.96	0.44

T4 – 18 hours after surgery; "0" day of the stay in the intensive care unit until the day after surgery; CPB – extracorporeal circulation, OPCAB – coronary artery disease without extracorporeal circulation, OS – standard deviation, PI – level of significance.

In the OPCAB group, more fluid was transfused to maintain cardiovascular stability.

The infiltration of colloidal solutions (hydroxyethylated starch or gelatine derivatives) was initiated only after transfusion of at least 1500 ml of crystalloids. Hence, the statistically significant differences in the

amount of crystalloid transfusions in the operating room. In turn, the amount of colloid solutions, transferred at similar time intervals, did not show statistically significant differences.

Loss of intraoperative and postoperative blood also proved to be statistically insignificant. The number of transfused units of red blood cells and frozen plasma was similar in both groups.

On the other hand, the amount of excreted urine was higher in the CPB group, which was probably due to the initial filling of the system into the extracorporeal circulation with a volume of 1500 ml of crystalloid (priming).

Table 5. Use of pressor amines

Type of intervention	Group	CPB	Group	OPCAB
	No. of ppl	Group %	No. of ppl	Group %
Ephedrine in the operating room	0	0.00%	11	27.50%
Dopamine in the operating room	40	100.00%	5	12.50%
Adrenaline in the operating room	4	10.00%	0	0.00%
Dopamine for POP	40	100.00%	10	40.00%
Adrenaline for POP	5	12.50%	2	5.00%
IABP	3	7.50%	1	2.50%

POP – post-operative intensive care room; IABP – intraarticular flow control; CPB – extracorporeal circulation, OPCAB – coronary angioplasty without extracorporeal circulation.

Ephedrine

In order to safeguard normal blood pressure in patients undergoing cardiac surgical revascularisation, ephedrine was administered in 11 out of 40 patients in the OPCAB group. However, this drug was not used at all in the CPB group.

Dopamine

In all CPB patients, dopamine infusion in the operating room was started and continued in the "O" day in the postoperative room. In contrast, only 5 patients in OPCAB required dopamine in the operating room, which was continued during the first hours after the surgery. In the postoperative room 5 consecutive patients from the OPCAB group required the inclusion of dopamine in order to maintain appropriate arterial pressure. The difference was statistically significant.

Adrenaline

Adrenaline infusion was started in the operating room only in 4 patients in the CPB group. In the postoperative course there was a need to start an infusion in another patient (5 in total) in the CPB group and in 2 patients in the OPCAB group. Differences were not statistically significant.

Three patients in the CPB group failed to achieve satisfactory results from inotropic treatment and postoperative intravascular counts were included in the postoperative course. However, in the OPCAB group, such situation occurred in only one patient.

Discussion

During the procedures with the use of extracorporeal circulation, the heart is subjected to temporary hibernation, which in most cases requires the use of pressure-induced amines during cardiac output, as well as in early postoperative periods. Some authors recommend the routine administration of pressor amines at this point in the operation, but in the literature there are divergent data ranging from just 5% to the recommended 100%.

In contrast, in patients operated without the use of extracorporeal circulation anaesthesiologist is confronted with a previously unknown, such a scale of a problem. Surgeries on the beating heart using cardiac stabilizers allowed to perform anastomoses for all coronary vessels. However, in such case the heart is rotated, oppressed, lifted and balanced. Venous return is reduced, and blood pressure decreases.

In order to safeguard normal arterial pressure, an anaesthesiologist supervising general anaesthesia in OPCAB procedures uses mechanical or pharmacological techniques. On the mechanical route, by changing the position of the table, we give the patient a position of Trendelenburg, which in such procedures can (even should) be very steep. This causes an increase in arterial pressure. This position is normally used during bypassing the coronary vessels on the back wall of the heart. A reverse position, or lifting the head up, allows for rapid lowering of arterial pressure [12–17].

Rational fluid therapy as well as appropriate for replenishing the loss of the cellular components of blood and plasma are another elements leading to obtain hemodynamic stability during and after a surgery.

On the pharmacological route, the first-line drug administered by a team of anaesthesiologist, in OPCAB-type surgery, was ephedrine – a drug that stimulates both alpha and beta receptors. In such case, a chronotropic positive effects of this drug is not particularly favourable, but rarely manifested clinically, because patients routinely take oral beta-blockers until the start of the operation. Although ephedrine is a model drug to illustrate how tachyphylaxis develops, this effect is mainly related to alpha receptors mediated by the release of norepinephrine from the nerve endings. For beta receptors the ephedrine works in a continuous manner, and in addition to the stimulation of bronchial smooth muscle, the effect of the drug on the coronary vessels is not insignificant [18]. In Poland, similar cases of such use are described [7]. However, there is no data available in the literature on the use of ephedrine in order to increase the pressure in the OPCAB surgeries in the world.

A pure alpha receptor agonist – phenylephrine [15,16,19–21] is preferred here. This drug was not registered in our country at the time of this study.

Ephedrine is a drug widely used by anaesthesiologists to control arterial pressure wherever regional anaesthesia (epidural or subarachnoid) is performed, which is always associated with a decrease in blood pressure [22]. Ephedrine seems to be a good choice as a first-line therapy in controlling intraoperative cardiac output and systemic blood pressure. Especially since heart rate using cardiac stabilizers is no longer a major technical problem, and most surgeons accept a heart rate at above 90/min. It has been used in the majority of patients in the OPCAB and not used at all in the CPB group.

Dopamine infusion was started in the operating room in all patients in the CPB group, which was caused by the administration of cardioplegia solution during the extracorporeal circulation and the associated time-hibernation *(stunning)* of the heart muscle [23].

Initiation of dopamine infusion already at the operating room in 5 patients in OPCAB group was evidenced by the difficulty of maintaining and coronary perfusion system using a first-line drug, which was ephedrine, and an anaesthetist's use of an inotropic drug with a stronger effect. In this case, dopamine administration usually continues in the postoperative period. Such a situation occurred. In 25% of patients (11 people) in the OPCAB group and in all patients in the CPB group, pharmacological cardiovascular support was introduced. Similar data can be found in other centres [22].

The use of adrenaline for patients in both groups was rather sporadic. In this case it was the next drug after dopamine. Adrenaline was used in five patients with extracorporeal circulation both in the operating room and during the course of the night, while in the OPCAB group it was required in only two patients in the postoperative room.

Adrenaline does not always have to be associated with severe circulatory failure. In some cardiac centres, adrenaline is used as a first-line drug instead of dopamine in this type of surgery [23]. Adrenaline was administered by intravenous infusion at 0.0005–0.002 micrograms/min primarily takes an effect by beta-stimulation, facilitates the conduction of stimuli, and thus shortens the contraction time rather than diastole [15]. The effect of this is to improve myocardial hemodynamic and increase coronary blood flow.

Conclusions

1. The use of ephedrine was almost a standard during the procedures in OPCAB group. However, this drug was not administered at all in the CPB group.
2. All patients operated with the use of extracorporeal circulation required dopamine in the course of surgery and in postoperative course. Similarly, only 25% of OPCAB patients received dopamine in the operating room and after the surgery.
3. There were no statistical differences between the groups in terms of the use of adrenaline in the operating room and in the postoperative course.

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Correspondence address:
Justyna Sejboth
ul. Ułańska 5/16, 40-887 Katowice
E-mail: justynasejboth@o2.pl

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ANALYSIS OF PERIODIC HEALTH EXAMINATIONS IN THE ADULT POLISH COMMUNITY: PRELIMINARY RESULTS

ANALIZA PROFILAKTYCZNYCH BADAŃ BILANSOWYCH DLA OSÓB DOROSŁYCH W POLSCE – WSTĘPNE WYNIKI

Marika Guzek[1 A-E]
Artur Prusaczyk[1 A,D,E,G]
Sylwia Szafraniec-Buryło[2 C,D,E]
Paweł Żuk[1 A,D,E,G]
Jacek Gronwald[3 D-F]
Katarzyna Kułaga[4 A,D-F]
Katarzyna Witkorzak[4 A]
Donata Kurpas[5,6 A,C-F]

[1] Siedlce Medical & Diagnostic Centre, Poland
[2] National Institute of Public Health – National Institute of Hygiene, Warsaw, Poland
[3] Pomeranian Medical University, Poland
[4] National Health Fund, Poland
[5] Wroclaw Medical University, Poland
[6] Opole Medical School, Poland

A – przygotowanie projektu badania | study design, **B –** zbieranie danych | data collection, **C –** analiza statystyczna | statistical analysis, **D –** interpretacja danych | interpretation of data, **E –** przygotowanie maszynopisu | manuscript preparation, **F –** opracowanie piśmiennictwa | literature review, **G –** pozyskanie funduszy | sourcing of funding

SUMMARY

Background: Periodic health examinations for adult persons are one of the basic components of the pilot study of coordinated health care in primary health care in Poland. It was recommended as the result of the project "Preparation, testing and implementation of the organization of coordinated care to the health care system (CCO)" (EU project – Operational Programme Knowledge Education Development).

Aim of the study: To assess the preliminary clinical results and resource use of pilot periodic health examinations in adults as a tool for performing prevention tasks in coordinated health care Polish PHC entity.

Material and methods: Periodic health examinations were performed in 13 PHC outpatient clinics (3 urban and 10 rural areas) by PHC teams comprised of 22 PHC physicians, eight nurses, seven medical receptionists, and one nutritionist. Enrollment included 122 patients (median age of 45, range: 18–65). The examinations were performed according to the questionnaire, which includes 135 patient variables: personal data, detailed patient interview, anthropometric measurements, physical examination, diagnostic results, conclusions, and patient health status.

Results: For this study, 71 women (58%) and 51 men (42%) were participants. As a result of the periodic health examinations, the following diagnoses were observed: one cholelithiasis case (2.4%), 36 incidences of hypercholesterolemia (85.7%), one case of diabetes mellitus type 2 (2.4%), one patient with hypothyroidism (2.4%; TSH 17.78), and three incidences of nephrolithiasis (7.1%). Increased risk of cardiovascular disease was found in six patients. Oncological diagnostics was advised to three patients. A risk of depression was observed in 12 patients. A strong addiction to nicotine was seen in four patients while an increased alcohol addiction risk was found in 19 patients.

Conclusions: Periodic health examinations in adults as a preventive measure might be useful and feasible for PHC teams in centers with basic health care coordination. However, the proposed periodic health examinations program requires further investigation in various populations and in entities with different levels of health care coordination.

KEYWORDS: periodic health examinations, adults, primary health care, care coordination

STRESZCZENIE

Wstęp: Profilaktyczne badania bilansowe dla osób dorosłych są jednym z podstawowych elementów pilotażowego badania Opieki Koordynowanej w podstawowej opiece zdrowotnej w Polsce. Rekomendacja badań jest wynikiem prac przeprowadzonych w ramach projektu „Przygotowanie, testowanie i wdrażanie organizacji skoordynowanej opieki dla systemu opieki zdrowotnej (OOK)" (Projekt UE – Program Operacyjny Wiedza Edukacja Rozwój).

Cel pracy: Wskazanie wstępnych wyników uzyskanych w pilotażu badań bilansowych u dorosłych oraz możliwości realizacji prewencji w zaproponowanym schemacie w warunkach polskiej POZ.

Materiał i metody: Bilanse prowadzono w 13 przychodniach POZ, w 3 placówkach miejskich i 10 na terenach wiejskich, w ramach prac zespołów POZ. Badaniami objęto 122 pacjentów (mediana wieku 45, zakres: 18–65). Narzędzie badań stanowił kwestionariusz bilansowy określający 135 zmiennych w domenach: dane personalne, szczegółowy wywiad z pacjentem, pomiary antropometryczne, badanie fizykalne, wyniki badań diagnostycznych, konkluzje oraz status zdrowotny pacjenta.

Wyniki: 71 kobiet (58%) and 51 mężczyzn (42%) uczestniczyło w badaniu. Wskutek badań bilansowych postawiono od razu następujące diagnozy w gabinecie lekarza POZ: kamica żółciowa – 1 przypadek (2,4%), hipercholestrolemia – 36 (85,7%), cukrzyca typu II – 1 (2,4%), niedoczynność tarczycy (TSH 17,78) – 1 (2,4%), kamice nerkowe – 3 (7,1%). Wydano 3 karty DILO z podejrzeniem nowotworów. Zidentyfikowano 6 pacjentów z dużym ryzykiem sercowo-naczyniowym, 12 pacjentów obciążonych dużym ryzykiem wystąpienia depresji, 4 pacjentów z silnym uzależnieniem od nikotyny oraz 19 pacjentów zagrożonych w znacznym stopniu problemem alkoholowym.

Wnioski: Badania bilansowe u dorosłych w zaproponowanym schemacie wydają się być formą prewencji możliwą do realizacji przez zespoły POZ w ośrodkach o elementarnym stopniu koordynacji. Proponowany schemat badań bilansowych wymaga jednak dalszych obserwacji w liczniejszej populacji i ośrodkach o zróżnicowanym stopniu koordynacji opieki zdrowotnej.

SŁOWA KLUCZOWE: profilaktyczne badania bilansowe, dorośli, podstawowa opieka zdrowotna, koordynacja opieki

Background

The analyses performed by the Central Statistical Office of Poland (GUS) in 2014 demonstrate that 52% of the Polish population suffer from chronic diseases and ailments (if compared with 46% in 2004 and 51% in 2009), including 70% of persons at the age of more than 50 years [1,2]. The population of chronic patients is anticipated to increase 1% annually until 2030. By the year 2020, chronic conditions will be the cause of approximately 75% of worldwide deaths, therein in the developing countries the death will be declared due to: 71% out of all caused by ischemic heart diseases, 75% by stroke, and 70% by diabetes. Therefore, in 2020, chronic diseases will become the main cause influencing direct and indirect medical costs. They are already economically significant and constitute a social strain on health-care system, community, and most of all, individual patients [3].

The greatest threat to Polish health are cardiovascular diseases, responsible for 45.1% of all deaths in 2014. The cardiovascular disease mortality rate has gradually declined since 1991. Cardiovascular diseases are significantly higher in Polish people than in the EU. Malignant neoplasms are the second main cause of death in Poland (25.4% of all deaths in 2014). The difference in survival of total malignancies, between Europe and Poland intensifies. In 2014, 28.8% of men and 17.2% of women smoked, which places Poland on the 11th and 21st position in the European Union respectively. The alcohol intake in Poland is 10.7 liters/person/year of citizens over 15 years of age, which is higher than the European average. Excess weight and obesity is observed in 62–68% of men and 46–60% of women. According to CSO, these proportions rose slightly during last four years. A low level of education is found to augment the risk of increased body weight. Adult Polish citizens are less active than a majority of European citizens, as they participate in fewer sports and less physical activity [4]. In 1990, depression was the 4th largest cause of disabilities in the world following infections of the lower respiratory tract, diarrhoea, and perinatal complications. It is estimated that by 2020, depression will be second largest cause of death after cardiovascular disease [5] and is currently second leading cause of health issues in Central Europe [6].

These data determined the scope of the medical interviews and physical examinations in periodic health examinations of adults as a part of a planned pilot study of coordinative care (PHC PLUS), the new, proactive, and complex model of Polish primary healthcare, that was developed by NHF team. Periodic health examinations of adults were recommended for implementation in a model of coordinative care for PHC, which was suggested by The World Bank within the project 'The preparation, testing and implementation in health care system of coordinated care organization (CCO) –

Stage I Preparation the model of integrated/coordinative health care in Poland."

Aim of the study

The purpose of study was to assess the preliminary clinical results and resource use of pilot periodic health examinations in adults as a tool for performing prevention tasks in coordinated health care Polish PHC entity.

Material and methods

The scope and criteria of periodic health examinations for adults were developed by NHF team on the base of: model of coordinated care for primary health care established by the World Bank [7], recommendations and guidelines [8–11], scientific literature [12–17], good practices [18], analyses and reports [4,19,20]. Preventive general medical examinations for adult persons should be provided for the whole population cared by the service provider delivering health care services related to Primary Health Care, performed every five years, in five-year age groups from the age of 20 to 65 years. However, in the current study, patients above age 18 were included due to the existing framework of the prevention program.

