Annals of Agricultural and Environmental Medicine 2013, Vol 20, No 1, 72-76
www.aaem.pl

ORIGINAL ARTICLE

Reasons for delay in diagnosis and treatment of lung cancer among patients in Lublin Voivodeship who were consulted in Thoracic Surgery Department

Marek Sawicki[1], Michał Szczyrek[2,3], Paweł Krawczyk[3], Paweł Rybojad[1], Andrzej Jabłonka[1], Janusz Milanowski[3,4]

[1] *Department of Thoracic Surgery, Medical University, Lublin, Poland*
[2] *Chair of Internal Medicine and Department of Internal Medicine in Nursing, Medical University, Lublin, Poland*
[3] *Department of Pneumonology, Oncology and Allergology, Medical University, Lublin, Poland*
[4] *Institute of Rural Health, Lublin, Poland*

Sawicki M, Szczyrek M, Krawczyk P, Rybojad P, Jabłonka A, Milanowski J. Reasons for delay in diagnosis and treatment of lung cancer among patients in Lublin Voivodeship who were consulted in Thoracic Surgery Department. Ann Agric Environ Med. 2013; 20(1): 72-76.

Abstract

Introduction: Despite the progress which has been made in the diagnosis and treatment of lung cancer, it is still one of the main causes of death in both men and women. The introduction of new therapeutic modalities did not improve the 5-year survival results of lung cancer patients. The Lublin Voivodeship is a sparsely-inhabited area with little urbanization and a population of about 2.2 million people. Only 46.8% of its citizens live in the towns, while the national average is 61.9%.

Objectives: The aim of the study was to compare the differences in the periods of time and reasons for delay in diagnosis and initiation of treatment of lung cancer among patients who are inhabitants of the rural and urban regions of Lublin Voivodeship, and who were consulted in Thoracic Surgery Department.

Materials and methods: 300 lung cancer patients who were consulted in the Thoracic Surgery Outpatient Clinic or who were hospitalized in the Department of Thoracic Surgery in the period between 2 January 2010 – 7 January 2011 were included in the study. Delays were calculated for two periods of time: 1) time from the first signs of the disease to the first medical examination; 2) the time from the first visit to a doctor to the start of treatment, or disqualification from the causative treatment. The time of the first delay for the urban and rural populations was similar and ranged from 2-37 weeks and 2-23 weeks, respectively. Lack of time and disregard of signs of disease were the most commonly reasons given for the first delay among rural residents. The urban population indicated fear and lack of time as the main reasons of delay. Assessment of the second reason for delay was possible thanks to a specially designed research protocol which gathered the main reasons of delay in several subgroups that enabled their statistical evaluation. The length of second period was similar for both populations.

Results: There were no significant differences in the length of the time of delay between the two assessed groups. In both groups, delays dependent on poor healthcare access were similar. Among rural inhabitants, the most often reasons of delay were waiting for hospital admission and re-bronchoscopy. In the urban population, the most common reasons for delay were waiting for hospitalization and CT procedure.

Conclusions: The results of the presented research allowed the following conclusions to be drawn: between the two assessed groups there were no differences in the length of the time of delay; 2) delays in diagnosis and treatment were too long for the patients and could affect the severity of the disease and final prognosis; 3) there is a need for intensification of information campaigns on lung cancer in order to reduce the delays dependent on patients, and to improve the cooperation of family doctors, pulmonologists, thoracic surgeons and oncologists.

Key words

lung cancer, treatment delays, oncological treatment

INTRODUCTION

Cancer morbidity remains one of the most important social problems of 21st century. Despite the progress made in the diagnosis and treatment of cancer, it still is one of the main causes of death in both men and women. Among all neoplasms, lung cancer remains the main cause of death worldwide. Despite the introduction of new therapeutic modalities and continuous improvement of the quality of treatment, in Poland the 5-year survival results of lung cancer patients are unsatisfactory and reflect the inability of the health system to fight cancer [1, 2]. The main reason for such results remains the advancement of clinical stage of the disease in patients newly reported for the treatment. More than a half of the patients are diagnosed with lung cancer in a highly advanced or metastatic stage, which often excludes the possibility of radical treatment. Clinical staging at the time of diagnosis not only affects survival but also influences the

Address for correspondence: Marek Sawicki Department of Thoracic Surgery, Medical University, Jaczewskiego 8, 20-954 Lublin, Poland
E-mail: marek.sawicki@umlub.pl

Received: 26 February 2012; accepted: 11 October 2012

costs of treatment [3, 4, 5, 6]. The main reasons for the delayed start of treatment (which results in cancer progression) are due to the fault of patient or/and physician [7, 8, 9, 10, 11]. Therefore, the most effective way to improve the outcomes of lung cancer is to eliminate the causes of this setback.

