Patient Preference and Adherence

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ORIGINAL RESEARCH

Analysis of the Results of Monitoring the Quality of Services in Oncological Treatment, Conducted as Part of the Pilot Project of the National Cancer Network for Lung Cancer in 2019-2023, in Poland

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Background: The aim of this study is to present and analyze the results obtained from satisfaction surveys of oncology patients diagnosed with lung cancer. Surveys were part of the pilot project of the National Cancer Network in Poland, conducted between 2019 and 2023, using data collected from the largest oncology center in the Lower Silesian Voivodeship, with population of 2.9 million.

Methods and Findings: Anonymous and voluntary surveys from 2019 to 2023 were analyzed. The questions focused on aspects related to patient satisfaction, including hospital stay, medical care, the scope of information provided about the treatment process, and selected elements of the National Cancer Network pilot. The surveys were completed by both hospitalized and outpatient patients. A total of 260 surveys were assessed, with a response rate of 5.80%. The aspect that received the lowest score was the scope and flow of information provided by medical personnel (average 4.44 ± 0.75). The highest score was given to support from the Oncology Care Coordinator, with 86% of respondents giving positive ratings. In the cross-analysis, statistical significance was found for the assessment of hospital meal quality, differentiated by both gender (p=0.041) and age (p=0.041) of the patients. Additionally, the sense of intimacy during medical procedures had the strongest impact on overall patient satisfaction.

Conclusion: Our analysis of satisfaction surveys highlights important elements of healthcare that affect overall satisfaction. Presented results provide valuable insights for further improving the quality of oncology care in Poland, with an emphasis on enhancing staff-patient communication. At our center, future studies need higher survey response rates, as the low participation was this study's main limitation and may have caused response bias.

Keywords: national cancer network, lung cancer, satisfaction survey

Introduction

The increase in the incidence of malignant tumours is a global health problem that has a significant impact on societies and health systems around the world with the number of new cases of malignant tumours worldwide increased to approximately 19.3 million in 2020, a 27% increase compared with that in 2012.[1,2]

In Poland, in recent years, new solutions have been proposed to improve oncology care by restructuring oncology service delivery. Starting in 2015, the National Oncology Strategy was adopted, followed by the Oncology Package (Rapid Oncology Therapy), and in 2018, a pilot study of the National Cancer Network (NCN) was initiated.[3,4] The main goals of the NCN are to provide integrated management of oncology care, improve the quality of diagnosis and treatment, optimize spending on oncology care, and increase patient satisfaction.

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The pilot study included patients diagnosed with breast, lung, colorectal, prostate, or ovarian cancer. One of the basic tenets of the NCN is the introduction of a patient satisfaction survey.

In recent years, with the growing interest in coordinated oncology care, an increasing number of studies have been emerging that focus on understanding what factors affect patient satisfaction and how it can be improved.[5–10]

Oncology patient satisfaction not only is an indicator of the quality of care but can also affect therapeutic outcomes.[11,12] Moreover, as the data from studies show, there is a statistically significant relationship between the level of patient satisfaction and their compliance with medical recommendations, as well as the extension of the duration of therapy, without premature termination by the patient.[13]

As part of the pilot study of the NCN in Poland, an integral part of the project was a voluntary patient satisfaction survey, which, as a research method, is the most commonly used tool to obtain independent and reliable results.[14]

The aim of this paper is to present the results obtained from satisfaction surveys of patients treated at the Lower Silesian Center for Oncology, Haematology, and Pulmonology in Wroclaw, Poland, and included in the NCN pilot study. Our analysis concerns patients diagnosed with lung cancer, which is the most common malignancy in Poland, accounting for more than 14% of all cancers overall.[15]

An additional focus of the study was the way the questionnaire was implemented, particularly regarding patient comprehension.

Materials and Methods

In 2018, upon the initiative of the Minister of Health, a new organizational model for the provision of oncology services in Poland called the National Cancer Network (NCN) was proposed.[16] The timeframe for the pilot study of the NCN, which ran from 2019 to 2023, was established, and the Lower Silesian, Holy Cross, Pomeranian, and Podlasie provinces were included in the project.[17]

The NCN pilot study included the introduction of a patient satisfaction survey to monitor the quality of services at a given centre. The analysis presents data derived from the aforementioned surveys from the largest oncology centre in the Lower Silesian Province, which is the Provincial Coordinating Center of the NCN—the Lower Silesian Oncology Center, which, due to restructuring, has been operating under the name of the Lower Silesian Center for Oncology, Hematology, and Pulmonology in Wroclaw since 2021.

Questionnaires delivered by patients included in the pilot study with a histopathological diagnosis of lung cancer were evaluated. The data came from the pilot study period in the Lower Silesian Province from February 2019 to March 2023.

Completion of the questionnaire was voluntary and individual in Polish, and the data obtained were fully anonymized.

The complete survey, translated into English, has been put in the Supplementary Materials (see Supplementary Survey S1 online).

Survey forms were issued when the patient provided formal consent to be included in the NCN pilot study by having the patient sign the appropriate written consent form. This was done, depending on the patient's path, in the consultation (oncology) office, during the multidisciplinary tumor boards or on admission to the hospital ward. Completed questionnaires were delivered by patients, either through medical staff or by letter, to the Oncology Prevention and Strategy Department, Provincial Coordinating Center, where the data were stored in a central data archive.

Statistical analysis was carried out via R software (version 4.1.2). Data were described via basic descriptive statistics (for numeric variables) or frequency (for nominal variables). The normality of the distribution was checked via the Shapiro–Wilk test and verified via skewness and kurtosis. Comparisons between the two groups were made via the Kruskal–Wallis test or the Mann–Whitney *U*-test due to nonstandard distributions. Comparisons between pairs were made via the Dunn test with Bonferroni correction. Linear regression models were used to understand the correlations between the aspects of satisfaction analysed and other nominal information (such as demographics or details of hospitalization) and overall satisfaction levels. Linear regression analysis was conducted with a univariate model. In all the statistical calculations, $\alpha = 0.05$ was used as the level of significance.

This study was approved by the Ethics Committee of Wroclaw Medical University, Poland. Approval number KB 226/2024. All patients included in the National Cancer Network (NCN) pilot program in Poland made a written declaration of informed consent to participate in the NCN pilot program. Before enrollment, each patient obtained

information about the principles of the pilot program and the detailed information of personal data processing as part of the NCN. All methods were carried out in accordance with the Helsinki declaration and with relevant guidelines and regulations.

Results

A satisfaction survey was completed by 260 patients. The survey response rate was 5.80% at the analysed centre. The study was dominated by patients over 65 years old (53.6%), and the percentages of patients aged 45–64 years and 24–44 years were 32.8% and 13.2%, respectively. One patient was in the 18–24-year age range. Almost half of the respondents were women (48.6%). The majority of patients were hospitalized for two or more days (69.2%), patients with a one-day hospital stay accounted for 21.5%, and patients treated in outpatient care accounted for 9.2%. Patient characteristics are shown in Table 1.

In addition to the sociodemographic section, the questionnaire included three sections that identified 34 areas that assess a patient's experience in the hospital on an importance scale of 1 to 4 (the higher the score is, the greater the importance) and a satisfaction scale of 1 to 5 (the higher the score is, the greater the satisfaction). The sections covered hospital stay (infrastructure and treatment organization), medical care, and the flow of information from the treating physician about the treatment process, for which a Likert scale was used. In addition, the fourth part included categorical questions about the pilot study and two open-ended questions about aspects of the hospital's operation that needed improvement and those that were particularly valued by the respondents. The fifth section included a single question with

Table 1 Characteristics of Research Group

Variable	n (%)
Age	
18-24 years	1 (0.4)
25-44 years	33 (13.2)
45-64 years	82 (32.8)
≥ 65 years	134 (53.6)
Sex	
Female	122 (48.6)
Male	129 (51.4)
City size	
Village	51 (20.7)
City ≤ 50k	79 (32.1)
City 50k–150k	46 (18.7)
City 150k–500k	11 (4.5)
City ≥ 500k	59 (24.0)
Number of hospitalizations within 2 years before current hospitalization	
None	82 (33.5)
1-5	144 (58.8)
≥ 5	19 (7.8)
Hospitalization type	
Two or more days	180 (69.2)
One day stay	56 (21.5)
Ambulatory services	24 (9.2)
Time from referral to hospital admission*	
Up to one week	59 (35.3)
More than one week, but not more than two weeks	64 (38.3)
More than two weeks, but not more than one month	35 (21.0)
More than one month, but not more than two months	9 (5.4)
More than two months	5 (2.9)

Notes: *n = 180 patients with hospitalization for two or more days. *n = 180 patients with hospitalization for two or more days.

