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REVIEW PAPER

Aneta Mela[1], Elżbieta Rdzanek[1], Łukasz A. Poniatowski[1, 2], Janusz Jaroszyński[3], Tomasz Kalicki[4], Monika M. Dutka[5], Maciej Furman[6], Anna Czajka[7], Marzena Furtak-Niczyporuk[8], Monika Wojciechowska[9], Justyna E. Król-Całkowska[10], Bartłomiej Drop[11], Katarzyna Drop[12], Maciej Krzakowski[13], Magdalena Sakowicz[14], Bartosz Grucza[15], Joanna Cygler[15], Beata Jagielska[16]

[1]Department of Experimental and Clinical Pharmacology, Centre for Preclinical Research and Technology (CePT), Medical University of Warsaw, Warsaw, Poland
[2]Department of Neurosurgery, Central Clinical Hospital of the Ministry of the Interior and Administration, Warsaw, Poland
[3]Department of Administrative Procedure, Faculty of Law and Administration, Maria Curie-Sklodowska University of Lublin, Lublin, Poland
[4]Independent Researcher, Warsaw, Poland
[5]Department of Public Economic Law, Faculty of Law and Administration, Łazarski University, Warsaw, Poland
[6]Department of Health Policy and Management, Institute of Public Health, Faculty of Health Sciences, Collegium Medicum, Jagiellonian University, Cracow, Poland
[7]Department of Neurology, Czerniakowski Hospital, Warsaw, Poland
[8]Department of Public Health, Faculty of Medicine, Medical University of Lublin, Lublin, Poland
[9]Department of Pediatric Nephrology, Medical University of Lublin, Lublin, Poland
[10]Department of European and International Law, Faculty of Law and Administration, Łazarski University, Warsaw, Poland
[11]Department of Information Technology and Medical Statistics, Faculty of Health Sciences, Medical University of Lublin, Lublin, Poland
[12]Department of Language, Rhetoric and Media Law, Institute of Journalism and Management, John Paul II Catholic University, Lublin, Poland
[13]Department of Lung Cancer and Thoracic Tumors, Maria Skłodowska-Curie National Research Institute of Oncology, Warsaw, Poland
[14]Department of Finance, Maria Skłodowska-Curie National Research Institute of Oncology, Warsaw, Poland
[15]Collegium of Management and Finance, Department of Infrastructure and Mobility Studies, SGH Warsaw School of Economics, Warsaw, Poland
[16]Department of Oncological Diagnostics, Cardioncology and Palliative Medicine, Maria Skłodowska-Curie National Research Institute of Oncology, Warsaw, Poland

Epidemiological features and changes in the occurrence of infectious diseases in Poland from 2015 to 2020 in the context of the emerging novel SARS-CoV-2 (COVID-19) pandemic

Address for correspondence:
dr n. prawn. Janusz Jaroszyński
Department of Administrative Procedure,
Faculty of Law and Administration,
Maria Curie-Sklodowska University
of Lublin, Lublin, Poland
e-mail: janusz_jaroszynski@tlen.pl

ABSTRACT

Introduction. The novel emerging infectious disease caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) is a global public health concern. The ongoing pandemic outbreak in Poland makes a great impact on the diagnosis and treatment of other conditions including cancer and non-neoplastic diseases such as other infectious diseases.

Research design. This study aimed to analyze trends in morbidity of selected infectious diseases in Poland over the last 6 years and assess the impact of the SARS-CoV-2 (COVID-19) pandemic on the incidence of other infectious diseases from January 1, 2020, to December 31, 2020, compared to the same period in 2019.

Results. No clear trend in the total number of cases of infectious diseases in Poland in the years 2015–2019 was observed. During the period from January 1, 2020 to December 31, 2020, a total of 1 273 155 SARS-CoV-2 infections were recorded in Poland; they represented the second most common disease entity in the analyzed period (after flu and suspected flu). At the same time, there was a decrease in morbidity for almost all disease entities for which at least one case had been reported in 2019. The mean hospitalization rate for COVID-19 amounted to 250.2 cases per 100 000 inhabitants.

