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## The quality of life of non-small cell lung cancer patients treated with chemotherapy

### Jakość życia chorych na niedrobnokomórkowego raka płuca poddanych chemioterapii

The authors declare no financial disclosure

#### Abstract

**Introduction:** The aim of the study was to assess the influence of non-small cell lung cancer chemotherapy on patients' health status, the occurrence of adverse events and their effect on everyday activities, depending on the patients' sex and age.

**Material and methods:** The study group consisted of 62 non-small cell lung cancer patients, (21 women and 41 men), aged 51–84 years, hospitalised due to the chemotherapy. The survey included SF-20 test and a questionnaire prepared by the authors.

**Results:** The most frequent adverse events indicated by the patients were: weakness (79%), nausea and vomiting (77%), loss of appetite (56%) and diarrhoea (45%). It was found that the side-effects of chemotherapy were not dependent on age ( $p = 0.9882$ ) or sex ( $p = 0.9968$ ).

The chemotherapy negatively influenced the quality of the patients' life ( $p < 0.000001$ ). It was shown that there is a statistically significant correlation between age and limitations on social roles, professional life and performing housework ( $p < 0.0133$ ), and also the inability to perform specific types of activities ( $p < 0.01$ ).

**Conclusions:** The results of the study show that chemotherapy of non-small cell lung cancer was connected with decreased quality of life, especially in patients over 65 years of age. The patients under 65 years of age could not deal with the disease in respect of psychological aspects, whereas people over 65 years of age had greater problems with physical, social and professional functioning.

**Key words:** chemotherapy, quality of life, non-small cell lung cancer, adverse events

*Pneumonol. Alergol. Pol.* 2014; 82: 349–357

#### Streszczenie

**Wstęp:** Celem pracy była ocena jakości życia chorych na niedrobnokomórkowego raka płuca (z uwzględnieniem wieku i płci) poddanym leczeniu cytostatycznemu.

**Material i metody:** Badanie przeprowadzono u 62 chorych (21 kobiet i 41 mężczyzn) w wieku 51–84 lata hospitalizowanych celem chemioterapii niedrobnokomórkowego raka płuca. W badaniach wykorzystano test SF-20 oraz ankietę własnego autorstwa.

**Wyniki:** Do najczęstszych objawów niepożądanych chemioterapii wskazywanych przez chorych należało osłabienie (79%), nudności i wymioty (77%), utrata apetytu (56%), oraz biegunka (45%). Stwierdzono, że działania niepożądane w trakcie chemioterapii

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DOI:10.5603/PiAP.2014.0044

Praca wpłynęła do Redakcji: 8.08.2013 r.

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ISSN 0867–7077

nie były zależne od wieku ( $p = 0,9882$ ) i płci ( $p = 0,9968$ ). Badając wpływ liczby podanych kursów chemioterapii na ocenę własnego zdrowia, stwierdzono, że im mniej kursów chemioterapii otrzymali pacjenci, tym lepiej oceniali swoją jakość życia ( $p < 0,000001$ ). Wykazano istotną statystycznie zależność między wiekiem chorych a ograniczeniami: w pełnieniu ról społecznych, w podejmowaniu pracy zawodowej oraz w wykonywaniu prac domowych ( $p < 0,0133$ ), a także pomiędzy wiekiem a niezdolnością do wykonania pewnego rodzaju pracy lub pewnej ilości zajęć domowych ( $p < 0,01$ ).

**Wnioski:** Chemioterapia niedrobnokomórkowego raka płuca w znacznie większym stopniu ograniczała jakość życia chorych po 65. roku życia, w porównaniu z pozostałymi. Stwierdzono, że chorzy poniżej 65. roku życia gorzej radzili sobie z chorobą w aspekcie psychologicznym, natomiast chorzy po 65. roku życia mieli większe problemy z funkcjonowaniem fizycznym, społecznym i zawodowym.

**Słowa kluczowe:** chemioterapia, jakość życia, niedrobnokomórkowy rak płuca, objawy niepożądane

**Pneumonol. Alergol. Pol. 2014; 82: 349–357**

## Introduction

### Epidemiological data

Due to its high prevalence, lung cancer is placed among the most frequent malignant neoplasms [1]. It represents annually approximately 21% of all diagnosed cancers in men and about 8.5% in women. Poland is one of the countries with the highest incidence and mortality rates of lung cancer. The standardised incidence rate in 2010 amounted to 52.2/100,000 for men and 16.9/100,000 for women. The incidence rate of lung cancer is closely related to age. Peak incidence occurs between 60 and 64 years of age both in men and women, but recently, more frequently than in previous years, the disease is being diagnosed in young people, 40-50 years of age. In 2010, standardised mortality rates in Poland amounted to 56.2/100,000 for men and 16.3/100,000 for women [2].