responses on a scale of 1 to 10 on whether respondents would recommend the hospital if their loved one needed similar treatment, expressing an overall level of satisfaction. A high proportion of missing data was observed for the validity variables in Section 1, which applied only to patients staying in the hospital for at least 2 days (the proportion of missing data in the average column in Section 1 was 41.7%, ranging from 38.9% to 46.1% in the columns of this section), and similar proportions were observed in Sections 2 and 3, which affected all patients (43.3% in the average column in Sections 2 and 3, ranging from 36.5% to 49.6% in the columns of these sections). The percentage of missing data required to assess satisfaction was lower (11.3% and 12.1% for Section 1 and Sections 2–3, respectively) (Table 2). Therefore, it was decided to omit the importance rating in the following analysis and focus on the satisfaction variables. The statistics for all aspects of satisfaction are shown in Table 3. In addition, since each section dealt with a specific area of the hospital stay, the average of the responses given within each area was calculated for each patient and is summarized in Table 3. On a scale of 1 to 5, the average rating of hospital stay (infrastructure and treatment organization) was 4.45 ± 0.68. On average, the medical care rating was higher (4.73 ± 0.56), and the information flow rating was lowest at 4.44 ± 0.75. The distribution of average satisfaction for each section is shown in Figure 1. Overall satisfaction measured on a scale of 1 to 10 was 9.32 ± 1.21, with a median of 10.00. Questions in part four assessed the organization

Table 2 Statistics for Missing Values for Variables Assessing Importance and Satisfaction of Defined Aspects of Hospitalization

	n	% of NAs for Importance		% of NAs for Satisfaction	
		Mean	Range	Mean	Range
Section 1 - hospital stay (infrastructure and organization of treatment) – 180 patients to answer	9	41.7	38.9–46.1	11.3	7.2–17.2
Section 2 and 3 - medical care and information flow – 260 patients to answer (all)	25	43.3	36.5–49.6	12.1	1.9–25.8

Note: Section 1 applied only to patients with hospital stay of 2 or more days.
Abbreviations: n, number of aspects/questions; NA, missing value.

Table 3 Descriptive Statistics for Outcomes of Satisfaction Measurement

Variable	n	Mean ± SD	Median (IQR)	Range
Quality of meals	160	4.05 ± 1.01	4.00 (3.00;5.00)	1.00–5.00
Cleanliness of your room	167	4.59 ± 0.74	5.00 (4.00;5.00)	1.00–5.00
Availability of a bathroom with a toilet	167	4.29 ± 1.04	5.00 (4.00;5.00)	1.00–5.00
Cleanliness of bathrooms and toilets	164	4.48 ± 0.83	5.00 (4.00;5.00)	1.00–5.00
Possibility to contact relatives and close ones	149	4.48 ± 0.86	5.00 (4.00;5.00)	1.00–5.00
Adapting the conditions in the ward to the specifics of your cancer	158	4.58 ± 0.72	5.00 (4.00;5.00)	1.00–5.00
Availability of the on-call physician in the absence of leading physician	161	4.44 ± 0.90	5.00 (4.00;5.00)	1.00–5.00
Access to specialists	156	4.53 ± 0.81	5.00 (4.00;5.00)	1.00–5.00
Responsiveness of nursing staff	155	4.72 ± 0.71	5.00 (5.00;5.00)	1.00–5.00
Section 1 - hospital stay (infrastructure and organization of treatment) – average assessment*	171	4.45 ± 0.68	4.67 (4.22;5.00)	1.00–5.00
Kindness of doctors in ward/outpatient clinic	255	4.77 ± 0.62	5.00 (5.00;5.00)	1.00–5.00
Your leading doctor's interest in your health	250	4.74 ± 0.66	5.00 (5.00;5.00)	1.00–5.00
Your leading doctor's readiness to answer questions	242	4.74 ± 0.61	5.00 (5.00;5.00)	1.00–5.00
Comprehensibility of the information provided to you by your leading doctor	246	4.70 ± 0.66	5.00 (5.00;5.00)	1.00–5.00
Availability of leading doctor	236	4.66 ± 0.71	5.00 (4.75;5.00)	1.00–5.00
Kindness of nursing staff	243	4.71 ± 0.64	5.00 (5.00;5.00)	1.00–5.00
Nurses' interest in your health and well-being	239	4.72 ± 0.68	5.00 (5.00;5.00)	1.00–5.00
The scope of information provided by nursing staff on how to prepare for examinations and procedures	240	4.70 ± 0.70	5.00 (5.00;5.00)	1.00–5.00
Taking care to maintain intimacy during medical procedures	238	4.74 ± 0.57	5.00 (5.00;5.00)	1.00–5.00
Readiness of medical staff to help you when you report pain	232	4.76 ± 0.64	5.00 (5.00;5.00)	1.00–5.00
Comprehensibility of information provided by oncology care coordinator	233	4.72 ± 0.69	5.00 (5.00;5.00)	1.00–5.00
Section 2 – medical care – average assessment*	259	4.73 ± 0.56	5.00 (4.70;5.00)	1.00–5.00

(*Continued*)

Table 3 (Continued).

Variable	n	Mean ± SD	Median (IQR)	Range
The information provided about the disease was sufficient	233	4.57 ± 0.80	5.00 (4.00;5.00)	1.00–5.00
There was no problem with access to specialists (as part of the consultation)	221	4.42 ± 0.92	5.00 (4.00;5.00)	1.00–5.00
The possible causes of your illness were clearly communicated	219	4.43 ± 0.89	5.00 (4.00;5.00)	1.00–5.00
Comprehensible information about essential tests was provided	233	4.62 ± 0.72	5.00 (4.00;5.00)	1.00–5.00
The information about possible progression of the disease was clear	230	4.47 ± 0.86	5.00 (4.00;5.00)	1.00–5.00
Disease stage (eg stage 1–4) was clearly communicated	223	4.32 ± 0.97	5.00 (4.00;5.00)	1.00–5.00
The information about the treatment plan was sufficient	229	4.41 ± 0.91	5.00 (4.00;5.00)	1.00–5.00
Sufficient information on possible therapies was provided	217	4.35 ± 0.97	5.00 (4.00;5.00)	1.00–5.00
The information about possible side effects was clear	219	4.40 ± 0.91	5.00 (4.00;5.00)	1.00–5.00
Specific expected outcomes of therapy were provided	213	4.35 ± 0.98	5.00 (4.00;5.00)	1.00–5.00
Changes in the oncological treatment plan were communicated on regular basis	209	4.41 ± 0.92	5.00 (4.00;5.00)	1.00–5.00
You have received instruction on what to do after leaving the oncology facility	209	4.56 ± 0.81	5.00 (4.00;5.00)	1.00–5.00
Your family members (or caregivers) received effective emotional support	193	4.34 ± 1.07	5.00 (4.00;5.00)	1.00–5.00
There was no problem with access to medical documentation	209	4.54 ± 0.79	5.00 (4.00;5.00)	1.00–5.00
Section 3 - information flow from leading doctor on treatment process – average assessment*	248	4.44 ± 0.75	4.82 (4.00;5.00)	1.00–5.00
General satisfaction – would you recommend the hospital?	255	9.32 ± 1.21	10.00 (9.00;10.00)	1.00–10.00

Notes: *Average assessment calculated as mean of all assessed aspects within the section, for each patient.
Abbreviations: SD, standard deviation; IQR, interquartile range.

of the pilot study. Most patients rated the waiting time as adequate (71.2%). The rest thought it was surprisingly short (15.5% of the total group) or too long (13.2%). The consent form to participate in the pilot study signed by patients was understandable (97.7%). More than half of the participants confirmed that their doubts had been clarified (54.2%), 37.0%

