ORIGINAL ARTICLE

Annals of Agricultural and Environmental Medicine
www.aaem.pl

Bottlenecks in lung cancer diagnostics cause poorer prognosis in this cancer – experience of a single oncology centre

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A – Research concept and design, B – Collection and/or assembly of data, C – Data analysis and interpretation, D – Writing the article, E – Critical revision of the article, F – Final approval of the article

Nalewaj K, Chmielewska I, Krawczyk P, Milanowski J. Bottlenecks in lung cancer diagnostics cause poorer prognosis in this cancer – experience of a single oncology center. Ann Agric Environ Med. doi:10.26444/aaem/212769

Abstract

Introduction and Objective. Lung cancer remains the leading cause of death from malignant tumours worldwide. Delays in the diagnosis of lung cancer in primary and specialist health care result in a high stage of the disease, lack of possibility of radical treatment, and the shortening of the life expectancy of patients. The aim of the study is to determine factors contributing to delays in the diagnosis of lung cancer in patients in the Lublin Province in south-east Poland. The study focuses on factors that influence the overall survival of patients.

Materials and Method. An anonymous survey was conducted among 249 patients diagnosed with lung cancer. 150 of the hospitalized patients were men (60.24%) and 99 women (39.76%). Data analysis was performed using Statistica software.

Results. The average time from the first symptoms to diagnosis was 13.5 weeks. Patients with respiratory infections and treated with antibiotics up to 6 months before diagnosis experienced a significantly ($p<0.00001$) longer wait to final diagnosis. The median survival time for all patients was 25.7 months. A long time from first symptoms to diagnosis had a significant ($p=0.046$) impact on the estimated survival time.

Conclusions. The results of the study showed that delays in the diagnosis of patients with lung cancer hospitalized in the Lublin Province were significant and contributed to shortening the survival time. It is necessary to introduce an algorithm for the diagnosis path of patients with symptoms of lung cancer

Key words

lung cancer, antibiotics, delays, lung cancer diagnosis, pulmonary infection and delayed cancer diagnosis, role of GPs in lung cancer diagnosis, lung cancer symptoms, NSLC, primary care

INTRODUCTION

Despite the development of medicine and efforts undertaken to improve diagnostics and spread awareness among the Polish population, lung cancer still remains the most common cause of death due to malignant neoplasms, among both men and women, and overtaking breast cancer. According to the National Cancer Registry, in Poland in 2022, approximately 21,000 new cases of lung cancer were diagnosed which accounted for 15% of all diagnosed malignant tumor during that year. In 2025, this number is expected to increase to 23,500 [1]. In 2021, lung cancer caused the deaths of 20,866 Poles – 13,059 men and 7,807 women – accounting for 29% of all deaths due to malignant tumors among men, and about 17% among women [2].

Worldwide, 2.2 million people are diagnosed with lung cancer each year. In 2022, 1.8 million people died of lung cancer, which amounted to 18.7% of all recorded cancer deaths, and this number is expected to reach 2.45 million by 2030 [3]. The age-averaged cumulative lifetime risk of being diagnosed with lung cancer is 3.8% in men and 1.77% in women [4]. The 5-year survival rate for lung cancer patients is 12%, which is significantly lower compared to other most common malignant tumors in Poland like breast or prostate cancer. However, data on the percentage of patients with 5-year survival seem to be outdated. Personalized treatment used as a adjunct to surgery, chemoradiotherapy or as single-method of treatment significantly prolong the survival of lung cancer patients. Five-year survival occurs in about 15–20% of patients with advanced NSCLC undergoing immunotherapy or chemoimmunotherapy, and in up to 50% of patients receiving molecularly targeted therapies. The percentage of cured patients undergoing radical methods of treatment is even higher [5].

The main symptoms of lung cancer include cough, weight loss, weakness, chest pain, and haemoptysis. The disease often presents with symptoms that are very common in a primary care situation, making early diagnosis difficult [6].

