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Analysis of the incidence of acute respiratory diseases in the paediatric population in Poland in the light of the "Health Needs Map"

Abstract

Introduction: Statistical data on the structure of acute respiratory diseases incidence in the paediatric population are still scarce. The demand for such data results mainly from the need to constantly implement new systemic and economic solutions.
The aim of the study was to attempt to use reported data for an assessment of the incidence of acute respiratory diseases in various age groups.

Material and methods: An analysis of selected acute respiratory diseases was conducted in relation to diagnoses reported from 1 January to 31 December 2014 to the National Health Fund (NFZ, *Narodowy Fundusz Zdrowia*) in accordance with the codes of the International Statistical Classification of Diseases and Related Health Problems, 10th Revision. The study was conducted under the Knowledge Education Development operational programme co-funded by the European Social Fund.

Results: A total of 101,000 children were hospitalised due to acute respiratory diseases, which amounted to 1,554 hospitalisations per 100.000. The most common causes of hospitalisation were pneumonia and bronchitis/bronchiolitis. Boys were hospitalised more often in each age group. The shortest average length of stay (ALOS) was 5.21 days and concerned hospitalisation due to bronchitis. The longest length of stay for children was due to tuberculosis (14.3 days). The highest age average of a child was recorded in pleural diseases (10.51 years) and the lowest in bronchitis (2.93 years). Rehospitalisation was necessary in children in whom tuberculosis or pleural diseases were diagnosed (1.43 *vs* 1.34). A total of 67 inpatient deaths were recorded, of which 19 were due to pneumonia or its complications.

Conclusions: Epidemiological data reported to the National Health Fund (NFZ) seem quite reliable and do not differ significantly from those reported in other European countries. The analysed data may be useful in estimating health needs in paediatrics.

Key words: children, hospitalisation, lung infection

Adv Respir Med. 2020; 88: 204–214

Introduction

Acute respiratory diseases in the paediatric population are one of the most common causes of paediatrician or general practitioner visits, both in outpatient and hospital care. The demand for epidemiological data on this group of diseases in children results from the need to implement well-thought-out systemic solutions which cover above all the assessment of health needs of this age group. Epidemiological knowledge is necessary for planning an appropriate level of contracting, both in hospital and outpatient care, and for assessing the institutional and staff needs in order to secure them. Outpatient and hospital databases are among valuable repositories of clinical information that may provide an important insight into the health needs of the population [1]. They may also be used to develop locally relevant indicators of child's health and well-being [2]. The aim of

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DOI: 10.5603/ARM.2020.0106
Received: 07.01.2020

ISSN 2451–4934

Table 1. Basic statistics (by sex and age group) for children hospitalised due to pneumonia, bronchitis and tuberculosis

	No. of hospitalisations	Cumulative % of hospitalisations in subgroups	No. of patients	Cumulative % of patients in subgroups	No. of hospitalisations per patient	No. of person-days	ALOS
Pneumonias	**73255**	**100**	**68543**	**100**	**1.07**	**534334**	**7.29**
0–1	**30208**	**41.24**	**28006**	**40.86**	**1.08**	**240340**	**7.96**
Female	12650	41.88	11825	42.22	1.07	99928	7.90
Male	17558	58.12	16181	57.78	1.09	140412	8.00
2–5	**29919**	**40.84**	**28064**	**40.94**	**1.07**	**200355**	**6.70**
Female	13482	45.06	12689	45.21	1.06	91200	6.76
Male	16437	54.94	15375	54.79	1.07	109155	6.64
6–17	**13128**	**17.92**	**12473**	**18.20**	**1.05**	**93639**	**7.13**
Female	6179	47.07	5866	47.03%	1.05	44616	7.22
Male	6949	52.93	6607	100.00%	1.05	49023	7.05
Bronchitis	**32366**	**100**	**30585**	**100**	**1.06**	**168661**	**5.21**
0–1	**15221**	**47.03**	**14212**	**46.47**	**1.07**	**88142**	**5.79**
Female	5907	38.81%	5550	39.05	1.06	33994	5.75
Male	9314	61.19	8662	61.95	1.08	54148	5.81
2–5	**12136**	**37.50**	**11512**	**37.64**	**1.05**	**56718**	**4.67**
Female	4899	40.37%	4670	40.57%	1.05	23328	4.76
Male	7237	59.43	6842	59.43	1.06	33390	4.61
6–17	**5009**	**15.47**	**4861**	**15.89**	**1.03**	**23801**	**7.96**
Female	2252	44.96%	2184	44.93%	1.03	10968	4.87
Male	2757	55.04	2677	55.07	1.03	12833	4.65
Tuberculosis	**668**	**100**	**467**	**100**	**1.43**	**12534**	**14.30**
0–1	**73**	**10.93**	**44**	**9.42**	**1.66**	**802**	**8.77**
Female	28	38.36	18	40.91	1.56	363	11.11
Male	45	61.64	26	59.09	1.73	439	7.31
2–5	**157**	**23.50**	**109**	**23.34**	**1.44**	**2159**	**11.76**
Female	67	42.68	49	44.95	1.37	1149	13.64
Male	90	57.32	60	55.05	1.50	1010	10.37
6–17	**438**	**65.57**	**314**	**67.42**	**1.39**	**9573**	**16.19**
Female	226	51.60	149	47.45	1.52	4731	16.17
Male	212	48.40	165	52.55	1.28	4842	16.20