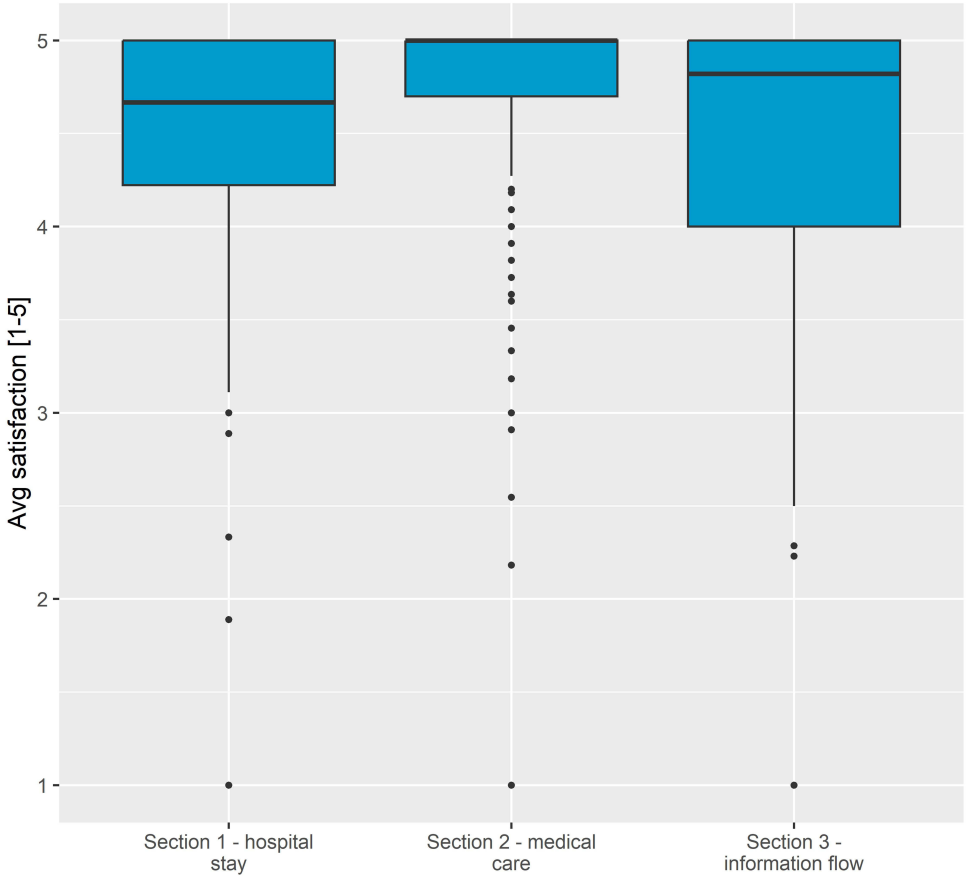

Figure 1 Boxplots presenting average satisfaction in split to analyzed areas.

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said that they had no doubts, and 8.8% said that their doubts had not been clarified. The infoline was used by one in five patients (21.2%). Among those who used the infoline, 73.3% confirmed that it was helpful. Most patients felt supported by a dedicated coordinator (86.3%). The results from this section are summarized in Table 4. Among the 101 responses to the open-ended questions, 25 were given to a question on areas for improvement, and 76 were given to questions related to the most appreciated features of hospital operations. On the basis of the responses received to question one, only two of the responses related to the same aspect, that is, the issue of hospital meals, their quality, and lack of information on dietary recommendations, were determined. Among the responses to the second open-ended question, the two most common were related to the professionalism and friendliness of the staff.

Three cross-analyses were performed to assess satisfaction levels in correlation with age, gender, and place of residence. Statistical significance was obtained for age-differentiated (p=0.041) and sex-differentiated (p=0.041) ratings of meal quality. In addition, women rated nurses' responsiveness higher than men did (p = 0.047). No other parameter achieved statistical significance according to age, gender, or place of residence, as shown in Tables 5–7.

To understand how each aspect correlates with overall satisfaction, a univariate linear regression was conducted, where the dependent variable was the level of overall satisfaction. Two sets of models were created, one for patients hospitalized for at least two days, covering all aspects included in the questionnaire, and another for all patients (discussed in Sections 2 and 3). All the analysed aspects were significantly associated with the level of overall satisfaction ($p \leq 0.001$ in all the cases). The magnitude of the impact was greatest for the sense of intimacy during medical procedures, both for patients who had been in the hospital for two days or more, as well as for the group as a whole. A score of 1.00 higher on this aspect translated into higher overall satisfaction by 1.26 and 1.20 points,

Table 4 Assessment of Organization of Pilot Treatment

Variable	n (%)
How do you assess the waiting time for health services provided within the pilot?	
Far too long	8 (3.5)
Rather too long	22 (9.7)
Appropriate	161 (71.2)
Surprisingly short	35 (15.5)
Was the consent you signed for the pilot understandable?	
Yes	216 (97.7)
No	5 (2.3)
If you had any doubts about the content, have they been explained to you?	
Yes	117 (54.2)
No	19 (8.8)
There was no such need	80 (37.0)
Have you used a dedicated hotline?	
Yes	43 (21.2)
No	160 (78.8)
If "yes" - how do you assess the hotline?*	
Very unuseful	1 (3.3)
Rather unuseful	2 (6.7)
Not able to assess its usefulness	5 (16.7)
Rather useful	12 (40.0)
Very useful	10 (33.3)
Have you received support and assistance from the coordinator assigned to patients for the pilot?	
Yes	157 (86.3)
No	25 (13.7)

Note: * n = 40 patients who used hotline and assessed it.

Table 5 Dependency Between Satisfaction Outcomes and Age

Variable	18-44 Years*	45-64 Years	≥ 65 Years	p
Quality of meals	4.00 (3.00;5.00)[a]	4.00 (3.00;5.00)	4.00 (4.00;5.00)[a]	**0.041**
Cleanliness of your room	5.00 (4.00;5.00)	5.00 (4.00;5.00)	5.00 (4.00;5.00)	0.749
Availability of a bathroom with a toilet	4.00 (4.00;5.00)	5.00 (4.00;5.00)	5.00 (4.00;5.00)	0.235
Cleanliness of bathrooms and toilets	4.00 (4.00;5.00)	5.00 (4.00;5.00)	5.00 (4.00;5.00)	0.147
Possibility to contact relatives and close ones	4.50 (3.75;5.00)	5.00 (4.00;5.00)	5.00 (4.00;5.00)	0.161
Adapting the conditions in the ward to the specifics of your cancer	5.00 (4.00;5.00)	5.00 (4.00;5.00)	5.00 (4.00;5.00)	0.378
Availability of the on-call physician in the absence of leading physician	5.00 (4.00;5.00)	5.00 (4.00;5.00)	5.00 (4.00;5.00)	0.989
Access to specialists	5.00 (4.00;5.00)	5.00 (4.00;5.00)	5.00 (4.00;5.00)	0.411
Responsiveness of nursing staff	5.00 (5.00;5.00)	5.00 (5.00;5.00)	5.00 (5.00;5.00)	0.998
Section 1 - hospital stay (infrastructure and organization of treatment) – average assessment**	4.44 (4.03;4.86)	4.67 (4.25;5.00)	4.75 (4.22;5.00)	0.144
Kindness of doctors in ward/outpatient clinic	5.00 (5.00;5.00)	5.00 (5.00;5.00)	5.00 (5.00;5.00)	0.409
Your leading doctor's interest in your health	5.00 (4.75;5.00)	5.00 (5.00;5.00)	5.00 (5.00;5.00)	0.623
Your leading doctor's readiness to answer questions	5.00 (5.00;5.00)	5.00 (5.00;5.00)	5.00 (5.00;5.00)	0.970
Comprehensibility of the information provided to you by your leading doctor	5.00 (5.00;5.00)	5.00 (5.00;5.00)	5.00 (5.00;5.00)	0.923
Availability of leading doctor	5.00 (5.00;5.00)	5.00 (5.00;5.00)	5.00 (5.00;5.00)	0.977
Kindness of nursing staff	5.00 (4.00;5.00)	5.00 (5.00;5.00)	5.00 (5.00;5.00)	0.598
Nurses' interest in your health and well-being	5.00 (5.00;5.00)	5.00 (5.00;5.00)	5.00 (5.00;5.00)	0.698
The scope of information provided by nursing staff on how to prepare for examinations and procedures	5.00 (4.25;5.00)	5.00 (5.00;5.00)	5.00 (5.00;5.00)	0.688
Taking care to maintain intimacy during medical procedures	5.00 (5.00;5.00)	5.00 (5.00;5.00)	5.00 (5.00;5.00)	0.892
Readiness of medical staff to help you when you report pain	5.00 (5.00;5.00)	5.00 (5.00;5.00)	5.00 (5.00;5.00)	0.845
Comprehensibility of information provided by oncology care coordinator	5.00 (4.00;5.00)	5.00 (5.00;5.00)	5.00 (5.00;5.00)	0.292
Section 2 – medical care – average assessment**	5.00 (4.64;5.00)	5.00 (4.70;5.00)	5.00 (4.82;5.00)	0.598
The information provided about the disease was sufficient	5.00 (4.00;5.00)	5.00 (5.00;5.00)	5.00 (4.00;5.00)	0.102
There was no problem with access to specialists (as part of the consultation)	5.00 (4.00;5.00)	5.00 (4.00;5.00)	5.00 (4.00;5.00)	0.286
The possible causes of your illness were clearly communicated	5.00 (4.00;5.00)	5.00 (4.00;5.00)	5.00 (4.00;5.00)	0.353
Comprehensible information about essential tests was provided	5.00 (4.00;5.00)	5.00 (4.00;5.00)	5.00 (5.00;5.00)	0.368
The information about possible progression of the disease was clear	5.00 (4.00;5.00)	5.00 (4.00;5.00)	5.00 (4.00;5.00)	0.812
Disease stage (eg stage 1–4) was clearly communicated	5.00 (3.75;5.00)	5.00 (4.00;5.00)	5.00 (4.00;5.00)	0.748
The information about the treatment plan was sufficient	5.00 (4.00;5.00)	5.00 (4.00;5.00)	5.00 (4.00;5.00)	0.640
Sufficient information on possible therapies was provided	5.00 (3.50;5.00)	5.00 (4.00;5.00)	5.00 (4.00;5.00)	0.698
The information about possible side effects was clear	5.00 (4.00;5.00)	5.00 (4.00;5.00)	5.00 (4.00;5.00)	0.770
Specific expected outcomes of therapy were provided	5.00 (3.25;5.00)	5.00 (4.00;5.00)	5.00 (4.00;5.00)	0.688
Changes in the oncological treatment plan were communicated on regular basis	5.00 (4.00;5.00)	5.00 (4.00;5.00)	5.00 (4.00;5.00)	0.977
You have received instruction on what to do after leaving the oncology facility	5.00 (4.00;5.00)	5.00 (4.00;5.00)	5.00 (4.75;5.00)	0.350
Your family members (or caregivers) received effective emotional support	5.00 (3.00;5.00)	5.00 (4.00;5.00)	5.00 (4.00;5.00)	0.519
There was no problem with access to medical documentation	5.00 (4.00;5.00)	5.00 (4.00;5.00)	5.00 (4.00;5.00)	0.983
Section 3 - information flow from leading doctor on treatment process – average assessment**	4.72 (3.91;5.00)	4.82 (4.00;5.00)	4.93 (4.04;5.00)	0.536
General satisfaction – would you recommend the hospital?	10.00 (9.00;10.00)	10.00 (9.00;10.00)	10.00 (9.00;10.00)	0.891