Less than 20% of lung cancer cases in Poland are diagnosed in the early stages which would allow for surgical intervention. The symptoms of lung cancer are non-specific and appear at a relatively late stage of the disease, which is the primary reason for late diagnosis. Another reason is the barrier to access to quick diagnostics, e.g. extended waiting time for computed tomography (CT), and therefore postponed initiation of treatment. The introduction of a fast diagnostic and therapeutic path for lung cancer, along with setting a time frame for each diagnostic step, should be a priority and an element of national guidelines. Unfortunately, such guidelines have yet to be published. Attempts to create regulations for highly specialized lung cancer diagnostic and

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Received: 18.09.2024; accepted: 15.10.2025; first published: 05.11.2025

treatment centres – Lung Cancer Units – have been ongoing in Poland for several years [7].

Primary care physicians – general practitioners (GPs) – play a central role in the diagnosis of patients with lung cancer, as most patients with symptoms suggestive of lung cancer initially report to them first. The GP is responsible for sending patients for additional examinations or for referral to specialists. It is crucial to maintain oncological vigilance, enabling the initiation of the diagnostic and therapeutic pathway. In the case of lung cancer, the task also involves preventing people from starting smoking, supporting patients in the fight against tobacco addiction, and directing them to preventive programmes.

The study is one of the largest studies of its kind conducted in Poland, and the results may have a significant impact on our understanding of the real causes of delays in the diagnosis of lung cancer patients. Most importantly, the results may lead to the acceleration of diagnosis and, consequently, an increase in the possibility of prolonging survival in these patients.

OBJECTIVE

The aim of the study is to show whether there are significant delays in lung cancer diagnostics in the Lublin Province of south-east Poland, while additionally indicating which factors influence the delays. The life expectancy of lung cancer patients is also determined. The factors that primarily determine the life expectancy of lung cancer patients are also identified. An attempt was also made to check whether previous results obtained in a smaller group of patients would be confirmed.

MATERIALS AND METHOD

The study was conducted in 2021–2023 among 249 patients diagnosed and treated in the Department of Pneumonology, Oncology and Allergology at the Medical University of Lublin in south-east Poland. Patients were asked to complete an author created 29-question survey. The study group comprised 249 hospitalized patients, 150 men (60.24%) and 99 women (39.76%) (Fig. 1). The average age of the patients was 66.43±8.08 years. The youngest patient was 25 years old and the oldest – 85.

The study was conducted in the Department of Pneumonology, Oncology and Allergology, where the largest number of patients with lung cancer are diagnosed and treated in the Lublin Province. Every year, the center deals with about 3,000 hospitalizations and 1,800 single-day stays for the treatment of lung cancer. At the same time, over 800 bronchoscopies are performed in patients with suspected lung cancer. Among them, lung cancer is diagnosed in about 270 patients per year. The treatment of lung cancer in the Lublin Province is additionally provided by hospital in Zamość, Biała Podlaska, or in the Specialist Provincial Hospital in Lublin. As shown by data from the National Cancer Registry, in 2022, lung cancer was diagnosed in 971 people in the Lublin Province. In the same year, 1,022 deaths were recorded due to this disease. For comparison, in 2021, there were 980 cases and 979 deaths, respectively.

The research results obtained in the study were subjected to statistical analysis. The values of the analyzed quantitative variables are presented using the mean, median, and standard deviation values, and the qualitative variables presented using frequencies and percentages. The normality of the distribution of variables in the study groups was checked using the Shapiro-Wilk normality test. The Mann-Whitney test was used to examine differences between groups. Categorical variables were compared using Pearson's chi-square test. The relationship between estimated survival time and selected independent variables was assessed using Kaplan-Meier analysis. $p<0.05$ was adopted as statistically significant. The database and statistical tests were performed using Statistica 9.1 software (StatSoft, Poland). The study is a continuation of a project with part of the data previously published, and presents a larger group of patients and new factors influencing delays in lung cancer diagnosis [8].