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Conclusions. The lack of a clear trend in data for the years 2015–2019 makes it difficult to measure the impact of COVID-19 disease on the occurrence of other infectious diseases in Poland. The latest data indicate a significant reduction in the number of cases reported in 2020 *vs.* 2019. The question remains, whether this reduction results from limitations in interpersonal contacts forced by the SARS-CoV-2 pandemic, or is it a matter of underreporting of other diseases.
Key words: oncology, pandemic, SARS-CoV-2

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Introduction

The novel coronavirus (CoV) disease 2019 (COVID-19) is an infectious disease caused by severe acute respiratory syndrome CoV2 (SARS-CoV-2) that is potentially fatal and is a great global public health concern [1]. In December 2019, a group of patients was hospitalized with a diagnosis of pneumonia of an unknown etiology. These patients were epidemiologically linked to a seafood and wet animal market in Wuhan, a city in China's Hubei Province [2, 3]. Early reports predicted the onset of a CoV outbreak based on the reproduction number for COVID-19, which was found to range from 2.24 to 3.58 [3]. The first cases were reported in December 2019, and up to January 2020, 41 hospitalized patients were diagnosed with COVID-19, and fewer than half of those patients had comorbidities, such as diabetes, hypertension, and cardiovascular disease [4]. Over this period, the Institute of Viral Disease, the Chinese Center for Disease Control and Prevention (CCDC) tested 515 environmental samples collected from businesses related to patients and their neighborhoods [5]. Further, on January 12, 2020, 70 more samples from wildlife shops in the seafood market were collected for testing. PCR (polymerase chain reaction) tests yielded 33 positive results among 585 samples, and the novel virus was successfully isolated from positive samples. An initial hypothesis suggested that the virus originated from animals sold at the seafood market in southern China [6]. From January 22, 2020, a total of 571 COVID-19 cases were reported in 25 provinces (districts and cities) in China [7]. CoVs (Coronaviruses) a large family of single-stranded RNA viruses, can infect animals and humans, causing respiratory, gastrointestinal, hepatic, and neurologic diseases [8]. CoVs are further divided into four genera: alpha-CoV, beta-CoV, gamma-CoV and delta-CoV [9]. Currently, there are six known human CoVs (HCoVs), including the alpha-CoVs HCoVs-NL63 and HCoVs-229E and the beta-CoVs HCoVs-OC43, HCoVs-HKU1, severe acute respiratory syndrome-CoV (SARS-CoV) and Middle East respiratory syndrome-CoV (MERS-CoV) [10, 11]. Patients with SARS-CoV-2 have clinical manifestations that are mild, moderate, or severe and rapidly progressive and fulminant disease [12]. Most SARS-CoV-2 patients had a normal and mild disease course, and their mortality was lower than that of SARS-CoV and MERS-CoV patients. The median duration from initial symptoms to dyspnea, hospital admission, and acute severe respiratory syndrome (ARDS) were 5 days according to a study by Whang [13]. Guan et al. [14] examined 425 confirmed cases with an incubation period of 5.2 days. The estimated mean incubation period of SARS-CoV-2 infection was 3.0 days [15]. Symptoms of COVID-19 are nonspecific, and the disease presentation can range from no symptoms (asymptomatic) to severe pneumonia and death. A 2020 study of 41 patients by Huang et al. [15] found that the most common symptoms were fever (98%), cough (76%), myalgia or fatigue (44%), and atypical symptoms included sputum (28%), headache (8%), hemoptysis (5%), and diarrhea (3%). About half of the patients had dyspnea [16]. The identification of CoVID-19 mainly includes virus isolation and viral nucleic acid detection. According to the traditional postulates by Koch, virus isolation is the "gold standard" for virus diagnosis in the laboratory. The detection of SARS-CoV-2 RNA is of diagnostic value [17]. The full genetic sequence of SARS-CoV-2 has been obtained, and samples can be collected from the upper respiratory tract (oropharyngeal and nasopharyngeal) and lower respiratory tract (endotracheal aspirate, expectorated sputum, or bronchoalveolar lavage) of patients with suspected SARS-CoV-2 infection for diagnosis by real-time real-time reverse transcription–polymerase chain reaction (RT-PCR) [18].

Aim

This study aimed 1) to analyze trends in morbidity of selected infectious diseases in Poland over the last 6 years and 2) to assess the impact of the SARS-CoV-2 (COVID-19) pandemic on the occurrence of other infectious diseases from January 1, 2020 to December 31, 2020, compared to the same period in 2019.

Data sources

We used data on the number of cases and morbidity of selected infectious diseases in Poland from January 1, 2015, to December 31, 2020. These data are published every two weeks by the National Institute of

Public Health — the National Institute of Hygiene (the Department of Infectious Disease Epidemiology and Surveillance) (NIPH-NIH) and by the Chief Sanitary Inspectorate (the Department of Anti-Epidemic and Sanitary Protection of Borders). These reports are available in the public domain and show the number of cases and the morbidity rate per 100 000 total individuals, live births (congenital diseases and puerperal fever), and children under 2 years of age or 0–14 years old for specific disease entities. For epidemiological surveillance, the European Union (EU) definitions are used if other definitions are not available. For most other diseases, Polish definitions are used.