the paper was to analyse the data reported to the National Health Fund (NFZ, *Narodowy Fundusz Zdrowia*) in order to assess the incidence of selected acute respiratory diseases in children.

Material and methods

Data analysis was conducted under the "Maps of Health Needs — Database of Systemic and Implementation Analyses" project which was co-funded by the European Social Fund under the Knowledge Education Development operational programme. On 31 December 2016, the project results were published on the website of the Ministry of Health, including data on acute respiratory diseases in children. The Polish project was carried out by the Department of Analyses and Strategy of the Ministry of Health. Its main

Table 2. Analysis of deaths and death rate in children

Disease group	No. of patients	Share of inpatient deaths	Death rate 30 days after discharge	Death rate 90 days after discharge	Total
Pneumonias	68538	19	24	74	117
Bronchitis	30582	0	5	11	16
Acute respiratory failure	929	46	14	22	82
Tuberculosis	467	0	0	0	0
Pleural diseases	370	2	0	1	3
Other	140	0	0	0	0

goal was to improve the quality of management in the current health care system based on the data reported to the NFZ. Continuation of the commenced analytical actions will make it possible to take a position on decisions taken by persons responsible for health care management in Poland on the national, regional and local levels, carried out by individual service providers.

Analyses of acute respiratory diseases were conducted in relation to the diagnoses reported between 1 January 2014 and 31 December 2014 to the National Health Fund (NFZ) as per the codes of the *International Statistical Classification of Diseases and Related Health Problems, 10th Revision* (ICD-10): pneumonias A37, B44, J10–J18, J69, bronchitis/bronchiolitis J20–J22, pleural diseases J85, J86, J90–J94, tuberculosis A15–A19, A31, B90, pulmonary oedema J81, acute respiratory failure J80, J96.0, other J68, J95, R05, T81.8.

The registered incidence rate was defined as the number of new patients with a given diagnosis reported as part of the health care system financed from the public funds per 100,000 inhabitants in a year. The analyses considered the age group of children. A child reported to the NFZ was considered a first-time patient if it appeared with a given diagnosis of an acute respiratory disease for the first time in the system in 2014.

Results

Respiratory diseases were the most common group of general paediatric diagnoses in Poland in 2014, constituting 32.4% of all hospitalisations across the country. A total of 101,000 children were hospitalised due to acute respiratory diseases (1554 hospitalisations per 100,000 children). Relative to the total number of hospitalisations of children in Poland, the percentage of hospitalisations due to acute respiratory diseases was 7.30%, and 1.45% relative to the size of the Polish paediatric population [3]. The most common reason for hospitalisation was pneumonia (68%), bronchitis or bronchiolitis (30% in total). The shortest average length of stay (ALOS) was 5.21 days and concerned hospitalisation due to bronchitis. Basic data (by sex and age group) on children hospitalised due to pneumonia, bronchitis and tuberculosis are presented in Table 1.

Based on available data, the deaths and death rate in children due to acute respiratory diseases were analysed. Summary results are presented in Table 2.

Multifactorial analysis of variance test was used for a comparison of the percentage of deaths among children, depending on the voivodship and age group. Multifactorial ANOVA test were applied for the leading causes of deaths among acute respiratory disease (pneumonia, bronchitis and acute respiratory failure). Test results are presented in Table 3.

In the pneumonia group, death was statistically often observed in the youngest analysed group (0–1), however, there were no differences according to the treatment in the analysed province. Among the death because of acute respiratory failure, statistical significance was observed between the provinces. In case of bronchitis, neither the main effects (province $P = 0.563$, age group $P = 0.664$) nor the province age group interaction ($P = 0.997$) were statistically significant.