Tools and variables

For conditioning, periodic health examinations utilized a questionnaire of 135 variables in various domains: personal details, detailed interview with a patient, anthropometric measurements, physical examination, results of diagnostic tests, conclusions, and patient's health status. The patient interview included questions used to determine general health state, physical activity, mental mood, occurrence of familial cancers and chronic diseases, medical history, the presence of chronic conditions, participation in preventive programs, smoking, alcohol intake, and pharmacological treatment and reported ailments.

Study design

Periodic health examinations were conducted in 13 PHC clinics of Siedlce Medical and Diagnostic Centre (SMDC) in three urban and 10 rural clinical sites. The examinations were overseen by PHC teams composed of 22 PHC doctors, eight nurses, seven medical receptionists, and one dietician. The first stage of periodic health examinations included a detailed patient interview, measurement of basic vital and anthropometric parameters and qualification of laboratory testing and diagnostics in which the patient was to undergo within two weeks. These examinations were conducted by a nurse and/or medical receptionist. Each patient underwent the detailed interview but labs and other diagnostic tests were individually selected based on collected data and reported symptoms. Periodic health examinations ended upon a visit to the General Practitioner (GP) when detailed medical examinations were conducted, test results and attained information were discussed, and the doctor defined the patient's status: (a) healthy without risk factors, (b) healthy without symptoms but with risk factors, (c) chronically ill without current symptoms, (d) chronically ill with symptoms requiring stabilization and necessary therapeutic decisions. The examinations were conducted from October 10–30, 2017.

Setting

The pilot study was performed in SMDC, a group of outpatient clinics, which are territorially widespread in the region (33 locations and over 84,000 patients under the PHC). At present, SMDC operates in two provinces of Poland (voivodships: mazowieckie and lubelskie) and provides PHC services in 27 units. Apart from GP practice, SMDC runs two stationary Nursing Health Care Units for 47 patients, including 10 places for mechanically ventilated patients and a Health Care Home. It also provides diagnostic back-ups in terms of laboratory, X-rays, ultrasonography, CT, endoscopy of the gastrointestinal tract, and cardiac units. Additionally, it provides screening tests performance (mammography and smear tests).

Participants

The patients were qualified for program participation according to the following criteria: over 18 years of age and no participation in the periodic health examinations' package within last 12 months. The recruitment of patients who fulfilled the study criteria was performed in two ways. The first group of patients was invited by telephone by the medical receptionist/nurse. The second group was redirected from the PHC doctor's office. These were the patients who reported themselves to a visit after an absence greater than 12 months. In the study, 122 patients who fulfilled the health periodic examinations criteria, were approved for participation.

Data sources

The study is a retrospective health record survey comprised of periodic health examination performance and online database analysis. All data included in the individual checkup questionnaire, including the patient's individual records, were analyzed. The source of data in the questionnaire is a patient interview and the results of the medical and diagnostic examinations. An additional source of information was the Informatics System for Prevention Monitoring (ISPM), an online informatics tool made accessible by the National Health Fund (NHF) used to monitor prophylaxis and time duration of each stage of the checkup performed by medical professionals (doctors, nurses, medical receptionists, and dietician).

Statistical methods

All attained data included in the questionnaire were generated and analyzed statistically and clinically in

Excel datasheets. The distribution of the variable age was analyzed with Shapiro-Wilk test and a lack of normal distribution was found in the whole group of patients.

Results

Participants

Seventy-one women (58.2%) and 51 men (41.8%) participated in the study with a median age of 45 (range: 18–65). The age and sex of all participants are presented in Fig. 1.

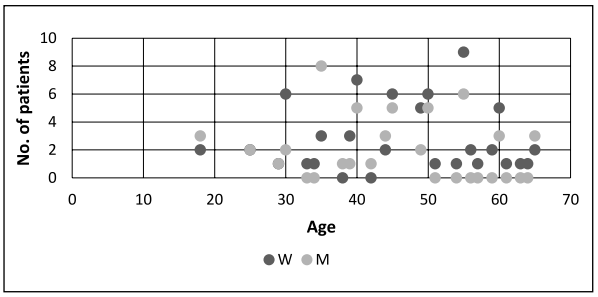

Figure 1. Age and sex of participants (W – women, M – men)

Ninety (73.8%) patients had a secondary education, eight (6.6%) had basic schooling, and 24 (19.7%) patients had a higher education (Fig. 2). Sixty (83.3%) patients declared they were in a relationship and shared a household with other person, e.g. child, spouse, or partner. Twelve (16.7%) patients claimed to unmarried, single, or did not share a household with another person. In 50 (41.1%) cases, such information was not provided.

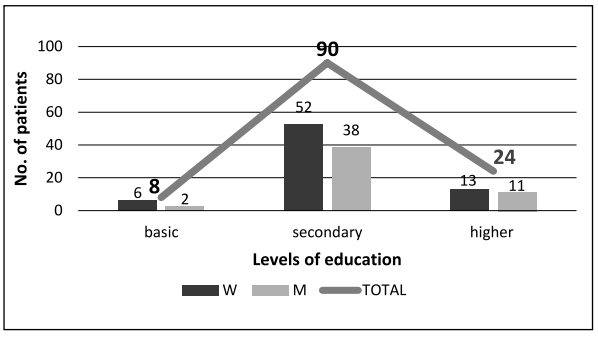

Figure 2. Participant's education (W – women, M – men)

Outcome data

For the subjective assessment of health conditions (scale from 1 – very bad to 5 – very well) – 54 patients (44.3%) described their health as level 4; 35 people (28.7%) defined their health on level 5; 29 people (23.8%) were level 3; and four people (3.3%) described themselves as level 2. Under subjective assessment of physical condition (scale from 1 – very low to 5 – very high) – 44 patients (36.1%) ranked their physical condition on the level 4 and, respectively, 36 (29.5%) on level 5, 30 (24.6%) on level 3, 10 (8.2%) on level 2, and two (1.6%) on level 1. Of the 111 (91.7%) patients that assessed their sport practice intensity, 63 (56.8%) declared they did not practice any sport, 10 (9.0%) patients defined the intensity at 1–3 times a month, 20 (18.0%) practiced 1–2 times a week, seven (6.3%) – 3–4 times a week, and 11 (9.9%) declared to practice sport more than four times a week. Sixty-five (63.1%) patients defined their intensity of physical effort as moderate, resulting in an increased heartbeat and breath intake. Thirty-eight patients (36.9%) described their physical activity as intense, causing very fast breathing and heartbeat. During the prior month, 22 (18.0%) of the total participants admitted to feeling sadness, depression, or desperation. Reduced interest in daily activities was described in 23 (18.9%) patients, while a need for help was reported in 12 (9.8%) participants.

The most frequent chronic disease diagnoses in patients' families were 26 (26.8%) cases of hypertension, 25 (25.8%) incidences of cardiovascular disease, 24 (24.7%) reports of diabetes, eight (8.2%) incidences of thyroid diseases, and seven (7.2%) cases of asthma. Regarding the history of familial cancer, patients reported their first-degree relatives had the most frequent oncological diagnoses: nine (23.7%) cases of lung cancer, seven (18.4%) incidences of colon cancer, four (10.5%) reports of breast cancer, three (7.9%) kidney, and four (10.5%) cancers of the genital tract. In second-degree relatives, the most frequent oncological diagnoses were as follows: six (23.1%) cases of lung cancer, four (15.4%) breast, two (7.7%) pancreas, two (7.7%) colon, and one (3.8%) report of liver cancer. When reporting both chronic disease conditions, patients listed injuries of the musculoskeletal system (32 patients, 16.6%), cardiovascular diseases (27 patients, 14.0%), sight disorders (27 patients, 14.0%), musculoskeletal disorders (23 patients, 11.9%) and diseases of the urogenital system (17 patients, 8.8%).

Participation in cardiovascular screening in the past confirmed 29/122 (23.8%) of patients, 87/122 (71.3%) declared to not participate in the programme. Six (4.9%) patients did not report an answer. In 29 patients who participated in the cardiovascular screening, 23 (79.3%) had normal test results and six (20.7%) were found to have abnormal results. Patients were recommended to lose weight, increase physical activity, follow a low calorie diet, and reduce their saturated fat consumption. Upon commencement of the examination process, 29 (23.8%) patients were eligible for cardiovascular screening (16 men and 13 women). Only one (0.8%) patient of all responders participated in the smoking related disease screening, of which COPD was included. This patient's test result was observed to be normal. Fifty (41.0%) patients fulfilled the age criteria for undergoing colon cancer screening, of whom 11 (22.0%) had a colonoscopy prior to the check-up. In eight (72.7%) patients, the test results were normal while three (27.3%) cases had abnormal findings (diverticular disease and colon polyps).

Vaccinations within the past five years were reported in 26 (22.8%) patients, including hepatitis B (10 patients, 37.0%) and influenza (10 patients, 38.0%).

In this same time period, 88 (77.2%) of responders did not vaccinate.

Thirty women (42.3%) fulfilled the age criteria for breast cancer screening (aged 50–69). Twenty-two (78.6%) women had a screening mammography performed (examination confirmed in ISPM). All results were normal. Six (21.4%) patients did not participate in the screening, and two (6.7%) failed to provide an answer. For the cervical cancer screening, 61 women (85.9%) fulfilled the age criteria (age 25–69). Fifty-four (93.1%) women had undergone a Pap smear before the check-ups began. Four (6.9%) women did not participate in the program and three (4.9%) did not answer. In the women who underwent Pap smears, two (3.7%) had abnormal results and received a recommendation of anti-inflammation treatment. There were ten (14.1%) women between the ages of 60 to 65. Due to the fact that the question verified past participation in the program, this group of patients was also analyzed. Four (44.4%) had screening examination performed, five (55.6%) did not have examinations, and in one (10.0%) case, the information was not provided. The four (100.0%) patients who had screening examinations reported normal results.

Menstruation occurred in 41 (57.7%) of the 71 women of all 71 women who participated in the study. The age of first menstruation was reported between the ages of 13 and 15 for 53 (74.6%) women. Twenty (28.2%) patients were menopausal. Three (4.8%) patients used of hormonal contraception, while 59 (95.2%) did not. Breast exams were performed by 48 (73.8%) women while 17 (26.2%) did not undergo exams. In six (8.5%) cases, no answer was given. There were three (6.3%) cases of abnormal results, and the women who then underwent breast examinations (breast cysts).

Analysis of the program participants found 27 (22.1%) active tobacco smokers, including 12 (16.9%) women and 15 (29.4%) men (Fig. 3). Eighty-one (66.4%) responders declared themselves tobacco free (women – 55 (77.5%), men – 26 (51.0%)). Fourteen (11.5%) participants had used tobacco products in the past (women – 4 (5.6%), men – 10 (19.6%)).

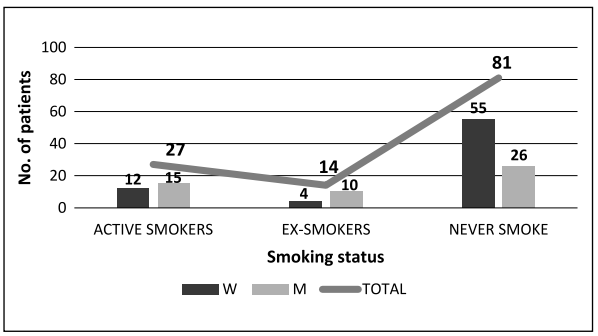

Figure 3. Tobacco smoking in participants (W – women, M – men)

The Fagerström test, which defines the level of nicotine dependence, was performed on 23 (85.2%) active smokers. Twelve (52.2%) patients had a low dependence on nicotine (points 0–3), seven (30.4%) patients had moderate dependence (points 4–6), and four (17.4%) subjects manifested a high dependence on nicotine (points 7–10).

In a group of 114 (93.4%) patients, alcohol consumption was measured using Alcohol Use Disorders Identification Test Consumption (AUDIT-C) for PHC. 89 (78.1%) patients declared to alcohol intake, including 63 (70.8%) patients drink 1–2 portion of alcohol, 18 (20.2%) – 3–4 portions, 5 (5.6%) – 5–6 portions and 3 (3.4%) patients 7–9 portion of alcohol within a period of its consumption. Alcohol intake 6 portion or more at once declared the following number of patients: less frequently than once a month – 29 responders (32.6%), once a week – 2 (2.2%), once a month – 8 (9.0%) and every day or almost every day – one patient (1.1%) (Fig. 4). According to interpretation criteria of the AUDIT-C test seven women (10%) and 12 men (24%) could be labelled as having alcohol problems.

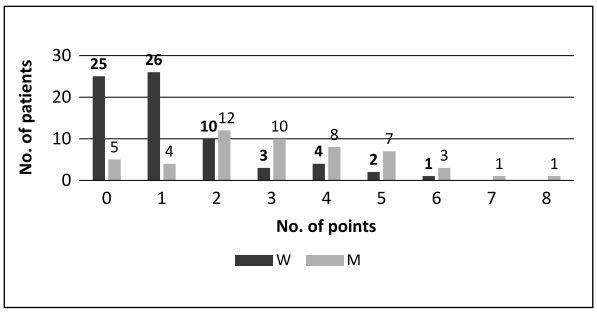

Figure 4. AUDIT-C results in study group (W – women, M – men; norm for women – up to 3 points, for men – up to 4 points)

Sixty-six (54.1%) patients had undergone surgical and diagnostic interventions during their lives. Most frequent were caesarean section (12 patients, 12.6%), orthopaedic surgery (12 patients, 12.6%), appendectomy (9 patients, 9.5%), cholecystectomy (8 patients, 8.4%), and lower limb varices surgery (6 patients, 6.3%). Seventy-six (63.9%) patients were hospitalized, with 16 (21.1%) patients having unrelated hospitalizations with surgical interventions. The listed causes of hospitalizations were (one patient per following condition): ischemic stroke (11.1%), back pain diagnostics (11.1%), anaemia (11.1%), heart failure (11.1%), asthma attack (11.1%). Forty-four (36.1%) participants had used specialized outpatient clinics: endocrine (18 patients, 23.4%), neurological (13 patients, 16.9%), cardiac (11 patients, 14.3%), pulmonology (6 patients, 7.8%) and orthopaedic (5 patients, 6.5%). Forty-eight (39.3%) patients had undergone pharmacological treatment advised by a doctor. Forty-four (36.1%) responders admitted to consuming OTC medication, and, within this group, 31 (70.5%) people took painkillers. Twelve (9.8%) people were found to be allergic to drugs, most frequently, penicillin (6 patients, 42.9%). Seven (58.3%) patients, who had allergic reactions to drugs most frequently, skin rashes (3 patients, 42.9%).

In the study group, 69 (56.6%) patients indicated at least one of the following symptoms presented in Fig. 5.

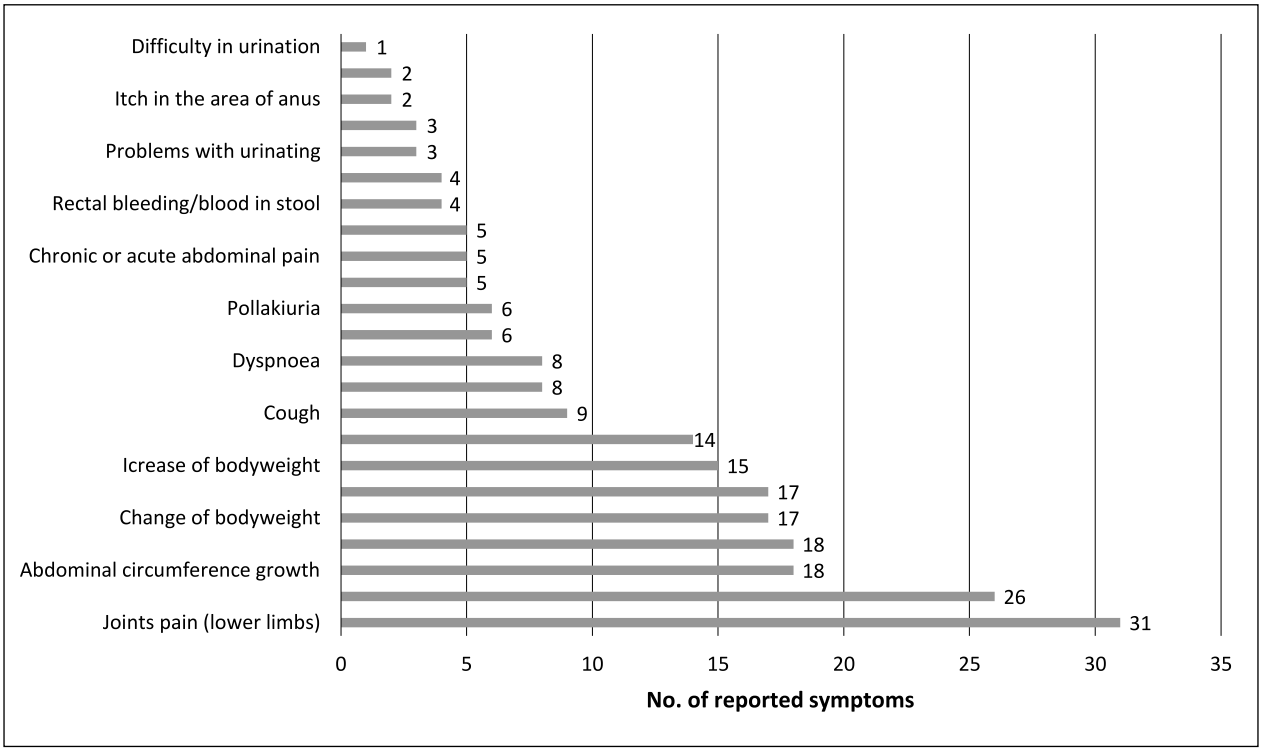

Figure 5. Study group symptoms

Only two women were identified as underweight (3%). Normal body weight was observed in 24 (36%) women and 13 (27%) men, 18 (21%) women and 25 (51%) men were found to be overweight. Obesity was seen in 23 (34%) women and 11 (22%) men.