All patients were informed about the purpose of the study and provided written consent to participate. The study was approved by the local Bioethics Committee (Approval No. KE-0254/14/2021).

RESULTS

Among the participants, 69.88% lived in small towns and villages, 30.12% lived in cities with > 150,000 inhabitants, and 45.38% lived close to a general practitioner's (GP) office. The criterion of 'close to a GP' was 5 km: up to 5 km – close, above 5 km – distant. Non-small cell cancer (NSCLC) was diagnosed in 75.5% of the patients; 81.93% were diagnosed in non-operative stages. Comorbidities – most often hypertension (73%) and diabetes (31.07%) were diagnosed. 79.52% of the respondents declared that they smoked cigarettes in the past, and 30% were current smokers. (Fig. 1). 177 patients presented symptoms of lung cancer, of which the most frequent was cough (29.4%). However, 29% of the patients had no symptoms of the disease. Predominantly, in unsymptomatic patients, lung cancer had been diagnosed at an early stage, and when other tests had been performed, e.g. CT scan to monitor the course of other chronic diseases.

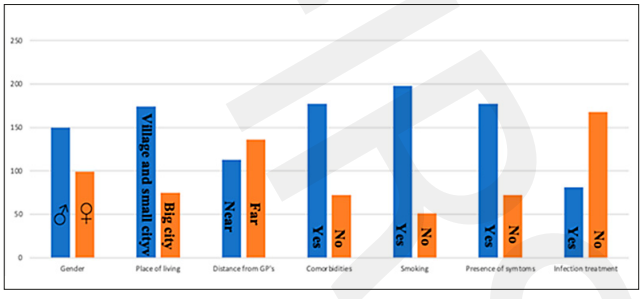

Figure 1. Characteristics of the group

In 54.6% of the patients, a GP had been the first doctor to examine the patients after the first symptoms appeared. Only 21.29% of the patients had received an Oncological Diagnosis and Treatment Card which enables access to a faster diagnostic path due to a strong suspicion of cancer. Only 17% of the patients had a card issued by a GP. In 16.06% of cases, apart from lung cancer, another primary cancer was diagnosed.

Before the final diagnosis of lung cancer, up to 6 months previously, 32.5% of patients had a respiratory infection

treated with an antibiotic. These patients had significantly more often (p<0.00002) cancer symptoms than people not treated with antibiotics. What is even more important, patients treated for respiratory infections up to 6 months before diagnosis, experienced a significantly (p<0.00001) longer wait to final diagnosis (Tab. 1).

Table 1. Duration of individual diagnostic stages in patients who had received or had not received antibiotics before cancer diagnosis

Variable			Patients treated with antibiotics 6 months before cancer diagnosis		Chi^2 p
			YES (N=81)	NO (N=168)	
Symptoms	YES	N	72	105	Chi^2=18.515 p<0.001
		%	88.89	62.50	
	NO	N	9	63	
		%	11.11	37.50	
Time from first symptoms to diagnosis	<1 month	N	10	75	Chi^2=27.023 p=0.00001
		%	12.35	44.64	
	1–6 months	N	48	69	
		%	59.26	41.07	
	> 6 months	N	23	24	
		%	28.40	14.29	
Time from first symptoms to first visit to a doctor who suspected lung cancer	<1 month	N	47	119	Chi^2=23.261 p=0.00004
		%	58.02	70.83	
	>1 month	N	34	49	
		%	41.98	29.17	
Time from first symptoms to first X-ray examination	<1 month	N	38	103	Chi^2=17,303 p=0.0006
		%	46.91	61.31	
	>1 month	N	43	65	
		%	53.09	38.69	

A comparison of the impact of an antibiotic therapy on diagnostic delays is presented in Table 2. Comparison of the time from the first symptoms to diagnosis depending on selected variables is shown in Table 3.