Pneumonia in children

Pneumonias were the most common cause of hospitalisation due to acute respiratory diseases, both in adults and children. In 2014, 73,255 hospitalisations due to pneumonia were reported among children and adolescents up to 18 years of age (by comparison, there were 59,790 hospitalisations in adults). The calculated incidence per 100,000 was 956.11 in children and 235.96 in adults. It was observed, both in children and adults, that in-

Table 3. Results of multifactorial ANOVA for the percentage of deaths by province and age group

Disease group	Source of Variation	df	Sums of squares	Mean square	F statistic	P
Pneumonias	Province	15	0.00157	0.0001044	1.100	0.35160
	Age group	2	0.00127	0.0006362	6.700	0.00128
	Province∗Age group	30	0.00215	0.0000717	0.755	0.82751
	Residuals	1114	0.10508	0.0000943		
Bronchitis	Province	15	0.00062	0.0000413	0.901	0.56300
	Age group	2	0.00004	0.0000188	0.409	0.66400
	Province∗Age group	30	0.00060	0.0000200	0.437	0.99700
	Residuals	1057	0.04846	0.0000459		
Acute respiratory failure	Province	15	3.06700	0.2044600	2.528	0.00157
	Age group	2	0.25200	0.1262000	1.560	0.21190
	Province∗Age group	30	1.60300	0.0534400	0.661	0.91395
	Residuals	277	22.40400	0.0808800		

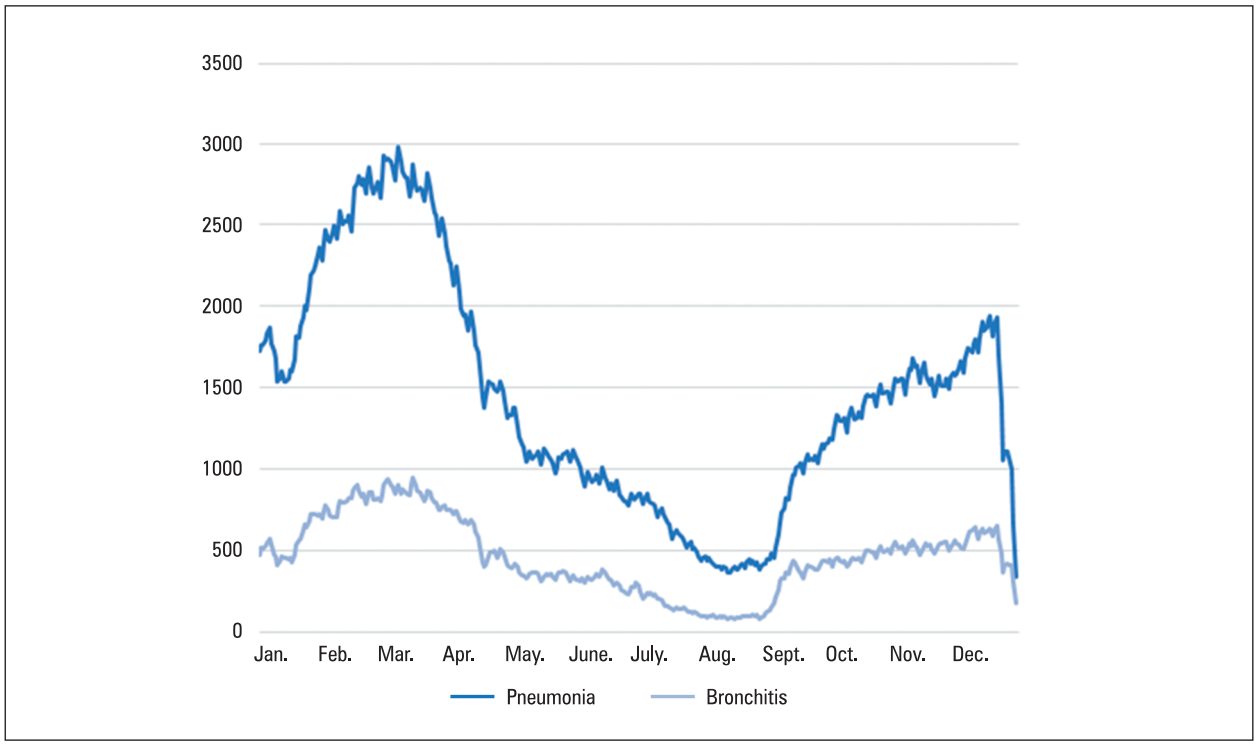

Figure 1. Daily number of hospitalisations due to pneumonia and bronchitis/bronchiolitis in children

cidence and hospitalisations due to pneumonia were seasonal, with the nadir in the summer season (June to August) and increased incidence in the autumn and winter season (Figure 1). ALOS for pneumonia is presented in Table 1.