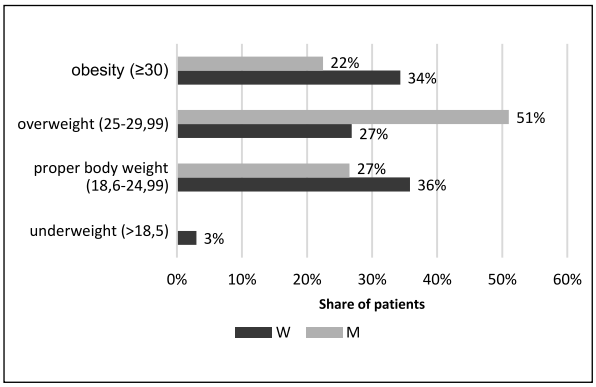

Figure 6. BMI in participants (W – women, M – men)

Blood pressure measurement was taken among 115 (94.3%) check-up participants. Ninety-five (82.6%) patients had normal systolic blood pressure while 20 (17.4%) were found to have abnormal parameters. Normal diastolic blood pressure was found in 92 (80.0%) patients and 23 (20%) had abnormal parameters. The most extreme blood pressure measurement was 180/100 mmHg. Heart rate was measured among 112 (91.8%) patients. There were 18 patients (16.1%) that had heart rates above reference values. The extreme measure of HR was 110 bpm and was identified in two (11.1%) cases. Ninety-four (83.9%) participants had normal heart rates.

Every patient had to undergo a detailed physical examination performed by a doctor. The examination consisted of 22 elements examining anatomical structures and function. The results are presented in Tab. 1.

Not all patients had a full physical examination in all measured parameters. In majority of these cases, it was due to underage patients, and in other cases, the patients refused to participate. Data analysis revealed a majority of patients refused the rectal examination: 19 (15.6%) patients participated while 45 (36.9%) refused the exam. In the case of the urogenital system, the examination was rejected by 24 (19.7%) patients.

Diagnostic tests were individually selected for particular patient on the basis of a detailed medical interview and reported symptoms. Tab. 2 and 3 present the test results.

In 61 (50%) patients SCORE cardiovascular risk was measured, which identified 6 (9.8%) patients (SCORE result ≥5%) with high risk requiring special attention.

Utilization of staff and time needed

Each stage of periodic health examinations performance was registered in terms of time duration of PHC teams: doctors, nurses, medical receptionists and dietician. The average duration of the whole check-up process was 95 minutes, where work time of nurse or medical receptionist lasted for 62 minutes and work time of doctor lasted for 33 minutes. The longest check-up performance lasted for 157 minutes with nurse participation through 110 minutes and doctor – 47 minutes. The shortest check-up performance lasted for 70 minutes (nurse – 45 minutes, doctor – 25 min-

Table 1. Results of physical examination in the analyzed group

Physical examination	Not examined	Examined	Results			
			Norm		Abnormal	
Skin	2	120	107	89.2%	13	10.8%
Lymph nodes	9	113	113	100.0%	0	0,0%
Mucosa	13	109	109	100.0%	0	0,0%
Cranium	22	100	100	100.0%	0	0,0%
Eyes and sight	32	90	63	70.0%	27	30.0%
Ears and hearing	26	96	94	97.9%	2	2.1%
Nose and olfaction	21	101	100	99.0%	1	1.0%
Oropharyngeal cavity	13	109	107	98.2%	2	1.8%
Teeth condition	19	103	64	62.1%	39	37.9%
Neck and thyroid	12	110	106	96.4%	4	3.6%
Chest	11	111	111	100.0%	0	0.0%
Breast	20	51	49	96.1%	2	3.9%
Lungs	11	111	111	100.0%	0	0.0%
Cardiovascular system	9	113	104	92.0%	9	8.0%
Abdomen	4	118	115	97.5%	3	2.5%
Liver and gallbladder	15	107	5	4.7%	2	1.9%
Per rectum examination	103	19	16	84.2%	3	15.8%
Urogenital system	61	61	56	91.8%	5	8.2%
Osteoarticular system	20	102	89	87.3%	13	12.7%
Nervous system	24	98	98	100.0%	0	0.0%

Table 2. Results of lab tests in study group

Laboratory tests	No of qualified patients	Results			
		Norm		Abnormal	
Morphology	90	71	79.0%	19	21.0%
Esr	95	76	80.0%	19	20.0%
Urine test	66	58	88.0%	8	12.0%
Glucose	95	88	93.0%	7	7.0%
Total cholesterol	97	61	63.0%	36	37.0%
HDL cholesterol	97	91	94.0%	6	6.0%
LDL cholesterol	97	75	77.0%	22	23.0%
Triglycerydes	97	78	80.0%	19	20.0%
ALT	54	49	91.0%	5	9.0%
AST	54	50	93.0%	4	7.0%
Thyrotropin	91	80	88.0%	11	12.0%
Thyroxin	72	67	93.0%	5	7.0%
Thriiodothyronine	36	36	100.0%	0	0.0%
PSA	18	18	100.0%	0	0.0%
Creatinine	47	44	94.0%	3	6.0%
Uric acid	35	30	86.0%	5	14.0%

Table 3. Results of diagnostic tests in study group

Other diagnostic tests	No of qualified patients	Results			
		Norm		Abnormal	
Spirometry	3	2	67.0%	1	23.0%
ECG	37	34	92.0%	3	8.0%
Abdominal ultrasound	79	59	75.0%	20	25.0%
Breast ultrasound	13	10	77.0%	3	23.0%
Thyroid ultrasound	16	9	56.0%	7	44.0%
Prostate ultrasound	3	3	100.0%	0	0.0%
CXR	8	5	63.0%	3	37.0%

utes). Average duration of the first stage, which was medical interview, basic vital parameters and anthropometric measurements performed by a nurse, medical receptionist or dietician was 49 minutes. The case of the longest performance of first stage lasted for 90 minutes, the shortest – for 30 minutes. Average duration of filling in the data of diagnostic results in the questionnaire form performed by a nurse, receptionist or dietician was 13 minutes. The case of the longest performance of this second stage lasted for 30 minutes, the shortest – for 5 minutes. Average duration of the third stage, which was physical examination, test results and attained data discussion and patent's status defining – performed by doctor was 33 minutes. The case of the longest performance of this step lasted for 65 minutes, the shortest – for 16 minutes.

Key results of the preliminary study

As a result of the periodic health examinations, the following diagnoses were made at the doctor's office: one (2.4%) report of cholelithiasis, 36 (85.7%) patients with hypercholesterolaemia, one (2.4%) case of diabetes mellitus type 2, one (2.4%) occurrence of hypothyroidism (TSH 17.78), and three (7.1%) cases of nephrolithiasis. In addition, three quick oncological diagnostics cards were issued with suspicion of neoplasms in the following localizations: adrenal glands, kidneys, and lungs. These patients are now undergoing further diagnostics. One patient with an abnormal lung image by chest X-ray was directed to a prophylactic Low-Dose Lung Tomograph which confirmed a suspicious oncological lesion. In addition, 12 (9.8%) patients at were at a high risk for depression, four (17.4%) patients had a strong nicotine dependence, 19 (15.6%) patients were at high risk for alcohol issues, and six (9.8%) patients had a high cardiovascular risk. During a qualitative study of 29 eligible patients for cardiovascular prophylaxis, the examination was performed in 28 (96.6%) people. Of the 17 women eligible for cervical cancer screening, five (29.4%) patients underwent the examination. Of the eight women eligible for breast cancer prophylaxis, the examination was performed in one (12.5%) patient while three patients (37.5%) did not participate in the screening.

Discussion

Behavioral risk factors are responsible for loss of 36% disability adjusted life-years (DALY), including smoking (18.6% for males and 7.9% for females) and alcohol consumption (9.5% for males and 1.7% females) [4]. Obesity is responsible for a loss of 9.1% years and reduced physical activity is responsible for a loss of 2.4% years [4]. Data collected during periodic health examinations will be used to systematically manage health programs in the population of PHC patients in coordination with other health systems. The proposed periodic health examination program results primarily from a lack of a comprehensive, coherent, and effective health prevention system, including activity planning, supervision of their implementation, and result evaluation, as evidenced by the report of the Supreme Chamber of Control. [20]. According to the Supreme Chamber of Control, primary care physicians were unable to provide and document preventive care. There are no adequate records or data on preventive measures, including diagnostic tests. Due to limited reporting, there is a lack of information about the nature of the medical examination (prophylactic or in relation to reported complaints). Actions taken in the area of preventive health, by local government are usually of an ad hoc nature as they lack the element of effect monitoring. For the discussion on the proposed preventive measures within the framework of the pilotage of PHC PLUS, the Supreme Chamber of Control report concludes there is a necessity in defining a coherent, comprehensive, and multifaceted concept of preventive actions aimed at preserving healthy living and prevention of diseases as well as NHS enforcement of PHC practitioners' implementation of health prevention procedures.

Impact of the results of the preliminary study

There are currently no similar analyses to this study, and the available studies and meta-analyses differ in terms of study objectives, study groups, timeframe of research, and range of studies [21–23]. The doubts concerning periodic health examinations in those who do not feel sick should be taken into account, as well as the fact that there is no clear evidence of the examinations' ineffectiveness [24,25]. Periodic health examinations are as thorough as possible based on signs and symptoms that should be standard upon the initial visit to a general practitioner. The in-depth examination would be closely correlated with risk factors/eligibility conditions derived from the interview and physical examination while maintaining the decision-making autonomy of the physician. At the same time, logically and socially, they enable rational resource management in accordance with the Donabedian theory [26].

The proposed program of periodic health examinations is a proactive model that invests in population health maintenance. The planned range of activities related to periodic health examinations is not solely based on the participation of healthy individuals. The assumption is that the periodic health examination program is intended primarily for that patient population, whereas PHC does not have sufficient knowledge of their health status. These are the patients who rarely or never use PHC services, but this does not mean that they are unhealthy. According to scientific reports, people with a higher risk of inferior health status (lower social status, smoking, low physical activity) are reluctant to benefit from primary care, and the greatest benefit of participating in preventive care should be visible in this group of patients [27]. In the area of disease prevention, the primary care physician should identify risk

factors and health risks of patients and take measures to reduce or eliminate them [9]. Performing individual tests (eg. Fagerström test, AUDIT-C) is reasonable if further interventions are performed. This was followed in the periodic health examination program, where they are an integral part of educational visits (simple counseling, short interventions). These are to be specifically targeted behavior risk factors such as smoking, physical activity, alcohol status, nutritional status, and those who have been exposed to these risks.

The planned periodic health examination program is complementary to existing and proposed chronic care models. The cost of the proposed health examination program, including hospital costs and patients in advanced stages of chronic (including oncological) diseases, allows for building a health investment policy through rational and efficient resource management. The lack of opportunities to obtain this basic social benefit is currently the cause of a poor quality assessment of our patients' function and care effectiveness in many evaluations (WHO, EU, etc.). This was the rationale behind the European Commission's grant to improve the quality of medical care in Poland.

Strengths and limitations

The study is not of epidemiological nature, but it may point to early prevention effectiveness of the proposed structure, which requires confirmation in a larger respondent group and centres with varying levels of health care coordination.

The proposed periodic health examination questionnaire is not a screening test. It is only an auxiliary tool for carrying out a periodic health examination and defines the basic scope of the data, which is a summary of the comprehensive knowledge about the health of the examined person based on the interview and physical examination. It is the basis for identifying risks, including behavioural ones.

Analyses in the further studies should take into account (a) the assessment of the "technological" potential of the periodic health examinations and (b) the organizational capacity of the health system. Only estimates of the time spent on one person's examination were made. There is no estimation of whether the resources of the medical, nursing, etc. staff are sufficient to cover the entire population. In this sense, the second aim is not fully realized and will be continued in further studies.

In fact, two groups were examined. First, invited people whose health was not known, and second, people who probably have had a health problem causing absenteeism. Such internal variation in the group could affect the results.

Conclusions

In Poland, using the proposed scheme, periodic health examinations in adults, according to the most significant risk factors, are a form of prevention used by PHC teams in centers with elementary health care coordination. However, the proposed periodic health examination program requires further investigation in more dense populations and centers with varying levels of health care coordination.

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Correspondence address:
mgr Marika Guzek
Koordynator Projektów Medycznych
Centrum Medyczno-Diagnostyczne Sp. z o.o.
ul. Kleeberga 2, 08-110 Siedlce
Phone: (+48) 517 203 710
E-mail: marika.guzek@centrum.med.pl

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QUANTITATIVE ASSESMENT OF MENUS FROM NURSING HOME

OCENA ILOŚCIOWA JADŁOSPISÓW REALIZOWANYCH W DOMU POMOCY SPOŁECZNEJ

Marzena Zołoteńka-Synowiec[A,D–F]
Ewa Malczyk[C,D,F]
Beata Całyniuk[D,F]
Marta Misiarz[D,F]
Aleksandra Zgraja[B,E,F]

Institute of Health Sciences,
University of Applied Sciences in Nysa, Poland

A – przygotowanie projektu badania | study design, **B –** zbieranie danych | data collection, **C –** analiza statystyczna | statistical analysis, **D –** interpretacja danych | interpretation of data, **E –** przygotowanie maszynopisu | manuscript preparation, **F –** opracowanie piśmiennictwa | literature review, **G –** pozyskanie funduszy | sourcing of funding

SUMMARY

Background: A properly balanced diet in terms of quantity and quality of the products consumed should meet the needs of elderly people in terms of energy value and nutrition.

Aim of the study: The aim of the study was to perform a qualitative and quantitative assessment of ten-day menus used by nursing homes which varied according to season.

Material and methods: The study included 40 ten-day menus, prepared for the four seasons of nursing home residents. A quantitative assessment of the meals was carried out using the Diet 5 computer program and Microsoft Excel statistical analyse the data, which included the average, median and coefficient of variation.

Results: The average energy value for all the seasons showed no significant differences. The fat and dietary fibre content in the menus was suitable for the group, regardless of the season. The average carbohydrate content was in the suitable range only in summer. In contrast, the dietary protein requirement for the elderly was at acceptable levels in autumn alone.

Conclusions: The menus assessed did not show many errors, however special attention must be paid when planning the diet for the elderly.

KEYWORDS: elderly people, nutrition, nutrients, quantitative evaluation of menus

STRESZCZENIE

Wstęp: Odpowiednio zbilansowana pod względem ilości spożywanych produktów dieta zapewnia pokrycie zapotrzebowania osób w wieku podeszłym na energię i składniki odżywcze.

Cel pracy: Celem pracy była ocena ilościowa jadłospisów dekadowych zrealizowanych w Domu Pomocy Społecznej, w zależności od pory roku.