The median survival time for all patients was 25.7 months – 95%, Confidence Interval (CI) – 21.28–30.18). Time from first symptoms to diagnosis had a statistically significant impact on the estimated survival time. Patients whose waiting time from the first symptoms to diagnosis was >6 months had a significantly shorter estimated survival time, compared to patients whose waiting time was <6 months (χ^2 = 3.988; p = 0.046) (Fig. 2).

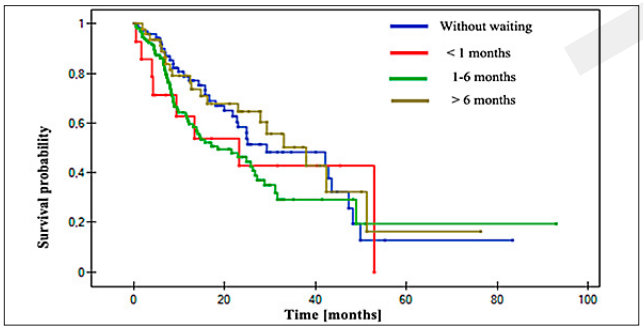

Figure 2. Survival function depending on time from the first symptoms to diagnosis

Patients who underwent surgery for lung cancer had a longer overall survival time than patients who were not eligible for surgery (p<0.01).

A history of smoking was recorded among 79.5% of patients, 23.7% were current smokers, 86% were heavy smokers, and 14% light smokers. Based on the responses about smoking, patients were categorized as non-smokers, former smokers, or light smokers (less than 20 cigarettes per day), and heavy smokers (more than 20 cigarettes per day). Smoking status had no statistically significant effect on the duration of individual diagnostic stages. However, non-smokers had a significantly longer predicted survival time than heavy smokers (p=0.021) (Fig. 3).

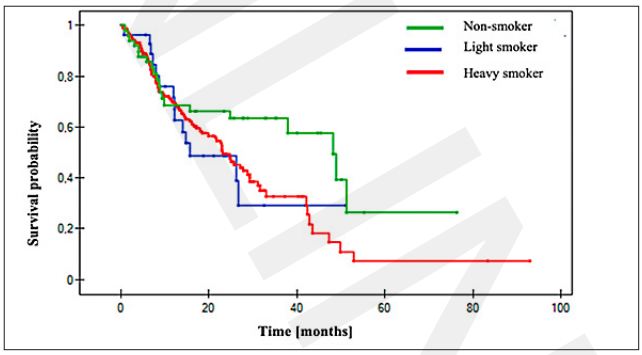

Figure 3. Survival function depending on the smoking status of examined patients

DISCUSSION

According to Bradley et al., the progress achieved in diagnosis and treatment has led to increased effectiveness in the treatment of many cancers. Since 1971, age-standardized, 5-year survival rates for breast cancer, prostate cancer and colorectal cancer in England and Wales have increased, from 53% to 87%, 37% to 85%, and 24% to 59%, respectively. However, age-standardized 5-year survival for lung cancer has increased from 5% to only 10% [9].

Symptoms of lung cancer are non-specific and depend on the stage of the disease and the histological type. The most common symptom of lung cancer is cough, which occurs in nearly 90% of patients and is a result of direct, mechanical irritation of the airways, as well as inflammation developing around the tumour. Released inflammatory mediators (such as histamine and prostaglandins) irritate cough receptors located in the respiratory epithelium [10]. Both the occurrence of cough and change in its character are alarming signs that should not be ignored.

Hoarseness, haemoptysis, and dyspnea are also alarming symptoms that require immediate diagnosis [11]. Recurrent respiratory infections resulting from atelectasis caused by the presence of a tumour and retained secretions constitute a significant clinical problem, and contribute to delays in diagnosis. Furthermore, lung microbiome dysbiosis, which disrupts the balance of the composition and size of the lung microbiome, has been shown to be associated with the occurrence of lung cancer, disease progression and prognosis. Microbiome dysbiosis may influence not only tumour progression, but also the clinical outcomes of therapeutic interventions, particularly immunotherapy [12].

