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## Supplementary Material



## Diseases Coexisting with Sarcoidosis and Cost of their Treatment in Silesian Voivodeship (Poland)

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### Abstract:

#### Objectives:

Sarcoidosis is a complex systemic disease with many symptoms of unknown etiology. The chronic course of sarcoidosis often allows it to co-occur with other diseases. A coexisting different form of sarcoidosis in some studies and no data regarding the costs of treatment justify the aim of the study. This study aims to assess a different form of sarcoidosis because no current data exist regarding the cost of this treatment.

#### Methods:

The epidemiological and economic analysis focused on diseases coexisting with sarcoidosis in the adult population of the Silesian Voivodeship (Poland), from 2011 to 2015, was conducted based on the secondary epidemiological data. The study involved 2,922 cases of the primary diagnosis of sarcoidosis (code D86 according to ICD-10) and 505 cases of sarcoidosis coexisting with another.

#### Results:

One out of ten patients with sarcoidosis has been found to be diagnosed with at least one comorbid disease. The comorbid disease includes diseases of the circulatory and respiratory system as well as endocrine, neoplasms, nutritional and metabolic diseases. The average unit cost of sarcoidosis therapy increases with the number of comorbidities and depends on the nature of the primary diagnosis and type of medical service.

#### Conclusion:

The epidemiological situation of diseases coexisting with sarcoidosis has been found to be similar to those reported in other European countries. However, neoplasms are one of the most common frequent comorbidities in Poland. The results obtained confirmed the strong impact of comorbidities on the cost of treatment of sarcoidosis.

**Keywords:** Sarcoidosis, Comorbidities, Cost of treatment, Incidence, Economic burden, Epidemiological data.

### Article History

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**Supplementary 1. The number and the percentage of comorbidities registered in patients with sarcoidosis in Silesian Voivodeship, total in 2011-2015.**

Comorbid Diagnosis <sup>1</sup> / Underlying Diagnosis <sup>2</sup> According to ICD-10 Classification	Sarcoidosis D86 as an Underlying Diagnosis						Sarcoidosis D86 as a Comorbid Diagnosis
	Unspecified Sarcoidosis N (%)	Sarcoidosis of other and Combined Sites N (%)	Sarcoidosis of Lung N (%)	Sarcoidosis of Skin N (%)	Sarcoidosis of Lymph Nodes N (%)	Total N (%)	Total N (%)

(Supplementary 1) contd....

A00-B99	Certain infectious and parasitic diseases	0 (0)	1 (2.4)	6 (1.7)	0 (0)	0 (0)	7 (1.2)	15 (3)
C00-C97, D00-D48	Neoplasms	2 (3.1)	2 (4.9)	3 (0.9)	0 (0)	3 (2.6)	10 (1.7)	<b>62 (12.3)</b>
<b>D50-D89</b>	Diseases of the blood and blood-forming organs and certain disorders involving the immune mechanism	4 (6.2)	5 (12.2)	13 (3.7)	4 (26.7)	9 (7.8)	<b>35 (6)</b>	2 (0.4)
<b>E00-E90</b>	Endocrine, nutritional and metabolic diseases	6 (9.2)	2 (4.9)	41 (11.7)	2 (13.3)	17 (14.8)	<b>68 (11.6)</b>	19 (3.8)
F00-F99	Mental and behavioural disorders	0 (0)	0 (0)	3 (0.9)	0 (0)	0 (0)	3 (0.5)	3 (0.6)
G00-G99	Diseases of the nervous system	0 (0)	0 (0)	3 (0.9)	0 (0)	3 (2.6)	6 (1)	11 (2.2)
H00-H59	Diseases of the eye and adnexa	1 (1.5)	0 (0)	1 (0.3)	0 (0)	0 (0)	2 (0.3)	6 (1.2)
<b>I00-I99</b>	Diseases of the circulatory system	12 (18.5)	5 (12.2)	130 (37.1)	3 (20)	33 (28.7)	<b>183 (31.2)</b>	<b>55 (10.9)</b>
<b>J00-J99</b>	Diseases of the respiratory system	21 (32.3)	7 (17.1)	81 (23.1)	1 (6.7)	25 (21.7)	<b>135 (23)</b>	<b>152 (30.1)</b>
K00-K93	Diseases of the digestive system	2 (3.1)	1 (2.4)	10 (2.9)	0 (0)	2 (1.7)	15 (2.6)	<b>33 (6.5)</b>
<b>L00-L99</b>	Diseases of the skin and subcutaneous tissue	6 (9.2)	0 (0)	9 (2.6)	3 (20)	9 (7.8)	<b>27 (4.6)</b>	<b>39 (7.7)</b>
<b>M00-M99</b>	Diseases of the musculoskeletal system and connective tissue	3 (4.6)	16 (39)	17 (4.9)	1 (6.7)	6 (5.2)	<b>43 (7.3)</b>	<b>37 (7.3)</b>
N00-N99	Diseases of the genitourinary system	2 (3.1)	1 (2.4)	4 (1.1)	1 (6.7)	1 (0.9)	9 (1.5)	12 (2.4)
<b>R00-R94</b>	Symptoms, signs and abnormal clinical and laboratory findings, not elsewhere classified	4 (6.2)	1 (2.4)	18 (5.1)	0 (0)	4 (3.5)	<b>27 (4.6)</b>	<b>49 (9.7)</b>
Z03-Z99	Factors influencing health status and contact with health services	2 (3.1)	0 (0)	11 (3.1)	0 (0)	3 (2.6)	16 (2.7)	10 (2)
Total		65 (100)	41 (100)	350 (100)	15 (100)	115 (100)	586 (100)	505 (100)