Notes: Data presented as median (interquartile range) due to non-normal distributions. Groups compared with Kruskal–Wallis test. a – outcome of pairwise comparison performed with Dunn test with Bonferroni adjustment (p adj = 0.046). *Age group of 18–24 years was combined with 25–44 years due to one patient aged 18–24 years. **Average assessment calculated as mean of all assessed aspects within the section, for each patient. Bold text for p-value with statistical significance.

Table 6 Dependency Between Satisfaction Outcomes and Sex

Variable	Females	Males	p
Quality of meals	5.00 (3.00;5.00)	4.00 (3.00;5.00)	**0.041**
Cleanliness of your room	5.00 (5.00;5.00)	5.00 (4.00;5.00)	0.150
Availability of a bathroom with a toilet	5.00 (4.00;5.00)	5.00 (4.00;5.00)	0.417
Cleanliness of bathrooms and toilets	5.00 (4.00;5.00)	5.00 (4.00;5.00)	0.610
Possibility to contact relatives and close ones	5.00 (4.00;5.00)	5.00 (4.00;5.00)	0.071
Adapting the conditions in the ward to the specifics of your cancer	5.00 (4.00;5.00)	5.00 (4.00;5.00)	0.439
Availability of the on-call physician in the absence of leading physician	5.00 (4.00;5.00)	5.00 (4.00;5.00)	0.210
Access to specialists	5.00 (4.00;5.00)	5.00 (4.00;5.00)	0.840
Responsiveness of nursing staff	5.00 (5.00;5.00)	5.00 (4.25;5.00)	**0.047**
Section 1 - hospital stay (infrastructure and organization of treatment) – average assessment*	4.76 (4.25;5.00)	4.65 (4.22;4.89)	0.062

(*Continued*)

Table 6 (Continued).

Variable	Females	Males	p
Kindness of doctors in ward/outpatient clinic	5.00 (5.00;5.00)	5.00 (5.00;5.00)	0.131
Your leading doctor's interest in your health	5.00 (5.00;5.00)	5.00 (5.00;5.00)	0.966
Your leading doctor's readiness to answer questions	5.00 (5.00;5.00)	5.00 (5.00;5.00)	0.800
Comprehensibility of the information provided to you by your leading doctor	5.00 (5.00;5.00)	5.00 (5.00;5.00)	0.960
Availability of leading doctor	5.00 (4.50;5.00)	5.00 (5.00;5.00)	0.787
Kindness of nursing staff	5.00 (5.00;5.00)	5.00 (5.00;5.00)	0.346
Nurses' interest in your health and well-being	5.00 (5.00;5.00)	5.00 (5.00;5.00)	0.365
The scope of information provided by nursing staff on how to prepare for examinations and procedures	5.00 (5.00;5.00)	5.00 (5.00;5.00)	0.537
Taking care to maintain intimacy during medical procedures	5.00 (5.00;5.00)	5.00 (5.00;5.00)	0.866
Readiness of medical staff to help you when you report pain	5.00 (5.00;5.00)	5.00 (5.00;5.00)	0.864
Comprehensibility of information provided by oncology care coordinator	5.00 (5.00;5.00)	5.00 (5.00;5.00)	0.448
Section 2 – medical care – average assessment*	5.00 (4.68;5.00)	5.00 (4.73;5.00)	0.713
The information provided about the disease was sufficient	5.00 (4.00;5.00)	5.00 (4.00;5.00)	0.843
There was no problem with access to specialists (as part of the consultation)	5.00 (4.00;5.00)	5.00 (4.00;5.00)	0.745
The possible causes of your illness were clearly communicated	5.00 (4.00;5.00)	5.00 (4.00;5.00)	0.245
Comprehensible information about essential tests was provided	5.00 (4.00;5.00)	5.00 (4.00;5.00)	0.976
The information about possible progression of the disease was clear	5.00 (4.00;5.00)	5.00 (4.00;5.00)	0.421
Disease stage (eg stage 1–4) was clearly communicated	5.00 (4.00;5.00)	5.00 (4.00;5.00)	0.516
The information about the treatment plan was sufficient	5.00 (4.00;5.00)	5.00 (4.00;5.00)	0.615
Sufficient information on possible therapies was provided	5.00 (4.00;5.00)	5.00 (4.00;5.00)	0.324
The information about possible side effects was clear	5.00 (4.00;5.00)	5.00 (4.00;5.00)	0.234
Specific expected outcomes of therapy were provided	5.00 (4.00;5.00)	5.00 (3.00;5.00)	0.178
Changes in the oncological treatment plan were communicated on regular basis	5.00 (4.00;5.00)	5.00 (4.00;5.00)	0.135
You have received instruction on what to do after leaving the oncology facility	5.00 (4.50;5.00)	5.00 (4.00;5.00)	0.288
Your family members (or caregivers) received effective emotional support	5.00 (4.00;5.00)	5.00 (4.00;5.00)	0.406
There was no problem with access to medical documentation	5.00 (4.00;5.00)	5.00 (4.00;5.00)	0.281
Section 3 - information flow from leading doctor on treatment process – average assessment*	4.85 (4.14;5.00)	4.86 (4.00;5.00)	0.467
General satisfaction – would you recommend the hospital?	10.00 (9.00;10.00)	10.00 (9.00;10.00)	0.300

Notes: Data presented as median (interquartile range) due to non-normal distributions. Groups compared with Mann–Whitney *U*-test. *Average assessment calculated as mean of all assessed aspects within the section, for each patient. Bold text for p-value with statistical significance.

respectively (β = 1.26 CI95 [1.00;1.52], p < 0.001 and β = 1.20 CI95 [0.97;1.43], p < 0.001). In the group of patients hospitalized for two or more days, the second and third largest influences on overall satisfaction were the responsiveness and friendliness that patients experienced from nursing staff. Satisfaction greater by one point in each of the two areas resulted in higher overall satisfaction by 1.01 and 0.95, respectively (β = 1.01 CI95 [0.76;1.26], p < 0.001 and β = 0.95 CI95 [0.68;1.23], p < 0.001). Among all the patients, ease of access to medical records and accessibility of information provided by the oncology coordinator had the second and third highest impacts on overall satisfaction. A 1-point greater satisfaction level in each area resulted in an overall increased satisfaction by 0.90 and 0.85 points, respectively (β = 0.90 CI95 [0.72;1.07], p < 0.001 and β = 0.85 CI95 [0.64;1.05], p < 0.001) (Table 8). The magnitude of the impact of the analysed aspects on overall satisfaction, expressed as the β coefficient from univariate linear regression models, was sorted and is shown in Figure 2. The top ten aspects affecting overall satisfaction include six aspects from Section 2 (medical care), two aspects from Section 1 (hospital stay), and two aspects from Section 3 (information flow). In addition, a linear regression model was built to understand the factors and areas affecting overall satisfaction, considering the average satisfaction from each of the three sections, as well as demographic data and other categorical information on hospitalization history and satisfaction with participation in oncology care in the pilot study. Among patients hospitalized for two or more days, patients whose level of hospital stay was higher translated into an increased overall satisfaction by 1.07 (β = 1.07 CI95 [0.83;1.31], p < 0.001). A 1-point higher level of satisfaction in the area of medical care translated

