

# Risk Factors of Inability to Exist Independently Among Patients With Lung Cancer

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## Research article

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# Abstract

**Background:** This study examined risk factors of the inability to live independently among people with lung cancer.

**Methods:** This paper involved 134 men and women who wanted to get a certificate of the inability to an independent existence issued by the Social Insurance Institution (ZUS). The study protocol was approved by the Commission of Bioethics. The analysis of the results was performed using the IBM SPSS Statistics 26 program.

**Results:** In the analyzed period, 75% of people obtained a certificate of the inability to an independent existence (group A) and 25% did not (group B). In group A 56.4% of people were men, and in group B 42.4%. In group A 11.8% of people were diagnosed with small cell lung cancer, no such case was found in group B. Metastases were revealed in 83.2% of applicants from group A while in 57.6% from group B. Statistically significantly lower body mass index (BMI) and a lower sum of points in the Barthel Index for Activities of Daily Living (BI) were found in group A compared to group B.

**Conclusions:** In the authors' opinion, information on BMI, histopathological diagnosis and the presence of metastases are useful in assessing the risk of being unable to live independently in people with lung cancer. BI seems to be helpful in assessing the inability to live independently.

## Background

Lung cancer is a malignant tumor leading to many deaths around the world. In fact it is the main cause of cancer-related mortality worldwide [1-3]. In the literature we can find a variety of works that focus on preventing lung cancer [4-7] and on implications for early detection [8-9]. It is a cancer that causes significant suffering among patients, both physical [10-13] and mental [14-17]. Many articles describe what treatment and which factors are responsible for extending life [18-20] and improving quality of life [21-24]. However, the authors of this article noticed that it is hardly to find studies about the factors causing the inability to live independently in the course of lung cancer. People unable to live independently because of this cancer are a group particularly vulnerable to suffering, they require a holistic approach to care. Therefore, this paper focuses on the risk factors of the inability to live independently in a group of patients with lung cancer. The purpose of determining these factors is to respond quicker to the patients' increased needs and as a result of that minimizing their suffering. Going that way we can also offer this group of patients faster financial assistance to overcome obstacles in their daily life. Many of them have increased financial needs due to their physical and mental state [25-27]. Patients who have a certificate of the inability to an independent existence, which is issued among others in Social Insurance Institution (ZUS) by evaluating doctors and medical boards, might be entitled to get nursing supplement or supplementary benefit. In Polish law the answer to the question of who is incapable of independent existence can be found in the Act of 17 December 1998 on pension benefits from the Social Insurance Fund. It is a damage to the organism's ability to function to a degree that

results in permanent or long-term assistance and care on the part of another person to satisfy basic life needs.

## Methods

### Participants and procedures:

In this study 134 final decisions issued by the Social Insurance Institution in Wrocław in 2016 were analyzed. The leading diagnosis was malignant lung tumor. All these people wanted to get a certificate of the inability to an independent existence. Their files were carefully studied. The informations on age, education and sex were collected. The type of cancer was defined, distant metastases were determined. The functional status of every person was determined on the basis of the Barthel Index for Activities of Daily Living [28] where the maximum number of points is 100 and the minimum is 0. The Body Mass Index (BMI) was calculated based on the available informations about weight and height. The study protocol was approved by the Commission of Bioethics at Wrocław Medical University (approval KB-331/2019).

### Statistical analysis:

The results were subjected to statistical analysis which was performed using the IBM SPSS Statistics 26 program. To assess the significance of the differences among groups, Mann-Whitney U and chi-square tests were performed. The following abbreviations are used in the tables (1-5) with the results of the analysis: „N”-numerical amount, „%”-percentage, „Chi-2”-statistic of chi-square test, „Z”-statistic of Mann-Whitney U test, „M”-arithmetic average, „Me”-median, „SD”-standard deviation, „p”-statistical significance of the test. Three levels of statistical significance were adopted:  $p < 0,001$  (\*\*\*),  $p < 0,01$  (\*\*) and  $p < 0,05$  (\*). In each of these three cases we can talk about statistical significance.

## Results

Among 134 analyzed final decisions 101 people (75%) received a certificate of the inability to an independent existence (these people were included in group A) while 33 people (25%) did not receive it (these people were included in group B). The groups did not differ significantly in terms of sex ( $p=0,161$ ). However it should be noted that in group A there were slightly more men and in group B women slightly dominated men (Table 1). The groups do not differ significantly in terms of education ( $p=0,376$ ). However in group A most people have primary and basic vocational education, group B is clearly dominated by people with basic vocational education (Table 1). The groups differ significantly in terms of histopathological diagnosis ( $p=0,045$ ). All patients in group B have non-small cell lung cancer (NSCLS) and among those in group A NSCLS is predominant but 11.8% of patients have a diagnosis of small cell lesion (Table 1). The groups differ significantly in terms of the presence of metastases ( $p=0,003$ ). They are much more common among people from group A than among people from group B (Table 1).