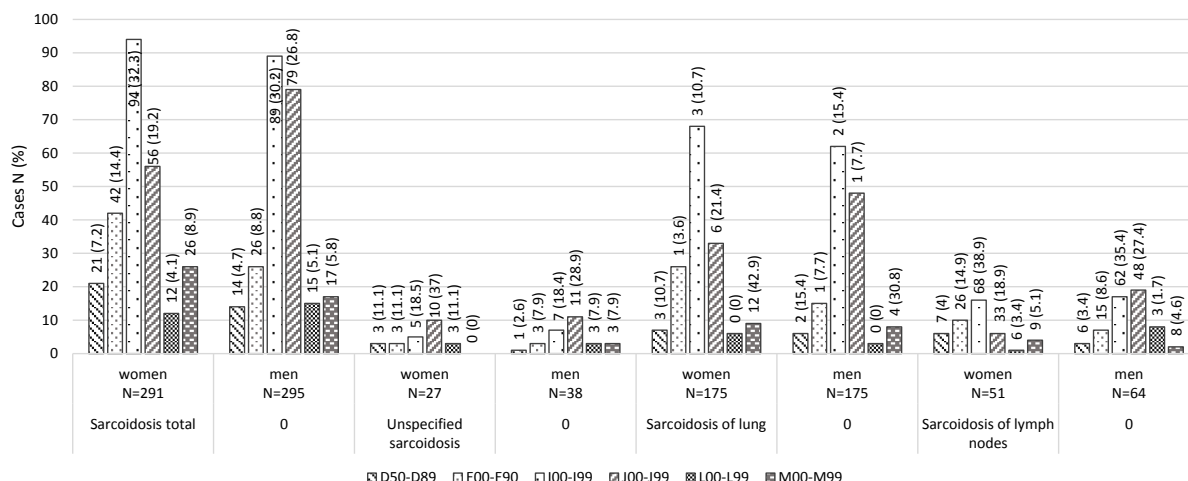
<sup>1</sup> Comorbid diagnosis in patients with sarcoidosis as the underlying disease.<sup>2</sup> Underlying diagnosis in patients with sarcoidosis as a coexisting disease.**Supplementary 2. A detailed list of the most frequently registered comorbidities in sarcoidosis patients treated in Silesian Voivodeship, in the period 2011-2015.**

Comorbid Diagnosis <sup>1</sup> / Underlying Diagnosis <sup>2</sup> According to ICD-10 Classification	Sarcoidosis D86 as the Underlying Diagnosis						Sarcoidosis D86 as a Comorbid Diagnosis
	Unspecified Sarcoidosis N (%)	Sarcoidosis of other and Combined Sites N (%)	Sarcoidosis of Lung N (%)	Sarcoidosis of Skin N (%)	Sarcoidosis of Lymph Nodes N (%)	Total N (%)	Total N (%)
C00-C97, D00-D48	2 (3.1)	2 (4.9)	3 (0.9)	0 (0)	3 (2.6)	10 (1.7)	62 (12.3)
Malignant neoplasms of respiratory and intrathoracic organs C30-C39	-	-	-	-	-	0 (0)	4 (0.8)
Melanoma and other malignant neoplasms of skin C43-C44	-	-	-	-	-	0 (0)	3 (0.6)
Benign neoplasms D10-D36	0 (0)	1 (2.4)	1 (0.3)	0 (0)	0 (0)	2 (0.3)	4 (0.8)
Neoplasms of uncertain or unknown behaviour D37-D48	2 (3.1)	0 (0)	1 (0.3)	0 (0)	1 (0.9)	4 (0.7)	39 (7.7)
Neoplasm of uncertain or unknown behaviour of middle ear and respiratory and intrathoracic organs D38	2 (3.1)	0 (0)	1 (0.3)	0 (0)	0 (0)	3 (0.5)	36 (7.1)
D50-D89	4 (6.2)	5 (12.2)	13 (3.7)	4 (26.7)	9 (7.8)	35 (6)	2 (0.4)
Sarcoidosis D86	4 (6.2)	4 (9.8)	12 (3.4)	4 (26.7)	9 (7.8)	33 (5.6)	-
Sarcoidosis of lung D86.0	1 (1.5)	1 (2.4)	6 (1.7)	1 (6.7)	2 (1.7)	11 (1.9)	-
Sarcoidosis of lymph nodes D86.1	1 (1.5)	0 (0)	1 (0.3)	0 (0)	3 (2.6)	5 (0.9)	-