Analysed was also the registered incidence of pneumonia by age group in all of Poland. The highest rate was calculated for the group of infants (3847.26 per 100,000), among children 2 to 5 years of age (1572.72 per 100,000) and above 6 years of age (270.59 per 100,000). The percentage share relative to the entire paediatric population was as follows — children up to 1 year of age constituted as much as 42.7%, children 2 to 5 years of age — 38.7%, and children above 5 years of age — 18.6%. In each age group, boys required hospitalisation more often (Table 1). The average age of a paediatric patient

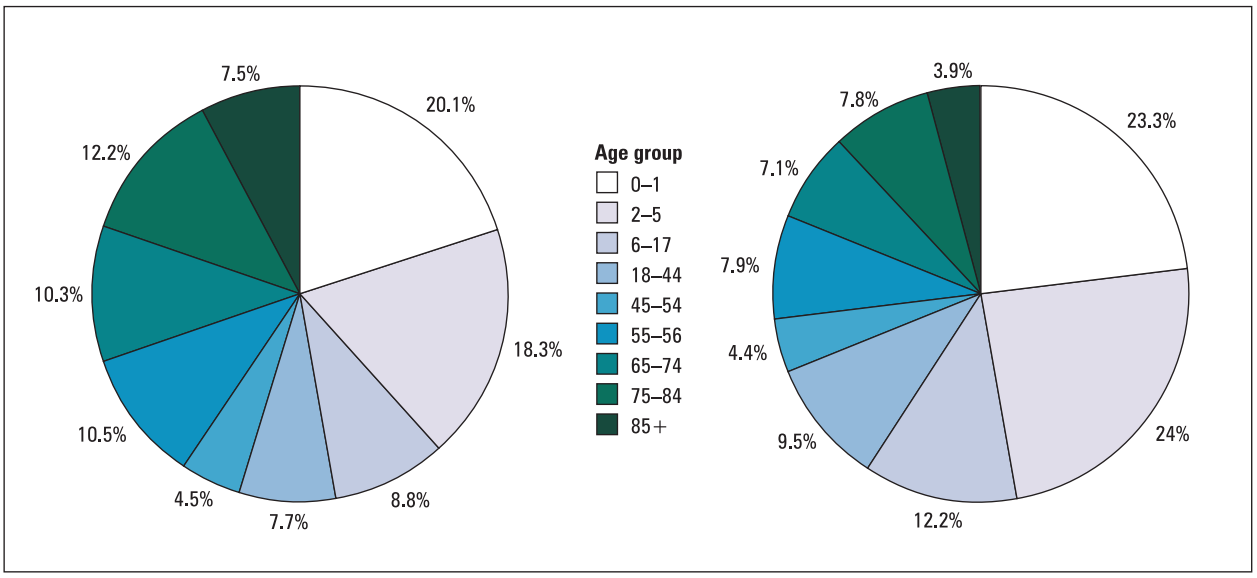

Figure 2. Structure of registered incidence of pneumonia (left) and bronchitis (right) by age group

requiring hospitalisation due to pneumonia was 3.25 years. Figure 2 summarises the structure of registered incidence of pneumonia and bronchitis by age group.

Bronchitis

In 2014 in Poland, there were 46,241 hospitalisations due to acute bronchitis identified by the ICD-10 codes J20-J22. Seventy percent of all hospital stays (32,366) were hospitalisations of children and adolescents up to 18 years of age. In the adult population, only 13,875 hospitalisations were reported (most were exacerbations of chronic obstructive pulmonary disease). The number of emergency admissions was 26,875 (83%) in children and adolescents, and 11,592 (84%) in adults. As in the case of pneumonia, a seasonality of incidence and hospital admissions was also observed (Figure 1). The calculated ALOS due to bronchitis/bronchiolitis is presented in Table 1. Code ICD-10: J21 (bronchiolitis) was isolated from among the overall coding data. 1,754 children under 1 year of age and 196 children aged 2 to 5 were hospitalised, and 11 patients above 6 years of age were diagnosed with bronchiolitis. The most commonly hospitalised due to bronchitis were children up to 1 year of age, irrespective of their place of residence. The registered incidence rate in this age group was 2633.4 per 100,000. In the group of children aged 2 to 5 years, registered incidence was calculated to be 1220.3 per 100,000, and for children above 6 years of age — only 221.9 per 100,000. For adults, this rate was 108.68 per 100,000. The structure of registered incidence, including the adult population, is presented in Figure 2. The calculated percentage share relative to the paediatric population only was as follows — children up to 1 year of age: 39.2%, children 2 to 5 years of age: 40.3%, children 6 years of age and older: 20.5%. In each of the analysed age groups, boys were hospitalised more often (Table 1), and the average age was 2.93 years.

Tuberculosis

In 2014, 467 children were hospitalised in Poland with the ICD-10 code for tuberculosis. The average length of stay was longest in the group of acute respiratory diseases (14.3 days). The structure of registered tuberculosis incidence in children by age and province is presented in Table 4. IGiChP data for 2014 are provided for the sake of comparison [4].