Symptoms appearing in advanced stages of the disease include unintentional weight loss or symptoms resulting from

Table 2. Impact of antibiotic use 6 months before lung cancer diagnosis on delays in individual diagnostic steps

	Total [N=249]	Patients treated with antibiotics	Patients without antibiotics treatment	p
Time from first symptoms to first visit to a doctor who suspected lung cancer [weeks]	5.03±10.71	6.85±14.48	4.14±8.20	**0.000423**
Time from the symptoms to first X-ray examination [weeks]	5.98±11.43	8.36±14.59	4.82±9.35	**0.000057**
Time from the symptoms to first CT examination [weeks]	9.5±13	13.49±15.36	7.55±1114	**0.000002**
Time from CT to bronchoscopy [days]	26.3±31.34	23.34±26.51	27.69±35.26	0.551855
Time from bronchoscopy to histopathological results [days]	26.5±48.32	30.88±67.09	24.23±35.35	0.532685
Time from receiving pathomorphological results to complete examination of predictive factors [days]	15±37.23	11.62±10.47	16.6±44.59	0.567956
Duration of examination of predictive factors [days]	8±7.83	9.17±10.62	7.35±6.08	0.594042
Time from bronchoscopy to final diagnosis and therapeutic decision [days]	46.2±77.06	54.50±90.83	42.00±69.32	0.898763
Time from first symptoms to diagnosis [weeks]	13.49±14.8	18.85±16.03	10.89±12.26	**0.000001**

the presence of metastases, such as neurological disorders (headaches and dizziness, epileptic seizures) or bone pain [13]. Small cell carcinoma is characterized by the occurrence of paraneoplastic syndromes, such as Lambert-Eaton syndrome (an autoimmune syndrome characterized by fatigue and muscle weakness mainly in the lower limbs), or Cushing's syndrome, the ectopic secretion of adrenocorticotropic hormone by cancer cells, which stimulates the adrenal glands to produce cortisol [14].

The role of the GP in the prevention and diagnosis of lung cancer seems to be crucial. Lung cancer patients mainly report to their GP on the appearance of the first symptoms. The first stage of diagnosis is an interview and a physical examination; this is a crucial step that essentially determines how quickly the patient will be diagnosed. If symptoms suggestive of a lung tumour are present, the GP may refer the patient for a chest X-ray, a visit to a pulmonologist or oncologist, or directly to the hospital in cases of massive haemoptysis or shortness of breath.

In Poland, from 1 October 2022, GPs can also refer patients for a CT scan of the chest, but only if the chest X-ray reveals abnormalities. The tasks of a GP include identifying lung cancer risk groups, and carefully observing people belonging to this group, including heavy smokers, and patients with chronic respiratory diseases, such as chronic obstructive pulmonary disease (COPD) or tuberculosis. Chronically treated patients should be monitored for new symptoms or changes in existing symptoms. A chronic cough is often treated for too long without the performance of a chest X-ray. Antibiotics are administered, often despite the absence of fever, leukocytosis or significant increase in CRP (C-reactive protein). This is one of the reasons for delays in the diagnosis and appropriate treatment of the disease.

According to a study by Wickramasinghe et al., the number of antibiotic prescriptions increases in the year preceding lung cancer diagnosis. The authors point out that the increase in antibiotic prescriptions (including inhaled medications) was observed earliest in patients with COPD, which may lead to a prolonged diagnostic process if early symptoms are misattributed to COPD,or other benign conditions. The study found that 3,445 (63%) patients received at least one prescription for antibiotics or inhaled medications in the 12 months preceding lung cancer diagnosis, 728 (37%) COPD-free patients received at least one prescription during this time, compared with 397 (59%) patients with newly diagnosed COPD, and 2,320 (83%) patients with pre-existing COPD. The most commonly prescribed medications among patients without COPD and patients with newly diagnosed COPD were antibiotics, while among patients with COPD, inhaled medications were prescribed [15].