Materiał i metody: Badaniem objęto 40 dekadowych jadłospisów, sporządzonych w ciągu czterech pór roku dla pensjonariuszy DPS. Przeprowadzono ocenę ilościowa racji pokarmowych przy użyciu programu komputerowego Dieta 5 i wyliczono dane statystyczne, podając średnią, medianę oraz współczynnik zmienności, przy zastosowaniu programu Microsoft Excel.

Wyniki: Średnia wartość energetyczna we wszystkich sezonach nie wykazała znaczących różnic. Również ilość tłuszczów i błonnika w badanych jadłospisach pokrywała zapotrzebowanie dla grupy, niezależnie od pory roku. Średnia

zawartość węglowodanów mieściła się w zakresie wyliczonym dla tego składnika wyłącznie latem. Natomiast białko to składnik, którego zapotrzebowanie dla osób w wieku podeszłym było regulowane prawidłowo tylko jesienią.

Wnioski: W ocenianych jadłospisach nie wykazano licznych błędów, jednak należy zwracać szczególną uwagę przy planowaniu odżywiania osób w wieku podeszłym.

SŁOWA KLUCZOWE: osoby w wieku podeszłym, odżywianie, składniki pokarmowe, ocena ilościowa jadłospisów

Background

Poland is one of the countries in the world where the prolonged average life span is observed. The increasing the number of elderly people in demographic forecasts amplifies the interest in their nutrition and quality of life. More and more attention is paid to pro-health behaviours, which affect the prolongation of human life and limit the development of age-related diseases [1].

The heterogeneity of this group restricts the development of universal dietary recommendations. Difficulties are being encountered in the creation of one optimal diet model that would be acceptable by the elderly and at the same time balanced, both economically and customary, while meeting the recommendations for rational nutrition of the elderly.

The knowledge that, with age, the demand for nutrients and also the way they are used by the body is changing, is essential for seniors [3], because more often than not, the diet of the elderly is incorrect. It should also be noted that the poor eating habits are usually fixed, therefore any change can be difficult. That is why, every modification should be introduced gradually. This is especially important in hospital settings, sanatoria, or social welfare homes, where the patient is prescribed a diet. In many cases, its composition, or the taste itself is not accepted by the elderly [2].

Lack of varied meals and a monotonous diet is a common mistake made by the elderly. Food choices are also limited by medication taken and numerous diseases. Seniors lead a more settled life than younger people, because they have no professional obligations. However, the frequency of meals is not adequate to the metabolic potential of the body. They often eat 3 meals a day, so snacking is another problem. Their diet usually consists of grain products, less often fruits, vegetables, milk and dairy products. This leads to an increase in its energy value. Moreover, the frequency of snacking increases in older age groups and often replaces basic meals, which negatively affects the quality of the diet [4].

Another common problem in geriatric populations is the reduction in the consumed amount of foods and fluid. These are the main causes of weight loss. In consequence, poorly balanced meals and low nutritional value lead to excessive intake of fats, cholesterol, phosphorus and sodium. Elderly people are also more vulnerable to deficiencies of vitamins and minerals. This is a serious health threat, because these deficiencies can aggravate existing conditions and increase the risk of nutritionally-dependent diseases [4].

Aim of the study

The aim of the study was to evaluate quantitative and qualitative ten-day menus realized in the nursing home, depending on the season.

Material and methods

The menus, which were prepared in the nursing home in Lower Silesia, were subjected to assessment. The meals were prepared in a canteen located in the facility. Due to the use of the ten-days menus, for each season of the year, 10 randomly chosen ones were taken into account, that is, spring, summer, autumn and winter.

In order to analyse 40 daily meals prepared for the residents of the nursing home and meals, which consisted of 3 basic meals, the Diet 5 program was used. Energy value, the content of nutrient and fibre were taken into account. Considering the physical activity of the elderly (1.4), using the norms developed by the Food and Nutrition Institute [5], the average norms of the analysed nutrients were calculated for people over 60 years of age. For this purpose a formula was used, where K – the norm for women, M – the norm for men. The results were compared with the calculated mean values of the norm for the elderly at the level of average consumption (EAR) for the energy value and nutrient content, and an adequate intake (AI) of the dietary fibre. The results were statistically analysed giving the mean value (X), the median and coefficient of variation (CV). The calculations were performed using Microsoft Excel.

Results

Tab. 1 shows the energy value and nutrient content of the four-season diets. The average energy value in all seasons showed no significant differences. It was the highest in the winter (1970 kcal), which covered 106% of the standard consumption, and the lowest in the autumn (1941 kcal), providing 105% of the daily energy demand.

Also the amount of fat in the menus studied covered the demand for the group, regardless of the season. The lowest intake of this component was shown in the spring (55 g), which covered 95% of the standard, whereas in the winter the fat content in the diet increased to 61 g, providing 106% of daily intake.

Dietary fibre was another component, whose amount in the rations in all the seasons, covered the daily requirements of the study group and was 19 g on average.

Table 1. Energy value and nutrient content in the studied menus, depending on the season

Season	Assessment parameters	Analyzed nutrient				
		Energy	Protein	Fats	Carbohydrates	Fibre
Spring	X	1960 kcal	87 g	55 g	296 g	19 g
	Median	1973 kcal	84 g	50 g	289 g	19 g
	CV	6%	17%	23%	9%	21%
	% of the norm	106%	124%	95%	–	95%
Summer	X	1965 kcal	85 g	60 g	289 g	19 g
	Median	1969 kcal	84 g	59 g	295 g	19 g
	CV	5%	17%	17%	7%	14%
	% of the norm	106%	121%	103%	–	95%
Autumn	X	1941 kcal	74 g	56 g	303 g	20 g
	Median	1908 kcal	79 g	57 g	287 g	19 g
	CV	5%	19%	24%	10%	17%
	% of the norm	105%	106%	97%	–	100%
Winter	X	1970 kcal	80 g	61 g	292 g	19 g
	Median	1948 kcal	79 g	60 g	294 g	20 g
	CV	4%	14%	22%	8%	20%
	% of the norm	106%	114%	105%	–	95%

X – mean, CV – coefficient of variation

The mean of carbohydrate content was within the range calculated for this component only in the summer. Elevated consumption was found in the remaining three seasons, with the highest in the autumn (303 g), accounting for 115% of the daily intake.

Protein is a component, whose demand for the elderly was suitable only in the autumn. In other seasons, an excessive amount of this component was observed in the menus studied. In the spring it was the most (87 g), which constituted 124% of daily demand for the study group.

Discussion

Our results have shown that the energy demand has been achieved in all evaluated menus. Similar results were obtained by Malczyk et al. [6] in studies evaluating the nutritional status of the people aged 60 and over, or Całyniuk et al. [7] in the analysis of the menus conducted in the selected nursing home and in Gacek [8] during an analysis done in one of the nursing homes in Cracow. In turn, in the assessment conducted by Stawarska et al. [9] in the Warsaw association and by Różańska et al. [1] in Tarnogóra and in WOBASZ's study [10], it was observed that the energy value of meals relative to the nutritional recommendations was lower. On the other hand, excessive energy supply was found in a study conducted by Grochowska-Niedowork et al. [11] with a 3-time repeated 24-hour interview on consumption of products and meals in nursing home in Silesia and by Leszczyńska et al. [12] in the prepared menus in the selected nursing home and therapeutic welfare units. The proper energy value of meals is very important, because the health risk for the elderly may be due to insufficient energy supply, leading to malnutrition and obesity resulting from excessive calorie diet [13].

The basis of a properly balanced diet is adequate distribution of macro nutrients in the daily food intake. The own analysis of protein, fat, carbohydrates and dietary fibre in the diets showed irregularities in the menus. The protein intake by nursing house residents was within the normal limits only in autumn. Comparable results were obtained by other authors [7,9,11] in the conducted study on the evaluation of menus for the elderly. The amount of protein in the rest of the year in the menus studied was reported to be in excess. Similarly, excessive protein intake was reported by Malczyk et al. [6], in a study evaluating the diets of people aged 60 and over from Jodłowo and Nadziejów and Gacek [8] in the analysis of food rations conducted in Cracow in the nursing home and by Leszczyńska et al. [12] during the evaluation of menus in the selected nursing home and nursing and therapeutic welfare units. Although, it is believed that a small excess of this components is harmless to the body, it should be emphasized that prolonged consumption of too much protein may contribute to overloading of the kidneys and liver, which is a serious health risk for the elderly [14].

Fat is the primary source of energy in the diet. Our own research has shown that this component, regardless of the season, was within the upper limit of the norm. While other authors [6,7,10–12] reported an excess in its recommended intake in the analyses of the menus or diets of the elderly. It should be emphasized that the correct amount of this component is important, because its excess, in combination with limited physical activity of the elderly, may contribute to being overweight or obesity and to increased incidence of car-

diovascular disease [15]. In turn, the shortage of fats in the diet can lead to deficiency in fat-soluble vitamins; A, D, E and K [5].

In the case of average amount of carbohydrates in the menus assessed only in the summer the norm was realized at the correct level. The excess of carbohydrates in the diet leads to a positive energy balance, which is largely responsible for the prevalence of being overweight and obesity in the elderly [15]. Too much of this component was noted in the spring, winter and autumn. Similar results were obtained by Leszczyńska et al. [12] in the studies conducted in the selected nursing home and in the nursing and therapeutic welfare units Malczyk et al. [6], Calyniuk et al. [7], Stawarska et al. [9] and Grochowska-Niedworok [11] in their studies obtained different results, indicating an insufficient amount of carbohydrates in the diet. The proper supply of this component is essential for the proper functioning of the body, as one of the effects of too little carbohydrate supply in food rations can be ketosis associated with nutritional deficiencies [5].

Another important element of the senior's diet is fibre, which slows down the absorption of sugars and reduces the absorption of toxic substances. Moreover it accelerates intestinal peristalsis what has positive effect on health of the elderly. Own analysis showed satisfactory coverage of standards for fibre evaluated in the menus in all seasons. Also the correct amounts of this components n the diet of the elderly were obtained by Calyniuk et al. [7], Gacek [8] and Leszczyńska et al. [12]. On the other hand, insufficient dietary supply of dietary fiber has been reported by other authors [1,6,10,11], where too little of this ingredient was found in the nutritional assessment of the elderly.

Conclusions

1. The energy value of the analysed menus was correct regardless of the season.
2. In the case of fats and dietary fibre, the amount of these constituents was within the limits of daily intake.
3. The share of energy derived from protein only in the autumn covered the daily demand. In contrast, in the spring, summer and winter it was too high.
4. The carbohydrate intake exceeded recommended amounts in the spring, winter and autumn. In turn, the summer supply of this nutrient in the diet was correct.

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Correspondence address:
Marzena Zołoteńka-Synowiec
ul. Ujejskiego 12, 48-300 Nysa
Phone: (+48) 668 177 666
E-mail: marzena.zolotenka-synowiec@pwsz.nysa.pl

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THE STANDARD OF CARE OF STUDENT NURSES IN HOSPITAL PRACTICE – PATIENTS' EVALUATION

POZIOM OPIEKI PIELĘGNIARSKIEJ ŚWIADCZONEJ PRZEZ STUDENTÓW PIELĘGNIARSTWA ODBYWAJĄCYCH ZAJĘCIA PRAKTYCZNE – OCENA PACJENTÓW

Mariola Wojtal[A,C–F]
Teresa Niechwiadowicz-Czapka[D–F]
Ewa Radwańska[B,D–F]
Anna Klimczyk[B,E]

Nursing Faculty, Opole Medical School, Poland

A – przygotowanie projektu badania | study design, **B –** zbieranie danych | data collection, **C –** analiza statystyczna | statistical analysis, **D –** interpretacja danych | interpretation of data, **E –** przygotowanie maszynopisu | manuscript preparation, **F –** opracowanie piśmiennictwa | literature review, **G –** pozyskanie funduszy | sourcing of funding

SUMMARY

Background: Conscious evaluation of nursing care through the experiences of the patient can be a valuable resource for creating an effective education system and a good criterion for its establishment. In order to improve the quality of nursing care, it is necessary to continually develop students' knowledge and ensure they practice their professional skills.

Aim of the study: The aim of this study is to evaluate the standards of nursing practice among student nurses who participate in practical classes in hospital training centres.

Material and methods: The studies were performed on 190 patients hospitalized on medical and surgical wards in Opole. The research was based on a survey specifically prepared for this study. The respondents gave their answers using a numerical scale from 1 to 5 (1 = lowest rating, 5 = highest rating). Average student skill level data are presented as the arithmetic mean across all measures.

Results: Skilled nurse candidates are required to possess specific predispositions and an appropriate attitude, expected of professional ethics. The assessment of student behavior and ethical approach is highly significant (average appraisal: 4.98). Students who are present on wards have a positive influence on patient well-being (4.97). Assessment of behavior and respect for patient rights received an average score 4.94 and 4.95. Patients evaluated student communication skills (the manner in which important information is explained to patients) as low – 4.75; similarly, a lower score was given to the level of health education (4.73).

Conclusions: 1. Greater emphasis needs to be placed on the health education of student nurses. 2. The ability of student nurses to communicate with patients, on matters relating to treatment, requires further improvement.

KEYWORDS: patient, student, evaluation, nursing care standards

STRESZCZENIE

Wstęp: Świadoma ocena opieki pielęgniarskiej przez pryzmat doświadczeń człowieka chorego stanowi bardzo cenne źródło i kryterium jakości kształcenia. Podniesienie poziomu jakości świadczonej opieki pielęgniarskiej wymaga ciągłego pogłębiania wiedzy i doskonalenia umiejętności zawodowych.

Cel pracy: Ocena poziomu opieki pielęgniarskiej sprawowanej przez studentów pielęgniarstwa odbywających zajęcia praktyczne w placówkach szkoleniowych.

Materiał i metody: Badanie przeprowadzono metodą sondażu diagnostycznego wśród 190 pacjentów hospitalizowanych w oddziałach chorób wewnętrznych i chirurgii opolskich szpitali. Kwestionariusz ankiety opra-

cowano dla potrzeb pracy. Badani dokonali oceny w oparciu o skalę numeryczną 1–5. Liczba 1 oznaczała ocenę najniższą, liczba 5 – najwyższą. Z uzyskanych ocen obliczono średnią arytmetyczną w celu prezentacji średniej oceny umiejętności studentów.

Wyniki: Od kandydatów do zawodu pielęgniarki/pielęgniarza wymagamy ściśle określonych predyspozycji oraz postawy zgodnej z wartościami etyki zawodowej, dlatego bardzo znamienny jest wynik badania w postaci najwyższej oceny kultury osobistej i etycznej postawy studentów (średnia ocen 4,98). Obecność studentów na oddziale skutkuje dobrym wpływem na samopoczucie chorych (4,97), a zachowanie się studentów na oddziale i przestrzeganie praw pacjenta uzyskały średnią ocen 4,94 i 4,95. Najniżej pacjenci ocenili kompetencje studentów związane z komunikacją (sposób przekazywania ważnych informacji chorym – 4,75) i edukację zdrowotną (4,73).

Wnioski: 1. Należy położyć większy nacisk na kształcenie umiejętności prowadzenia przez studentów edukacji zdrowotnej. 2. Umiejętności studentów w zakresie komunikacji terapeutycznej z pacjentami wymagają ciągłego kształtowania oraz doskonalenia.

SŁOWA KLUCZOWE: pacjent, student, ocena, poziom opieki

Background

Increasing the quality level of nursing care requires continuous improvement of knowledge and professional skills. In order to achieve the best results in this field it is necessary to start with nursing education. Conscious evaluation of nursing care, through the prism of the patient's experiences, is a very valuable source and a measure of the quality of education [1]. A patient is the best informant and insightful observer who remembers many details, reactions and behaviours they encounter while staying in contact with medical staff, including nursing students undergoing practical training. The level of nursing care and its assessment is related to students' responsibilities, self-control and self-improvement [1]. Nowadays, a patient actively participates in the treatment process, has a good knowledge of health and makes informed decisions about their treatment [2]. Systematic evaluation by patients of the level of nursing care provided by the students gives an opportunity to improve the effectiveness of education, which has a direct impact on the future of improving the quality of medical services, provided in health care facilities. Nursing care directed at a patient requires a nurse/student to perform a large set of specific activities [3]. These include instrumental and caregiving ones that play a leading role in the nursing treatments, which is to be understood as a sequence of logically and temporally related actions undertaken and performed by a nurse in the health or illness of individuals and entire social groups [3].