Univariate analysis of variance (ANOVA) test was used to differentiate the incidence of tuberculosis between province. Test results are presented in Table 5.

ANOVA test results showed group differences to be significant at $p < 0.05$ for all the age groups except the group aged 0 to 1 year.

Registered incidence of tuberculosis by age group was also analysed. Tuberculosis incidence in the paediatric population constituted only a small percentage (4.1%) relative to other age groups (Figure 3). The average age of a paediatric patient requiring hospitalisation due to tuberculosis was 8.91 years.

Table 4. Structure of registered incidence of tuberculosis per 100,000 children by age and province together with data published by IGiChP

Province	0– 1 year of age	2–5 years of age	6–17 years of age	IGiChP data	
				0– 14 years of age	15–19 years of age
Dolnośląskie	11.4	2.6	5.3	1.2	2.8
Kujawsko-pomorskie	5.1	4.5	7.4	0.6	1.7
Lubelskie	–	–	4.2	0.6	4.0
Lubuskie	–	–	–	–	–
Łódzkie	13.5	12.0	16.2	0.6	8.6
Małopolskie	17.5	14.6	10.9	0.8	1.0
Mazowieckie	17.1	13.6	15.0	3.4	7.0
Opolskie	–	–	1.8	–	9.5
Podkarpackie	–	2.3	2.6	0.6	3.1
Podlaskie	14.1	8.5	13.4	1.2	2.9
Pomorskie	6.2	17.7	11.6	0.3	1.6
Śląskie	2.4	2.2	5.0	2.8	6.2
Świętokrzyskie	–	–	4.8	–	4.2
Warmińsko-mazurskie	–	14.5	6.6	–	3.5
Wielkopolskie	–	5.0	3.0	0.7	3.6
Zachodniopomorskie	39.1	30.6	18.4	–	3.2
Poland	8.8	8.6	8.5	0.2	2.8

Table 5. Results of 1-Way ANOVA for the incidence of tuberculosis by province for all age groups

Age group	Source of variation	df	Sums of squares	Mean square	F statistic	P
0–1	Province	15	1795	119.67	0.6021	0.8733
	Residuals	364	72342	198.74		
2–5	Province	15	11305	753.68	3.5252	< 0.0001
	Residuals	364	77823	213.80		
6–17	Province	15	10491	699.40	5.5555	< 0.0001
	Residuals	364	45825	125.89		

Pleural diseases

Pleural diseases were the cause of hospitalisation of 370 children, who required 494 hospital stays (number of hospitalisations per patient: 1.34). The calculated average patient age was 10.51 years, and ALOS was 11.2 days. Pneumothorax was diagnosed in 145 children requiring hospitalisation (incidence rate of 2 per 100,000 children). In this group, as many as 133 children (92%) were older than 6 years of age. 225 children (including only 16 infants) were hospitalised due to diagnosed pleural empyema/effusion. As part of the implementation of the project, the 10 most commonly reported ICD-9 procedures were selected from the databases, of which radiological examination, pleural drainage, and chest ultrasound, essential for pleural diseases, were reported 311, 163, and 123 times, respectively.

Acute respiratory failure

Acute respiratory failure was diagnosed in 929 children (996 hospitalisations). The average patient age was 4.19 years, and ALOS was 7.24 days. After analysing the accompanying codes of acute respiratory failure, the ICD-10 codes most commonly accompanying it were identified. The most common accompanying diagnoses included G71.0 (muscular dystrophy)

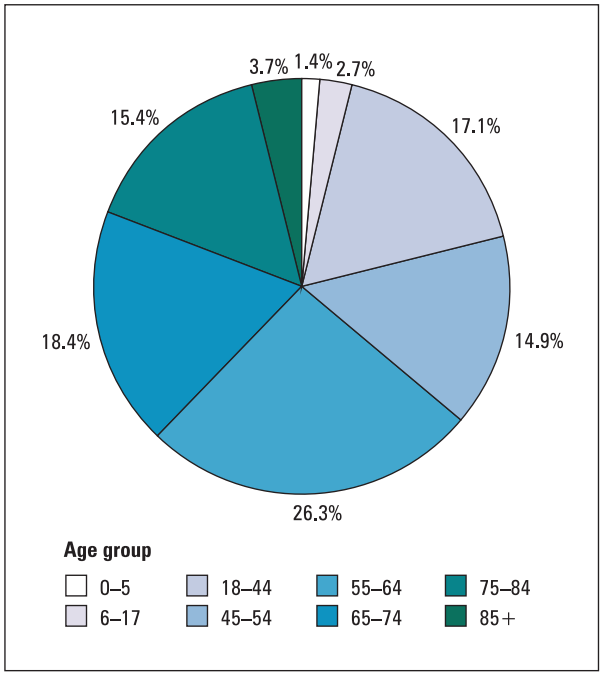

Figure 3. Structure of registered incidence of tuberculosis by age group

and G80.9 (cerebral palsy), both reported in the case of 8% of all hospitalisations. Among the 10 most commonly reported ICD-9 procedures in patients hospitalised with diagnosed acute respiratory failure, there was no invasive or non-invasive ventilation. Oxygen therapy was reported 215 times in 929 patients (23%) and pulse oximetry and gasometry were reported 278 (30%) and 121 times (12.6%), respectively.

