

---

## Streszczenie w języku angielskim:

Title: Use of a national hospital morbidity registry to analyze epidemiological trends of selected diseases of infancy

### Introduction

Care of the child at such a crucial time as the newborn and infant period is one of the major public health challenges worldwide. The goal of effective prevention of both infectious and non-infectious diseases is to know their nature, including their epidemiology. Identifying both risk and protective factors, as well as determining long-term epidemiological trends for selected disease entities, enables the development of an effective health strategy, both at the national and global levels, and translates into everyday clinical practice. Diseases of the infancy are conditions occurring up to the child's first year of life. Congenital infections and respiratory infections, spread by the droplet route, deserve special attention due to their significant impact on the health, development and quality of life of the pediatric population. The use of nationwide hospital morbidity registries allows for epidemiological assessment of selected disease entities. The data collected in the registry provide information on the health needs of the population (frequency of hospitalizations for specific diseases or health problems) and on the process of treatment (including length of hospital stay, hospital mortality, subsequent hospitalizations for the same cause). Along with data routinely collected in ambulatory health care, it is an important element in the planning of national health policy.

### Objectives of the study

1. To determine epidemiological measures of congenital HSV infections (**Publication 1**), RSV infections (**Publication 2**) and congenital *Toxoplasma gondii* infections (**Publication 3**) in the infant population in Poland, and to assess the utility of using a hospital morbidity registry for this purpose.
2. Evaluation of hospital incidence and its trend over many years (**Publication 1, 2 and 3**).

- 
3. Evaluation of the impact and structure of gender, place of residence (rural/urban) and age of hospitalized patients on the incidence of selected infections (**Publication 1, 2 and 3**).
  4. Identification of hospital deaths associated with selected disease entities and related epidemiological measures (**Publication 1, 2 and 3**).
  5. Assessment of seasonality of infection (**Publication 2**).
  6. Assessment of comorbidity (**Publication 3**).

### Methods

In Poland, the institution statutorily obliged to collect information on hospitalization is the National Institute of Public Health National Institute of Hygiene - National Research Institute (NIZP PZH-PIB). Every hospital in Poland, with the exception of units providing psychiatric care, is obliged to send data on hospitalization to NIZP PZH-PIB. The hospital morbidity survey is carried out by NIZP PZH-PIB within the Public Statistics Statistical Research Program. After obtaining the data from the Institute and comparing it with the data from the Central Statistical Office, a consistency analysis of the raw databases was carried out, followed by statistical analysis, set in the clinical context and the existing state of knowledge derived from the available literature. The results were published periodically in the form of subsequent original articles.

### Results

In **Publication 1**, 2,391 hospitalizations of infants due to congenital herpes simplex virus (cHSV) infection in Poland in 2014-2019 were analyzed. After excluding repeated (subsequent) hospital admissions, a group of 1,573 first-time hospitalizations of unique patients were further explored. In this group, 70.1% were infants up to 90 days of age. The mean and median age of the study group were 98 days (95% CI: 94.5-101.8 days) and 70 days (IQR: 53-104 days), respectively. Based on demographic data, the average incidence of cHSV was calculated at 69 per 100,000 live births. The number of cases fluctuated over the study period, with a significant downward trend in 2015-2019 ( $p < 0.01$ ). It was shown that among patients living in urban areas, the incidence was higher, relative to those from rural regions of

---

Poland (88 versus 40 per 100,000 live births,  $p < 0.001$ ). During the period analyzed, no hospital deaths due to cHSV were reported in Poland.

In **Publication 2**, the study included 57,552 hospitalizations of children under the age of 5 due to RSV infection in Poland, between 2010 and 2020. Boys predominated among the children (57.2%,  $p < 0.0001$ ). In the entire analyzed group, the mean and median age were 232 days (95% CI: 230-234 days) and 132 days (IQR: 63-271 days), respectively. Over the analyzed period, there was a significant increase in the number of hospitalizations due to RSV in Poland ( $R^2 = 0.93$ ,  $p < 0.0001$ ). The highest number of hospitalizations due to this viral infection was observed between January and March. The average hospitalization rate due to RSV infection for children under the age of 5 in Poland, from 2010 to 2020, was 267.5 per 100,000. Additionally, children from urban areas had a significantly higher hospitalization rate relative to those from rural areas (267 versus 256 per 100,000,  $p < 0.001$ ). A separate analysis included a subgroup of infants up to the age of 1 year, i.e. 47,041 hospitalizations (81.7% of all cases). A separate analysis covered the subgroup of infants under the age of 1 year, i.e. 47,041 hospitalizations (81.7% of all cases). Children up to the age of 90 days accounted for 36.8% in this subgroup, while those up to the age of 180 days accounted for 61.7%. Male children hospitalized for RSV infection were significantly older than those of the female sex (128.5 versus 119.5 days,  $p < 0.0001$ ). The average rate of hospitalization for RSV infection among infants in Poland between 2010 and 2020 was 1132 per 100,000 person-years. In this subgroup, there were no significant differences in hospitalization rates depending on place of residence. However, a significant increase in the number of hospitalizations over the explored period was identified ( $R^2 = 0.90$ ,  $p < 0.0001$ ). There were 45 deaths due to RSV infections during the explored period.