Individual reports that present data from the selected period compared to the same period in the previous year may differ in terms of the number of disease entities included (e.g., data on SARS-CoV-2 infection are available only in reports for 2020). Due to possible differences in definitions of individual disease entities in different years, this analysis included data for a given period from the most recent report. For example, for data from 2018, which are available in two reports, 1) comparing data for 2019 versus 2018 and 2) comparing data for 2018 versus 2017, data from the more recent report was used.

The number of inhabitants in Poland in 2020 (in total and by voivodship) was obtained from the Central Statistical Office in Poland [19].

Methodology

Joint analysis was conducted for individual disease entities — i.e., when data for a given infection were divided (e.g., by the type of bacterium causing the disease), cumulative data were analyzed. Analysis was performed in two stages. In the first stage of the analysis, we established a list of the 25 most common infectious diseases in Poland in 2019. In the next stage, data from 2015-2019 were compared for all cases and for the 25 most common diseases to identify possible trends. The second stage of analysis attempted to assess the impact of the COVID-19 pandemic on the occurrence of other infectious diseases in Poland. Data for the period from January 1, 2020 to December 31, 2020, were compared with data from the same period in the previous year. Analysis was performed for the total number of cases and the 25 most common infectious diseases in 2019.

Results

Analysis of full-year data from 2015 to 2019

There was no clear trend in the total number of cases for 2015–2019 (Fig. 1). While there was a noticeable upward trend in the total number of cases of selected infectious diseases in Poland from 2015 to 2018, there was a significant decrease in the total number of cases in 2019 (5.2 million in 2019 compared to 5.6 million in 2018, representing a 6.9% decrease).

The 25 most common infectious diseases in Poland identified during the period from January 1, 2019 to December 31, 2019, account for approximately 99.95% of all cases recorded during this period (5 232 546 out of 5 230 123). The most common infectious disease in this period was flu and suspected flu; in total, approximately 4.8 million cases were recorded, which accounted for 91.5% of all cases (Tab. 1).

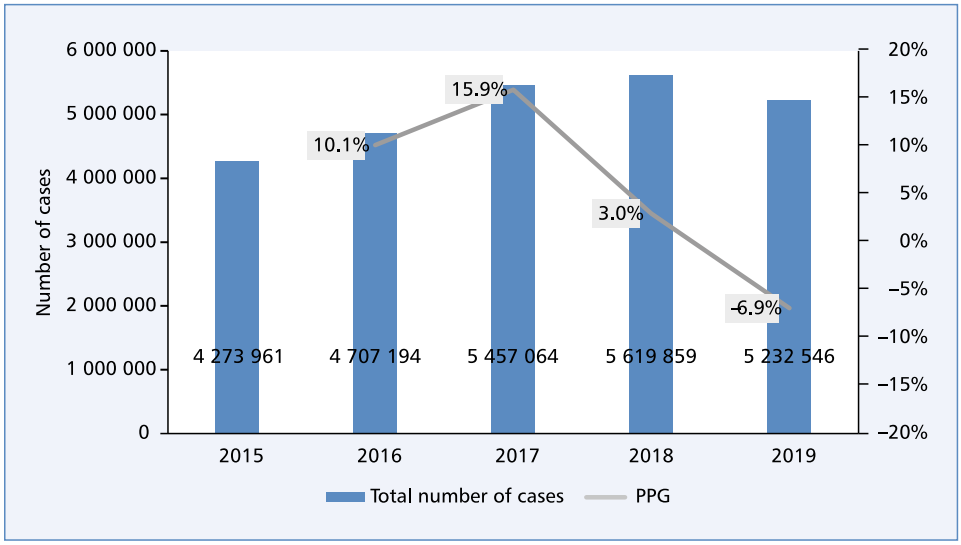

Figure 1. The total number of cases of selected infectious diseases in Poland in 2015–2019; PPG — previous period growth

Table 1. Number of cases and morbidity from 2015–2019 for the 25 most common infectious diseases in Poland during the period from January 1, 2019, to December 31, 2019