Other acute respiratory diseases

In this diverse set of diseases (ICD-10 codes — J68, J95, R05, T81.8), 143 hospitalisations were reported in 140 children. It amounted to only 0.1% of all hospital stays due to acute respiratory diseases, and therefore, no detailed analysis of the available data was conducted.

Discussion

Acute respiratory diseases in the paediatric population are a significant problem in all countries. They are a common cause of hospitalisation and a reason for necessary out-of-hospital medical services. In 2014, acute respiratory diseases constituted 32.4% of all hospitalisations among children. Similar results were obtained by Nguyen *et al*. The authors found that respiratory diseases in a tertiary hospital in Hanoi were the most frequent, accounting for 37.7% of all hospital admissions [5]. By comparison, in 2012 in the United States, this percentage for children up to 17 years of age (excluding the neonatal period) was 22 [6]. Each year in Poland, about 7 to 8% of children with respiratory infections are hospitalised. According to Pancer *et al*., hospitalisation is required more often in infants (15 to 17%) and in children up to 4 years of age (about 30%) [7]. In the Hanoi population, 45.8% of the hospitalised children with a respiratory disease were infants. Hospital admissions for the same reason in the group of children from 5 to 17 years were 19.6% [5]. Similarly, in our data, a decreasing tendency has already been observed in the population of children above 2 years of age, and especially among children above 6 years of age. The recommended vaccination against pneumococcus may contribute to this, however, the lack of reliable data on the aetiology of pneumonias and on the percentage of children vaccinated in 2014 only enables a casual hypothesis in our reports. According to earlier data of the National Institute of Public Health — National Institute of Hygiene (NIZP-PZH) from 2010, children under 1 year of age and persons above 65 years of age were the most often hospitalised. In the population up to 18 years of age, the most often hospitalised due to respiratory diseases were children under 10 years of age, however, the highest percentage were patients up to 5 years of age [8]. Gajewska *et al*. also pointed out in their studies that the incidence rates decrease with the child's age [9, 10]. Nguyen *et al*. found that in the infant group, the hospitalisation rate in 2014 due to pneumonia was 34 per 1,000 children and only 5 per 1,000 for children aged 1 to 4 years [5]. In the same time frame in Poland, 56,070 children under 5 years of age were hospitalised in Poland due to pneumonia, which allows us to calculate the prevalence rate at 0.02 per child per year. This complies with the data coming from other developed countries [11]. In our analyses, older children required hospitalisation 4 times less often. The average length of stay due to pneumonia was 7.29 days. Children up to 1 year of age were hospitalised for the longest time (7.96 days). In the Vietnamese population, the average length of stay due to pneumonia was 6.42 [5]. In a paper by Gajewska *et al*., LOS was 10.1 in 2007 and 8.2 in 2011. Children up to 2 years of age were hospitalised for the longest time (nearly 11 days in 2007 and 9 days in 2011). A study of numerous papers from the subsequent years shows that the length of stay becomes shorter with age. By comparison, the average length of stay in the United States — irrespective of the cause — was

3.9 days in 2012. The shortening of the length of hospitalisation may also result from a different system of insurance, which in as much as 43.6% of all cases is based on private insurance, and from a system of insurance settlements, which is different from that in Poland [6]. Moreover, a decrease in length of stay observed in another country was associated with a decreased threshold for hospital admission. On the other hand, an increase in unplanned admissions or an increase in short-stay admissions, which was observed in Poland, may result from primary health care inefficiencies [12].

Another equally common acute respiratory disease requiring hospitalisation was bronchitis/bronchiolitis. Incidence of these diseases in 2014 in the group of children under 1 year of age was 2633.4 per 100,000. The data published in the ERS White Book 2011 recorded incidence in this age group at 2773.7 per 100,000. Similar data comes from Finland, the Czech Republic, Austria, Switzerland, and the United Kingdom [11]. A separate analysis of the ICD-10 code: J21 (bronchiolitis) made it possible to calculate registered incidence in the group of children up to 1 year of age, hospitalised with bronchiolitis at 238.34 per 100,000. Ten times and one hundred times lower values were calculated respectively for the age groups 2 to 5 years of age and above 6 years of age. The obtained results match the data concerning the diagnosis of bronchiolitis as a disease characteristic for the infant population. As in the case of pneumonias, in each of the age groups analysed, boys were hospitalised due to bronchitis more often. Similar conclusions were reached by De Lusignan *et al*. General practitioners in England more often diagnosed (in outpatient clinics) lower respiratory tract infections, mainly bronchitis, in boys up to 15 years of age [13].