Table 7 Dependency Between Satisfaction Outcomes and City Size

Variable	Village	City ≤ 50k	City 50k–150k	City 150k–500k	City ≥ 500k	p
Quality of meals	4.00 (3.50;5.00)	4.00 (4.00;5.00)	5.00 (3.00;5.00)	4.00 (4.00;4.50)	4.00 (3.00;5.00)	0.863
Cleanliness of your room	5.00 (4.00;5.00)	5.00 (4.00;5.00)	5.00 (4.00;5.00)	5.00 (5.00;5.00)	5.00 (5.00;5.00)	0.285
Availability of a bathroom with a toilet	5.00 (4.00;5.00)	5.00 (4.00;5.00)	5.00 (4.00;5.00)	4.00 (3.50;5.00)	5.00 (3.00;5.00)	0.367
Cleanliness of bathrooms and toilets	5.00 (5.00;5.00)	5.00 (4.00;5.00)	5.00 (4.00;5.00)	5.00 (4.00;5.00)	5.00 (4.00;5.00)	0.494
Possibility to contact relatives and close ones	5.00 (4.50;5.00)	5.00 (4.00;5.00)	5.00 (4.00;5.00)	5.00 (4.00;5.00)	5.00 (4.00;5.00)	0.372
Adapting the conditions in the ward to the specifics of your cancer	5.00 (4.50;5.00)	5.00 (4.00;5.00)	5.00 (4.00;5.00)	5.00 (4.50;5.00)	5.00 (5.00;5.00)	0.523
Availability of the on-call physician in the absence of leading physician	5.00 (4.00;5.00)	5.00 (4.00;5.00)	5.00 (4.00;5.00)	5.00 (4.00;5.00)	5.00 (4.00;5.00)	0.394
Access to specialists	5.00 (4.00;5.00)	5.00 (4.00;5.00)	5.00 (4.50;5.00)	5.00 (4.00;5.00)	5.00 (4.00;5.00)	0.794
Responsiveness of nursing staff	5.00 (5.00;5.00)	5.00 (4.00;5.00)	5.00 (5.00;5.00)	5.00 (5.00;5.00)	5.00 (5.00;5.00)	0.373
Section 1 - hospital stay (infrastructure and organization of treatment) – average assessment*	4.67 (4.40;5.00)	4.59 (4.08;5.00)	4.53 (4.00;5.00)	4.78 (4.00;4.83)	4.78 (4.31;4.89)	0.874
Kindness of doctors in ward/outpatient clinic	5.00 (5.00;5.00)	5.00 (5.00;5.00)	5.00 (5.00;5.00)	5.00 (5.00;5.00)	5.00 (5.00;5.00)	0.119
Your leading doctor's interest in your health	5.00 (5.00;5.00)	5.00 (5.00;5.00)	5.00 (4.00;5.00)	5.00 (5.00;5.00)	5.00 (5.00;5.00)	0.190
Your leading doctor's readiness to answer questions	5.00 (5.00;5.00)	5.00 (5.00;5.00)	5.00 (4.25;5.00)	5.00 (5.00;5.00)	5.00 (5.00;5.00)	0.687
Comprehensibility of the information provided to you by your leading doctor	5.00 (5.00;5.00)	5.00 (5.00;5.00)	5.00 (4.00;5.00)	5.00 (4.00;5.00)	5.00 (5.00;5.00)	0.176
Availability of leading doctor	5.00 (5.00;5.00)	5.00 (5.00;5.00)	5.00 (4.00;5.00)	5.00 (4.50;5.00)	5.00 (4.25;5.00)	0.663
Kindness of nursing staff	5.00 (5.00;5.00)	5.00 (5.00;5.00)	5.00 (5.00;5.00)	5.00 (4.50;5.00)	5.00 (4.00;5.00)	0.748
Nurses' interest in your health and well-being	5.00 (5.00;5.00)	5.00 (5.00;5.00)	5.00 (5.00;5.00)	5.00 (4.25;5.00)	5.00 (5.00;5.00)	0.416
The scope of information provided by nursing staff on how to prepare for examinations and procedures	5.00 (5.00;5.00)	5.00 (5.00;5.00)	5.00 (4.00;5.00)	5.00 (4.25;5.00)	5.00 (4.00;5.00)	0.079
Taking care to maintain intimacy during medical procedures	5.00 (5.00;5.00)	5.00 (5.00;5.00)	5.00 (4.00;5.00)	5.00 (5.00;5.00)	5.00 (5.00;5.00)	0.316
Readiness of medical staff to help you when you report pain	5.00 (5.00;5.00)	5.00 (5.00;5.00)	5.00 (5.00;5.00)	5.00 (5.00;5.00)	5.00 (5.00;5.00)	0.562
Comprehensibility of information provided by oncology care coordinator	5.00 (5.00;5.00)	5.00 (5.00;5.00)	5.00 (5.00;5.00)	5.00 (4.25;5.00)	5.00 (5.00;5.00)	0.612
Section 2 – medical care – average assessment*	5.00 (4.91;5.00)	5.00 (4.80;5.00)	4.95 (4.48;5.00)	5.00 (4.59;5.00)	5.00 (4.70;5.00)	0.267
The information provided about the disease was sufficient	5.00 (5.00;5.00)	5.00 (4.00;5.00)	5.00 (4.00;5.00)	5.00 (4.50;5.00)	5.00 (4.00;5.00)	0.519
There was no problem with access to specialists (as part of the consultation)	5.00 (4.00;5.00)	5.00 (4.00;5.00)	5.00 (4.00;5.00)	5.00 (3.50;5.00)	5.00 (4.00;5.00)	0.414
The possible causes of your illness were clearly communicated	5.00 (4.00;5.00)	5.00 (4.00;5.00)	5.00 (4.00;5.00)	5.00 (4.00;5.00)	5.00 (4.00;5.00)	0.961
Comprehensible information about essential tests was provided	5.00 (5.00;5.00)	5.00 (4.00;5.00)	5.00 (4.00;5.00)	5.00 (5.00;5.00)	5.00 (5.00;5.00)	0.349
The information about possible progression of the disease was clear	5.00 (4.75;5.00)	5.00 (4.00;5.00)	5.00 (4.00;5.00)	5.00 (5.00;5.00)	5.00 (4.00;5.00)	0.464
Disease stage (eg stage 1–4) was clearly communicated	5.00 (4.00;5.00)	5.00 (4.00;5.00)	4.00 (3.00;5.00)	5.00 (4.00;5.00)	5.00 (4.00;5.00)	0.509
The information about the treatment plan was sufficient	5.00 (4.00;5.00)	5.00 (4.00;5.00)	5.00 (3.25;5.00)	5.00 (4.25;5.00)	5.00 (4.00;5.00)	0.531
Sufficient information on possible therapies was provided	5.00 (4.00;5.00)	5.00 (3.50;5.00)	5.00 (3.50;5.00)	5.00 (4.00;5.00)	5.00 (4.00;5.00)	0.649
The information about possible side effects was clear	5.00 (4.25;5.00)	5.00 (4.00;5.00)	5.00 (3.00;5.00)	4.00 (4.00;5.00)	5.00 (4.00;5.00)	0.428
Specific expected outcomes of therapy were provided	5.00 (4.00;5.00)	5.00 (3.50;5.00)	5.00 (4.00;5.00)	5.00 (4.00;5.00)	5.00 (3.50;5.00)	0.922
Changes in the oncological treatment plan were communicated on regular basis	5.00 (4.50;5.00)	5.00 (4.00;5.00)	5.00 (4.00;5.00)	5.00 (4.00;5.00)	5.00 (4.00;5.00)	0.635
You have received instruction on what to do after leaving the oncology facility	5.00 (5.00;5.00)	5.00 (4.00;5.00)	5.00 (4.00;5.00)	5.00 (5.00;5.00)	5.00 (4.00;5.00)	0.651
Your family members (or caregivers) received effective emotional support	5.00 (4.00;5.00)	5.00 (3.00;5.00)	5.00 (4.00;5.00)	5.00 (5.00;5.00)	5.00 (3.00;5.00)	0.328
There was no problem with access to medical documentation	5.00 (4.50;5.00)	5.00 (4.00;5.00)	5.00 (4.00;5.00)	5.00 (5.00;5.00)	5.00 (4.25;5.00)	0.277
Section 3 - information flow from leading doctor on treatment process – average assessment*	4.96 (4.38;5.00)	4.93 (4.00;5.00)	4.43 (3.92;5.00)	4.86 (4.18;5.00)	5.00 (4.00;5.00)	0.548
General satisfaction – would you recommend the hospital?	10.00 (9.00;10.00)	10.00 (9.00;10.00)	10.00 (9.00;10.00)	10.00 (10.00;10.00)	10.00 (9.00;10.00)	0.485

Notes: Data presented as median (interquartile range) due to non-normal distributions. Groups compared with Kruskal–Wallis test. *Average assessment calculated as mean of all assessed aspects within the section, for each patient.