Disease entity	Number of cases						Morbidity					
	2015	2016	2017	2018	2019	2020	2015	2016	2017	2018	2019	2020
Flu and suspected flu	3,843,438	4,315,219	5,043,491	5,239,696	4,790,033	3,164,446	9,994.8	11,229.7	13,126.5	13,637.1	12,478.4	8,243.7
Chickenpox	187,624	160,660	173,196	149,567	180,641	71,392	487.9	418.1	450.8	389.3	470.6	186.0
Diarrhea and gastrointestinal inflammation	58,412	60,283	56,544	59,028	67,435	25,857	151.9	156.9	147.2	153.6	175.7	67.4
Viral intestinal infections (in total)	55,729	44,830	55,563	48,533	62,333	14,386	144.9	116.7	144.6	126.3	162.4	37.5
Viral intestinal infections in children under 2 years old	22,910	16,748	23,692	21,529	27,623	6,230	3,122.6	2,270.8	3,105.8	2,822.3	3,609.9	814.2
Scarlet fever	26,782	20,365	16,411	18,776	20,837	7,639	69.7	53.0	42.7	48.9	54.3	19.9
Lyme borreliosis	13,625	21,220	21,514	20,139	20,630	12,524	35.4	55.2	56.0	52.4	53.7	32.6
Other bacterial intestinal infections (in total)	13,311	13,029	15,665	15,362	15,047	11,800	34.6	33.9	40.8	40.0	39.2	30.7
Salmonellosis	8,652	10,016	10,000	9,969	9,234	5,270	22.5	26.1	26.0	26.0	24.1	13.7
Contact and exposure to rabies/need for vaccination	8,157	7,978	8,245	7,424	8,076	4,277	21.2	20.8	21.5	19.3	21.0	11.1
Viral hepatisis	7,909	8,172	10,453	8,139	7,293	2,056	20.6	21.3	27.2	21.2	19.0	5.4
Disease caused by Streptococcus pyogenes, invasive disease	5,383	5,641	5,336	5,827	6,163	3,104	14.0	14.7	13.9	15.2	16.1	7.9
Newly detected HIV infections	1,295	1,459	1,463	1,304	1,763	934	3.4	3.8	3.8	3.4	4.6	2.4
Pertussis	4,956	6,856	3,066	1,552	1,629	743	12.9	17.8	8.0	4.0	4.2	1.9
Syphilis	1,338	1,593	1,593	1,198	1,617	716	3.5	4.2	4.2	3.1	4.2	1.9
Disease caused by Streptococcus pneumoniae, invasive	978	955	1,182	1,315	1,541	545	2.5	2.5	3.1	3.4	4.0	1.4
Measles	48	132	63	339	1,502	30	0.1	0.3	0.2	0.9	3.9	0.1
Other bacterial intestinal infections in children under 2 years old	1,811	1,675	1,589	1,535	1,494	735	246.8	227.1	208.3	201.2	195.2	96.1
Mumps (common parotitis)	2,208	1,978	1,670	1,584	1,338	577	5.7	5.2	4.4	4.1	3.5	1.5
Viral meningitis	891	952	810	1,220	950	265	2.3	2.5	2.1	3.2	2.5	0.7
Giardiasis (lambliosis)	1,746	1,471	1,229	924	784	355	4.5	3.8	3.2	2.4	2.0	0.9
Other meningitis and unspecified	548	722	682	901	766	258	1.4	1.9	1.8	2.3	2.0	0.7
Gonorrhea	441	390	0	246	524	250	1.2	1.0	0.0	0.6	1.4	0.7
Other bacterial food poisoning (in total)	1,438	1,035	504	512	452	97	3.7	2.7	1.3	1.3	1.2	0.3
Other sexually transmitted diseases caused by Chlamydie	220	232	258	285	418	168	0.6	0.6	0.7	0.7	1.1	0.4