Both in pneumonia and bronchitis, incidence is seasonal, with the nadir in the autumn and winter season. It corresponds with infections common in a moderate climate, mainly viral infections, during the "colder" seasons. The number of hospitalisations is affected by, in the case of bronchitis, infections caused by the respiratory syncytial virus (RSV), and in the case of pneumonia, infections caused by the influenza virus. Peak hospitalisations due to pneumonia in March 2014 coincided with the peak flu incidence recorded at that time by the National Institute of Hygiene (PZH) [14]. In a population of 236 children under 16 years of age, Finianos *et al*. observed that the majority of positive results of tests for viral infections were recorded between December and March [15]. Ramaekers *et al*. observed a clear increase in the number of viral infections between 2011 and 2016, mainly caused by RSV and the influenza virus, during the winter season [16]. According to our data, a reduced number of hospitalisations, both in the pneumonia and bronchitis group, was observed during Easter (20 April 2014) and Christmas. In accordance with observations resulting from the authors' experience, in these special periods, children remaining at hospitals are those most ill and requiring treatment continuation in closed health care conditions. Summing up, it must be emphasised that the seasonality of respiratory infections and the periods of church holidays affect the variations in the use of resources (such as hospital beds and medical staff), which is a challenge for the organisation of flexible health care, irrespective of the system in place.

Another issue analysed was an evaluation of death rates due to acute respiratory diseases. According to our data, in 2014 a total of 117 deaths due to pneumonia were reported to the National Health Fund (NFZ), however, only 19 children died during hospitalisation. Multifactorial analysis of variance showed that in those cases, a province was not relevant, but interestingly, we observed statistically significant differences according to the age. The highest death rate was observed in the youngest children, although deaths did not depend on treatment in the provinces. No inpatient deaths due to bronchitis or bronchiolitis were reported. At the same time, death due to acute respiratory failure (ICD-10- J96) during hospitalisation was reported in 46 patients under 18 years of age, and 36 additional children died within 90 days after discharge. We observed that the province has an impact on death due to acute respiratory failure. There is no simple explanation of that because we analysed namely registered incidence of each disease and also deaths. Children with complication due to many reasons, finally with acute respiratory failure were probably hospitalised not only in the district hospital but were transported to the voivodship hospital, however, there is no simply data in the system on that. In accordance with the available data by the World Health Organisation (WHO) and Europe Mortality Databases, the rate of deaths in Poland in 2011 — including deaths due to bronchiolitis, bronchitis and pneumonia — was 14.36 per 100,000 in the population of children up to 1 year of age, and the death rate in severe pneumonia among children up to 15 years of age was 1.91 per 100,000 [17]. According to the data

by the Polish Central Statistical Office (GUS), the reduction in the death rate among children 1 to 14 years of age in Poland is a positive phenomenon, observed constantly for several years now. In 2014, 3,114 children up to 19 years of age died [3] of which 5.7% (178 children) were deaths due to pneumonia [18]. The highest death rate due to this reason was recorded in a group of infants (1.6%) and the lowest in the group of children 10 to 14 years of age (0.38%) [8, 18]. The hard-to-explain differences in the reports presented in this paper and by the Central Statistical Office (GUS) may result, for example, from incorrectly completed death reports by doctors or from incorrectly identified (coded) causes of death. Cardiac or respiratory arrests as a consequence of acute respiratory failure, notoriously entered into the death reports, are after all not the cause of death but a consequence of the underlying cause. Code J96 (respiratory failure) belongs to the extended list of the so-called "garbage codes" which fail to precisely and accurately describe various conditions and diseases, thus preventing a precise determination of the cause of death.