The Lublin Voivodeship is a sparsely-inhabited area with little urbanization and a population of about 2.2 million people, of whom only 46.8% live in the towns, compared with the national average which is 61.9%. The predominance of rural inhabitants causes the need for epidemiological studies based on this part of the population. According to National Institute of Health (NIH) data from 2007, the inhabitants of Lublin Voivodeship, especially those who live in small localities and who remained in so-called good health (i.e. with no disabilities) had the shortest survival time in Poland. Differences in access to medical services may also be proved by the fact that urban residents are more likely to be hospitalized by about 20% than rural residents.

There is only one department of thoracic surgery in Lublin Voivodeship where all the patients from this region suspected of suffering from lung cancer, and who can potentially be treated surgically, are consulted.

The aim of the presented study was to analyze differences in the periods of time and reasons for delays in diagnosis and initiation of treatment of lung cancer among patients who are inhabitants of rural and urban regions of the Lublin's Voivodeship. The obtained results will serve to identify new targets for health education, prevention and organization to reduce existing delays.

MATERIALS AND METHODS

300 patients who were consulted in the Thoracic Surgery Outpatient Clinic or who were hospitalized in the Department of Thoracic Surgery in the period between 2 January 2010 – 7 January 2011 were included in the study. All patients had the diagnosis of lung cancer confirmed by histological examination. The authors' research tool was a specially designed questionnaire – the Research Protocol (RP) – which enabled collection of demographic data and patients' medical history. The RP was constructed in a manner which helped record the decisions taken by the patients during the period of diagnosis. These data were supplemented with information about individual staging and therapeutic procedures. Patients were qualified for the survey in a manner which enabled the creation of two groups with equal numbers. To achieve this, the medical records of all evaluated lung cancer patients were divided into two groups, depending on residential status (urban/rural). After that, 150 files were randomly selected from each group. As the final point of the observation period, the date of implementation of surgical or oncological treatment (chemotherapy or radiotherapy, or both), or the day of disqualification from any treatment, was adopted. 150 rural residents were enrolled into the test group (Group I) and 150 urban dwellers into the control group (Group II). Demographic differences between the two groups are presented in Table 1.

Chi-square test was used to compare the reasons for delay in diagnosis and treatment of the patient groups, divided according to different demographic and social factors. The U-Mann Whitney test was used for testing the equality of population medians among the groups. The results were accepted as statistically significant at the significance level $p \leq 0.05$.

Table 1. Demographic data

	Group I	Group II
Men	105 (70%)	98 (65.3%)
Women	45 (30%)	52 (34.7%)
Mean age in the group	57 YEARS	58.5 YEARS

RESULTS

The number of higher educated people was insignificantly lower in the group of rural inhabitants. The education level of rural inhabitants more frequently stayed at the lower level (44%), compared to the urban regions (32.7%). Less significant but still visible differences in educational status was observed on the secondary and academic levels (43.3% vs. 48% and 12.7% vs. 19.3%, respectively).

Thanks to the RP it was possible to evaluate the potential cancer risk factors of the respondents. Although statistical evaluation did not reveal any statistically significant differences, nevertheless, other cancers were more often observed in the patients in Group II (4.7% vs. 3.3%), lung cancer was observed in families more often in Group I (4% vs. 2%), risk factors at work were more frequently mentioned by urban inhabitants (18% vs. 10%), and smoking was almost equally indicated in both groups (57.3% vs. 61.3%). Risk factors at work were explained to the responders as frequent exposure to chemical substances, radiation, and electromagnetic fields.

The data gathered thanks to the RP also enabled evaluation of the frequency of use of medical services (Tab. 2). Medical care was significantly more frequently used by patients living in the urban environment.

Table 2. Medical services

Medical services	Group I		Group II		χ^2 p
	n. of patients	percentage	n. of patients	percentage	
Medical and X-ray examination					14.538
YES	40	26.7%	73	48.7%	0.0001
NO	110	73.3%	77	51.3%	
No. of visits to a doctor per year					
0	28	18.7%	31	20.7%	11.195
1	58	38.7%	32	21.3%	0.0107
2	30	20.0%	42	28.0%	
3 or more	34	22.6%	45	30.0%	

On the basis of subjective assessment of the patients on a scale of 0 – 5, the degree of their knowledge about lung cancer was evaluated (0 = complete lack of knowledge, 5 = full knowledge). The source of knowledge was also registered (Tab. 3).