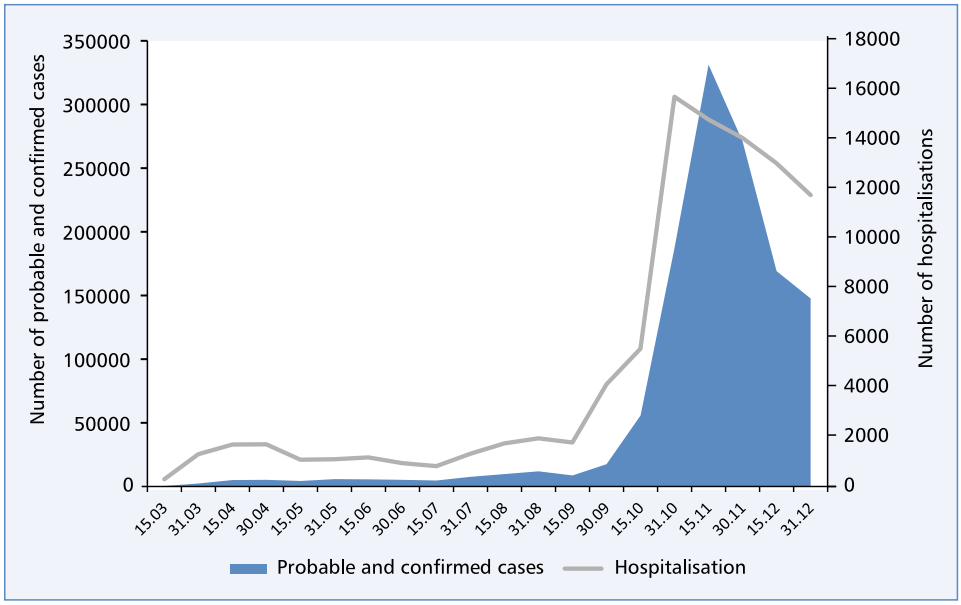

Figure 2. Number of confirmed and probable cases and number of patients hospitalized for COVID-19 in year 2020

We compared the morbidity rates from 2015 to 2019 for the 25 most common infectious diseases in 2019 in Poland. For three disease entities [other bacterial intestinal infections in children under 2 years old, mumps (common parotitis), and giardiasis (lambliosis)], there was a noticeable decrease in the morbidity rate in the later years. However, in the case of other sexually transmitted diseases caused by Chlamydia, an increase in morbidity in later years was observed. For the remaining diseases, no clear trends were observed during this period.

Characteristics of COVID-19 in Poland

The first confirmed case of a patient infected with the SARS-CoV-2 virus in Poland was recorded on March 4, 2020. According to NIPH-NIH reports data on infectious diseases in Poland (published every 2 weeks), as of December 31, 2020, there was a total of 1 251 032 confirmed, 4 593 probable, and 17 530 possible[1] cases of SARS-CoV-2 infection in Poland. During the same period, 96 032 patients were hospitalized for COVID-19 (250.2 cases per 100 000 inhabitants).

The highest incidence rate per 100 000 inhabitants were observed in the Warmińsko-mazurskie, Wielkopolskie, and Zachodniopomorskie voivodships, while the highest hospitalizations rate per 100 000 inhabitants for COVID-19 occurred in the Lubelskie, Mazowieckie, and Podlaskie voivodships. From December 31, 2020, the weighted (by the number of inhabitants) average hospitalization rate in Poland amounted to 2502.0 per 100 000 inhabitants. The analysis of subsequent reports shows a significant increase in the total number of cases and the number of hospitalizations starting from mid-September (Fig. 2).

Impact of COVID-19 on the occurrence of infectious diseases in Poland

During the period from January 1, 2020, to December 31, 2020, a total of 1 273 155 SARS-CoV-2 infections were recorded in Poland, and they represented the second most common disease entity in the analyzed period (after flu and suspected flu). At the same time, there was a decrease in morbidity for almost all disease entities for which at least one case was reported during the period from January to May 2019 (data not shown).

A detailed comparison between the data from the period from January 1, 2020 to December 31, 2020, and the data from the same period in the previous year showed an 11.9% decrease in the total number of cases of all reported infectious diseases (including SARS-CoV-2 infections in 2020). For the 25 most common disease entities during 2019, there was a 36.2% decrease in the number of cases in 2020 versus 2019. The highest reduction was observed in the number of measles cases (98.0% decrease), while other bacterial intestinal infections (in total) had the smallest reduction (21.6% decrease) (Tab. 2).

Discussion

Among analyzed diseases, there was mostly an upward trend from 2015 to 2018. In 2019, a decrease

[1]Information on the number of possible cases was available only from the perspective of the entire country, therefore all analyzes concerning the administrative division of Poland include only confirmed and probable cases and hospitalizations.

Table 2. Change in the number of cases and morbidity during in 2020 vs. 2019 (data for the 25 most common disease entities during year 2019).