Interesting but difficult to interpret, are the data reported to the NFZ concerning tuberculosis. According to our study, 467 children were hospitalised in Poland in 2014 with such a diagnosis. The data differ considerably from the data published in the IGiChP 2014 Bulletin. Korzeniewska-Koseła states that in 2014, a total of 70 cases of tuberculosis were reported in the group of children up to 14 years of age, and 86 cases were reported in the age group of 15 to 19 years of age [19]. Similarly, divergent are the data coming from individual provinces. The highest incidence was registered in the Zachodniopomorskie Province, although according to the IGiChP data, there was not a single report to the Central Register in the group of children up to 14 years of age, and details of only 3 patients were entered among children aged 15 to 19. Data most similar to those coming from IGiChP were obtained in the Śląskie Province. Beside of our findings, for clarification we used univariate analysis of variance to differentiate the incidence of tuberculosis between voivodships. We observed, that there is a significant difference between the incidence of tuberculosis depending on the province. ANOVA test results showed group differences to be significant at $p < 0.05$ for all age groups except the youngest one. One of the explanations why there is no significance in children up to the 1year of age is that in this special group, tuberculosis was recognised very rarely. The important question is why data vary so greatly in most provinces? It is difficult to explain, because a doctor in Poland is obliged to report each infection to the State District Sanitary Inspector or to the State Border Sanitary Inspector appropriate for the site of identification. Reporting flu incidence is mandatory under the Infectious Diseases Act of 5 December 2008 [20]. One of the most rational explanation may be that ICD-10 tuberculosis diagnosis codes are used for the purpose of financial settlements with the NFZ when it is suspected, and therefore, when it is necessary to carry out examinations to confirm it or to rule it out. The final report to IGiChP — which translates into the data published in the bulletin — is made only when the disease is confirmed bacteriologically or clinically and not when it is suspected.

Pleural diseases were also included in the acute respiratory diseases group. Half in this group was pneumothorax, which in as much as 92% was the cause of hospitalisation in the group of children above 6 years of age. It corresponds with the reports by both national and foreign centres [21, 22] as spontaneous pneumothorax occurs most often in the group of older children and in adolescents. According to our data, incidence in Poland in 2014 may be assessed at 2 per 100,000 children. Among the analysed procedures reported during hospitalisation due to pleural diseases, there were no biochemical, cytological and microbiological tests of pleural effusion — all essential from the point of view of medical treatment. Also, no thoracentesis (pleural tap) was listed — a procedure less invasive than surgical drainage. In a group of 370 patients, pleural drainage was reported in 44% of patients, and chest ultrasound in only 30% of patients. It should be stressed that these are essential procedures in managing patients with pleural effusion. For children, the percentage of pleural ultrasound should be close to 100%.

When analysing the issue of acute respiratory failure, it was observed that the use of oxygen therapy (only in 23% of all children) and of invasive and non-invasive ventilation were reported relatively rarely. It should be stressed that supporting ventilation by means of various methods and/or oxygen therapy are vital therapeutic procedures in the treatment of respiratory failure. It is therefore not possible that these methods were not used in such diagnosis. Such a low percentage results from failure to include these procedures in reports.

The strength of this paper is that it comprises data coming from one source in the same period of time, which makes it possible to compare it

with data from other European health systems. Its weakness is the lack of accurate data concerning performed ICD-9 procedures, which may result, among others, from the fact that the statistical records are not accurately completed. In 2014, in most hospitals, this data was entered by doctors or medical secretaries themselves. Automatic data entering will contribute positively to the reliability of available data.

The analysis performed by the authors of this study raises several questions for future investigations. First of all, why are there still so many hospitalisations due to respiratory diseases? Second, what is the importance of the distance between the place of residence and hospitals, insurance and hospital LOS? Thirdly, how to shorten LOS, increase the efficiency of the hospital system and reduce costs without jeopardising the quality of care? Understanding these factors will provide the information needed to plan and implement evidence-based prevention and treatment strategies.

Summary

The presented data on acute respiratory diseases reported in 2014 to the NFZ seem quite reliable and do not differ significantly from those reported in other European countries. The tuberculosis incidence rates, and acute respiratory disease death rates are a clear exception which requires, above all, improved reporting. Based on results obtained from data analysis, it seems that a skilful use of the reported data in combination with appropriate communication between the service provider and the payer will make it possible to appropriately assess the needs with respect to both hospital and outpatient care in acute respiratory diseases in children.

Significance for public health

Acute respiratory diseases in the paediatric population are one of the most common causes of paediatrician or general practitioner visits, both in outpatient and hospital care. The demand for epidemiological data on this group of diseases in children results from the need to implement well-thought-out systemic solutions which cover above all the assessment of health needs of this age group. Epidemiological knowledge is necessary for planning an appropriate level of contracting, both in hospital and outpatient care, and for assessing the institutional and staff needs in order to secure them. Clinical information from the databases is relevant to the development of local health needs.

Conflict of interest

None declared.

Funding

This paper has been prepared within the project Maps of Health Needs — Database of Systemic and Implementation Analyses. The project is co-financed by the European Union from the European Social Fund under the Operational Programme Knowledge Education Development and it is being carried out by the Analyses and Strategies Department of the Polish Ministry of Health.

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