Prognosis in lung cancer is poor. In Poland, the percentages of 1- and 5-year survival are among the lowest in Europe, which undoubtedly is the effect of late diagnosis of the disease [3]. The results of the EURO CARE-4 study show that the percentage of a 5-year survivors in Poland is 11.59% for men and 14.16% for women, whereas 1-year survival is 35.62% for men and 37.85% for women [4].

### Quality of life during chemotherapy

Quality of life is an elusive concept as it depends on the philosophy of life, education and tradition. It is easier to talk about its elements, and finally, it is thought that the quality of life can be defined as the judgement of a personal situation, concerning a certain period of time [5].

Traditional criteria for the assessment of the results of treatment of cancer include complete survival time, time to progression and toxicity rate concerning cytotoxic treatment. Recently, special

attention has been paid to the quality of life of oncological patients. It is caused by the fact that treatment results, particularly in relation to lung cancer patients, are still not satisfactory. Many studies have shown that making a life longer by a few months is an unsatisfactory index of the efficacy of treatment. The success of treatment should be defined by two factors: the prolongation of life and maintaining its good quality.

Quality of life is always a subjective value, and to a large extent it depends on mental state, personal qualities, taste, and the system of values of a given person [6].

The patient and his/her family usually associate neoplastic disease with death. The disease causes great mental stress, even if it does not lead to physical suffering or does not limit physical or social activity. It is the result of the specificity of the disease and is associated with emotions such as anger, sadness and annoyance. According to patients, the most bothersome symptoms are vomiting and loss of hair, followed by sleepiness, fatigue, pain, loss of appetite and lowered life satisfaction [5]. Cancer pain is chronic and it often represents the biggest problem to the patient. Long-lasting pain results in depression, anxiety and physical exhaustion. Another symptom that disturbs the quality of life is the anxiety about the possible loss of a certain value.

In cancer, suffering rarely passes; on the contrary, it often becomes more intensive with time. It negatively influences almost every area of life. Physical fitness and mental state are lowered, and opposing emotions may occur alternately, e.g. low spirits, sensitivity, aggression, anxiety, indifference, emotional dependence. Patients often lose their willingness, strength and motivation to fight the disease. It frequently means failure to fulfil basic needs in spite of having plenty of time, usually spent alone.

The term health-related quality of life (HRQOL) was introduced by Schipper et al., who defined it as the 'functional effect of a disease perceived by a patient'. The concept had numerous supporters, including Wołowicka and de Walden-Gałuszko [7]. Quality of life is evaluated using various questionnaires (general, mixed, specific). Among lung cancer patients, the following questionnaires are usually used:

1. QLQ-C30 and the module for lung cancer LC-13. The questionnaire was drawn up by the European Organisation for the Research and Treatment of Cancer (EORTC). It is designed for patients to self-assess their somatic and mental status, social relations and physical fitness. It includes the QLQ-C30 core questionnaire (common for all cancers) and an additional module that takes into account specific features for a given cancer (LC-13 is designed for lung cancer) [8, 9].
2. MOS SF-20 (Medical Outcome Study Short Form 20). The SF-20 test is a shortened version of the SF-36. It includes 20 statements gathered in 6 domains: MH — mental health, PF — physical functioning, HP — health perception, PP — pain perception, RF — role functioning and SF — social functioning [7, 10].
3. WHOQOL-Bref. WHOQOL-Bref includes 26 questions and concerns four areas of quality of life: physical, mental, social and environmental [11, 12].

The aim of the study was to assess the influence of chemotherapy of non-small cell lung cancer on the patients' quality of life, health status and on everyday activities, depending on the patients' sex and age.

### Material and methods

The study was conducted at the Department of Clinical Oncology, University of Rzeszów between September 2011 and January 2012. It enrolled 62 consecutive patients with non-small cell lung cancer (NSCLC) — 21 women (87%) and 41 men (66%), without brain metastases, not treated to date. The mean age was 65.5 years ( $\pm$  8.58), range 51–84.

The performance status was assessed according to the Karnofsky scale and it amounted to 80–100%, whereas clinical stage of the disease according to WHO was IIIB or IV.