Disease entity	Number of cases			Morbidity		
	2020	2019	Change (2020 *vs.* 2019)	2020	2019	Change (2020 *vs.* 2019)
Flu and suspected flu	3,164,446	4,790,033	–33,9%	8,243.7	12,478.4	–33,9%
Chickenpox	71,392	180,641	–60,5%	186.0	470.6	–60,5%
Diarrhea and gastrointestinal inflammation	25,857	67,435	–61,7%	67.4	175.7	–61,7%
Viral intestinal infections (in total)	14,386	62,333	–76,9%	37.5	162.4	–76,9%
Viral intestinal infections in children under 2 years old	6,230	27,623	–77,4%	814.2	3,609.9	–77,4%
Scarlet fever	7,639	20,837	–63,3%	19.9	54.3	–63,3%
Lyme borreliosis	12,524	20,630	–39,3%	32.6	53.7	–39,3%
Other bacterial intestinal infections (in total)	11,800	15,047	–21,6%	30.7	39.2	–21,6%
Salmonellosis	5,270	9,234	–42,9%	13.7	24.1	–42,9%
Contact and exposure to rabies/need for vaccination	4,277	8,076	–47,0%	11.1	21.0	–47,1%
Viral hepatisis	2,056	7,293	–71,8%	5.4	19.0	–71,8%
Disease caused by Streptococcus pyogenes, invasive disease	3,104	6,163	–49,6%	7.9	16.1	–50,9%
Newly detected HIV infections	934	1,763	–47,0%	2.4	4.6	–47,1%
Pertussis	743	1,629	–54,4%	1.9	4.2	–54,2%
Syphilis	716	1,617	–55,7%	1.9	4.2	–55,6%
Disease caused by Streptococcus pneumoniae, invasive	545	1,541	–64,6%	1.4	4.0	–64,6%
Measles	30	1,502	–98,0%	0.1	3.9	–98,0%
Other bacterial intestinal infections in children under 2 years old	735	1,494	–50,8%	96.1	195.2	–50,8%
Mumps (common parotitis)	577	1,338	–56,9%	1.5	3.5	–57,0%
Viral meningitis	265	950	–72,1%	0.7	2.5	–72,2%
Giardiasis (lambliosis)	355	784	–54,7%	0.9	2.0	–54,9%
Other meningitis and unspecified	258	766	–66,3%	0.7	2.0	–66,5%
Gonorrhea	250	524	–52,3%	0.7	1.4	–52,6%
Other bacterial food poisoning (in total)	97	452	–78,5%	0.3	1.2	–78,8%
Other sexually transmitted diseases caused by Chlamydie	168	418	–59,8%	0.4	1.1	–59,6%

in the incidence of infectious diseases was noted. The largest differences were observed between 2019 and 2020, as a decrease in the number of cases was noted for all 25 disease entities. Among these diseases, the highest rates were recorded for viral meningitis, other bacterial intestinal infections in children under 2 years old, and other sexually transmitted diseases caused by Chlamydia, giardiasis (lambliasis), syphilis, and scarlet fever (differences above 40%). This decrease may not have been caused by an actual decline in cases, but by an increased number of undetected cases that were not recorded. It is, therefore, worth comparing the diseases analyzed here and their trends during the COVID-19 pandemic in countries other than Poland.

COVID-19 is often compared in the literature to the influenza virus due to their similar symptoms and clinical scenarios. The period of most frequent occurrence is also similar between the two diseases (fall and winter months) [19]. In the US, from October 2019 to April 2020, approximately 39 to 56 million patients were reported, a portion of whom visited doctors (from 18 to 26, million individuals). Patients with serious cases were

hospitalized (from 410 000 to 740 000 people), and some patients have died (between 24 000 and 62 000) [20]. In comparison, from the beginning of the pandemic to April 2020, over 1 900 000 cases of SARS-CoV-2 have been reported in the US, and more than 109 000 of these patients have died [21]. Thus, influenza is more prevalent but has a lower mortality rate than SARS-CoV-2.

Estimates of the cumulative burden of seasonal influenza are subject to several limitations. First, the cumulative rate of laboratory-confirmed influenza-associated hospitalizations reported during the season may be an underestimate of the rate at the end of the season because of detection and reporting delays. Second, rates of laboratory-confirmed influenza-associated hospitalizations were adjusted for the frequency of influenza testing and the sensitivity of influenza diagnostic assays. However, data on testing practices during the 2019–2020 season are not available in real-time. The Center for Disease Control (CDC) uses data on testing practices from the past influenza seasons as a proxy. Burden estimates will be updated at a later date when data on contemporary testing practices become available. Third, estimates of influenza-associated illness and medical visits are based on data from prior seasons, which may not be accurate if the illness severity or care-seeking patterns have changed [22]. In the case of COVID-19, the number of cases associated with this disease entity may also differ from the official results. The number of confirmed cases and deaths at the beginning of the pandemic could be an underestimate, as not all individuals with the suspected disease were given SARS-CoV-2 tests. Thus, the screening system was ineffective, and the real scale of the pandemic was probably larger than estimated [23].