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Table 8 Univariate Linear Regression Outcomes for General Satisfaction with Detailed Outcomes of Hospital Stay Assessment as Independent Variables

Variable	Patients with Hospitalization of Two or More Days				All Patients			
	β	95% CI for β	Std. β	p	β	95% CI for β	Std. β	p
Section 1 - hospital stay (infrastructure and organization of treatment)								
Quality of meals	0.53	0.35 to 0.71	0.42	**< 0.001**	-	-	-	-
Cleanliness of your room	0.54	0.31 to 0.76	0.31	**< 0.001**	-	-	-	-
Availability of a bathroom with a toilet	0.48	0.30 to 0.66	0.39	**< 0.001**	-	-	-	-
Cleanliness of bathrooms and toilets	0.49	0.29 to 0.69	0.32	**< 0.001**	-	-	-	-
Possibility to contact relatives and close ones	0.34	0.14 to 0.55	0.23	**0.001**	-	-	-	-
Adapting the conditions in the ward to the specifics of your cancer	0.58	0.35 to 0.81	0.33	**< 0.001**	-	-	-	-
Availability of the on-call physician in the absence of leading physician	0.76	0.57 to 0.96	0.53	**< 0.001**	-	-	-	-
Access to specialists	0.88	0.66 to 1.09	0.56	**< 0.001**	-	-	-	-
Responsiveness of nursing staff	1.01	0.76 to 1.26	0.56	**< 0.001**	-	-	-	-
Section 2 – medical care								
Kindness of doctors in ward/outpatient clinic	0.80	0.56 to 1.04	0.44	**< 0.001**	0.78	0.56 to 1.00	0.40	**< 0.001**
Your leading doctor's interest in your health	0.76	0.53 to 1.00	0.44	**< 0.001**	0.76	0.55 to 0.97	0.41	**< 0.001**
Your leading doctor's readiness to answer questions	0.61	0.37 to 0.85	0.32	**< 0.001**	0.64	0.42 to 0.86	0.32	**< 0.001**
Comprehensibility of the information provided to you by your leading doctor	0.88	0.63 to 1.12	0.49	**< 0.001**	0.83	0.61 to 1.04	0.45	**< 0.001**
Availability of leading doctor	0.94	0.70 to 1.18	0.53	**< 0.001**	0.82	0.62 to 1.02	0.48	**< 0.001**
Kindness of nursing staff	0.95	0.68 to 1.23	0.49	**< 0.001**	0.82	0.60 to 1.04	0.44	**< 0.001**
Nurses' interest in your health and well-being	0.87	0.63 to 1.12	0.49	**< 0.001**	0.79	0.58 to 1.00	0.45	**< 0.001**
The scope of information provided by nursing staff on how to prepare for examinations and procedures	0.81	0.56 to 1.06	0.46	**< 0.001**	0.72	0.51 to 0.92	0.41	**< 0.001**
Taking care to maintain intimacy during medical procedures	1.26	1.00 to 1.52	0.61	**< 0.001**	1.20	0.97 to 1.43	0.57	**< 0.001**
Readiness of medical staff to help you when you report pain	0.78	0.52 to 1.04	0.44	**< 0.001**	0.81	0.57 to 1.04	0.43	**< 0.001**
Comprehensibility of information provided by oncology care coordinator	0.88	0.65 to 1.11	0.53	**< 0.001**	0.85	0.64 to 1.05	0.49	**< 0.001**
Section 3 - information flow from leading doctor on treatment process								
The information provided about the disease was sufficient	0.63	0.42 to 0.84	0.44	**< 0.001**	0.66	0.48 to 0.84	0.44	**< 0.001**
There was no problem with access to specialists (as part of the consultation)	0.61	0.42 to 0.81	0.48	**< 0.001**	0.65	0.49 to 0.81	0.50	**< 0.001**
The possible causes of your illness were clearly communicated	0.71	0.52 to 0.90	0.52	**< 0.001**	0.66	0.50 to 0.83	0.49	**< 0.001**
Comprehensible information about essential tests was provided	0.80	0.56 to 1.05	0.47	**< 0.001**	0.78	0.58 to 0.97	0.46	**< 0.001**
The information about possible progression of the disease was clear	0.76	0.56 to 0.96	0.53	**< 0.001**	0.73	0.57 to 0.89	0.52	**< 0.001**
Disease stage (eg stage 1–4) was clearly communicated	0.57	0.39 to 0.76	0.46	**< 0.001**	0.59	0.44 to 0.74	0.48	**< 0.001**
The information about the treatment plan was sufficient	0.69	0.49 to 0.89	0.51	**< 0.001**	0.69	0.53 to 0.84	0.52	**< 0.001**
Sufficient information on possible therapies was provided	0.62	0.43 to 0.80	0.50	**< 0.001**	0.61	0.45 to 0.77	0.49	**< 0.001**
The information about possible side effects was clear	0.80	0.60 to 0.99	0.59	**< 0.001**	0.71	0.55 to 0.87	0.54	**< 0.001**
Specific expected outcomes of therapy were provided	0.70	0.51 to 0.88	0.57	**< 0.001**	0.65	0.50 to 0.80	0.53	**< 0.001**
Changes in the oncological treatment plan were communicated on regular basis	0.87	0.68 to 1.06	0.66	**< 0.001**	0.77	0.61 to 0.92	0.58	**< 0.001**
You have received instruction on what to do after leaving the oncology facility	0.86	0.65 to 1.06	0.59	**< 0.001**	0.79	0.61 to 0.97	0.53	**< 0.001**
Your family members (or caregivers) received effective emotional support	0.58	0.40 to 0.75	0.54	**< 0.001**	0.61	0.46 to 0.75	0.54	**< 0.001**
There was no problem with access to medical documentation	0.90	0.68 to 1.12	0.59	**< 0.001**	0.90	0.72 to 1.07	0.59	**< 0.001**

Note: Bold text for p-value with statistical significance.
Abbreviations: β, coefficient from linear regression mo CI, confidence interval; Std. β, standardized coefficient from linear regression model.

into a 1.12 higher overall satisfaction level (β = 1.12 CI95 [0.86;1.38], p < 0.001). A 1-point higher level of satisfaction in the information flow area resulted in a 0.92 higher overall satisfaction level (β = 0.92 CI95 [0.72;1.12], p < 0.001). In addition, a waiting time from referral to hospital admission of one to two months was associated with a 1.81-point lower overall satisfaction level than that associated with a wait time of up to one week (β = −1.81 CI95 [−2.86; −0.76], p = 0.001). Patients who rated the waiting time as too long had lower overall satisfaction scores by 0.85 than patients who rated the wait time as appropriate (β = −0.85 CI95 [−1.47; −0.22], p = 0.008). Considering formal consent to participate in the pilot study, as understood, was associated with a 2.12-point higher level of overall satisfaction (β = 2.12 CI95 [0.95;3.29], p < 0.001). Among all the patients, a 1-point higher level of satisfaction with medical care translated into a 1.08 higher overall satisfaction level (β = 1.08 CI95 [0.85;1.31], p < 0.001). A 1-point higher level of satisfaction in the information flow area resulted in a 0.92-point higher overall satisfaction level (β = 0.92 CI95 [0.75;1.09], p < 0.001). In