Aim of the study

The aim of this study is to assess the level of nursing care provided by nursing students undergoing practical training in training facilities.

Material and methods

The study was carried out from November to December 2016, among 190 male and female patients, aged 25–75, hospitalized in the wards of internal medicine and surgery in Opole, where the students of the Department of Nursing of the Public Higher Medical Professional School in Opole carried out their practical training. For that reason, the approval of the bioethics committee was obtained. The conditions to include a patient in the study were: the patient's informed consent to participate in the study, preserved logical verbal contact and provision of nursing care for the patient by the students. A diagnostic questionnaire was developed for the needs of this study. The evaluations of the level of nursing care, which was provided by the students, was carried out using a numerical scale of 1–5, where number 1 was the lowest rating, whereas number 5 was the highest.

The patients expressed their evaluation in the following areas:

- Effectiveness of nursing treatments (toilet, making beds, changing bed linen, feeding, etc.).
- Patient's preparation for nursing, diagnostic and therapeutic treatments, the way of communicating important information to the sick,
- Efficiency of performing diagnostic and therapeutic treatments (e.g. blood sampling, setting an intravenous injection, drug administration, etc.).
- Interest in the needs of the patient, devotion of time and attention to the patient,
- Behaviour of students in the ward,
- Health education about the patient's lifestyle (nutrition, physical activity, stimulants, etc.)
- The impact of the students' presence on patient well-being,
- Students' personal culture and their ethical attitudes,
- Students' respect for patient rights.

From the obtained results an arithmetic mean was calculated in order to present the average scores in these individual areas.

Results

Patients appreciate a very high level of nursing care provided by students pursuing practical classes in training facilities; the average rating is 4.88. The results

of evaluation of the effectiveness of nursing activities (toilet, making beds, changing bed linen, feeding, etc.), diagnostic and therapeutic activities (blood sampling, setting an intravenous injection, administration of medication, etc.) and preparation of a patient for nursing, diagnostic and therapeutic activities is presented in Tab. 1.

Fig. 1 shows the average rating of the efficiency of nursing students in performing medical treatments at the level of their undergraduate training in the evaluation of patients

The result of the study, in terms of the highest rating concerning personal culture and ethical attitudes of students, is very significant: 186 patients (97.89%) rated is as very good and 4 (2.11%) rated is as good; the average rating was 4.98.

The presence of students in the ward has a very positive effect on the well-being of patients during hospitalization: 184 patients (96.84%) rated this influence as very good and 6 (3.16%) rated it as good; the average rating in this area was 4.97.

The patients also very highly rated the respect for patient rights and the behaviour of students in the ward; the breakdown of ratings is shown in Tab. 2 and the mean in Fig. 2.

The patients evaluated the students' competences related to communication and health education as the lowest. A method of conveying important information to the patient was assessed as very good by 161 people (84.74%), 23 rated it as good (12.1%) and 6 as satisfactory (3.16%). Health education concerning lifestyle (nutrition, physical activity, stimulants, etc.) was assessed as very good by 158 patients (83.16%), 23 rated it as good (12.1%), while 5 rated it as satisfactory (2.6%), and 4 as mediocre (2.11%). The average ratings in these areas are shown in Fig. 3.

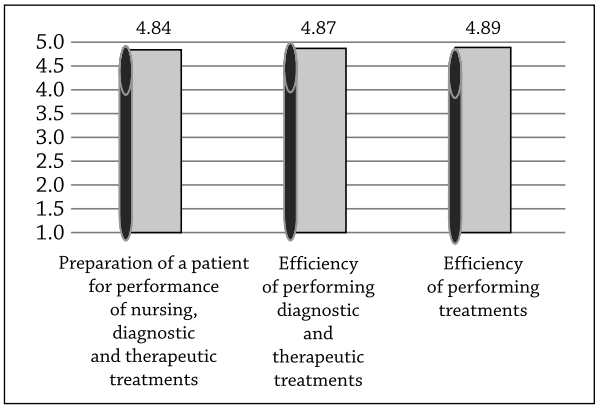

Figure 1. Opinions on the effectiveness of the procedure and the preparation of a patient for their performance

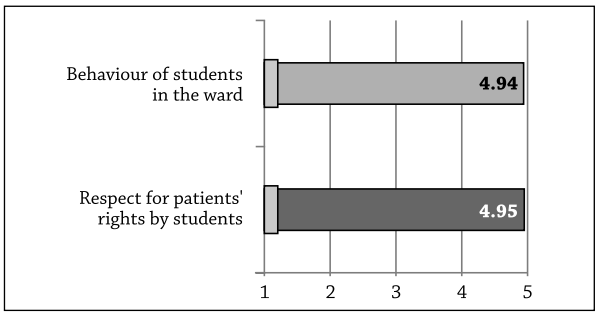

Figure 2. Patients' opinions regarding the respect for patients' right and behaviour of students in a ward

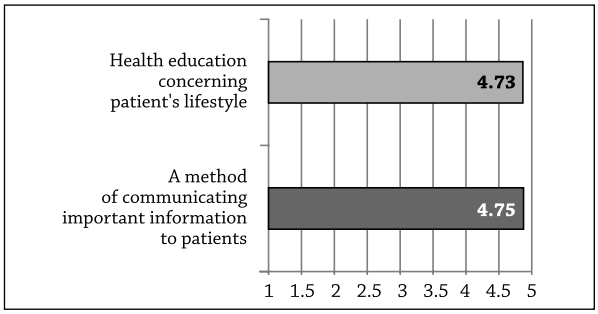

Figure 3. A method of communicating important information to the sick and health education about lifestyle

Discussion

Nursing students undergoing practice and work placements in hospital wards are part of the therapeutic team, understood as a group of people with different

Table 1. Rating distribution of the efficiency of care treatments and the preparation of a patient to perform them

No.	Scope of rating	Rating									
		5		4		3		2		1	
		n	%	n	%	n	%	n	%	n	%
1.	Efficiency of nursing treatments	175	92.10	13	6.84	1	0.53	1	0.53	0	0
2.	Efficiency of performing diagnostic and therapeutic treatments	171	90.00	14	7.37	4	2.10	1	0.53	0	0
3.	Preparation of a patient to the treatments	169	88.95	17	8.95	3	1.57	1	0.53	0	0

Table 2. Distribution of ratings regarding the respect for patients' rights and behaviour of students in the ward

No.	Scope of rating	Rating									
		5		4		3		2		1	
		n	%	n	%	n	%	n	%	n	%
1.	Respect for patients' rights by students	180	94.74	9	4.73	1	0.53	0	0	0	0
2.	Behaviour of students in the ward	179	94.21	11	5.79	0	0	0	0	0	0

professional background who provide diagnostic, therapeutic and facilitating services to patients. The study on the evaluation of the level of nursing care provided by nursing students during practical training has not yet been carried out by other medical schools.

Nursing skills are initially taught in simulated situations (professional skills labs), the next stage is the natural environment (practical classes and work placements in medical institutions). The condition for shaping a given skill is a multiple of repetition, consistent with the rules and procedures. Efficiency in the performance of a given activity depends on one's professional experience determined by job seniority. The obtained results of the conducted study indicate a high evaluation of the efficiency of the students performing nursing, diagnostic and therapeutic treatments. Similar results were obtained in a study conducted by the students of Public Higher Medical Professional School in Opole in 2010, where 92% of respondents were satisfied with the nursing care provided by the students and the treatments that they performed, while only 8% expected that "it could be better" [4].

A nursing profession requires specific predispositions and character traits, attitudes and behaviour consistent with the values of professional ethics. Students of this profession, learn how to care for patients, help and support them. They try to do their jobs with the utmost accuracy and care. In everyday practice, they meet with both patients' praise and gratitude, but also with their lack of trust. The necessity of hospitalizing a patient confronts medical staff with many specific tasks related to the provision of a hospital environment, which is hospitable and conductive, and at the same time minimizes the inconvenience and the consequences of separation from the home environment. Hospitalization, especially the prospect of surgery, is a difficult situation for most people. Loss of self-reliance and dependence on strangers, lack of contact with the family, staying with other patients, being embarrassed by medical treatments performed by people, often much younger than the patient, the accompanying pain and other ailments, it all results in experiencing a sense of danger by a patient. According to Grochans and the team, Polish patients expect a nurse to be "an angel of goodness" [5] and according to Nowicki, a common image of a nurse and a midwife is that they accompany each of us from birth to death. The results obtained in 2010 confirmed this image with respect for prospective nurses. Patients believed that a trainee student should be: "a good Samaritan", "open to human suffering", "of gentle character, sensing patient's needs", "kind to the suffering person". In addition, other qualities such as caring, patience, understanding and composure are also desirable. Present results also point to patients' high expectations of students to be interested in their needs, pay attention to them and spend time with them. The impact of students' presence on the well-being of patients and their personal culture is evaluated positively. Similar results were obtained in 2010, when most of the surveyed patients were satisfied with the presence of students in the ward and found the trainees to be very nice, attentive and respectful [4].

In the course of preparation for a nursing profession, it is necessary to have both theoretical and practical background in this field. The Regulation of the Minister of Science and Higher Education, on the content and effects of education in the field of philosophy and ethics of a nursing profession for a major in nursing, draws attention to student's skills and competences, among others, the ability to identify basic ethical values and the use of the principles of the Code of Ethics, thus respecting patient's rights in a clinical practice. In addition to theoretical preparation, students should be taught about appropriate behaviour and respect for patient's rights, especially during their practical training and work placement, while observing the behaviour of their teachers and all the people involved in the treatment of a patient. Medical practitioners are required to respect patient's autonomy and dignity, which is protected by patients' rights under the Patient Rights Act and Patient Rights Advocate of November 6, 2008.

Respecting the dignity of a patient is expressed, inter alia, in the protection of their privacy and having respect for a patient's consent (or refusal) for the actions which are undertaken towards them. [7]. The consent (or refusal) can be expressed by a patient in various forms. Most often it is written or a casual one i.e. oral or implicit. The implicit form can be expressed by gesture e.g. a nod of the head [8,9].

Observing patient rights is a prerequisite for proper nursing care and treatment.

Patients do not always know the skills of the trainees, so sometimes their fears are not expressed directly, and at times they refuse to grant permission for a surgery performed by a student, because they are "still young and inexperienced people." However, the vast majority of respondents in 2010 were willing to undergo student-cantered procedures ("everyone must learn") and were not afraid of them, provided the student performed the treatment under the supervision of experienced nurses [4]. Similar results were obtained in the current study by Olejniczak et al., in which most of the students respected the patient's right to confidentiality and autonomy, while observing the patient's right to respect his or her dignity indicate an urgent need to pay attention to this problem [10]. Our results in this area are highly satisfactory. A similar study by Tawaj et al. among nurses and midwives shows that the vast majority of respondents (93.0%) inform patients about the planned treatments and perform them only if they receive their consent [7]. Patients rated the student's ability to conduct trainings on health education as the lowest. Monika Bińkowska-Bury et al. in their studies prove that health promotion and preventive activities require greater dissemination, not only among students but also among medical staff [11]. According to many specialists a conversation with

a patient about obesity and physical activity can be of great health benefit [11].

One of the limitations of this study is obtaining consent from hospitals and patients to complete the questionnaire, but it will be continued as a result of changes in nursing education standards and patient expectations towards this occupational group and their satisfaction with nursing care.

Conclusions

1. More emphasis should be placed on the education of students' ability to teach about health education.
2. Students' skills in therapeutic communication with patients require continuous shaping and improvement.

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Correspondence address:
mgr Anna Klimczyk
Państwowa Medyczna Wyższa Szkoła Zawodowa w Opolu
ul. Katowicka 68, 45-060 Opole
Phone: (+48) 784 784 125
E-mail: annazaleszczuk-klimczyk@wp.pl

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APPLICATION OF VARIOUS PHYSIOTHERAPEUTIC METHODS IN A CONSERVATIVE TREATMENT OF NEUROGENIC SCOLIOSIS IN A COMATOSE PATIENT – A CASE REPORT

ZASTOSOWANIE RÓŻNYCH METOD FIZJOTERAPEUTYCZNYCH W LECZENIU ZACHOWAWCZYM SKOLIOZY NEUROGENNEJ U PACJENTKI W ŚPIĄCZCE – OPIS PRZYPADKU

Dorota Gruszczyk[1 A,B,D]
Antonina Kaczorowska[2 A,E,F]
Aleksandra Katan[1 E,F]

[1] Physiotherapy Department, Higher School of Management and Enterprise in Wałbrzych, Poland

[2] Physiotherapy Faculty, Opole Medical School, Poland

A – przygotowanie projektu badania | study design, **B –** zbieranie danych | data collection, **C –** analiza statystyczna | statistical analysis, **D –** interpretacja danych | interpretation of data, **E –** przygotowanie maszynopisu | manuscript preparation, **F –** opracowanie piśmiennictwa | literature review, **G –** pozyskanie funduszy | sourcing of funding

SUMMARY

Background: Conservative treatment of scoliosis is difficult and does not always result in improvement. Correcting scoliosis of a patient in a coma presents a great challenge due to lack of contact with the patient, thus lack of cooperation during therapy, as well as the inability to perform active movements. As a result this makes the therapy much more difficult and reduces to a great extent the range of methods available. This problem is complex, so relying on one therapeutic technique is usually inefficient. However, by using a combination of different techniques positive results can be achieved.

Aim of the study: The aim of the study is to describe the methods and results used in the treatment of neurogenic scoliosis in an eight-year-old female, comatose patient.

Case report: The patient described here is an eight-year-old girl in a coma, who was diagnosed with scoliosis. In order to reduce the process of spinal deformation, the patient was treated with Vojta, NDT-Bobath, proprioceptive neuromuscular facilitation (PNF) and fascial therapy, together with a flexible stabilizing medical corset. Fascial therapy was carried out on the abdominal walls, chest, shoulders, shoulder blades and in the thoracic and lumbar section of the spine. According to the Vojta method, exercises in three positions with different combinations were used. The NDT-Bobath method was used to practice patterns of proper head maintenance in space relative to the torso, correct positioning of the upper and lower limbs in the support and proper pelvis positioning. Exercises using the PNF method relied on the therapist performing passive movement patterns of the shoulder blade, pelvis, head and neck, as well as some to the upper and lower limb patterns. The effects of the treatments on the torso were fixed with a flexible corset.

Results: The therapeutic methods used here contributed to a reduction and improvement of the scoliosis.

KEYWORDS: neurogenic scoliosis, coma, scoliosis conservative treatment, physiotherapy

STRESZCZENIE

Wstęp: Leczenie zachowawcze skolioz jest trudne i nie zawsze prowadzi do uzyskania poprawy. Korekcja skoliozy u pacjenta przebywającego w śpiączce jest dużym wyzwaniem, ponieważ brak kontaktu z pacjentem oraz związany z tym brak współpracy podczas terapii i niemożność wykonywania ruchów czynnych w dużym stopniu utrudnia leczenie i ogranicza możliwość stosowania w pełni wielu metod terapeutycznych. Ze względu na złożoność problemu praktykowanie jednej metody nie jest skuteczne. Łączne stosowanie kilku metod terapeutycznych może dać pozytywne rezultaty.

Cel pracy: Celem pracy jest przedstawienie metod i wyników terapii skoliozy neurogennej u ośmioletniej pacjentki będącej w śpiączce.

Opis przypadku: Opisywaną pacjentką jest ośmioletnia dziewczynka przebywająca w śpiączce, u której zdiagnozowano skoliozę. Aby zahamować proces deformacji kręgosłupa, u pacjentki zastosowano terapię metodą Vojty, NDT-Bobath, PNF, terapię powięziową oraz stosowanie elastycznego gorsetu stabilizacyjnego. Terapia powięziowa prowadzona była na powłokach jamy brzusznej, klatce piersiowej, barkach, łopatkach oraz na grzbiecie w odcinku piersiowym i lędźwiowym. Według metody Vojty stosowano ćwiczenia w trzech pozycjach z różnymi kombinacjami. Metodą NDT-Bobath ćwiczono wzorce prawidłowego utrzymania głowy w przestrzeni względem tułowia, prawidłowego ustawienia kończyn górnych i dolnych w podporze oraz prawidłowego ustawienia miednicy. Ćwiczenia metodą PNF polegały na biernym wykonywaniu przez terapeutę wzorców ruchowych łopatki, miednicy oraz głowy i szyi a także niektórych wzorców kończyny górnej i dolnej. Efekty prowadzonych terapii w obrębie tułowia utrwalane były przez zastosowanie elastycznego gorsetu.