The SARS-CoV-2 pandemic that broke out in December 2019 was originally compared to the SARS-CoV virus outbreak in 2003. However, the scale of this event was completely different. In 2003, over 8 000 people worldwide fell ill, of whom 774 died [24]. The method of disease transmission was identical to the currently circulating virus. However, the scale of the SARS-CoV outbreak was significantly smaller than that of the current pandemic. The SARS-CoV pandemic did not reach many countries, including Poland, and did not contribute to such serious health and economic crisis of the ongoing pandemic. Therefore, the current situation is difficult to compare to previous pandemics in the 21st century because similar events in the past did not cause significant restrictions on access to public utilities or healthcare services.

Noroviruses are one of the most common viruses. These viruses cause food-borne infections. Noroviruses often exist in the stomach and intestines in human populations.

There was a higher incidence of noroviruses among adults than children. According to data from the Polish Chief Sanitary Inspector, from January to June 2019, 3 484 people were infected with norovirus, representing a rate of 9.08 per 100 000. In the same period of the previous year, 3 189 cases were reported, or 8.30 cases per 100 000 individuals. However, 2020 yielded record low numbers of norovirus infections. From January to June 2020, 1 019 cases were reported (2.65 cases per 100 000 inhabitants), which is lower than the number of reported cases during the corresponding period one and two years ago [25]. Norovirus outbreaks have also decreased in the United States of America (USA). Data available from the CDC presented the suspected and confirmed norovirus outbreaks reported by State Health Departments in Massachusetts, Michigan, Minnesota, Nebraska, New Mexico, Ohio, Oregon, South Carolina, Tennessee, Virginia, Wisconsin, and Wyoming to the Centers for Disease Control and Prevention (CDC) through the National Outbreak Reporting System (NORS) by the week of illness onset. It is worth noting that there was a significant decrease in the number of outbreaks in March and April between 2019 and 2020 (200 outbreaks in March 2019 *vs.* 91 outbreaks in March 2020; 123 outbreaks in April 2019 *vs.* 10 outbreaks in April 2020). This coincides with the time of the highest increases in the number of infections and deaths related to COVID-19 [26]. Such differences may indicate that the SARS-CoV-2 epidemic has greatly contributed to a reduction in norovirus outbreaks.

Rotaviruses are another type of virus that causes inflammation in the digestive system. In 2020, official data provided by the Polish National Institute of Public Health show a significantly lower number of rotavirus cases (4 692 cases in the period January 1, 2020 to June 15, 2020, *vs.* 26 928 in the same period of 2019 and 15 557 in 2018). There was also a downward trend for intestinal viral infections in children under 2 years (4 551 in 2020 *vs.* 19 452 in 2019 and 12 692 in 2018) and diarrhea and gastrointestinal inflammation in the same group (4 084 in 2020 *vs.* 9 599 in 2019 and8 511). A similar upward trend was noted among sexually transmitted diseases (STDs), e.g., syphilis and gonorrhea. All types of hepatitis had a lower prevalence in 2020 than in the previous years [25]. A possible reason is social isolation, which limits person-to-person contact.

The following indicators show how the closure of facilities affected the reporting of infectious diseases other than COVID-19. The lack of access to doctors contributed to a decrease in the reported number of people suffering from noroviruses and other mild infections of the digestive system. Some Sanitary Inspectorates in Poland did not even report the prevalence of other diseases, and data provided by the centers was incomplete [25]. Most likely, the reduced number and morbidity of patients are also due to decisions of public authorities in many countries regarding how to utilize

healthcare services. A comparison of Poland and the US reveals that the SARS-CoV-2epidemic has limited health services.

During the pandemic, the healthcare focus on SARS-CoV-2 patients has caused issues. Some countries have even created separate hospitals that are specifically dedicated to SARS-CoV-2 patients. One of these countries is Poland, where a network of 19 infectious hospitals was created, with the sole purpose of admitting patients with COVID-19 during the pandemic [27]. Later in the epidemic, this number was expanded to include support facilities. The shift of attention and resources to the fight against COVID-19 resulted in neglecting planned procedures and limited access to services. People with other unrelated health conditions were reluctant to visit their general practitioner (GP) or a hospital to avoid contracting the virus and thus remained undiagnosed or did not receive the medical treatment they might have needed [28]. As a result of the pandemic, many clinics canceled follow-up visits and diagnostic tests for pregnant women, such as ultrasounds, gynecological doctor's offices were closed, birth classes were canceled, and there was a lack of midwife care. Finally, cardiac procedures were postponed or indefinitely rescheduled, which could increase the wait for cardiac surgery in the future.