Arterial hypertension dominated among concomitant diseases (in approximately 80% of the patients), other diseases were: stable coronary

heart disease, diabetes and chronic obstructive pulmonary disease.

The patients mentioned the following symptoms: dyspnoea, strength reduction and pain, which was controlled with non-steroidal anti-inflammatory drugs and weak opioids. No significant abnormalities were found in blood cell count or blood smear, liver or renal parameters, which allowed the introduction and continuation of cytotoxic treatment.

The patients received chemotherapy consisting of cisplatin at a dose of 30 mg/m<sup>2</sup> for 3 successive days, with vinorelbine at a dose of 30 mg/m<sup>2</sup> or with gemcitabine at a dose of 1250 mg/m<sup>2</sup> on the 1<sup>st</sup> and 8<sup>th</sup> day every 21 days. Each patient received at least one course of chemotherapy. Most of the patients (43/61) received 2–4 courses. Due to a various number of chemotherapy courses, the subjects were divided into three groups: patients who received one course of chemotherapy (9 patients — 15%), those who received 2–4 courses (43 patients — 69%) and those who received 5–6 chemotherapy courses (10 patients — 16%).

Ondansetron and dexamethasone were used as premedication. According to the RECIST criteria, the evaluation of treatment efficacy was assessed every three courses. The patients from the study group did not undergo radiotherapy.

A questionnaire prepared by the authors of the study was also used. The questionnaire was anonymous and it included 17 one-choice and multiple-choice questions that concerned demographic data and symptoms/suffering that occurred during chemotherapy. The standardised SF-20 test was also used.

The patients were divided into two age groups: over 65 years of age — 34 (55.84%), and under 65 years of age 28 (45.16%). Statistical analysis consisted of proportional comparison of the results, according to the age and sex of the patients. The chi-square test was applied in order to check the differences in variables measured in the study groups.  $P < 0.05$  was considered significant. Only the results that achieved statistical significance in the SF-20 test have been presented in the study.

### Results

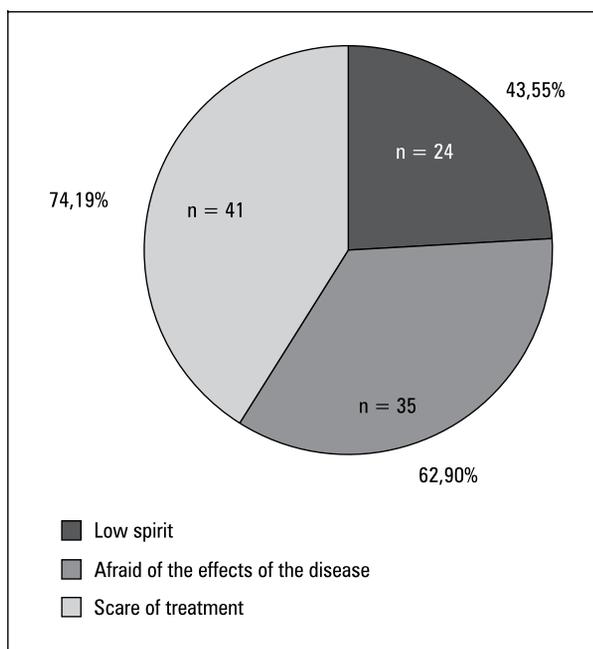
Most of the patients were scared of treatment (74.19%), 62.9% of them were afraid of the effects of the disease and 43.55% of the respondents experienced low spirits (Fig. 1).

Table 1 presents the opinion of the patients concerning their quality of life during

**Table 1. Quality of life of lung cancer patients depending on the number of chemotherapy courses**

Number of courses	How do you assess your health during chemotherapy?								Total number of patients	
	Very bad		Bad		Neither good nor bad		Good		n	%
	n	%	n	%	n	%	n	%		
1	0	0	0	0	0	0	9	100	9	100
2–4	0	0	7	16	24	56	12	28	43	100
5–6	1	10	9	90	0	0	0	0	10	100
Total	1	10	16	26	24	39	21	34	62	100.00

p < 0.000001



**Figure 1.** Psychological adverse events associated with treatment

chemotherapy, depending on the number of chemotherapy courses used. All of the patients who received only one course of chemotherapy evaluated their health status as good, whereas 9/10 patients who received 5–6 courses assessed it as bad. It was observed that a lower number of chemotherapy courses was combined with better quality of the patients’ lives, mainly due to less pronounced side effects during systemic treatment.