When comparing groups A and B in terms of age it should be noted that these groups do not differ significantly ( $p=0,961$ ) from each other (Table 2). In contrast there is a significant statistical difference of the BMI in groups ( $p=0,011$ ), people from group A have a lower BMI compared to group B (Table 2).

A significantly ( $p<0,001$ ) lower overall score on the Barthel Index for Activities of Daily Living (BI) was recorded in group A (Table 2). People from group A obtained statistically significantly lower results than those from group B on the overall (BI) but also in almost all its subindexes considered separately (Table 3). There is only no significant difference between the groups in the ability to control the urine and the bladder sphincter.

In addition group A was analyzed in terms of sex. There was no statistically significant difference between men and women taking into account (Table 4): age ( $p=0,400$ ) and BMI ( $p=0,645$ ). On the other hand in the case of the BI: sum of points' difference is close to statistical significance ( $p=0,122$ ). Higher results were recorded among women than among men (Table 4). In all subindexes of BI considered separately, no statistically significant differences were found between women and men from group A (Table 5). It should be noted, however, that there are differences close to statistical significance in the cases of: grooming, moving and dressing (women are more independent in these matters than men).

## Discussion

To our knowledge this is the first study about risk factors of the inability to live independently among people with lung cancer. In the past attention had already been paid to work not only on gathering information about a lung cancer itself but also on being aware of symptoms for better patients' care [7]. It is connected (among others) with the knowledge of factors that make a damage to the organism's ability to function to a degree that results in permanent or long-term assistance and care on the part of another person to satisfy basic life needs. Our research shows that people with inability to live independently in the course of this malignant tumor have a lower BMI compared to other people suffering from lung cancer. The available studies show that significant weight loss may impair wound healing and reduce: an ability of immune system, tolerance of treatment and a quality of life [6] which naturally causes a great impairment of the functional state of the human body. We also know that metastases in the course of lung cancer are an important factor influencing the survival time [20]. In our study people with the inability to live independently had significantly more often diagnosed distant metastases in the course of lung cancer than people who were not granted such a certificate. Additionally our observations confirm that small cell lung cancer (SCLC) is a far more aggressive and lethal than NSCLS [29] and that's why SCLS causes greater functional devastation of patients' organism. All persons diagnosed with this form of lung cancer were considered incapable of independent existence. Compared to other malignant tumours lung cancer causes greater unmet needs but these needs have never been fully described [24,30]. Identifying those needs that affect daily functioning could facilitate interventions to improve the quality of life of patients with lung cancer [10], also in group of people with inability to live independently. Physicians of ZUS who issue certificates of the inability to an independent existence often assess patients using the BI. This scale assesses the basic activities of everyday life. This index was originally

developed for the evaluation of neurological patients, especially those with stroke. However, as our research shows, this scale is also suitable for assessing the unmet needs of a person with lung cancer applying for a certificate of the inability to an independent existence. Persons with a final certificate of the inability to an independent existence had significantly lower results than those who did not receive such a certificate. This confirms that functional performance is an important factor in influencing every day of life of patients with lung cancer [13]. It should also be remembered that despite the advancement in the detection of lung cancer, the possibility of an accurate histopathological diagnosis and access to a wide range of treatments for this cancer, many patients still develop advanced, incurable forms that ultimately lead to death [31] and along the way, at some stage of the disease, often lead to an inability to exist independently.

Our research has several limitations. First of all we were not able to collect informations about treatment of lung cancer in both groups. We also have to remember that not every person with lung cancer applies to ZUS for a certificate of the inability to an independent existence, our study is based on the people who submitted such a request. We analyzed 134 men and women who wanted to get a certificate of the inability to an independent existence issued by the Social Insurance Institution but only in Wroclaw. During data collection we had problems to collect every single information about every single person (for example we had no informations about metastases among six patients in group A). This happened for three reasons, first of all certificates of the inability to an independent existence seldom are issued in absentia, second of all patients rarely don't want to give some informations. Finally, during physicians' examination it may turn out that inability to an independent existence is undisputed and there is no reason to gain additional informations.