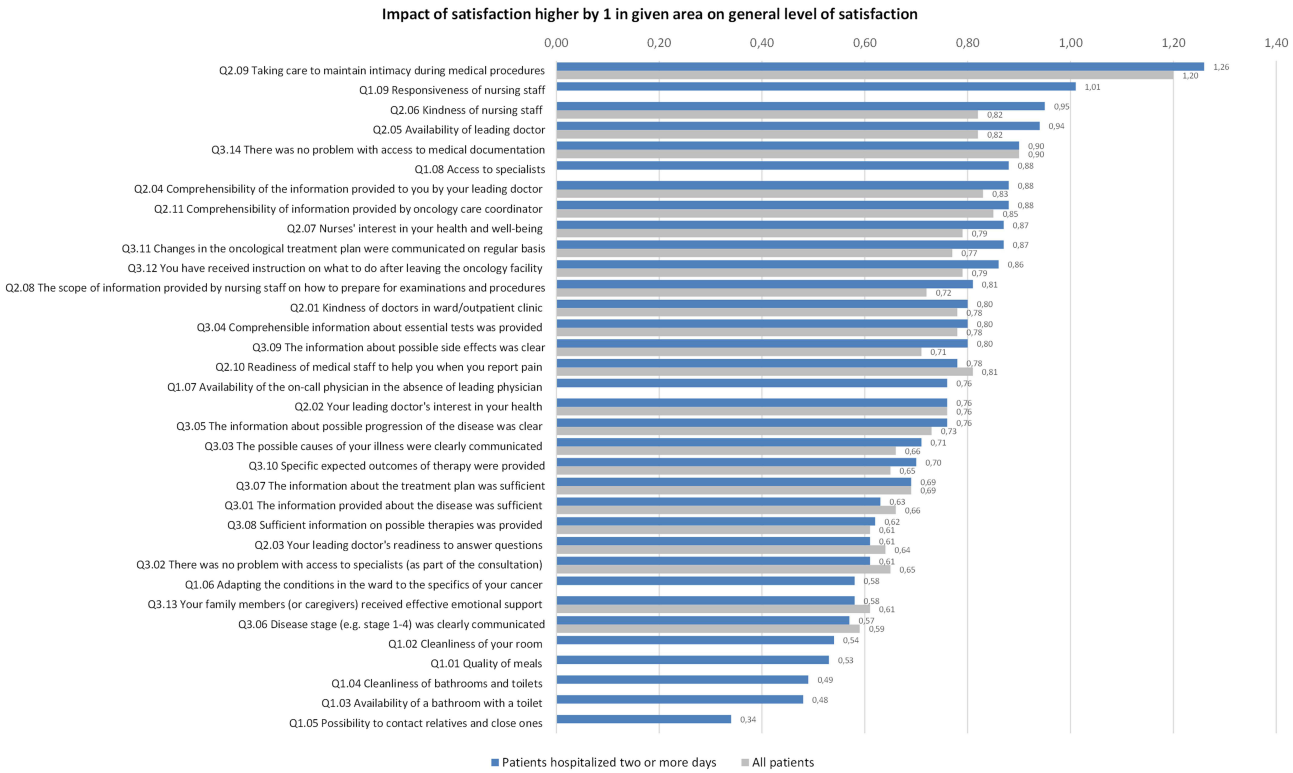

Figure 2 Impact of satisfaction higher by 1 in given area on general level of satisfaction (β coefficient from univariate linear regression models for general satisfaction).

addition, patients who rated the wait time as too long had an overall satisfaction level of 0.91 points lower than that of patients who rated the wait time as appropriate (β = −0.91 CI95 [−1.43; −0.39], p = 0.001). Considering the requirement of formal consent to participate in the pilot study as understandable was associated with a 1.59-point higher level of overall satisfaction (β = 1.59 CI95 [0.59;2.60], p = 0.002; Table 9).

Table 9 Univariate Linear Regression Outcomes for General Satisfaction with Three Numeric Parameters Assessing Sections of Hospitalization, Demographics and Other Categorical Information as Independent Variables

Variable	Patients with Hospitalization of Two or More Days				All Patients			
	β	95% CI dla β	Std. β	p	β	95% CI dla β	Std. β	p
Section 1 - hospital stay (infrastructure and organization of treatment) – average assessment**	1.07	0.83 to 1.31	0.57	**< 0.001**	-	-	-	-
Section 2 – medical care – average assessment**	1.12	0.86 to 1.38	0.54	**< 0.001**	1.08	0.85 to 1.31	0.50	**< 0.001**
Section 3 - information flow from leading doctor on treatment process – average assessment**	0.92	0.72 to 1.12	0.58	**< 0.001**	0.92	0.75 to 1.09	0.58	**< 0.001**
Age								
18-44 years*	*Ref*	-	-	-	*Ref*	-	-	-
45-64 years	−0.08	−0.69 to 0.53	−0.06	0.801	−0.07	−0.57 to 0.42	−0.06	0.773
≥ 65 years	−0.03	−0.62 to 0.56	−0.02	0.927	−0.08	−0.55 to 0.39	−0.06	0.743
Sex								
Female	*Ref*	-	-	-	*Ref*	-	-	-
Male	−0.29	−0.68 to 0.10	−0.22	0.150	−0.17	−0.47 to 0.14	−0.14	0.282
City size								
Village	*Ref*	-	-	-	*Ref*	-	-	-
City ≤ 50k	−0.15	−0.73 to 0.42	−0.12	0.600	−0.10	−0.53 to 0.33	−0.08	0.650
City 50k–150k	−0.49	−1.10 to 0.13	−0.38	0.118	−0.26	−0.75 to 0.23	−0.22	0.296
City 150k–500k	0.20	−0.86 to 1.26	0.16	0.711	0.32	−0.48 to 1.11	0.26	0.437
City ≥ 500k	−0.34	−0.92 to 0.25	−0.26	0.254	−0.10	−0.56 to 0.36	−0.08	0.665

(*Continued*)

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Table 9 (Continued).

Variable	Patients with Hospitalization of Two or More Days				All Patients			
	β	95% CI dla β	Std. β	p	β	95% CI dla β	Std. β	p
Number of hospitalizations within 2 years before current hospitalization								
None	*Ref*	-	-	-	*Ref*	-	-	-
1-5	−0.32	−0.76 to 0.12	−0.25	0.150	−0.32	−0.65 to 0.02	−0.26	0.065
≥ 5	−0.66	−1.48 to 0.17	−0.51	0.117	−0.29	−0.92 to 0.34	−0.24	0.365
Hospitalization type								
Two or more days	-	-	-	-	−0.48	−0.99 to 0.04	−0.40	0.069
One day stay	-	-	-	-	−0.46	−1.04 to 0.12	−0.38	0.120
Ambulatory services	-	-	-	-	*Ref*	-	-	-
Time from referral to hospital admission								
Up to one week	*Ref*	-	-	-	-	-	-	-
More than one week, but not more than two weeks	−0.22	−0.73 to 0.29	−0.17	0.401	-	-	-	-
More than two weeks, but not more than one month	−0.58	−1.18 to 0.01	−0.46	0.053	-	-	-	-
More than one month, but not more than two months	−1.81	−2.86 to −0.76	−1.41	**0.001**	-	-	-	-
More than two months	0.08	−1.14 to 1.30	0.06	0.898	-	-	-	-
How do you assess the waiting time for health services provided within the pilot?								
Far too long	−0.78	−1.67 to 0.12	−0.61	0.089	−0.78	−1.62 to 0.05	−0.65	0.065
Rather too long	−0.85	−1.47 to −0.22	−0.66	**0.008**	−0.91	−1.43 to −0.39	−0.75	**0.001**
Appropriate	*Ref*	-	-	-	*Ref*	-	-	-
Surprisingly short	0.02	−0.59 to 0.63	0.01	0.950	0.07	−0.37 to 0.52	0.06	0.738
Was the consent you signed for the pilot understandable?								
Yes	2.12	0.95 to 3.29	1.66	**< 0.001**	1.59	0.59 to 2.60	1.32	**0.002**
No	*Ref*	-	-	-	*Ref*	-	-	-
If you had any doubts about the content, have they been explained to you?								
Yes	0.18	−0.53 to 0.88	0.14	0.620	0.23	−0.34 to 0.81	0.19	0.423
No	*Ref*	-	-	-	*Ref*	-	-	-
There was no such need	0.07	−0.64 to 0.79	0.06	0.844	0.18	−0.41 to 0.78	0.15	0.541
Have you used a dedicated hotline?								
Yes	−0.04	−0.59 to 0.51	−0.03	0.877	−0.25	−0.67 to 0.18	−0.21	0.253
No	*Ref*	-	-	-	*Ref*	-	-	-
Have you received support and assistance from the coordinator assigned to patients for the pilot?								
Yes	0.17	−0.38 to 0.73	0.14	0.537	−0.10	−0.54 to 0.33	−0.08	0.644
No	*Ref*	-	-	-	*Ref*	-	-	-

Notes: *Age group of 18–24 years was combined with 25–44 years due to one patient aged 18–24 years. **Average assessment calculated as mean of all assessed aspects within the section, for each patient. Bold text for p-value with statistical significance.
Abbreviations: β, coefficient from linear regression mo CI, confidence interval; Std. β, standardized coefficient from linear regression model.

Discussion

As the quality of diagnostics continues to improve and the effectiveness of therapy increases, the role of issues such as patients' quality of life and patients' sense of satisfaction with the services included in the diagnostic and therapeutic pathway increases. This is especially true for oncology patients, among whom feelings of anxiety and confusion shape the cited aspects.[18]

The management of the health care system has seen an evolution in its operation, the essence of which seems to be the idea of patient-centred care, considering the experiences, needs, and preferences of patients at various stages of the services provided.[19,20] In addition, patients increasingly want to consciously participate in and shape oncology care.

The aim of this analysis was to evaluate the results of satisfaction surveys of patients with a diagnosis of lung cancer treated at our centre. The survey was part of a pilot study to test new organizational solutions in oncology care in Poland. The selection of patients with this diagnosis was dictated by the fact that it is the most common malignancy in Poland, associated with more than 20,000 deaths each year and involving the oncology care system to the fullest extent.[21]

The survey helps to address the issue of comprehensive quality management and relates to definitions of measuring the quality of medical care, such as patient-reported experience measures (PREMs).[14,22] Analyses and assessments of needs realized by the health system and the provider have become widely used tools that can affect the improvement of

services.[21] For example, two projects using the PREM, the "Expectations and Satisfaction of Patients and Their Families" and the "Flemish Patient Survey", are used in Belgium.[23]

The United Kingdom's health care system, the National Health Service (NHS, UK), was one of the first to introduce data reporting on patient experience, including oncology.[24–26]

In Italy, during the COVID-19 pandemic, PREMs were used to gather information on how to reorganize the oncology care system in an emergency, considering the needs of patients.[27]

In our analysis, the demographic characteristics of patients with lung cancer were reflected in the predominance of a group of patients over 65 years of age, with lung cancer being the second most commonly diagnosed malignancy in men and women in this age group in Poland, and in the percentage of inpatients compared with outpatients.[28] The latter is probably related to oncological treatment regimens for this diagnosis requiring hospitalization, such as surgery, perioperative care, and chemotherapy in combination with radiation therapy, which is performed sequentially or concurrently.