The analysis did not show any significant differences in the level of awareness and knowledge about lung cancer between the two evaluated populations. Inhabitants of rural regions more often indicated family and friends as the main source of their knowledge.

Table 3. State of knowledge about lung cancer

Knowledge about lung cancer	Group I		Group II		χ^2 p
	No. of patients	percentage	No. of patients	percentage	
Knowledge about lung cancer on the scale					
0-1	46	30.7%	36	24.0%	2.669 0.266
2-3	90	60.0%	93	62.0%	
4-5	14	9.3%	21	14.0%	
Source of knowledge					
Doctor	22	14.7%	30	20.0%	
Family/friends	63	42.0%	25	16.7%	23.473 0.0001
Mass media	50	33.3%	70	46.7%	
Internet	15	10.0%	25	16.6%	

Clinical staging, based on the Tumour-Node-Metastasis (TNM) classification was established based on clinical or pathological evaluation. There were no significant differences in the distribution of disease advancement between the analyzed groups of patients. Stage I+II was observed in about 26-30%, stage IIIA in 12-14 %, IIIB in 18-20%,and stage IV in 36-41%. About half of the patients who were diagnosed and treated in our department were in higher stages of Non-Small Cell Lung Carcinoma (NSCLC) – IIIB and IV, and were therefore were disqualified from surgical treatment.

Altogether in both study groups, 116 patients were treated with radical surgery – 61 (40.7%) from Group I, and 65 (43.3%) from Group II. Lobectomy was the most commonly performed procedure. The remaining patients from both groups were subjected to diagnostic surgical procedures or endoscopy. Some patients with histological confirmation of the diagnosis and who remained at high levels of a clinical stage and/or who were in poor general health, were disqualified from surgical treatment and chemotherapy.

The time of delay was calculated for two periods of time: 1) the period from first signs of disease to the first medical examination (delay was considered as being solely the fault of the patient); 2) the period from the visit to a doctor to the start of treatment, or disqualification from causative treatment (delay caused by health system organization). The first delay for both evaluated populations was similar, and for urban population reached 2-37 weeks (median 9 weeks), for rural inhabitants – 2-23 weeks (median 8 weeks). The most common reasons given by patients in RP for the first delay are shown in Table 4.

Table 4. Reasons for first delay

Reasons for first delay	Group I		Group II		χ^2 p
	No. of patients	percentage	No. of patients	percentage	
Underestimation of signs of disease	49	32.7%	33	22%	
Fear	28	18.7%	36	24%	
Own treatment	8	5.3%	11	7.3%	1.346 0.718
Lack of time	38	25.3%	43	28.7%	
Lack of money	13	8.7%	11	7.3%	
Family reasons	14	9.3%	16	10.7%	

There were no significant differences in the distribution of reason for the first delay between the examined groups. However, lack of time and underestimation of signs of disease were the most commonly given reasons for the first delay among rural residents. The urban population indicated lack of time and fear as the main reasons for delay.

Assessment of the second reason for delay, which was dependent mainly on the poor organization of health care, was more complicated. Thanks to the RP, the main reasons were gathered in several subgroups which enabled their statistical evaluation. The length of the second period was similar – from 6-17 weeks (median 12 weeks) (Tab. 5).

Table 5. Reasons for the second delay

Reasons for the second delay	Group I		Group II		χ^2 p
	No. of patients	percentage	No. of patients	percentage	
Symptomatic treatment	7	4.7%	6	4%	
Incorrect diagnosis	5	3.3%	7	4.7%	
Delay in referral to a specialist	8	5.3%	6	4%	
Waiting for hospitalization	61	40.7%	50	33.3%	3.19 0.671
Waiting for CT	32	21.3%	42	28%	
Necessity for re-bronchoscopy	37	24.7%	39	26%	

In both groups, delays dependent on poor healthcare access were similar. Among rural inhabitants the most often reasons for delay were waiting for hospital admission and re-bronchoscopy. In the urban population, the most common reasons were waiting for hospitalization and CT procedure.

Cumulative Delay Time (CDT) was counted as length of the period from the first signs of lung cancer (LC) to implementation of surgical or oncological treatment, or disqualification from any treatment. The CDT, i.e. length of first and second periods, was similar for both groups (Tab. 6).