## Conclusions

For assessing the risk of being unable to live independently in group of people with lung cancer, in authors' opinion, the useful informations are: BMI, histopathological diagnosis and metastases. No statistically significant differences were observed with such factors as age, education and sex. The BI seems to be helpful in assessing the inability to live independently. However, no statistically significant differences were observed in the BI between women and men who got certificates of the inability to an independent existence. Further research with larger samples and with informations about treatment is needed.

## List Of Abbreviations

ZUS: Social Insurance Institution

BI: Barthel Index for Activities of Daily Living

BMI: body mass index

NSCLS: non-small cell lung cancer

SCLC: small cell lung cancer

## Declarations

Ethics approval and consent to participate:

The study protocol was approved by the Commission of Bioethics at Wroclaw Medical University (approval KB-331/2019).

Consent for publication:

Not applicable.

Availability of data and materials:

The data that support the findings of this study are available from ZUS but restrictions apply to the availability of these data, which were used under license for the current study, and so are not publicly available. Data are however available from the authors upon reasonable request and with permission of ZUS.

Competing interests:

The authors declare that they have no competing interests.

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Authors' contributions:

MT: research concept, research methodology, collecting material, statistical analysis, interpretations of results, references; JZ: research concept, collecting material, interpretations of results; RRS: statistical analysis, references; GM: research methodology, interpretation of results; AB: research methodology, interpretation of results.

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## Tables

Table 1: Informations on sex, education, histopathology and metastases in group A and group B:

	Group				
	A (N=101)		B (N=33)		
SEX	N	%	N	%	
women	44	43,6	19	57,6	Chi-2=1,960
men	57	56,4	14	42,4	p=0,161
	A (N=88) <sup>1</sup>		B (N=33)		
EDUCATION	N	%	N	%	
primary	33	37,5	7	21,2	
basic vocational	33	37,5	16	48,5	Chi-2=3,107
secondary	17	19,3	7	21,2	p=0,376
higher	5	5,7	3	9,1	
	A (N=93) <sup>2</sup>		B (N=31) <sup>3</sup>		
HISTOPATHOLOGY	N	%	N	%	
small cell lung cancer	11	11,8	0	0	Chi-2=4,024
non-small cell lung cancer	82	88,2	31	100	p=0,045*
	A (N=95) <sup>4</sup>		B (N=33)		
METASTASES	N	%	N	%	
no	16	16,8	14	42,4	Chi-2=8,933
yes	79	83,2	19	57,6	p=0,003**

<sup>1</sup> no informations about 13 persons

<sup>2</sup> no informations about 8 persons

<sup>3</sup> no informations about 2 persons

<sup>4</sup> no informations about 6 persons

Table 2: Informations on age, BMI and BI in group A and group B:

	Group							
	A			B			Z	p
	M	Me	SD	M	Me	SD		
Age	65,34	66,00	5,92	65,73	65,00	4,28	-0,049	0,961
BMI <sup>1</sup>	24,23	23,99	4,80	26,76	27,69	4,68	-2,527	0,011*
BI <sup>1</sup>	56,24	60,00	15,70	89,70	90,00	7,70	-8,302	<0,001***

<sup>1</sup> No informations about 16 persons in group A

Table 3: Barthel Index for Activities of Daily Living (BI) in group A and group B:

	Group				
	A (N=85) <sup>1</sup>		B (N=33)		
	N	%	N	%	
FEEDING					
unable	4	4,7%	0	0,0%	
needs help	58	68,2%	2	6,1%	Z=-6,425, p<0,001***
independent	23	27,1%	31	93,9%	
TRANSFERS (BED TO CHAIR AND BACK)	N	%	N	%	
unable	4	4,7%	0	0,0%	
major help	18	21,1%	1	3,0%	Z=-7,841, p<0,001***
minor help	57	67,1%	1	3,0%	
independent	6	7,1%	31	94,0%	
GROOMING	N	%	N	%	
needs help (personal care)	21	24,7%	1	3,0%	Z=-2,702, p=0,007**
independent	64	75,3%	32	97,0%	
TOLIET USE	N	%	N	%	
dependent	6	7,1%	0	0,0%	
needs some help	42	49,4%	3	9,1%	Z=-4,628, p<0,001***
independent	37	43,5%	30	90,9%	
BATHING	N	%	N	%	
dependent	83	97,6%	21	63,6%	Z=-5,106, p<0,001***
independent	2	2,4%	12	36,4%	
MOBILITY (FLAT TERRAIN)	N	%	N	%	
immobile or < 50 m	33	38,8%	1	3,0%	
wheelchair independent <sup>2</sup>	7	8,2%	0	0,0%	Z=-6,386, p<0,001***
walks with help of 1 person <sup>2</sup>	44	51,8%	15	45,5%	
independent, may use an aid <sup>2</sup>	1	1,2%	17	51,5%	
STAIRS	N	%	N	%	
unable	32	37,6%	0	0,0%	
needs help	52	61,2%	5	15,2%	Z=-8,140, p<0,001***