The patients most frequently reported the following adverse effects of treatment: weakness (79%), nausea and vomiting (77%), hair loss (71%), inflammation of the mucous membranes (73%) and less frequently — diarrhoea (45%). Furthermore, it was found that 76% of the patients had sleep problems that had not been observed prior to chemotherapy. Adverse events that occurred during chemotherapy did not depend on age (p = 0.9882) or sex (p = 0.9968) (Tables 2, 3).

**Table 2. The relationship between age and the incidence of adverse events caused by chemotherapy**

Have you experienced during chemotherapy?	Age bracket			
	≤ 65 years of age No 28		> 65 years of age No 34	
	n	%	n	%
Weakness	19	68	30	88
Nausea and vomiting	19	68	29	85
Inflammation of the mucous membrane	19	68	26	76
Loss of appetite	14	50	21	62
Diarrhoea	13	46	15	44
Hair loss	19	68	25	74

p = 0.9882

**Table 3. The relationship between sex and the incidence of adverse events caused by chemotherapy**

Have you experienced during chemotherapy?	Sex				
	Women No 21		Men No 41		
	n	%	n	%	
Weakness	16	76	33	80	<b>p = 0.9968</b>
Nausea and vomiting	17	81	31	76	
Inflammation of the mucous membrane	15	71	30	73	
Loss of appetite	11	52	24	59	
Diarrhoea	10	48	18	44	
Hair loss	16	76	28	68	

**Table 4. Mental health (MH) status according to patients' age**

		Age				Significance level p
		≤ 65 years of age No 28		> 65 years of age No 34		
		n	%	n	%	
For how long during the last month were you depressed and in low spirits? (MH3)	All of the time	10	35	1	3	<b>0.0026</b>
	Most of the time	9	32	5	15	
	Quite a lot of the time	4	14	14	41	
	For some time	3	11	7	21	
	For a short time	2	7	6	18	
	Not at all	0	0	1	3	
How often during the last month were you so depressed that there was nothing that could cheer you up? (MH5)	All of the time	11	39	3	9	<b>0.0256</b>
	Most of the time	9	32	8	24	
	Quite a lot of the time	3	11	4	12	
	For some time	3	11	9	26	
	For a short time	2	7	9	26	
	Not at all	0	0	1	3	

## The analysis of the SF-20 test

### Scale I — Mental Health (MH)

The conducted analysis showed that sex had no impact on mental or physical health, health perception, or social functioning of the study patients; therefore, data concerning this aspect were not presented in the study. However, there was a statistically significant correlation between age and depression (Table 4). The patients under 65 years of age more frequently reported low spirits (35%) and that there was nothing that could cheer them up (39%) compared to the patients above 65 years of age (3% and 9%, respectively).

### Scale II — Physical Functioning (PF)

The conducted analysis showed the impact of age on some activities. Limitations lasting more than 3 months were observed more frequently in the patients over 65 years of age. Statistical dependence was found between age and the performance of activities such as standing up, going up the third or higher floor ( $p < 0.02$ ), bending forward or lifting objects ( $p < 0.0256$ ), and everyday activities, e.g. eating, getting dressed, taking a bath or using the toilet ( $p < 0.068$ ) (Table 5).

### Scale III — Health perception (HP)

Age played a crucial role in health perception (Table 6). There was a statistical correlation

**Table 5. Physical functioning (PF) according to patients' age**

		Age				Significance level p
		≤ 65 years of age No 28		> 65 years of age No 34		
		n	%	n	%	
Standing up or going up the stairs (PF1)	Limitations for over 3 months	14	50	27	79	0.0200
	Limitations up to 3 months	14	50	6	18	
	No limitations	0	0	1	3	
Bending forward, lifting objects or bending down (PF2)	Limitations for over 3 months	11	39	23	68	0.0256
	Limitations up to 3 months	9	32	9	26	
	No limitations	8	29	2	6	
Eating, getting dressed, bathing or using the toilet (PF3)	Limitations for over 3 months	3	11	10	29	0.0680
	Limitations up to 3 months	15	54	19	56	
	No limitations	10	35	5	15	