In the study by Weinberg FD, et al., the overall incidence of pneumonia before lung cancer diagnosis was 2.3%. Patients who had pneumonia before lung cancer diagnosis had shorter overall survival compared with patients who had pneumonia diagnosed after lung cancer diagnosis (1.9 vs. 15.9 months; $p < 0.001$), or patients who did not develop pneumonia at all (1.9 vs. 21.8 months; $p < 0.001$). Patients who had pneumonia before lung cancer diagnosis had a higher risk of death than patients who had pneumonia after lung cancer diagnosis or patients without pneumonia [16].

According to the statistics cited above, it seems reasonable that in individuals at risk of lung cancer (age, smoking, recurrent infections), empirical antibiotic treatment (if indicated) should be planned with a control X-ray after 4–6 weeks, or earlier if necessary, and possibly extended diagnostics with a chest CT in the case of a strong suspicion of lung cancer.

A study conducted in New South Wales, Australia, identified the key role of GPs in the diagnosis of lung cancer – 93% of patients had visited their GP within three months before diagnosis, 60% had visited their GP four times before diagnosis, and 23% had been accidentally diagnosed with lung cancer [17].

To detect cancer at an early stage, when treatment has the highest chance of success, the Lung Cancer Early Detection Programme was introduced. It relies on low-dose computed tomography (LDCT), which allows for the detection of even very small lung lesions, invisible on X-ray, while using a lower radiation dose. Screening tests are targeted at asymptomatic individuals who are at a particularly high risk of developing lung cancer [18].

The effectiveness of lung cancer screening has been described in numerous studies. The National Lung Screening Trial (NLST) conducted in the USA in 2011 demonstrated that LDCT is more effective than chest X-ray in reducing mortality in the high-risk group, resulting in a 20% reduction in lung cancer mortality. The NELSON (Nederlands–Leuvens Longkanker Screenings Onderzoek) study demonstrated a 24% decrease in lung cancer mortality in men and 33% in women, and a significant increase in the detection of early-stage lung cancer [19].

The standard measure of the correct diagnostic path in oncological patients is the time from the appearance of the first symptoms of the disease to the final diagnosis. Rapid

cancer diagnosis in order to improve therapeutic outcomes is a priority for many European governments. For example, in the the UK, government policy focuses on increasing the percentage of cancer patients diagnosed early (at stages I or II) from 50% to 75% by 2028 [20]. The current British guidelines from the National Institute for Health and Care Excellence (NICE) are evidence-based recommendations for identifying symptoms that may be caused by developing cancer. They also present a selection of appropriate tests used in primary health care for suspected cancer, the results of which allow referral of patients to appropriate specialists.

In many countries, such as the UK, Norway, Sweden and the Czech Republic, the waiting time for treatment is regulated by law. In the UK, the time between GP and specialist visits cannot exceed 14 days, and the time from final diagnosis to treatment cannot exceed 31 days. The maximum time from visiting a family doctor to starting treatment is 62 days [21]. The UK National Cancer Diagnosis Audit found that the median interval from first visit to referral to primary care for lung cancer was 14 days. However, prolongation to 60 and 90 days was experienced by 17.9% and 10.8% of lung cancer patients, respectively. One-third of patients diagnosed with lung cancer had presented to their GP with cancer-related symptoms three or more times before diagnosis [22]. On the other hand, a study conducted in Sweden showed that among patients diagnosed with lung cancer there was a 6-month delay between the appearance of the first symptoms and the start of treatment [23]. In a meta-analysis conducted by Guirado et al., the median time from the onset of symptoms to the start of treatment in patients with lung cancer was 87.5 days (44–130.5). The time from diagnosis to initiation of treatment,on average, was > 20 days. The median time from the first symptoms to the first visit to a GP was 44.52 days (8–53) [24].