independent	1	1,2%	28	84,8%	
DRESSING	N	%	N	%	
dependent	7	8,2%	0	0,0%	
needs help	59	69,4%	1	3,0%	Z=-7,094, p<0,001***
independent	19	22,4%	32	97,0%	
BOWELS	N	%	N	%	
incontinent; needs enemas	5	5,9%	0	0,0%	
occasional accident	19	22,4%	2	6,1%	Z=-2,626, p=0,009**
continent	61	71,7%	31	93,9%	
BLADDER	N	%	N	%	
incontinent; catheterized	4	4,8%	1	3,0%	
occasional accident	32	37,6%	10	30,3%	Z=-0,911, p=0,362
continent	49	57,6%	22	66,7%	

<sup>1</sup> No informations about 16 persons in group A

<sup>2</sup> over 50 metres

Table 4: Informations on age, BMI and BI in group A (women and men)

	SEX							Z	p
	women			men					
	M	Me	SD	M	Me	SD			
Age	65,68	66,50	5,65	65,07	65,00	6,15	-0,841	0,400	
BMI <sup>1</sup>	23,74	24,61	4,53	24,61	23,67	5,02	-0,461	0,645	
BI <sup>2</sup>	57,57	60,00	17,31	55,21	55,00	14,44	-1,546	0,122	

<sup>1</sup> No informations about 11 women and 5 men

<sup>2</sup> No informations about 7 women and 9 men

Table 5: Barthel Index for Activities of Daily Living (BI) in group A (men "Mn" and women "Wo")

	SEX				
	Wo (N=37) <sup>1</sup>		Mn (N=48) <sup>2</sup>		
	N	%	N	%	
FEEDING					
unable	2	5,4%	2	4,2%	
needs help	24	64,9%	34	70,8%	Z=-0,348, p=0,727
independent	11	29,7%	12	25,0%	
TRANSFERS (BED TO CHAIR AND BACK)	N	%	N	%	
unable	2	5,4%	2	4,2%	
major help	8	21,6%	10	20,8%	Z=-0,069, p=0,945
minor help	24	64,9%	33	68,8%	
independent	3	8,1%	3	6,2%	
GROOMING	N	%	N	%	
needs help (personal care)	6	16,2%	15	31,2%	Z=-1,584, p=0,113
independent	31	83,8%	33	68,8%	
TOLIET USE	N	%	N	%	
dependent	3	8,2%	3	6,2%	
needs some help	18	48,6%	24	50,0%	Z=-0,134, p=0,893
independent	16	43,2%	21	43,8%	
BATHING	N	%	N	%	
dependent	37	100,0%	46	95,8%	Z=-1,249, p=0,212
independent	0	0,0%	2	4,2%	
MOBILITY (FLAT TERRAIN)	N	%	N	%	
immobile or < 50 m	11	29,7%	22	45,8%	
wheelchair independent <sup>3</sup>	3	8,1%	4	8,3%	Z=-1,430, p=0,153
walks with help of 1 person <sup>3</sup>	23	62,2%	21	43,8%	
independent, may use an aid <sup>3</sup>	0	0,0%	1	2,1%	
STAIRS	N	%	N	%	
unable	13	35,1%	19	39,6%	
needs help	24	64,9%	28	58,3%	Z=-0,288, p=0,774

independent	0	0,0%	1	2,1%	
<b>DRESSING</b>	<b>N</b>	<b>%</b>	<b>N</b>	<b>%</b>	
dependent	3	8,1%	4	8,3%	
needs help	22	59,5%	37	77,1%	Z=-1,611, p=0,107
independent	12	32,4%	7	14,6%	
<b>BOWELS</b>	<b>N</b>	<b>%</b>	<b>N</b>	<b>%</b>	
incontinent; needs enemas	3	8,1%	2	4,2%	
occasional accident	7	18,9%	12	25,0%	Z=-0,090, p=0,928
continent	27	73,0%	34	70,8%	
<b>BLADDER</b>	<b>N</b>	<b>%</b>	<b>N</b>	<b>%</b>	
incontinent; catheterized	3	8,1%	1	2,1%	
occasional accident	14	37,8%	18	37,5%	Z=-0,780, p=0,435
continent	20	54,1%	29	60,4%	

<sup>1</sup> No informations about 7 persons (Barthel Index)

<sup>2</sup> No informations about 9 persons (Barthel Index)

<sup>3</sup> over 50 metres