**Table 6. Health perception (HP) according to patients' age**

		Age				Significance level p
		≤ 65 years of age No 28		> 65 years of age No 34		
		n	%	n	%	
Would you say that your health is: (HP1)	Perfect	0	0	1	3	0.0001
	Very good	0	0	1	3	
	Good	16	57	3	9	
	Medium	9	32	10	29	
	Rather poor	3	11	19	56	
I am as healthy as anyone else (HP2)	All of the time	1	4	0	0	0.0019
	Most of the time	9	32	0	0	
	A lot of the time	4	14	3	9	
	For some of the time	6	21	7	21	
	For a short time	5	18	9	26	
	Not at all	3	11	15	44	
Recently I have felt bad (HP3)	All of the time	0	0	9	26	0.0006
	Most of the time	2	7	9	26	
	A lot of the time	7	25	10	29	
	For some of the time	8	29	4	12	
	For a short time	9	32	2	6	
	Not at all	2	7	0	0	

between the patients' age and general self-assessment of their health ( $p < 0.0001$ ). 19/34 (56%) of patients over 65 years of age assessed their health as rather poor, compared to 3/28 (11%) of patients under 65 years of age. It means that the patients under 65 years of age were more optimistic about their health status.

The influence of age on health perception ("I am healthy as no one else") was observed ( $p < 0.0019$ ). Among the study subjects, 32% of the patients under 65 years of age assessed that they felt healthy for most of the time, and only 11% did not feel healthy at all. Whereas among the patients over 65 years of age, none felt healthy for

**Table 7. Role functioning (RF) according to patients' age**

		Age				Significance level p
		≤ 65 years of age No 28		> 65 years of age No 34		
		n	%	n	%	
Does your health status prevent you from taking up a job or doing the housework (inability to take up a job and to do the housework)? (RF1)	Limitations for over 3 months	10	35	19	56	0.0133
	Limitations up to 3 months	12	42	15	44	
	No limitations	6	21	0	0	
Were you unable to do certain types of work or amount of work or the housework (RF2)	Limitations for over 3 months	6	21	20	59	0.01
	Limitations up to 3 months	22	79	14	41	

**Table 8. Social functioning (SF) according to patients' age**

		Age				Significance level p
		≤ 65 years of age No 28		> 65 years of age No 34		
		n	%	n	%	
How often during the last month have you limited your social life due to your health (e.g. visiting friends, relatives, neighbours)? (SF)	All of the time	1	4	14	41	0.0049
	Most of the time	3	11	7	21	
	A lot of the time	4	14	2	6	
	For some of the time	6	21	5	15	
	For a short time	7	25	4	12	
	<b>Not at all</b>	<b>7</b>	<b>25</b>	<b>2</b>	<b>6</b>	

most of the time and 44% did not feel healthy at all. 26% of younger patients declared that most of time recently they had felt bad, compared to 7% of the patients from the younger group ( $p < 0.0006$ ).

#### Scale IV — Role functioning (RF)

46.78% of the respondents worked less due to their health condition, whereas 43.54% of the patients thought that disease restricted their lives to a certain degree. 9.68% of the respondents reported that they were not limited in any way and could work or do the housework.

The influence of age on ceasing ( $p < 0.01$ ) and on restricting ( $p < 0.0133$ ) professional activity and housework was found (Table 7). 59% of the respondents over 65 years of age answered that chemotherapy had markedly limited their professional functioning and domestic activities for over three months. The same problem concerned just 21% of the respondents under 65 years of age.

#### Scale V — Social Functioning (SF)

The health status of the patients over 65 years of age limited their social lives to a greater

degree, compared to younger patients (Table 8). 41% of the patients over 65 years of age had limited their social relations during the previous month, comparing to 4% of younger patients ( $p < 0.0049$ ). However, age itself, not only the disease, may also impact social relations.

## Discussion

Research concerning quality of life during chemotherapy of patients with diagnosed lung cancer is of vital importance, as it allows us to recognise their expectations of therapy and to assess all aspects of the patient's functioning in different areas of life. According to some studies, chemotherapy causes many adverse effects on quality of life [13–15]. The analysis of the results concerning the relation of chemotherapy courses and self-assessment of health status by the patients showed that all the subjects who received only one course of chemotherapy evaluated their health as good, whereas 100% of the patients who received 5–6 chemotherapy courses assessed their health status as bad or very bad. According to the

present study, there was a statistically significant dependence ( $p < 0.000001$ ) between the number of administered chemotherapy courses and self-assessment of health. The fewer chemotherapy courses were given, the better was the patients' quality of life. This fact may be caused by adverse events during systemic treatment and also by the necessity of staying in hospital. The literature does not provide data concerning the relation between patients' self-assessment of health and the number of given chemotherapy courses in the therapy of NSCLC. The impact of chemotherapy on the quality of patients' lives is still being investigated. The aim of chemotherapy in stages III and IV is to decrease the tumour mass, to reduce suffering associated with cancer and to improve the quality of life after regression of adverse events of chemotherapy. For most of the patients, chemotherapy was combined with greater stress than the lung cancer itself [16]. According to other research projects, patients who received chemotherapy were satisfied with their general quality of life. Butler et al. have shown that the evaluation of quality of life is an important element in overall assessment of a patient's health. They maintain that chemotherapy may improve the patient's quality of life due to regression of ailments associated with the tumour mass [17].