Wnioski: Zastosowane metody terapeutyczne wpłynęły na zmniejszenie się skoliozy i poprawę sylwetki dziewczynki.

SŁOWA KLUCZOWE: skolioza neurogenna, śpiączka, leczenie zachowawcze skoliozy, fizjoterapia

Background

Scoliosis is not just a cosmetic defect. It may have long-term health effects, which result from a prolonged abnormal alignment of the body, such as respiratory and circulatory disorders, reduced physical capacity or spinal pain [1].

The treatment of conservative scoliosis is difficult and does not always result in improvement. Correcting scoliosis of a patient in a coma is a great challenge due to lack of contact with the patient which leads to lack of cooperation during the therapy as well as lack of possibility to perform active movements. A comatose patient shows no signs of arousal or self-consciousness or the environment, does not perform any movements, and therefore is unable to work independently during the therapy [2]. In addition, the longer the time from the onset of scoliosis to the end of the child's growth process, the greater the risk of a larger and more complicated spinal deformity.

There are different methods of treatment of scoliosis [3–6]. Most of the effective ones, in a conservative treatment of scoliosis, are based on the active cooperation of a patient and the performance of appropriate therapeutic exercises [5,7,8]. Therefore, the conservative treatment of scoliosis in a comatose patient is not an easy task. Due to the complexity of the problem, the use one method is not effective. However, combing a few therapeutic techniques can bring positive results.

Aim of the study

The aim of the study is to present the methods and results of the treatment of neurogenic scoliosis in an eight-year-old female, comatose patient.

Case report

A patient described here is an eight-year-old Sandra. Her legal guardian (the mother) has agreed to place the child's photography in the work as well as in the manuscript.

The girl was born in the 32nd week of pregnancy, with a weight of 1200 grams. She was assessed as a pre-term infants with symptoms of hypoxia and asphyxia. Ultrasound examination showed internal hydrocephalus. The girl was qualified for surgery and the middle pressure ventricular-peritoneal valve was surgically implanted.

When the patient was 3 years old, the valve was unlatched. After several unsuccessful operational attempts, Sandra had external drainage inserted, followed by a surgical closure of the drain. The patient was put into a pharmacological coma. After discontinuation of sleep medications, the girl was waking up for a week, but did not regain consciousness. The state of coma was declared. The ventricle-peritoneal valve system was also established.

The prolonged coma, frequent seizures, increased muscle tension, contractile flexion, and rapid growth of the patient resulted in the development of scoliosis. The patient can neither walk nor sit one her own, she can only lie. When the girl reached the age of 6 years and 6 months, her asymmetrical body alignment was observed. In the front or back in the supine and sitting position, the patient clearly shortened the left side of the body, while the right side was quite stretched. She was setting her head with a bend and her face turned to the left.

To diagnose the scoliosis, the diagnostic methods had to be adjusted to the physical abilities of the

child. Because of the history of trauma and coma, the patient remained without consciousness and she was not able to perform any intentional movement on her own or consciously stand on her feet, therefore a computer analysis of the spine was impossible.

The visual assessment of the patient's posture at the back was performed in the supine position (Fig. 1a and 1b). In the frontal plane, the lines connecting the individual topographical points did not run concurrently. Anatomical points showed lack of symmetry between the right and left sides. The elevation of the lower shoulder blade angle, arched course of the spinous processes, hip extension, gentle rib hump, torso and shoulder triangle, difference in the position of the rear iliac spines and chest dislocation to the side and inclination of the head towards the shoulder joint on the side of the contracture were revealed. In the sagittal plane, the vertical was led in a sitting position while maintaining the tuberosity of the occipital bone. It differed significantly from the set of spinous processes and interstitium gap.

Figures 1a and 1b. The assessment of the patient's profile – the back (source: Author)

The visual assessment shown in Fig. 1a was carried out in an abdominal position with legs curled. In Fig. 1b, the patient is in an upright position on the abdomen. In this position, the contraction on the left side, strong stretch of the right side, difference in setting of the lower blade shoulder angles and pelvic rotation were very clearly visible.

The visual assessment of the front also showed irregularities and the lack of symmetry between the right and left side (Fig. 2). The assessment of the profile was conducted in a supine position on the back. The middle of the chin had no bearing on the indentation of the sternum, the vertical line was strongly shifted to the left. The chest was slightly sunken and contracted in the centre. Arched ribs humps were visible on the right side of the torso. On the left side of the torso the visibility of the rib arches was limited due to the established gastrostomy.

In the frontal plane there was no symmetry between the anatomical points of reference. The acromion were not in line. Differences also occurred in the line of costal arch and the anterior superior iliac spines. Sitting position revealed a rib hump.

An orthopedic surgeon, who diagnosed her using the dermatographic method did not choose to mark the point of reference on the patient's skin, because its sensitivity to touch resulted in a girl's nervousness, sorrowful grimace on her face, skin spots, increased muscle

Figure 2. The evaluation of the patient's profile – the front (own source)

tension and pathological hyperactivity and this could affect the correct selection of the points of reference and thus the correctness of the dermatographic image and the calculation.

Since the girl had been exposed for diagnostic purposes many times before, it was decided not to take another X-ray image. For the purpose of visual assessment, the current photograph was taken and used to diagnose an oesophageal reflux (Fig. 3). In the X-ray picture, the deformity of the spine is visible.

The health status of the patient and a large damage to the central nervous system excluded her from referral for surgery. More intensive rehabilitation was recommended in order to inhibit the progress of spinal deformity.

For this purpose, the patient was treated with Vojta, NDT-Bobath, PNF, fascial therapy and the use of a flexible stabilizing corset.

Since the fascial therapy affects relaxation of the connective tissue, it was the first one which was always used before all the other therapies. The aim of the treat-

Figure 3. X-ray of the patient (source: Author)

ment was to balance the muscular tension by relaxing the soft tissues. The patient was treated on the lower and upper limbs and the whole torso. Due to the fact that the main focus was to slow down the progression of scoliosis, the amount of this therapy was increased on the body. The treatment was performed 3 times a week on abdominal walls, chest, shoulder and shoulder blades, especially in the thoracic and lumbar sections. The patient was treated in a lateral position (Fig. 4a and 4b), in which the chest and back coatings were loosened.

Another therapeutic method used in the patient was Vojta therapy. Exercises in three positions with different combinations were introduced. As the girl quickly entered into the so-called escapement position (back stretching, strong muscular tension in the lower extremities, flexion of the upper limbs, treading away from the body's axis), the stimulation of the zones was often changed during the therapy, not allowing her to escape in the wrong pattern. The exercises on the girl were performed in the reflex turning phase. In this phase the chest area was stimulated with combinations of shoulder and pelvis areas. It was aimed at keeping the torso in the body axis and include the abdominal muscles to work. The starting position was lying on the back, in which the torso was in the axis of the body.

Exercises according to Vojta were always performed twice on each side, in the alternating right-left system.

Figures 4a and 4b. Fascia therapy of the spine ridge (source: Author)

Figure 5. The first phase of reflex turning (source: Author)

Figure 6. The first phase of reflex turning, left side (source: Author)

Figure 7. The second phase of reflex turning (source: Author)

In the second phase of the reflex turning (Fig. 7), the upper and lower iliac spine zones were combined with buttock and torso zones. The patient was in a lateral position, in which the therapist stimulated the affected areas while rotating the patient's torso.

The reflex turning was also stimulated in the patient in the sloping squat position (Fig. 8a and 8b). During the exercises the torso rotation was also used.

The third exercise conducted using Vojta method was reflex creep (Fig. 9). The primary stimulation zone was the heel zone. In addition, the combination of hip, thoracic, or medial epithelial humerus zone were stimulated, while holding the palm of her hand in the position of pronation. Reflex creep in a girl was also performed combined with the pull up of one or both of the lower limbs.

Figures 8a and 8b. Reflex turning in a sitting position (source: Author)

Figure 9. Reflex creep (source: Author)

Figure 10. NDT therapy – Bobath (source: Author)

The exercises using Vojta method were performed by the girl at home 3 times a day with weekly control of a therapists from the Neurorehabilitation Center in Wroclaw.

In addition, the patient was exercised using NDT-Bobath method. The patient was trained to maintain the proper patterns of the head positioning in a space relative to the torso, correct positioning of the upper and lower limbs in the support, and correct pelvic positioning, which translated into correct positioning of the spinal axis.

The therapist was placing the patient's head in the axle, the pelvis in a slight rotation and by correctly positioning of the arm in the support, she provoked the head of the humerus to the correct position in the shoulder (Fig. 10).

The improvement in a deep sensation in a patient was achieved during the treatment, in which the body weight and the deflections in different planes were transferred (Fig. 11).

The girl was also exercises using PNF method (Fig. 12). The therapist performed passively selected movement patterns of the head and neck, bladder and pelvis patterns – back depression and front elevation as well as frontal depression and posterior elevation, altogether with some of the upper and lower limb patterns:

1. flexion, adduction, external rotation
2. extension, abduction, internal rotation
3. flexion, adduction, external rotation
4. extension, adduction, internal rotation

Exercises were performed twice a week on therapy conducted at the Neurorehabilitation Center and once a week at home.

The therapists practicing with the patient using PNF method also used the play element, saying to Sandra, for example: "pass me a puck please", "we will move the puck up", in addition to stimulating the damaged nervous system.

Figure 11. Transfer of body weight (source: Author)

Figures 12a and 12b. PNF patterns of the upper limb (source: Author)

Figure 13. Flexible stabilizer corset (source: Author)

Figure 14. Placement on the left side (source: Author)

The results of the treatment within the torso were fixed with a flexible corset, worn by the patient after the treatment and always when the torso was in high positions, e.g. in long-term care while conducting other treatments or while driving a car and also when carrying the patient.

Placement positions on the sides and on the stomach were also introduced. Placing the girl on the side of the rib edge between the top of the hip plate and the lower edge of the ribs, a rolled blanket or half-roll was placed in order to passively stretch the left side. Placing the patient on the left side, while it was contracted, contributed to passive stretching of the spine joints on the contracted side (Fig. 14). Placing the patient on the abdomen with the lower limbs and axillary pits arranged on the wedge, caused stretching of the hip flexors and armpits, the elongation of the entire spine and the deepening of the lordosis in the lumbar region.

An assessment of the results of a one and a half year of intensive rehabilitation was used to evaluate the underlying condition. In the girl, the improvement of the torso and the reduction of the ribs were observed. Fig. 15 shows the view of the back of the patient's after a year and a half of the rehabilitation. The shoulder on the right side is still protruding, however, the symmetry of the lower angles of the shoulder blades is maintained, whereas the difference in the level between them is clearly reduced. The hump of the ribs was softened, and the rear upper iliac spines are also more symmetric. Fig. 16a and 16b show a reduction in the rotation of the spine and rib hump.

Figure 15. The view the back of the patient's profile year and a half after the therapy (source: Author)

Figures 16a and 16b. The view of the patient's profile after the therapy in the left sided position (source: Author)

Conclusions

The therapeutic methods used here were associated with a reduction of the scoliosis and an improvement of the patient's profile of the body. The patient's therapy should be continued according to the program designed, in order to prevent the deformation and stabilize the effects achieved by this treatment.

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Correspondence address:
Antonina Kaczorowska
Państwowa Medyczna Wyższa Szkoła Zawodowa w Opolu
ul. Katowicka 68, 45-060 Opole
Phone: (+48) 692 639 634
E-mail: t.kaczorowska@op.pl

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CARE PLAN OF A CHILD WITH MYELOMENINGOCELE AND COEXISTING HYDROCEPHALUS – A CASE REPORT

PLAN OPIEKI NAD DZIECKIEM Z PRZEPUKLINĄ OPONOWO-RDZENIOWĄ I WSPÓŁISTNIEJĄCYM WODOGŁOWIEM – OPIS PRZYPADKU

Patrycja Nicpoń[1 B–F]
Ewa Radwańska[2 A,D,E]

[1] Department of Anaesthesiology and Children Intensive Care, University Teaching Hospital in Opole, Poland

[2] Nursing Faculty, Opole Medical School, Poland

A – przygotowanie projektu badania | study design, **B –** zbieranie danych | data collection, **C –** analiza statystyczna | statistical analysis, **D –** interpretacja danych | interpretation of data, **E –** przygotowanie maszynopisu | manuscript preparation, **F –** opracowanie piśmiennictwa | literature review, **G –** pozyskanie funduszy | sourcing of funding

SUMMARY

Background: Due to the advances made by children who are born with myelomeningocele (open spina bifida), they have increased life expectancies. However, it is still important to understand the causes of neural tube defects that are presently poorly understood. The key period for the development of the neural tube is the first month of pregnancy, when a mother is often unaware of her pregnancy. That is one reason why the folic acid supplementation is advised for women of childbearing age, so that even an unborn child is not at risk of defects.

Aim of the study: To discuss the substance of the myelomeningocele disease and to propose an exemplary nursing care plan for the patient with this type of spina bifida, who has been treated in hospital since birth.

Case report: The case study is a description of a 2.5-year-old boy who was born with a myelomeningocele in the thoracic-lumbar area with co-existing hydrocephalus. Plastic surgery of myelomeningocele was performed at the first and second day of life. Rehabilitation of the child started immediately after healing of the wound. At 9 weeks of age, a ventriculoperitoneal shunt was implanted. Additionally, the decision was taken to install a tracheotomy tube. During the child's stay in the ward it was necessary to double-plasty the wounds on his back. Due to the persistent symptoms of gastro-oesophageal reflux, the decision was taken to perform the anti-reflux and exposure of gastrostomy procedure. Also exteriorization of vesicocutaneous fistula was performed, due to recurring infections of the bladder due to neurogenic bladder. Currently, the boy still requires mechanical ventilation. He is fed by gastrostomy (PEG). He in quite good contact with the environment, he smiles, recognizes relatives and reacts to strangers.

Conclusions: It is important to recognize the patient's deficits/dysfunctions and to place appropriate nursing diagnoses. The scheduled, suitable for nursing interventions are subject to systematic evaluation and enable adjusting the care plan to the changing situation. Unfortunately, some damage in myelomeningocele is irreversible, nevertheless the professional nursing care makes it possible to meet the needs of a patient, whereas the level of proper care and observation of a child significantly improves its quality of life.

KEYWORDS: patient, care plan, developmental defect, myelomeningocele

STRESZCZENIE

Wstęp: Dzięki postępom, jakie zrobiła medycyna, dzieci, które urodziły się przepukliną oponowo-rdzeniową, mają większe szanse na przeżycie. Nadal jednak warto próbować poznać przyczyny powstania wad cewy nerwowej, które nie do końca są znane. Okresem kluczowym dla rozwoju cewy nerwowej jest pierwszy miesiąc ciąży, kiedy często przyszła matka nie ma jeszcze świadomości swojego odmiennego stanu. Dlatego właśnie tak ważna jest suplementacja kwasem foliowym wśród kobiet w okresie rozrodczym, aby nawet nieplanowany potomek nie był zagrożony wadami.

Cel pracy: Omówienie istoty schorzenia, jakim jest przepuklina oponowo-rdzeniowa, oraz zaproponowanie przykładowego planu opieki pielęgniarskiej nad pacjentem z przepukliną, który od urodzenia leczony jest w warunkach szpitalnych.