**Publication 3** focused on identifying and describing epidemiological trends of congenital toxoplasmosis in Poland during 2007-2021. In the analyzed period, 2131 hospitalizations due to congenital toxoplasmosis were identified, including 1504 first-time hospitalizations, which were analyzed in detail. The study group consisted of 763 male children (50.7%) and 741 female children (49.3%). The mean and median age at diagnosis were 31 days (95% CI: 29-34 days) and 10 days (IQR 0-36 days), respectively. In the study group, children up to 90 days of age accounted for 89.7% of all hospitalized infants, and newborns up to 28 days of age accounted for 69.8% of the total group. Based on data from the

---

national hospital morbidity register and demographic data from the Central Statistical Office, the average annual incidence of congenital toxoplasmosis in Poland was calculated. It amounted to 2.6 (95% CI: 2-3.2) per 10,000 live births during the analyzed period. The value of this rate fluctuated from year to year, with a peak in 2010 and the lowest value in 2014. There were no significant differences between genders and in relation to place of residence (rural/urban). During the analyzed period, 8 deaths (0.5%) were registered. An analysis of comorbidity was also carried out, which showed that among comorbidities important for the course of hospitalization, the following predominated: congenital malformations, deformities and chromosomal aberrations (13.4% of all hospitalized infants), neonatal jaundice due to other and unspecified causes (11.8%), congenital infection caused by cytomegalovirus (11.2%), disorders associated with short gestation and low birth weight (5.9%).

### Conclusions

Conclusions on the epidemiology of the diseases analyzed:

1. The incidence of cHSV in Poland in 2014-2019 fluctuated and was relatively high compared to other countries, with a clear downward trend in 2015-2019. A higher incidence was observed in urban areas compared to rural areas suggesting a multifactorial influence on the incidence of the disease (**Publication 1**).
2. RSV infections among infants in Poland are a growing problem, with the peak incidence occurring in January-March. Appropriate information campaigns and preventive measures should be implemented to reduce this risk in the Polish pediatric population (**Publication 2**).
3. The incidence of congenital toxoplasmosis in Poland is similar to that reported in other European countries. Hospital mortality from the disease among infants is relatively low. Despite potentially higher environmental exposure, no higher incidence has been observed among populations from rural areas. Periodic increases in incidence, indicate the need for health education of the population and the development of effective methods of prenatal diagnosis and treatment (**Publication 3**).

---

Conclusions on the utility of the hospital morbidity registry to analyze epidemiological measures of selected diseases of infancy:

1. The national hospital morbidity registry is a useful source of data used in the analysis of selected infantile diseases in Poland. The data collected in the registry makes it possible, among other things, to determine the rate of hospitalization for specific causes, taking into account gender, age and place of residence of patients, as well as to analyze the length of hospitalization or hospital mortality.
2. The use of the registry has its limitations. Data on hospital morbidity do not give a complete understanding of the health situation of the population - hospitalizations are a consequence of the severity of the course of the disease, the ability to establish a diagnosis and provide appropriate treatment in outpatient care, the admission selection associated with the availability of hospital beds, and the impact of socioeconomic factors. The advantage of using a registry is the acquisition of data from across the country and the long-term observation period.
3. With the selection of suitable disease entities, it is possible to determine with a relatively high precision such epidemiological measures as incidence, in-hospital mortality, comorbidity, as well as other risk factors such as, among others, the age of the patient at the time of diagnosis, gender structure and prevalence of the disease in the country, cause of death and other parameters related to hospitalization.
4. The use of the registry allows monitoring the epidemiological situation and the use of hospital resources in the treatment of selected infectious diseases at the national level, and also allows comparisons with other countries, which can be used to create and modify health policy in Poland.