Diagnosis of neoplastic disease often triggers negative emotions in patients, and in addition, the treatment causes adverse events [18]. According to the literature, at the moment of diagnosis, most patients are afraid of therapy and the effects of the disease. According to data from the literature, anxiety, fear of disease and depression occur in approximately 80% of patients [19].

Many patients treated with chemotherapy due to lung cancer suffer from weakness, especially during prolonged therapy. According to Zielińska-Więczkowska et al., patients who underwent chemotherapy complained mostly of fatigue, weakness and sleep problems [20]. In the present study, the most frequent problem was weakness (79%). Another frequent difficulty that occurred during chemotherapy in our group of patients were gastro-intestinal symptoms (nausea and vomiting — 77%). According to the literature, nausea and vomiting occur in approximately 50–60% of lung cancer patients, and more often among women [21]. Słowik-Gabryelska et al. [21] and Kruk et al. [22] showed that the intensity of gastro-intestinal symptoms depends on patients' age, drug dosage and the effects of therapy.

Other frequent adverse events in our group of patients were hair loss (71%) and sleep pro-

blems (76%). Chwiałkowski et al. showed that the most frequent complication of chemotherapy was hair loss, which occurred in 100% of patients, whereas sleeping problems were sparse (27%) [19].

While assessing the mental health of the study subjects (SF-20 test), it was found that during chemotherapy most of the patients were nervous, depressed and in low spirits.

According to the conducted analysis, age partially influenced the mental health of the study subjects. Statistically significant differences were found between older and younger patients concerning the occurrence of the feeling of depression and low spirits ( $p < 0.0026$ ). The analysis of the obtained data of the SF-20 test showed that chemotherapy, to a considerable degree, influenced the patients' functioning in everyday life. It was observed that in 35% of the patients under 65 years of age no limitations on everyday activities occurred, compared to 15% of patients over 65 years of age ( $p < 0.0680$ ). In Leppert's study, problems with everyday activities occurred rarely and appeared in 13.4% of the patients [23]. It was assessed that activities that need some muscle strength, such as standing up, bending forward and walking without rest, were significantly disturbed during chemotherapy.

In the opinion of Słowik-Gabryelska et al., lung cancer patients are particularly at risk of adverse events during chemotherapy. They showed that in more than half of the patients, adverse events lowered general functioning and negatively influenced their quality of life [24].

In the present study, a significant dependence was found between the patients' age and general health perception ( $p < 0.0001$ ). The patients over 65 years of age felt significantly worse and evaluated their health negatively. No dominating concomitant diseases were found in this group. The patients under 65 years of age evaluated their health more optimistically and felt better.

The disease markedly restricted the patients' role functioning. 46.8% of the subjects had their professional and domestic functioning limited for over three months. Just 6/62 patients (9.6%) could work professionally or do the housework without any limitations. A statistically significant correlation was found between age and limitations on social and professional functioning. The patients over 65 years of age had greater difficulties with maintaining professional and home activity than did the younger ones ( $p < 0.01$ ).

The present study showed that the patients markedly limited their social life due to their

health condition and chemotherapy. Nevertheless, this concerned only 4% of patients under 65 years of age and 41% of patients above 65 years of age.

The present study concerning the quality of life of the patients hospitalised due to chemotherapy showed that the disease and the therapy significantly deteriorated their quality of life. There is a need for further research to evaluate the quality of life after completed chemotherapy, based on the efficacy of applied treatment.

### Conclusions

The adverse events that occurred in the patients treated with chemotherapy did not depend on age or sex.

It was found that, in the course of cytotoxic treatment, the smaller the number of chemotherapy courses, the better the patients' quality of life, which was associated with less intensive adverse effects of chemotherapy.

The study showed (based on the results of the SF-20 test) that mental health was impaired more frequently in the patients below 65 years of age than in the older ones, but limitation of daily activities, social functioning and self-perception of health status were significantly greater in the patients over 65 years of age compared to the younger ones.

### Conflict of interest

The authors declare no conflict of interest.

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