A study by Tsai et al. proved that a shortening of the time from confirmation of the disease to the start of treatment in patients with NSCLC to 7 days is associated with extending 5-year survival by 0.49–9.07%, depending on the stage at which the cancer was diagnosed. The improvement in 5-year survival was particularly pronounced in patients with NSCLC in the early stages (stages I and II), which amounted to 10.28–10.34%; in patients at stages III and IV, this increased only by 1.91% and 0.49%, respectively. Moreover, it has been shown that in patients at stage I or stage II, the longer the time from diagnosis to the initiation of treatment, the more increased was the risk of death from lung cancer [25].

The current study shows that although delays in the diagnosis of patients in the Lublin Province are significant, they are comparable to the above-mentioned statistics.

Lung cancer and smoking. Compounds contained in tobacco smoke lead to DNA damage and chronic inflammation. The risk of developing lung cancer increases proportionally to the number of cigarettes smoked and the duration of smoking. It is important to mention that smoking also has a negative impact on the effectiveness of treatment for patients already diagnosed with lung cancer. Smokers are at greater risk of post-operative complications, and due to poorer tissue oxygenation, the effectiveness of radiotherapy is reduced. Furthermore, smoking is associated with worse tolerability of systemic treatment and a greater risk of adverse effects [26].

It should be emphasized that there is no safe dose of cigarettes. As shown in the study by Schane RE et al., even occasional smoking (1–2 cigarettes per day or smoking from time to time) despite the low intensity, is associated with a significantly increased risk of lung cancer compared to never smokers. In daily smokers (> 20 cigarettes per day), the risk of death from lung cancer is over 23 times higher in men, and approximately 13 times higher in women, than in non-smokers, while the risk for occasional smokers, although lower, is still significant [27].

Hung et al. examined survival times in 515 lung cancer patients and showed that the median survival of all the patients was 33.9 months. The median survival of patients who were treated after multidisciplinary team (MDT) discussion was 41.2 months, compared to only 25.7 months in patients treated without multidisciplinary care. Moreover, multivariate analysis showed that MDT, tumour size, performance status, and surgery, were significant prognostic factors in lung cancer patients [28].

The Polish Diagnostics and Oncology Treatment Card. A priority referral card for a patient with suspected cancer, and thanks to which the patient avoids the usual queues and experiences a significantly accelerated diagnostics process. The GP should always issue this card when there is high risk of cancer. Moreover, in specialist care, the card introduced the obligation to plan the path of cancer patients using MDT. The card entitles the patient to fast-track access to the necessary diagnostics and then to treatment within the guaranteed maximum waiting times: 28 days of basic oncological diagnostics, 21 days of in-depth diagnostics, which includes determining the type of cancer and its stage of advancement, and 14 days from MTD to start of treatment. The planned maximum waiting time for basic and in-depth diagnostics should not exceed 7 weeks [29]. Unfortunately, issuing the card is not obligatory and it is not available for all Polish patients. In the current study, this time was much longer and amounted to 13.5 weeks; moreover, only 19.68% of patients received a card, and GPs issued only 18.37% of the cards. Recently, since the collection of material for the current study, the situation has improved. Almost all patients in the authors' Department of Pneumonology, Oncology and Allergology in Lublin receive a card after obtaining a pathological diagnosis, and the planning of diagnostics and treatment is handled by the coordinator and the MDT. As a result, the time from bronchoscopy to the start of treatment has been shortened to 21–28 days. Unfortunately, this time is much longer if the patient is partially diagnosed outside ther oncology centre and does not have a card and comprehensive tests. The algorithm for the current diagnostic and therapeutic procedures is presented in Figure 4. The preferred time for each diagnostic stage is presented in Table 4.