(Supplementary 2) contd.....

Sarcoidosis of lung with sarcoidosis of lymph nodes D86.2	0 (0)	1 (2.4)	0 (0)	1 (6.7)	0 (0)	2 (0.3)	-
Sarcoidosis of skin D86.3	0 (0)	0 (0)	3 (0.9)	1 (6.7)	2 (1.7)	6 (1)	-
Sarcoidosis of other and combined sites D86.8	0 (0)	2 (4.9)	1 (0.3)	1 (6.7)	1 (0.9)	5 (0.9)	-
Sarcoidosis, unspecified D86.9	2 (3.1)	0 (0)	1 (0.3)	0 (0)	1 (0.9)	4 (0.7)	-
E00-E90	6 (9.2)	2 (4.9)	41 (11.7)	2 (13.3)	17 (14.8)	68 (11.6)	19 (3.8)
Disorders of thyroid gland E00-E07	4 (6.2)	0 (0)	9 (2.6)	1 (6.7)	4 (3.5)	18 (3.1)	2 (0.4)
Diabetes mellitus E10-E14	1 (1.5)	1 (2.4)	25 (7.1)	1 (6.7)	10 (8.7)	38 (6.5)	13 (2.6)
Obesity and other hyperalimentation E65-E68	0 (0)	1 (2.4)	6 (1.7)	0 (0)	2 (1.7)	9 (1.5)	1 (0.2)
Metabolic disorders E70-E90	1 (1.5)	0 (0)	1 (0.3)	0 (0)	1 (0.9)	3 (0.5)	0 (0)
F00-F99	0 (0)	0 (0)	3 (0.9)	0 (0)	0 (0)	3 (0.5)	3 (0.6)
Anxiety disorders F41	0 (0)	0 (0)	2 (0.6)	0 (0)	0 (0)	2 (0.3)	1 (0.2)
I00-I99	12 (18.5)	5 (12.2)	130 (37.1)	3 (20)	33 (28.7)	183 (31.2)	55 (10.9)
Hypertensive diseases I10-I15	10 (15.4)	3 (7.3)	100 (28.6)	2 (13.3)	24 (20.9)	139 (23.7)	15 (3)
Ischaemic heart diseases I20-I25	2 (3.1)	0 (0)	21 (6)	0 (0)	6 (5.2)	29 (4.9)	11 (2.2)
Other forms of heart disease I30-I52	0 (0)	2 (4.9)	5 (1.4)	1 (6.7)	2 (1.7)	10 (1.7)	20 (4)
J00-J99	21 (32.3)	7 (17.1)	81 (23.1)	1 (6.7)	25 (21.7)	135 (23)	152 (30.1)
Influenza and pneumonia J09-J18	2 (3.1)	1 (2.4)	2 (0.6)	0 (0)	0 (0)	5 (0.9)	18 (3.6)
Other acute lower respiratory infections J20-J22	0 (0)	0 (0)	1 (0.3)	1 (6.7)	1 (0.9)	3 (0.5)	5 (1)
Other diseases of upper respiratory tract J30-J39	6 (9.2)	1 (2.4)	4 (1.1)	0 (0)	3 (2.6)	14 (2.4)	7 (1.4)
Chronic lower respiratory diseases J40-J47	9 (13.8)	4 (9.8)	58 (16.6)	0 (0)	12 (10.4)	83 (14.2)	54 (10.7)
Other respiratory diseases principally affecting the interstitium J80-J84	0 (0)	0 (0)	3 (0.9)	0 (0)	2 (1.7)	5 (0.9)	13 (2.6)
Other diseases of the respiratory system J95-J99	1 (1.5)	0 (0)	9 (2.6)	0 (0)	6 (5.2)	16 (2.7)	39 (7.7)
L00-L79	6 (9.2)	0 (0)	9 (2.6)	3 (20)	9 (7.8)	27 (4.6)	39 (7.7)
Urticaria and erythema L50-L54	3 (4.6)	0 (0)	7 (2)	0 (0)	9 (7.8)	19 (3.2)	31 (6.1)
Other disorders of the skin and subcutaneous tissue L80-L99	1 (1.5)	0 (0)	1 (0.3)	2 (13.3)	0 (0)	4 (0.7)	4 (0.8)
M00-M99	3 (4.6)	16 (39)	17 (4.9)	1 (6.7)	6 (5.2)	43 (7.3)	37 (7.3)
Arthropathies M00-M25	1 (1.5)	12 (29.3)	9 (2.6)	1 (6.7)	4 (3.5)	27 (4.6)	17 (3.4)
Arthropathies in sarcoidosis M14.8	0 (0)	9 (22)	2 (0.6)	1 (6.7)	0 (0)	12 (2)	1 (0.2)
Systemic connective tissue disorders M30-M36	1 (1.5)	3 (7.3)	1 (0.3)	0 (0)	0 (0)	5 (0.9)	5 (1)
Dorsopathies M40-M54	1 (1.5)	1 (2.4)	4 (1.1)	0 (0)	1 (0.9)	7 (1.2)	9 (1.8)
R00-R94	4 (6.2)	1 (2.4)	18 (5.1)	0 (0)	4 (3.5)	27 (4.6)	49 (9.7)
Cough, hemoptysis, abnormalities of breathing, pain in throat and chest, pleurisy R04-R07, R09	3 (4.6)	0 (0)	9 (2.6)	0 (0)	1 (0.9)	13 (2.2)	11 (2.2)
Enlarged lymph nodes R59	1 (1.5)	0 (0)	6 (1.7)	0 (0)	3 (2.6)	10 (1.7)	18 (3.6)
Total	65 (100)	41 (100)	350 (100)	15 (100)	115 (100)	586 (100)	505 (100)