At the beginning of our analysis, we already observed a high percentage of missing data on important variables relative to satisfaction. Moreover, given the low level of deficiencies in the satisfaction aspect, the above situation may be related to patients' incomplete understanding of the descriptive command of the survey itself in the various sections. This represents a significant limitation of our analysis and prompts us to modify the survey by adding an understandable definition of the phrases `importance` and `satisfaction`.

Based on an assessment of the average satisfaction values in the first three sections of the survey, the very small differences between them are noteworthy. Nevertheless, the results indicated that the lowest rating was for the scope and flow of information (average 4.44 ± 0.75). As studies have shown, the level of information flow in oncology between medical staff and patients can translate clearly into patients' quality of life.[29,30]

Nearly 1 in 10 respondents said that while signing the consent for the pilot study, they had doubts about it that were not clarified by staff. This point is in accordance with the communication aspect and indicates room for improvement in this element at the assessed centre.

The above results suggest the need for further work to improve communication between patients and medical staff. Investment in interpersonal communication training for medical personnel may be one solution that can help improve this aspect.[31,32]

One of the key changes that have occurred in recent years in the system of oncology care in Poland was the introduction of an oncology therapy coordinator dedicated to patients.

The role and place of the coordinator in oncology care have been well defined over the past few years, defining this function as one of the main functions throughout the treatment process, starting from the stages of diagnosis, treatment, and post-therapeutic follow-up.[33–35]

The results of the survey confirmed a very positive assessment of this arrangement, as expressed by a significant percentage of patients reporting that they received support and assistance from the coordinator. Similar results were obtained by Hunnibell et al[36] in an analysis of the use of nurse coordination to improve the timeliness of lung cancer oncology care.

Analysis of the results also indicated that among the first 3 sections of the survey, respondents were more likely to provide answers in the second and third sections regarding the evaluation of medical care and information flow. The evaluations of the hospital stays and, thus, the first section of the survey, were more often unanswered. This may suggest some prioritization of the issues patients rated, placing the level of care and staff-patient communication ahead of hospital infrastructure in priority.

From the cross-analyses performed, statistical significance was obtained only for aspects of meal quality versus patient age and gender and for nursing team responsiveness related to respondents' gender.

Due to the very small differences observed, despite the significance, it is difficult for us to clearly define the reasons for the above results, which are similar to the results of studies on the issue of the quality of hospital meals.[37,38]

Among the possible reasons why older patients may be more satisfied with their meals is the variety in their diet. For seniors who have limited culinary options at home, these meals can be seen as appealing. In addition, not having to prepare meals can be convenient, especially for elderly individuals.

As studies have shown, the issue of quality and satisfaction with hospital meals can have a clear impact on the level of food consumption by patients, which is important in the therapeutic process, making this aspect valuable for continuous monitoring.[39,40]

Further interesting correlations were observed when the associations of overall patient satisfaction with individual questions in the survey were analysed. Considering all respondents, both inpatient and outpatient, the feeling of intimacy during medical procedures was the most significant in this case of statistical evaluation, most strongly translating into the level of overall satisfaction.

Issues such as the courtesy of staff, their ability to respond quickly and appropriately to patients' needs, and their interest in patients' health and well-being—aspects of medical care itself—were perceived by patients as more important than hospital infrastructure or organization. These results are consistent with the most frequent responses to the second open-ended question of the survey, in section four, relating to an aspect of the hospital's work that is particularly appreciated by patients.

At this stage of our work, a theme is already emerging of a specific group of issues that seem to be a priority from the point of view of the oncology patient, namely, the interpersonal competence of medical personnel.

The above observations are consistent with the correlations shown not only in oncology care but also in other areas of medicine.[41–45]

The feedback obtained from the surveys can be used in the future to develop recommendations and guidelines for interpersonal communication between staff to improve it or maintain it at a satisfactory level.[46]

An unquestionable limitation of the analysis presented here is that the data were based on a survey with a low response rate at the assessed centre. Among the 4483 lung cancer patients included in the pilot study at our centre, 260, or 5.8%, completed and delivered the questionnaire. This was one of the lowest values obtained in the Lower Silesian province, which was also associated with the highest absolute number of questionnaires; this result was related to the total number of patients included in the project. For example, at the evaluated centre, in the group of patients diagnosed with breast cancer, the response rate of questionnaires was more than 50%, and among patients with prostate cancer, it was more than 20%.

When we compare the response rates obtained via questionnaires with those of other similar studies, we consider our results to be significantly below expectations.[47–49]

The issue of survey response rate and its relevance to statistical evaluations is a complex and frequent topic of research, but its impact on analytical results is not clearly defined.

Many studies suggest the importance of the response rate of questionnaires used in health care systems for the final analysis.[50–53]

Moreover, research suggests that the indicator alone should not be decisive in the evaluation of the entire survey and that this element should be considered in conjunction with other aspects of the analysis conducted.[54]

In our opinion, the low percentage of response rate in our centre requires diagnosing the reason for this result and trying to propose solutions that can improve it. It is likely that the lack of clear information from those issuing the questionnaires about its relevance to the pilot study as a whole and the overly elaborate questions in the survey may have influenced the low motivation among respondents to complete and deliver them.

There are various mechanisms to increase survey response rates, such as financial incentives, tokens, or even lottery tickets.[55] In our case, also for consideration is the introduction of an online version of the survey in addition to the paper version and some form of reminder and incentive for patients to deliver the survey, as well as raising awareness among patients about the impact of their responses on improving the oncology care system, not only at a specific centre but also potentially more broadly. In addition, a strictly defined moment in the patient's path at which he or she receives the questionnaire should be specified and adhered to, as should the time and place of delivering the questionnaire, such as when the patient receives a discharge from a hospital or outpatient procedure.

The low response rate, the analysis of respondents' answers limited to one type of cancer, and the data from a single centre dictate that the results presented should be approached with caution. The above limitations create a risk that our analysis is unrepresentative. In the future, it will be valuable to compare results from questionnaires from patients with other diagnoses included in the NCN Pilot Study, ie, breast cancer, colorectal cancer, prostate cancer, and ovarian cancer.

In addition, the expansion of the study group to other centres participating in the pilot study should increase the authoritative nature of the analysis.

Despite the aforementioned limitations of our analysis, we believe it is a valuable contribution to the discussion of patient-centred oncology care.

Importantly, this is one of the first similar evaluations conducted among oncology patients, on this scale, in Poland.[56]

The introduction of the assumptions of the National Oncology Network will allow a broad database nationwide from the units included in the structure of the oncology network to be obtained in the future. To achieve this goal, it is necessary to have the right infrastructure, including both technical, to collect and process large amounts of data, and personnel, medical and administrative, to be prepared for managing the data. A key aspect throughout the process is to maintain continuous monitoring of patient preferences and experiences such that the changes and system adaptations that are made are up-to-date with emerging needs from patients, which may change over time.[57,58]

A promising prospect is the possibility of comparing the results obtained between centres, not only in Poland but also in other countries, with a special focus on European Union countries.[59–61] However, the heterogeneous systems for assessing patient satisfaction and the existing differences in the functioning and organization of oncology care, which are specific to different countries and even regions, necessitate caution in trying to easily generate conclusions from such comparisons.[62]

Conclusions

In conclusion, in this work, we presented the usefulness of the tool in which the centres participating in the pilot study of the NCN in Poland were given to monitor patient satisfaction with the services provided. In the era in which the patient is seen as being at the centre of the entire oncology care system, information obtained directly from the recipient relating to the functioning of the system allows the expectations and preferences of patients to be taken into account, making care even more pro-patient.

It should be emphasized that the low response rate constitutes a significant limitation of the conducted analysis. Therefore, a key challenge for the future will be to take steps to increase the survey return rate, which will allow for more representative and reliable results.

Data Sharing Statement

Data supporting the study results can be provided followed by request sent to the corresponding author's e-mail.

Ethics Approval and Consent to Participate

This study was approved by the Ethics Committee of Wroclaw Medical University, Poland. Approval number KB 226/2024. All patients included in the National Cancer Network (NCN) pilot program in Poland made a written declaration of informed consent to participate in the NCN pilot program. Before enrollment, each patient obtained information about the principles of the pilot program and the detailed information of personal data processing as part of the NCN. All methods were carried out in accordance with the Helsinki declaration and with relevant guidelines and regulations.

Informed Consent Statement

Informed consent was obtained from all subjects involved in the study.

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Disclosure

The authors report no conflicts of interest in this work.

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