Table 6. Cumulative Delay Time in both evaluated groups

	Group I		Group II	
	Range	Median	Range	median
Time of delay (weeks)	7-46	18	10-36	19

DISCUSSION

There are four possible ways that can lead to a reduction in the mortality of patients with LC. First, by prophylaxis, with particular emphasis on prevention of smoking as the main factor in increasing LC morbidity. It is also necessary to emphasize the importance of early detection of cancer and the lack of delay in diagnosis [12, 13, 14, 15, 16, 17]. Delays dependent on the fault of the patient, which may occur even before reporting to the doctor, are caused mainly by insufficient knowledge about LC [18, 19, 20]. In the presented study, more than 30% of the rural patients had almost no knowledge about their disease in the period before the illness. Knowledge among the remaining 60% of patients was incomplete. Additionally, information came mainly

from friends and family, and thus was often inaccurate and without emphasis on the importance of early diagnosis for the disease outcome.

In the RP, the patients reported underestimation of symptoms and lack of time as the most common causes for late reporting to a doctor. It is significant that the lack of time is also a way of belittling the disease risk. The knowledge of urban inhabitants about LC was significantly higher, and came mostly from more reliable sources, such as television, radio and the internet. However, this has not reduced significantly the time of delay in reporting to a doctor, which indicates the need to revise the educational programs also for this group of patients.

The total delay time for the patients of rural population equaled 9 weeks and was similar to the patients of urban population. In both groups, delays dependent on patients occurred also in the period between referral to a physician and implementation of treatment. They were most often caused by the irrational fear of cancer diagnosis. At this stage of the disease, the blame for the delay must be divided between the State – which should ensure an adequate level of knowledge of patients, and the family doctor who should properly explain the problem to his patients with adequate elucidation of benefits of early diagnosis and treatment [21, 22, 23].

In the literature, only a few studies provide information about the length of time from the first symptoms to the first examination by a doctor [24]. In American medical literature, 25-39% of patients experienced a delay of more than 3 months [25]. Antkowiak reported that in his study group of young patients (not older than 45 years) the average setback was 2.4 months [26]. Bourke et al. state that in their similar group the delay exceeded 3 months [27]. In Pawlicki's study group (patients with all kinds of malignancies), the first period of delay was even longer and reached 8.6 months [18, 28]. Some authors deliberately omitted study of this first period because it is extremely difficult to determine the first symptoms of the disease which require medical examination [29, 30]. In the Italian GIVO study (Gruppo Interdisciplinare Valutazione Interventi in Oncologa) – Interdisciplinary Group for Cancer Care Evaluation – the median time for the first delay (dependent on the patient) was only 7 days, which seems to be drastically different from the studies conducted in other countries, and therefore unreliable [31].

A subsequent way to the reduce mortality among patients with lung cancer could be screening performed using the newest research methods. However, studies conducted so far indicate that the prevalent screening tests are causing much controversy because of their low specificity and high cost.

Further improvement of outcomes of treatment is associated with the introduction of new medicaments, surgical techniques, and methods of radiotherapy. To date, however, expectations of the amelioration of the new methods were much bigger than the effects of their use in clinical practice. Additionally, their use is associated with huge medical costs incurred by the State.

Finally, the mortality can be reduced by shortening the periods of delays by simply improving the organization of health services in a way which does not require any additional costs [28]. In the presented study, the time of the second delay (time from the first visit to the doctor to the start of treatment, or disqualification from the causative treatment) was similar for both groups: 11 weeks for the rural population and 12 weeks for the urban population. The main causes of delays during this period were errors by general practitioners, and problems associated with the organization of health care in Poland. The results obtained in the presented study did not show any significant differences in the access to a family doctor or to a specialist between the two evaluated groups. Delays caused by the fault of a doctor did not exceed 13%, and were similar in both groups of patients. The main medical malpractices were initial incorrect diagnosis, neglecting to perform an x-ray examination, and subsequent inappropriate treatment. In over 85%, delays of the second period were caused mainly by the organization and capabilities of health care system [18, 28].