As doctors, nurses, and other health professionals were mobilized to serve as first responders, health systems sought ways to increase the number of staff available and to make the best use of their work [29]. For instance, Poland started to receive support from medical students. Other European countries, e.g., the United Kingdom, provided work for migrants or enlisted retired doctors [30].

One of the Polish foundations asked a representative group of Poles how they rated the availability of medical services during the SARS-CoV-2 pandemic. Access to a doctor for matters not related to SARS-CoV-2 was difficult according to 80.6% of respondents. Patients did not seek health services despite needing them due to fear of SARS-CoV-2 (71.5%), and 44.6% of the study group understood the seriousness of the situation and reported that they could safely wait for a medical appointment or surgery [31].

The lack of access to primary and outpatient care services may contribute to the deterioration of patient health, even due to failure to implement a treatment plan. All planned rehabilitation treatments ceased (activities of physiotherapists were stopped for a month). This could aggravate health problems associated with the discontinuation of treatment. Patients are afraid to follow through with planned procedures. Experts confirmed that excessive fear is unfavorable and may result in treatments that are not beneficial to patient health [32].

Medical professionals have noticed that patients are waiting too long for treatment. They have been avoiding hospitals even as their health conditions are worsening. This is true for stroke patients. They have not been admitted to hospitals or emergency departments due to the current epidemiological situation. Stroke treatment requires quick decisions related to using appropriate therapeutic methods [33, 34].

In summary, difficulties in accessing healthcare services can have very negative effects, and the further discontinuation of treatment may further affect patient health.

Therefore, the ongoing COVID-19 pandemic has changed healthcare strategies and practices in industries across the globe, and oncological care was no exception. In this case, immediately after the pandemic started, oncologists and patients were forced to undergo several changes in clinical practice, which were sometimes challenging or, at the very least, impractical. The comprehensive data concerning the impact of COVID-19 on cancer care in Europe reported that the pandemic had caused about a 20% decrease in the referral of newly diagnosed patients to oncological care [35]. This same observation was made about access to palliative care [36].

COVID-19 impacted the care and well-being of many patients with cancer, in particular, people with advanced disease stages [37].

In Poland, the COVID-19 pandemic had a significant impact on access of cancer patients to diagnosis and treatment. The transformation of hospitals into facilities dedicated to the treatment of patients infected with the SARS-CoV-2 virus limited significantly diagnostics or planned hospitalizations [38]. The redirection of pulmonary physicians to treat mainly COVID-19 patients was also important [39]. This resulted not only in a delay in diagnosis for oncological patients but also in an increase in the number of diagnoses at a higher stage of the disease for which survival rates are lower [40]. It is worth noting that the symptoms associated with lung cancer could be misidentified as symptoms associated with SARS-CoV-2 infection, and in the case of negative tests for the virus, further diagnoses were not carried out or were significantly delayed [39].

The outbreak of the pandemic meant that two subsequent reimbursement lists were not published, and ongoing reimbursement processes were suspended. Therefore, after the Ministry of Health published the list of reimbursed drugs from March 1, 2020, all new therapies (including oncology) were available in the reimbursement system on September 1, 2020, at the earliest [40, 41].

Conclusions

The analysis of full-year data from the period from January 1, 2015 to December 31, 2019, showed an increase in the overall number of cases of infectious

diseases in Poland from 2015 to 2018 and a decrease in 2019 compared to the previous year. A similar relationship was observed for data from the first five months of a given analyzed years. The lack of a clear trend for 2015-2019 makes it difficult to measure the impact of COVID-19 infections on the occurrence of other infectious diseases in Poland.

Undoubtedly, data for the first 5 months of 2020 indicate that there was a significant decrease (22.0%) in the overall number of cases compared to that in the same period in 2019. The same relationship was observed for each of the 25 most common disease entities. This suggests that the introduction of significant restrictions that limit person-to-person contacts, closing public educational institutions (nurseries, kindergartens, schools, and universities), significant travel restrictions (both foreign and domestic), and increased hygiene measures significantly reduced the number of cases of other infectious diseases in Poland.

Conflict of interest

No conflict of interest.

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