Opis przypadku: Opis sytuacji 2,5-letniego chłopca, który urodził się z przepukliną oponowo-rdzeniową w odcinku piersiowo-lędźwiowym ze współistniejącym wodogłowiem. Plastykę przepukliny oponowo-rdzeniowej wykonano na przełomie pierwszej i drugiej doby życia. Rehabilitację u dziecka rozpoczęto zaraz po wygojeniu się rany pooperacyjnej. W 9. tygodniu życia dziecka implantowano zastawkę komorowo-otrzewnową. Podjęto decyzję o założeniu rurki tracheotomijnej. W czasie pobytu dziecka w oddziale konieczne było dwukrotne wykonanie plastyki rany na plecach W związku z utrzymującymi się objawami refluksu żołądkowo-przełykowego podjęto decyzję o wykonaniu zabiegu antyrefluksowego i wyłonienia gastrostomii Wykonano również zabieg wyłonienia przetoki pęcherzowo-skórnej z uwagi na nawracające infekcje pęcherza moczowego oraz pęcherz neurogenny. Obecnie dziecko nadal wymaga wentylacji mechanicznej. Karmione jest przez gastrostomię (PEG). Jest w dość dobrym kontakcie z otoczeniem, uśmiecha się, poznaje bliskich, reaguje na obce osoby.

Wnioski: Istotnym jest rozpoznanie deficytów/dysfunkcji pacjenta oraz postawienie diagnoz pielęgniarskich. Zaplanowane odpowiednie działania pielęgniarskie podlegają systematycznej ewaluacji i pozwalają dopasować opiekę do zmieniającej się sytuacji. Niestety, część uszkodzeń w przepuklinie oponowo-rdzeniowej jest nieodwracalna, jednak profesjonalna opieka pielęgniarska daje możliwość zaspokojenia potrzeb pacjenta, odpowiedniej pielęgnacji, obserwacji dziecka, co znacząco poprawia jakość jego życia.

SŁOWA KLUCZOWE: pacjent, plan opieki, wada rozwojowa, przepuklina oponowo-rdzeniowa

Background

All parents want their child to be born healthy, most of them do not even suspect that it could be otherwise. Therefore, in almost every case of child disability the parents experience shock, despair and fear of the future.

Congenital malformations of a neural tube in the form of myelomeningocele (MMC) are still a serious therapeutic problem. The neural tube defects occur in the first month of fetal life, when a woman does not know that she is pregnant. Their origins are determined by a number of environmental and genetic factors that are not fully understood [1], and which are a common congenital defect associated with an abnormal closure of the neural tube. They develop between 3 and 4 weeks of fetal life, due to neuronal disorders [2].

A basic test to evaluate the anatomy of the fetus and to detect structural flaws is the ultrasound (US). It should be performed at around 10, 20, and 32 weeks of pregnancy [3]. An important test is the determination of alpha-fetoprotein (AFP) in the blood serum of a pregnant women about 14–20 weeks of pregnancy. Only about 2% of the value of elevated fetal protein is responsible for neural tube defects. The combination of ultrasounds and AFP tests helps to identify neural tube defects in 75–90% of births [3].

Myelomeningocele treatment involves the surgical closure of its opening and the removal of the sac. If the defect is accompanied by hydrocephalus, the surgical treatment of concomitant hydrocephalus is performed at the same time with the use of external drainage or permanent peritoneal connection, which ensures the outflow of the cerebrospinal fluid [4,5].

Definition of MMC

Myelomeningocele is a developmental disorder of the closure in the spinal column, which occurs during the process of spinal cord structures and spinal column formation in the fetus. It is characterized by bone loss of vertebral arches, which causes that spinal cord to protrude through an opening (Fig. 1) [4].

Figure 1. Myelomeningocele (open spina bifida); source: own documentation

Consequences of myelomeningocele:

1. Neurogenic bladder
2. Neurogenic anal canal
3. Abnormal innervation of the lower limbs:

– motor – they are the cause of lower limbs paralysis, limb deformities, dislocations of hip joints, knee joint hyperplasia, and foot deformities (Fig. 2).
– sensory – referred to as mosaic.

Paresis of the lower limbs and lack of sensation create good conditions for bedsores [3,4].

Hydrocephalus is a condition in which excessive accumulation of cerebrospinal fluid in the CNS is accompanied by an increase in intracranial pressure (Fig. 3) [4,6].

Figure 2. Foot deformation; source: own documentation

Figure 3. Hydrotherapy; source: own documentation

Rehabilitation of a child with a myelomeningocele

The first part of a rehabilitation is to change the position of a new-born every hour, to massage the affected limbs and to correctly place the limbs and toes, which helps to prevent distortion and reduce the swelling of the tissues [7]. Beneficial effect has the irritation of the skin and the delivery of various sensory impressions. Light compression of joint surfaces stimulates the blood supply of the bone abdomen, and it is beneficial for their growth. Since the 10th day after the procedure, active exercises should be performed in order to mobilize the remaining nerve pathways and the muscles that they supply. It aims to reduce the disability and limitations in the movement, improving the quality of the future functioning of a child. Rehabilitation should start immediately after the postoperative healing of the wound, and after stabilization of the general condition of a child [7].

Purpose and assumptions of the study

The purpose of this study and the case described is to present the role of nurses in child care with myelomeningocele, with particular emphasis on the importance of early rehabilitation, which has an impact on improving the quality of life of the child.

Material and methods

The material describes the health situation of a 2,5 year-old boy with congenital malformation in the form of myelomeningocele in the thoracic-cross area.

In the study the method of the individual case with interview techniques and documentation analysis was used. The complementary methods were: observation method (standardized observation) and measurement method.

For the purpose of preparing the description, the consent of the bioethics committee and the legal guardians of the child was obtained, granted for the publication of the images showing the child. On the basis of prepared case report, the nursing process can be proposed based on nursing diagnosis.

Case report

The boy, born on 03.09.2013 by Caesarean section, with birth weight of 2800g, rated at 5 points in the Apgar scale. The fact that the baby will be born with birth defects parents learned at 16 weeks of pregnancy during an ultrasound. The doctor at the time of the examination found an abnormal picture of the brain and an abnormal image of the spine. Subsequent tests confirmed incorrect structure, along with severe and irreversible damage to the child.

In the third hour of the boy's life, he was transferred to the Department of Intensive Care and Neonatal Pathology in Katowice due to extensive myelomeningocele. In the physical examination, extensive open spina bifida, shortening and distortion of the chest, large skull with enlarged bone seams, deformities and limb paralysis of the lower limbs were found. After the anesthesiological and surgical consultation, he was qualified for the plastic surgery of myelomeningocele, which was performed at the turn of the first and second day of life. The rehabilitation of the child started immediately after the healing of the wound. It mainly consisted of the change of body position, the physiological positioning and the use of passive form of exercise.

At 9 weeks of child's age, a ventriculoperitoneal shunt was implanted (Fig. 4). The postoperative course was without complications. The shunt was working properly. Since its insertion, the ventricular system did not widen.

During a 4-month stay in the Department of Intensive Care and Neonatal Pathology, the chronic respiratory failure was diagnosed, mainly due to severe chest deformity and lung insufficiency, as well as the paralysis of respiratory muscles due to the underlying disease. It was decided to insert a tracheotomy tube.

On 14.01.2014 the boy was transferred to the Department of Anaesthesiology and Intensive Care of Children and Newborns in Opole where he stayed until

Figure 4. The patient after the insertion of peritoneal shunt; source: own documentation

May 2016. During the child's stay in the ward it was necessary to perform a plastic surgery on his back wound twice. The first time the gerotex patch was removed and the plastic surgery of spinal canal using synthetic meninges was made. The second time it was excision of the produced fistula.

Due to persistent symptoms of gastro-oesophageal reflux, the decision was made to perform anti-reflux and gastrostomy procedures.

Also the exteriorization of vesicocutaneous fistula procedure was performed, due to recurring infections of the bladder and neurogenic bladder (Fig. 5).

Figure 5. Exteriorized vesicocutaneous fistula; source: own documentation

In the intervals between treatments, ongoing rehabilitation activities were used, which mainly consisted of passive and active exercises of the patient.

Currently, the child still needs mechanical ventilation, primarily due to abnormal chest mechanics caused by its considerable deformity. He is fed by gastrostomy (PEG). He is in quite good contact with the environment, he smiles, recognizes relatives and reacts to strangers. He attempts to establish contact with the environment (through the vocalization of vowels o, a, e).

The boy can independently turn from his back to the side by engaging the upper limbs and a torso, while the lower limbs passively participate in this movement. He uses upper limbs to pull to the sides of the crib and can change the position of the body by 360 degrees along his axis. Seated to the vertical position, he can keep his head in the axis without inclination and with a little guarding, he really likes this position.

Nursing process

1. Nursing diagnosis: the respiratory problems caused by the retention of secretion in the respiratory tract in a patient with a tracheotomy tube.

Purpose: maintenance of airway obstruction, maintenance or improvement of lung function, maintenance of tracheotomy tube.

Nursing activity:

- daily toilet of the mouth,
- a toilet of the bronchial tree,
- suctioning of residual respiratory secretions,
- keeping to the of aseptic and antiseptics rules during suctioning of respiratory secretions,
- min. twice a day we change the position of the sealing sleeve of the tube,
- change of the dressing at the tracheotomy tube.

2. Nursing diagnosis: the risk of complications resulting from artificial ventilation of the patient.

Purpose: prevention of complications.

Nursing activity:

- patient observation for hypoxia genesis and hypoxia,
- heart rate monitoring,
- monitoring of blood gas and saturation,
- patient observation for hypoxia,
- ensuring the tightness and drainage of the pipe connections from the ventilator,
- ventilator tube replacement in case of physical dirt,
- daily replacement of the antibacterial filter in the ventilator.

3. Nursing diagnosis: the discomfort associated with elevated body temperature.

Purpose: restoration of the body temperature to normal.

Nursing activity:

- observation and measurement of the temperature,
- keeping the appropriate room temperature (ventilation of the room, closing the radiators when the temperature in the room is high),
- physical cooling using e.g. a cold pack (in the form of an ice pack or cold compresses) to the head, inguinal, axillary and neck, a bath
- humidification of the air,
- the appropriate amount of lukewarm fluids,
- change of personal and bed linen in the case of over sweating,
- administering medication to lower the body temperature at the physician's request if the temperature is above 38°C.

4. Nursing diagnosis: the risk of complications associated with percutaneous endoscopic gastrostomy fistula.

Purpose: prevention of complications.

Nursing activity:

- adherence to rules when feeding by a gastronomy fistula,
- feeding in a semi-sitting or sitting position,
- meals should be heated to room temperature or body temperature,
- feeding with 6–8 hour intervals, with breaks,
- assessing (before feeding) the volume of residual gastric contents,
- rinsing the gastrostomy tube with boiled water before each meal and at the end of feeding,
- fixing the gastrostomy tube in such a way as to prevent the stomach from escaping from the skin and the development of bedsores on the skin and mucous membrane,
- closing the outer end of the gastrostomy tube with a special clamp/ stopper to prevent leakage of the gastric contents on the surrounding skin catheter,
- controlling the skin around the gastrostomy fistula once a day for bedsores, ulcers and the application of protective ointments (zinc).

5. Nursing Diagnosis: the constipation caused by impaired intestinal peristalsis.

Purpose: regulation of bowel movements, improvement of well-being.

Nursing activity:

- elimination of dietary products that cause constipation,
- introduction of higher amount of fluids,
- insertion of the rectal tube,
- execution of enema,
- administration of Lactulose by medical order,
- observation of bowel movements.

6. Nursing Diagnosis: The risk of bedsore due to lowered muscle tension in the lower limbs.

Objective: anti-bedsore prophylaxis, obtaining proper tension in the muscles – rehabilitation.

Nursing activity:

- placing a child on a pressure-sensitive mattress,
- use of bed facilities such as rollers, wedges, discs,
- in the lateral position, separate the lower limbs with the cushions,
- frequent change of body position,
- patting of places exposed to pressure,
- accurate bed lining so as not to leave folds,
- exercises to strengthen muscles,

7. Nursing diagnosis: delayed psycho-motor development of the child caused by the disease.

Purpose: stimulation of development.

Nursing activity:

- educational games,
- providing visual and auditory stimuli (coloured toy books, differentiated textures),
- keeping eye contact and verbal communication throughout the child's play.

8. Nursing diagnosis: frequent urinary tract infections caused by dermal fistula.

Purpose: prevention of urinary tract infection.

Nursing activity:

- monitoring of bowel movements,
- controlling the balance of liquids,
- maintenance of personal hygiene,
- monitoring for signs of urinary tract infection,
- performing urine tests,
- administration of medication (Furagin 1/2 tabl.) permanently.

9. Nursing Diagnosis: the lack of control over physiological functions caused by the myelomeningocele

Purpose: keeping the patient clean.

Nursing activity:

- prevention of buttocks chafing and maintenance of personal hygiene and the whole body,
- protection of the child and bed linen against dirt, use of diapers and sleepers in the cot,
- skin care of buttocks,
- frequent checks of the diaper pants and their change if necessary
- thorough cleansing of the skin of the buttocks with soap and warm water after defection.
- leaving the buttocks to dry in the air or their gentle drying and greasing with protective ointment,
- observation of the buttocks toward the pathological changes.

10. Nursing diagnosis: the risk of contracting and muscular atrophy due to movement limitations.

Purpose: reduction of movement limitations by introducing rehabilitation activities

Nursing activity:

- changing the position of the every hour,
- massage and physiological placement of uncharged limbs,
- delivering sensory impressions through skin irritation,
- stimulation of the blood supply of bone parts by light compression of joint surfaces,
- use of active type of dehydration, rehydration in joints from the tenth day of child's life.

Discussion

Caring of a child with myelomeningocele should be interdisciplinary and its primary goal is to achieve maximum functional independence. The clinical aspect has been highlighted as there are few reports in the literature on nursing of the described child. In myelomeningocele some damage is irreversible, but the great compensatory potential of the brain provides a real chance to improve the child's psychophysical condition, and comprehensive rehabilitation should be started as soon as possible [8].

Many bibliographic sources point to the need for the operation of myelomeningocele during the first 72 hours of life. This reduces the risk of infection, increases the extent of tissue mobilization during surgery and allows early rehabilitation, which significantly

improves the quality of life of the patient. [8] As if it was in this case. The patient underwent the plastic surgery of myelomeningocele at the turn of the first and second day of life.

Children with myelomeningocele are more likely to be delayed in psychosocial development [3,4]. The results of the research of German scientists (Żurek A., Dębska U., Kubiś F.) confirm that children who have been living from the time of birth in conditions other than a properly functioning family home demonstrate significantly delayed psycho-motor development. The age of speech formation, understanding as well as social age is significantly delayed [9]. The case in question confirms these observations.

Children with hydrocephalus often have hydrocephalus. If left untreated, it leads to the death of very narrow blood vessels in the brain [9,10]. In the patient described in this study, the head circumference and widening of the ventricular system were observed. A ventricle-peritoneal shunt was inserted, which allowed the development of the brain.

The lack of psychological support in the prenatal period causes long-term consequences for the mother and her contacts with the environment. The above facts are confirmed by numerous authors in their research studies, including Matuszak E., Dębek W., Lenkiewicz T., Oksiuta M., Olański W [11].

Lack of professional care for families of children with myelomeningocele contribute to negligence in performance of care and safety functions, therefore many families are accompanying by the sense of loneliness [3]. Such was the situation of the patient described in the study. The parents of the boy did not receive any support and they were left to deal with this problem alone.

Conclusions

1. Early detection of developmental defects is possible thanks to modern diagnostic methods. This allows parents to better prepare themselves for the care and participation in the rehabilitation.
2. Early initiation of facilitation, continuity and complexity of post natal care and active parental involvement guarantee effective reduction of the child's disability, which affects the quality of his or her further life.
3. A nurse is actively involved in detecting pathological changes in children with developmental disabilities.
4. Caring of a child with myelomeningocele should be performed in an interdisciplinary manner, which will guarantee the maximum functional independence of the young patient in the subsequent stages of her or her puberty.