Pathomorphological evaluation of the malignancy and determination of its clinical staging with the use of CT and bronchoscopy examination are the necessary conditions for initiation and planning of further treatment of LC [32, 33]. These tests are usually performed on an outpatient basis or during the one-day hospitalization. In the current economic situation in Poland, limited health funds in various diagnostic centres may extend the CT waiting period to 4-5 weeks. Additional delays are caused by the frequent need to repeat bronchoscopic examination in order to obtain suitable material for pathological evaluation. The duration of the cycle of the bronchoscopy and histological examination can range between 2-3 weeks. This diagnosis could be made much faster if possibilities existed for hospitalization in special lung cancer diagnostic units, where each patient could be consulted by a pulmonologist, radiologist, pathomorphologist, oncologist and thoracic surgeon. Only such complex care could shorten the delays caused by sending patient from one specialist to another. In Poland, there is lack of such highly specialized diagnostic centres. Only some pulmonological wards can meet somewhat similar conditions; unfortunately, the limited number of beds and restricted annual admissions do not permit this service for all LC patients. Similarly, the waiting time for admission to the Department of Thoracic Surgery for patients already scheduled for surgical radical treatment can range from 2-8 weeks which, in extreme cases, can lead to the need to duplicate the diagnostic work previously carried out.

Delays caused by inappropriate organization of health services concern not only Poland. Various degrees of latency have also recorded in the USA, UK, Sweden, Brazil, and many other countries [21, 23, 25, 30, 34, 35, 36]. In Poland, an immediate solution to this problem could be the qualification of LC by the NFZ (Narodowy Fundusz Zdrowia), the National Health Fund, as a priority, without limiting funds for diagnosis and treatment. This could eliminate the most common reason for delay – waiting for a bed in the hospital.

The results obtained in the presented study confirm that the place of residence does not affect the delay in diagnosis and treatment of lung cancer. Thanks to this study, it was possible to point out opportunities for shortening this period by multidirectional actions directed at the improvement of education and organization of the health system.

CONCLUSIONS

1. Between the two assessed groups there were no differences in the length of the time of delay.
2. Delays in diagnosis and treatment are too long for the patients, and may affect the severity of the disease and final prognosis.

3. There is a need for intensification of information campaigns about lung cancer in order to reduce the delays dependent on patients, and to improve cooperation among family doctors, pulmonologists, thoracic surgeons and oncologists.