Table 3. Comparison of the time from the first symptoms to diagnosis (in weeks) by selected variables

VARIABLE		N	Mean	Median	Standard deviation	p
Patients treated with antibiotics 6 months before cancer diagnosis	YES	81	18.85	16	16.03	**<0.001**
	NO	167	10.89	8	12.26	
Distance from GPs office	CLOSE	113	15.77	12	16.00	**0.038**
	FAR	135	11.59	10	11.97	
Diagnosis during COVID-19 pandemic (04.03.2020–13.05.2022)	YES	145	14.39	12	15.31	0.412
	NO	102	12.29	10	12.13	

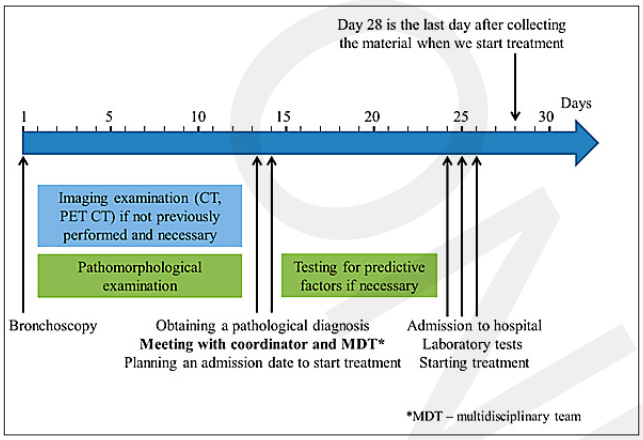

Figure 4. The path of an oncological patient in a specialized oncological center in Lublin

Table 4. Targeted time for cancer diagnosis in Polish patients

Time from first visit to a doctor to diagnosis [weeks]	7
Preliminary diagnostics [weeks]	4
In-depth diagnostics [weeks]	3
Time from bronchoscopy to start of treatment [weeks]	4
Time from first symptoms to start of treatment [weeks]	9
Time from final diagnosis (including predictive factors) to start of treatment [weeks]	2

The majority of NSCLC patients worldwide demonstrate poor survival – 25–30% die within < 3 months. The life expectancy of patients with locally advanced or metastatic NSCLC (stages IIIB-IV) is so short that surgery is not recommended at all, leaving platinum-based therapy, radiotherapy, tyrosine kinase inhibitor targeted therapy, or immunotherapy as a treatment option [30]. Patients in stages I and II undergoing surgery have a 37–65% chance of 5-year survival; when distant metastases are detected, these chances fall to 9%. The average 5-year survival for patients diagnosed with NSCLC, regardless of stage, is 28% [31].

Surgery also has a significant impact on the overall survival of patients. The main goal of surgery for lung cancer is to cure the condition through personalized surgical resection. In a study conducted by Schussler et al., a global survival rate of 41.9% at 5 years and 23.8% at 10 years after surgery was reported. Depending on the stage of disease (I-IV), 10-year survival rates were 30%, 14%, 12% and 14%, respectively [32]. For comparison, in another study of 22,000 patients undergoing surgery due to lung cancer, the 5-, 10- and 14-year survival rates for stages I-II were approximately 50%, 25% and 15%, respectively. For stages III-IV, survival rates were approximately 20% after 5 years, 10% after 10 years and less than 5% after 14 years [33]. As shown by the current study, the estimated survival time in patients in the Oncology Deparment was significantly longer in patients who underwent surgery.

The stage at which lung cancer is diagnosed has a direct impact on the length of survival. Despite the significant development of medicine and the constant introduction of new drugs into therapy, it seems that making an early diagnosis remains the key element in improving treatment results. Kasynamjova et al., observed that delaying treatment significantly increased the risk of death. In patients whose time from diagnosis to the start of treatment was < 30 days, the median of survival time was 14.8 months, and in persons whose treatment was started > 30 days after diagnosis – 11 months [34]. In Poland, however, the waiting time for treatment of cancer patients is too long, in 60% of cases it exceeds 9 weeks. In general, the Polish public health care system is underfinanced compared to other European countries. Additionally, the coordination of diagnostic and therapeutic processes at various levels of the health care system should be improved. Finally, in Poland, compared to European Union (EU) standards, there are too few doctors relative to the total population.

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