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Correspondence address:
mgr Ewa Radwańska
Państwowa Medyczna Wyższa Szkoła Zawodowa w Opolu
ul. Katowicka 68, 45-060 Opole
Phone: (+48) 609 049 761
E-mail: eradwanska@onet.eu

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MYCOTOXINS IN FOOD PRODUCTS – HEALTH EFFECTS AND METHODS OF MONITORING IN POLAND

MIKOTOKSYNY W ŻYWNOŚCI, SKUTKI ZDROWOTNE, METODY MONITOROWANIA W POLSCE

Beata Dobosz[1 A–C]
Karolina Król[1 A]
Katarzyna Lar[1 A]
Alina Mroczek[1 A]
Ewa Zbrojkiewicz[1 A]
Renata Złotkowska[1,2 B,C]

[1] Department of Social Medicine and Health Promotion, School of Public Health in Bytom, Medical University of Silesia in Katowice, Poland

[2] Institute of Occupational Medicine and Environmental Health in Sosnowiec, Poland

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SUMMARY

Food that is consumed by humans on a daily basis has essential nutritional and dietary value, but can also pose a threat to human life and health. This risk is caused by the mycotoxins that food products contain. Grains are often contaminated by the Alternaria species, which are capable of producing a range of mycotoxins. In addition, the consumption of grains attacked by the Alternaria species and contaminated with mycotoxins is associated with the risk of oesophageal cancer in humans. This paper is a review of the literature on the harmful effects of mycotoxins contained in food products. The potential threats to human health and life caused by food contaminated with mycotoxins are also described. The most important groups of mycotoxins: aflatoxins, ochratoxins A, trichothecenes and fumonisins have been characterized in terms of their occurrence and toxicity. Furthermore, the methods of determining mycotoxins and the principles of the functioning of mycotoxins monitoring system in food in Poland are described, indicating the aim of the research undertaken and the results obtained. The reference material for this study was the literature on the presence of mycotoxins in food and their effects on humans, which was provided by the scientific and medical databases, as well as the reports of the Department of Epidemiology of the National Institute of Public Health – the National Institute of Hygiene, Department of Prevention and Control of Infections and Infectious Diseases in People and the Chief Sanitary Inspectorate.

KEYWORDS: mycotoxins, aflatoxins, food, monitoring

STRESZCZENIE

Spożywana codziennie przez człowieka żywność ma nie tylko właściwości odżywcze czy dietetyczne, ale może również być obarczona ryzykiem zagrożenia dla ludzkiego zdrowia i życia. Ryzyko to jest związane z występowaniem w produktach spożywczych chorobotwórczych mikotoksyn. Ziarna zbóż są często zanieczyszczone przez gatunki Alternaria, które są zdolne do wytwarzania szeregu mikotoksyn. Ponadto, spożycie zbóż zaatakowanych przez gatunki Alternaria i zanieczyszczonych mikotoksynami jest związane z ryzykiem wystąpienia raka przełyku u człowieka. W pracy dokonano przeglądu piśmiennictwa dotyczącego szkodliwego działania mikotoksyn zawartych w produktach żywnościowych, wskazano, jakie zagrożenia dla ludzkiego zdrowia i życia niesie żywność skażona mikotoksynami. Scharakteryzowano najważniejsze grupy mikotoksyn: aflatoksyny, ochratoksynę A, trichoteceny i fumonizyny pod względem ich występowania i toksyczności. Ponadto przedstawiono metody oznaczania mikotoksyn i zasady funkcjonowania systemu monitoringu mikotoksyn w żywności w Polsce oraz wskazano na celowość podejmowanych badań i osiągane w powyższym zakresie

wyniki. Materiał poglądowy w pracy stanowiło piśmiennictwo dotyczące występowania mikotoksyn w żywności oraz ich działania na ludzi, udostępnione przez wydawnictwa naukowe i medyczne bazy danych, a także raporty Zakładu Epidemiologii Narodowego Instytutu Zdrowia Publicznego – Państwowego Zakładu Higieny, Departamentu Zapobiegania i Zwalczania Zakażeń i Chorób Zakaźnych u Ludzi Główny Inspektorat Sanitarny.

SŁOWA KLUCZOWE: mikotoksyny, aflatoksyny, żywność, monitoring

Background

Food that is consumed by humans on a daily basis not only has nutritional and dietary value, but it can also pose a threat to human life and health. This risk is caused by the mycotoxins that food products contain. Grains are often contaminated by Alternaria species, which are capable of producing a range of mycotoxins. In addition, the consumption of grains attacked by Alternaria species and contaminated with mycotoxins is associated with the risk of oesophageal cancer in humans [1]. Live micro-organisms consumed with food can be a stimulus for infectious diseases, whereas toxic substances may lead to acute intoxication or have a long-term adverse effects on the health of consumers [2]. The literature defines mycotoxins (from mycosis-fungi group) as toxins produced by some species of fungi of: Aspergillus, Penicilinum, Fusarium, Rhiozoctonia, Clariceps, Stachyborytrys, and others. Mycotoxins are fungal metabolites that have a low molecular weight and often play a key role in the pathogenesis of plants and the spread of fungal infections [3]. These toxins are present all over the world as natural impurities in a variety of products of vegetable origin, as well as in foods of animal origin [4,5]. Globally, mycotoxins have a significant impact on human and animal health, as well as on the economy and international trade [6]. This global scenario confirms that pollution is heavily dependent on regional climatic conditions [7]. These toxins optimally develop at a temperature of 20–25 degrees Celsius (which gives them favourable conditions of existence, and among other countries, also in Poland), while the main source of their formation are infected food products – mainly grains [8].

The existing literature considers: aflatoxins, ochratoxin A, patulin, fumonisin, zaralenon, deoxynivalenol and trichothecenes as the most dangerous mycotoxins consumed by humans [8]. In Polish conditions (in terms of climate) the most important producers of mycotoxins are the fungi of *Aspergillus, Penicilinum and Fusarium* species, which cause the most severe mycotoxins [9]. Tab. 1 shows the main feedstock and products in which mycotoxins have been found [8].

Health effects of mycotoxins

The essence of mycotoxins is that they contaminate feedstock (including feed) and make food products stale, this allows for the emission of harmful substances that have a toxic effect on the human body. Toxicity is characterized by over 400 species of fungi [10] where about 50 types of them are organisms that contaminate human food [11]. The most common type of grain contaminated with mycotoxins is maize. According to the 2013 research by Mycotoxins Research Laboratory of Kazimierz Wielki University, a half of 167 samples taken was the contaminated maize. What is more, a year later these results showed an even more unfavourable tendency [12].

Mycotoxins enter the human body primarily through the digestive tract. Harmfulness is already observed at a low concentration, i.e.at about 1 milligram per kilogram (one million part of body weight) [8]. Mycotoxins have multi directional effects on the human body. They cause damage to the liver, kidneys, interfere with the function of the digestive tract and the immune system. They can exhibit carcinogenic, mutagenic, cytotoxic, teratogenic, neurotoxic or estrogenic properties. Mycotoxins are one of the possible causes of carcinogenic hepatocellular carcinoma (HCC) [13]. Hepatocellular carcinoma (HCC) is a malignant tumour, which has a high prevalence in the world. The prognosis for HCC cure is very low because patients cannot undergo surgery. In addition, the cells of liver cancer are highly resistant to standard chemotherapy [14]. At present,

Table 1. Feedstock and food products that contain harmful mycotoxins [10]

Mycotoxins	Type	Product
Aflatoxins	*Aspergillus flavus, A. parasiticus, A. nomius*	Grains, nuts, spices, dried fruits
Ochratoxin A	*Aspergillus alutaceus, A. melleus, A. ochraceus, A. carbonarius, A.niger, A. ostianus, Penicillium verrucosum var. cyclopium, P. verrucosum var. Verrucosum, P. commune, P. nordicum, P. purpurescens, P. variabile*	Grains, dried fruits, wine, coffee, spices, food of animal origin
Fumonisin	*Fusarium verticillioides, F. proliferatum, F. subglutinans*	Grains and grain products
Trichothecenes	*Fusarium sporotrichioides, F. poae, F. equiseti, F. culmorum, F. graminearum*	Grains and grain products
Patulin	*Aspergillus chevalieri, A. clavatus, A. terreus, Penicillium cyclopium, P. Expansum, P. patulum, Byssochlamys fulva, B. nivea*	Fruit and fruit products
Zearalenone	*Fusarium cerealis, F. culmorum, F. equiseti, F. graminearum*	Grains and grains preserves

about a half of all HCC patients suffer from chronic hepatitis B and C (HBV and HCV), while the remaining cases are due to etiologic factors such as alcohol abuse, cigarette smoking, mycotoxins [15]. More and more evidence shows that the types of etiologic HCC risk factors vary between geographical areas. For example, obesity associated with HCC has become one of the most important medical problems in developed countries, and food contamination with mycotoxins remains a critical risk factor for hepatocellular carcinoma in developing countries, including southern and eastern Africa, India and China [13].

Aflatoxins are the most widely known group of mycotoxins that are extensively studied for their role in the treatment of the liver. The main types are B_1, B_2, G_1 and G_2, as well as M_1 and M_2, which are metabolites present in human and animal milk [14].

In turn, ochratoxin A (OTA) induces reactive forms of oxygen and nitrogen, it promotes the formation of tumours and is toxic to neurons, therefore it influences the development of neurodegenerative diseases. It has been linked to the causes of Parkinson's and Alzheimer's disease [16]. In humans, ochratoxin causes endemic nephropathy, which has been described in many studies. Epidemiological studies have shown that in places where high levels of ochratoxin A in food, as well as in the blood of the population are stated, there is the high incidence of nephropathy and renal tumours [17]. The studies conducted in recent years in Poland have shown that contamination of food and feed with mycotoxins is a great problem both in our domestic and imported products [10]. It has been proven that OTA is naturally found in all grains, including maize, barley, wheat, sorghum, rye, oats and rice [18,19]. It does not decompose in the cooking process or during bread baking. Thermal decomposition of this toxin occurs only at temperatures above 250°C [20].

The impact of trichothecenes on human health has long been known. Many forms, which are plant pathogens, produce trichothecenes that are toxic to humans and animals. Exposure to these toxins can cause immunological diseases, vomiting, inflammation of the skin and bleeding. This studies confirms the presence of this mycotoxin, but do not indicate the number of cases of illness in the country. Nevertheless, due to the prevalence and multidirectional nature of mycotoxins, they constitute a threat to humans caused by their presence in the gastrointestinal tract. At the cellular level, trichothecenes are responsible for inhibiting protein synthesis, reduction of enzyme activity, disturbances in cytoplasmic membrane permeability, disturbances in cell division, induction of chromosomal observations and disturbances in the cell cycle [21].

Patulin is also dangerous to humans. Patulin is a chemical pollutant produced by several species of mold, especially *Aspergillus, Penicillium and Byssochlamys*. It is the most common mycotoxin found in apples and apple products. This is a toxin that can cause severe illness and even death. As experimentally proven, patulin shows a carcinogenic and mutagenic effect. An overdose causes severe poisoning, gastrointestinal disorders combined with intestinal bleeding and damage to the mucosa. At higher doses, it causes changes in renal function [22].

Therefore, contamination of food with mycotoxins entails various health risks for humans (Tab. 2).

Table 2. Effects of mycotoxins on the human organism [10]

Mycotoxin	Toxin effect
Aflatoxin B_1, ochratoxin A, strigmatocystyna, fumonisin B_1, toxins Fusarium moniliforme	Carcinogenic
Aflatoxin, Potulin, strigmatocystin,	Hepatotoxic
Ochratoxin A, citrate	Neurotoxic
Moniliformin	Cardiotoxic
Aflatoxins, ochratoxin A, trichothecenes	Immunocritical
Aflatoxins, patulin, ochratoxin A	Teratogenic
Zearalenone	Estrogenic
Deoxynivalenol	Emetic
Deoxynivalenole	Haemorrhagic
Trichothecenes, T-2 toxin	Dermatoxic

Infections with mycotoxins result in acute mycotoxicoses. Contaminated food and feed are a problem all over the world. Currently, the presence of severe high doses of mycotoxins are rare in humans and animals. An intake of a small amount of Fusarium mycotoxins is common, but does not lead to intoxication [23,24]. Also in Polish conditions mycotoxins are rarely acute – they are mostly caused by chronic poisoning due to their accumulation in human tissues throughout life – mycotoxins affect cells, tissues and even whole organisms [11]. The International Agency for Research on Cancer reviewed the health effects of mycotoxins. The team concluded that mycotoxins are not only the cause of acute intoxication and cancer, but also contribute to the inhibition of growth in children in the infected population [25]. According to the reports of the Chief Sanitary Inspectorate in Poland, in the years 2012–2015 no cases of food poisoning, which was contaminated with mycotoxins, were found [26,27].

Method of mycotoxins monitoring in Poland

Due to the importance of the problem, the content of mycotoxins in food has reached the EU legislation and has been subject to specific monitoring [8]. In Europe, the guidelines for the determination of mycotoxins in food [28] have been developed and approved. In order to reduce the risks associated with mycotoxins, restrictions are placed on food and feed. Currently in Poland the Regulation of the European Union Commission 1881/2006, as amended [29–32], sets the maximum residue levels (MRLs) for 11 mycotoxins detected in food: aflatoxins (the sum of aflatoxins B1, B2, G1 and G2 (AFB1, AFB2, AFG1, AFG2), the sums of fumoni-

sin B1 and B2 (FB1, FB2), ochratoxin A (OTA), patulin, deoxynivalenol (DON), and zearalenone (ZEA).

In order to ensure and enforce these limits, reliable and accurate analytical methods are needed. The presence and quantity of laboratory mycotoxins are being determined, among others, by an enzyme-linked immunosorbent assay (ELISA) [8], as well as many sensitive and specific chromatographic techniques such as thin-film TLC, liquid HPLC or gas GC [33,34]. In the European Union and in our country, the analysis of the content of mycotoxins in food is carried out by a number of laboratories, which use High performance liquid chromatography (HPLC) [35,36]. High performance liquid chromatography (HPLC) is one of the physicochemical methods. As a result of the intermolecular interactions between the chemical compounds and the filling, the homogeneous mixtures are separated into individual components [37]. High-performance liquid chromatography is widely used in analytics in various industries, including the detection of mycotoxins [38]. This method meets the criteria set out in the EU Regulation on recovery and precise data [39] as well as the performance criteria [40]. Furthermore, the use of this method makes it possible to label all mycotoxins which are covered by the EU Regulation [29–32]. The source of human exposure to these compounds is food products, so it is imperative to constantly test their levels. Removal of contaminated products from the food chain is the simplest solution to ensure the safety of food and feed. For the industry, it is essential to create effective control methods that are applicable throughout the entire chain of production.

Currently, there are national monitoring programs implemented in Poland by the State Sanitary Inspection in the field of food contamination with mycotoxins. These programs are created by the Chief Sanitary Inspectorate on the basis of guidelines developed by the National Institute of Hygiene. These programs carry out scheduled observations and measurements in order to obtain compliance data with food law. Systematic and repetitive studies are subject to samples of food available on the market [41]. That is why, research is in this field is mandatory. Altogether with inter-ministerial, multi-annual, national control plans, National Focal Point and the coordination of RASFF activities (Early Warning System for Dangerous Food Products and Nutrition). Its essence is the collection and rapid dissemination of information on food products that endanger human and animal life [42]. The results of RASFF analysis confirm that the level of aflatoxin contamination (B_1, B_2, G_1 and G_2) in peanuts, Brazil nuts, pistachios, figs is a serious threat to public health.

For the protection of human health and the prevention of mycotoxins in food, laboratory testing should be reproducible, include a broader range of products and cyclically repetitive. Only the coordinated action of specialized institutions in the country, which aim to prevent the risk of food safety hazards, will ensure the health of the consumer.

Summary

The aim of the study was to achieve the three key objectives. The review of current literature has shown that consumed food – mainly grains – is contaminated with various types of mycotoxins.

It shows that the most contaminated product is maize and its products. The literature of the subject also allowed to indicate what threats to human health and life carry the food that is contaminated with mycotoxins. Moreover, it has also been proven that in Poland there is a system for monitoring mycotoxins in food and reporting possible cases of illnesses, as confirmed by the reports of the Chief Sanitary Inspectorate.

To summarize:

- mycotoxins are found in foods consumed by humans;
- mycotoxins accumulate in grains and grain products;
- mycotoxins have a harmful effect on humans;
- mycotoxins are subject to established principles of monitoring;
- there are specific laboratory methods for testing mycotoxins;
- in Polish conditions mycotoxins do not cause dangerous mycotoxicoses.

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Correspondence address:
Beata Dobosz
Zakład Medycyny Społecznej i Profilaktyki
Wydział Zdrowia Publicznego w Bytomiu
Śląski Uniwersytet Medyczny
Phone: (+48) 503 093 472
E-mail: bdkd@wp.pl

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e) Chapter within a book
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