<sup>1</sup>Comorbid diagnosis in patients with sarcoidosis as the underlying disease.<sup>2</sup>Underlying diagnosis in patients with sarcoidosis as a coexisting disease



**Supplementary 3.** Structure of the most common comorbidities registered in male and female patients treated for sarcoidosis in the Silesian Voivodship, in 2011-2015.

**Supplementary 4.** Structure of the most common comorbidities registered in the particular age groups of sarcoidosis patients treated in the Silesian Voivodship, all study period.

Comorbidity Diagnosis	Sarcoidosis - Total N (%)				Unspecified Sarcoidosis N (%)				Sarcoidosis of Lung N (%)				Sarcoidosis of Lymph Nodes N (%)			
	19-34	35-54	55-64	65+	19-34	35-54	55-64	65+	19-34	35-54	55-64	65+	19-34	35-54	55-64	65+
D50-D89	2 (2.9)	23 (9.3)	8 (4.9)	2 (1.9)	0 (0)	4 (9.5)	0 (0)	0 (0)	0 (0)	8 (6.2)	4 (3.6)	1 (1.4)	1 (5.6)	6 (11.8)	2 (7.4)	0 (0)
E00-E90	9 (13)	23 (9.3)	20 (12.3)	16 (15)	1 (14.3)	4 (9.5)	1 (10)	0 (0)	6 (15)	11 (8.5)	16 (14.4)	8 (11.6)	1 (5.6)	8 (15.7)	3 (11.1)	5 (26.3)
I00-I99	15 (21.7)	55 (22.2)	64 (39.5)	49 (45.8)	1 (14.3)	5 (11.9)	4 (40)	2 (33.3)	11 (27.5)	39 (30)	46 (41.4)	34 (49.3)	3 (16.7)	7 (13.7)	13 (48.1)	10 (52.6)
J00-J99	16 (23.2)	62 (25)	37 (22.8)	20 (18.7)	2 (28.6)	15 (35.7)	2 (20)	2 (33.3)	9 (22.5)	32 (24.6)	26 (23.4)	14 (20.3)	5 (27.8)	12 (23.5)	5 (18.5)	3 (15.8)
L00-L99	6 (8.7)	16 (6.5)	3 (1.9)	2 (1.9)	1 (14.3)	4 (9.5)	1 (10)	0 (0)	2 (5)	7 (5.4)	0 (0)	0 (0)	3 (16.7)	5 (9.8)	1 (3.7)	0 (0)
M00-M99	5 (7.2)	22 (8.9)	10 (6.2)	6 (5.6)	1 (14.3)	2 (4.8)	0 (0)	0 (0)	2 (5)	6 (4.6)	5 (4.5)	4 (5.8)	0 (0)	5 (9.8)	0 (0)	1 (5.3)
Total	69 (100)	248 (100)	162 (100)	107 (100)	7 (100)	42 (100)	10 (100)	6 (100)	40 (100)	130 (100)	111 (100)	69 (100)	18 (100)	51 (100)	27 (100)	19 (100)