REFERENCES

1. Jemal A, Siegel R, Xu J, Ward E. Cancer statistics. CA Cancer J Clin 2010; 60:277-300.
2. Annakkaya AN, Arbak P, Balbay O, Birgin C, Erbas M, Bulut I. Effect of symptom-to-treatment interval on prognosis in lung cancer. Tumori. 2007; 93: 61-67.
3. Petty TL. The early diagnosis of lung cancer. Dis Mon. 2001; 47: 204–264.
4. Radzikowska E, Roszkowski K, Głaz P. Lung cancer – diagnosis and therapy delay. Pneumonol Alergol Pol. 2001; 69(11-12): 600-610.
5. Carbone P. Lung Cancer: Early Events, Early Interventions: Conference Summary for the 46th Annual Thomas L. Petty Aspen Lung Conference. Chest. 2004; 125(5): 167–72.
6. O'Rourke N, Edwards R. Lung cancer treatment waiting times and tumour growth. Clin Oncol. (R Coll Radiol) 2000; 12(3): 141-144.
7. Corner J., Hopkinson J. Roffe L. Experience of health changes and reasons for delay in seeking care: a UK study of the months prior to diagnosis of lung cancer. Soc Sci Med. 2006; 62: 1381-1391.
8. Ozlu T, Bulbul Y, Oztuna F, Can G. Time course from first symptom to the treatment of lung cancer in the Eastern Black Sea Region of Turkey. Med Princ Pract. 2004; 13: 211-214.
9. Liberman M, Liberman D, Sampalis JS, Mulder DS. Delays to surgery in non-small-cell lung cancer. Can J Surg. 2006; 49: 31-36.
10. Żuchowska-Vogelgesang B. Analiza przyczyn opóźnionego leczenia chorych na nowotwory złośliwe. Pol Tyg Lek. 1974; 29: 1211-1213.
11. Tod AM, Craven J, Allmark P. Diagnostic delay in lung cancer: a qualitative study. J Adv Nurs. 2008; 61(3): 336-43.
12. Hamilton W, Peters TJ, Round A, Sharp D. What are the clinical features of lung cancer before the diagnosis is made? A population based case-control study. Thorax. 2005; 60: 1059-1065.
13. Quarterman RL, McMillan A, Ratcliffe MB, Block MI. Effect of preoperative delay on prognosis for patients with early stage nonsmall cell lung cancer. J Thorac Cardiovasc Surg. 2003; 125(1): 108-13.
14. Koyi H, Hillerdal G, Branden E. Patient's and doctors' delays in the diagnosis of chest tumors. Lung Cancer. 2002; 35: 53-57.
15. Yilmaz A, Damadoglu E, Salturk C, Okur E, Tuncer LY, Halezeroglu S. Delays in the diagnosis and treatment of primary lung cancer: are longer delays associated with advanced pathological stage?. Ups J Med Sci. 2008; 113: 287-296.
16. Olsson JK, Schultz EM, Gould MK. Timeliness of care in patients with lung cancer: a systematic review. Thorax. 2009; 64: 749-775.
17. Jensen AR, Mainz J, Overgaard J. Impact of delay on diagnosis and treatment of primary lung cancer. Acta Oncol. 2002; 41(2): 147-52.
18. Pawlicki M, Rachtan J, Żuchowska B. Ocena przyczyn opóźnionego leczenia chorych na nowotwory złośliwe. Nowotwory 1989; 39: 31-6.
19. Chandra S, Mohan A, Guleria R, Singh V, Yadav P. Delays during the diagnostic evaluation and treatment of lung cancer. Asian Pac J Cancer Prev. 2009; 10: 453-456.
20. Brocken P, Kiers BA, Looijen-Salamon MG, Dekhuijzen PN, Smits-van der Graaf C, Peters-Bax L, de Geus-Oei LF, van der Heijden HF. Timeliness of lung cancer diagnosis and treatment in a rapid outpatient diagnostic program with combined FDG-PET and contrast enhanced CT scanning. Lung Cancer. 2011; 21.
21. Yorio JT, Xie Y, Yan J, Gerber DE. Lung cancer diagnostic and treatment intervals in the United States: a health care disparity? J Thorac Oncol. 2009; 4(11): 1322-30.
22. Tromp DM, Brouha XD, Hordijk GJ, Winnubst JA, de Leeuw JR. Patient factors associated with delay in primary care among patients with head and neck carcinoma: a case-series analysis. Fam Pract. 2005; 22: 554-559.
23. Bozcuk H, Martin C. Does treatment delay affect survival in non-small cell lung cancer? A retrospective analysis from a single UK centre. Lung Cancer. 2001; 34(2): 243-52.
24. Brocken P, Prins JB, Dekhuijzen PNR, Van der Heijden HFM. The faster the better? – a systematic review on distress in the diagnostic phase of suspected cancer, and the influence of rapid diagnostic pathways. Psycho-Oncology. 2011: 20.
25. Kern KA. Medicolegal analysis of the delayed diagnosis of cancer in 338 cases in the United States. Arch Surg. 1994; 129: 397-403.
26. Antkowiak JG. Regal AM, Takita H. Bronchogenic carcinoma in patients under age 40 Ann Thorac Surg. 1989; 47: 391-393.
27. Bourke w, Milstein d, Giura R. Lung cancer in young adults. Chest. 1992; 102: 1723-1729.
28. Pawlicki M, Rysz B. Badania nad przyczynami opóźnień w rozpoczęciu leczenia na nowotwory złośliwe. Nowotwory 2001; 51(5): 494-498.
29. Salomaa ER, Sallinen S, Hiekkanen H, Liippo K. Delays in the diagnosis and treatment of lung cancer. Chest. 2005; 128: 2282-2288.
30. Silva PP, Pereira JR, Ikari FK, Minamoto H. Lung cancer and the delay in diagnosis: analysis of 300 cases. Rev Assoc Med Bras. 1992; 38: 145-9.
31. G.I.V.I.O. (Interdisciplinary Group for Cancer Evaluation), Author A. Diagnosis and first-line treatment of patients with lung cancer in Italian general hospitals. Tumori. 1989; 75: 163-167.
32. Valdés S, García E, Pérez H, Hernández M. Length of diagnostic delay in patients with non-small-cell lung cancer. MEDICC Rev. 2010; 12(1): 29-32.
33. Myrdal G, Lambe M, Hillerdal G, et al. Effect of delays on prognosis in patients with non-small cell lung cancer. Thorax. 2004; 59: 45-49.
34. Corner J, Hopkinson J, Fitzsimmons D, Barclay S, Muers M. Is late diagnosis of lung cancer inevitable? Interview study of patients' recollections of symptoms before diagnosis. Thorax. 2005; 60: 314-319.
35. Buccheri G, Ferrigno D. Lung cancer: clinical presentation and specialist referral time. Eur Respir J. 2004; 24: 898-904.
36. Bjerager M, Palshof T, Dahl R, Vedsted P, Olesen F. Delay in diagnosis of lung cancer in general practice. Br J Gen Pract. 2006; 569(532): 863-868.