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Analysis of the Epidemiological Situation on the Pneumonia with Signs of Coronavirus Infection among the Population of the Republic of Kazakhstan

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Abstract

BACKGROUND: New coronavirus infection caused by SARS-CoV-2 (COVID-19), as well as pneumonia with signs of coronavirus infection, continues to spread around the world, but the epidemiological situation is not the same in different countries.

AIM: The aim of the study was to analyze the epidemiological situation of coronavirus infection and pneumonia with signs of coronavirus infection in the Republic of Kazakhstan.

MATERIALS AND METHODS: Retrospective epidemiological analysis of the incidence of coronavirus infection and pneumonia with signs of coronavirus infection in the republic according to official statistical reporting, as well as a statistical analysis of discharge records of patients diagnosed with coronavirus infection (no virus identified) in a small town of Karaganda region was carried out.

RESULTS: An increase in cases, sick persons, recovered persons, and lethal cases in population with positive PCR for COVID-19, as well as pneumonia with signs of coronavirus infection in the Republic of Kazakhstan was registered for the period from January 8, 2020, to December 31, 2021. The number of cases of coronavirus increased in 10.93 times those who recovered – in 15.78 times and deaths – in 16.4 times, respectively. The increase in the number of cases of pneumonia with signs of coronavirus infection also increased in 16.24 time, the number of those who recovered at the beginning of the observation was not established, by the end the number of recovered was 76,989 people, the number of deaths increased in 173.83 time.

CONCLUSION: An analysis of the discharge records of patients with pneumonia with signs of coronavirus infection revealed that 54.2% of the patients were females and 45.8% were males. The disease was registered in 21.8% of patients older than 60 years in the presence of concomitant diseases. Concomitant diseases were represented in 42% by arterial hypertension, in 26% by ischemic heart disease, and in 14% by pyelonephritis. The same percentage of cases (12%) was chronic obstructive pulmonary disease and iron deficiency anemia, 11% – diabetes mellitus. Among all patients, 69.4% were urban residents and 30.6% were rural areas.

Introduction

The coronavirus pandemic, which has affected most of the countries of the modern world, has caused a huge amount of changes not only in our habits, needs, or lifestyle. The pandemic has changed our consciousness, our behavior, way of thinking, the usual rhythm of life of every person, and regardless of which state he lives in. First of all, the COVID-19 outbreak dealt a huge blow to public health, not only due to its rapid and aggressive onset, but also due to its extremely high contagiousness and prevalence in various countries and on various continents [1], [2].

The Ministry of Health of the Republic of Kazakhstan (MOH RK) from July 18, 2020, has identified new approaches to recording and compiling statistical data to ensure maximum transparency of data on cases of COVID-19 and pneumonia.

Following a series of technical consultations with the WHO Regional Office for Europe, a decision was made to move towards coding and reporting of COVID-19 cases using the new International Classification of Disease codes.

Cases of pneumonia with negative PCR test result, but with clinical and epidemiological signs, from August 1, 2020, began to be counted as a coronavirus infection (the virus was not identified). A decision was made to include this disease in the general statistics, as well as to carry out appropriate anti-epidemic measures, the same as during the registration of coronavirus infection (the virus was identified) [3], [4], [5].

The aim of the study was to analyze the epidemiological situation for coronavirus infection and pneumonia with signs of coronavirus infection in the republic.

Materials and Methods

The materials of the study were official statistical reporting on the incidence of coronavirus infection and pneumonia with signs of coronavirus infection in the republic, discharge records of patients that are clinically and epidemiologically similar to COVID-19, but without laboratory confirmation. The materials were taken from the Central Hospital of a small town in the Karaganda region. The study used descriptive and evaluative epidemiological methods, a retrospective epidemiological analysis of morbidity, a statistical analysis of discharge records of patients diagnosed with coronavirus infection (no virus identified), registered from August 1, 2020, to December 2021 inclusive, in the amount of 354 people. Gender, age, place of residence, profession, comorbidities, clinical symptoms, and medications used in treatment were analyzed.

Research Results

Statistics of morbidity and mortality from COVID-19 in the republic began to be formed from two sources of data: Laboratory-confirmed cases and unspecified viral pneumonias, but with symptoms similar to COVID-19: U07.2 «Coronavirus infection (no virus identified)».

The number of cases with a positive PCR test result for coronavirus infection and recovered across the country for the period from August 1, 2020, to December 31, 2021, showed that the registration of cases of both sick and recovered cases has a synchronous course (Figure 1).

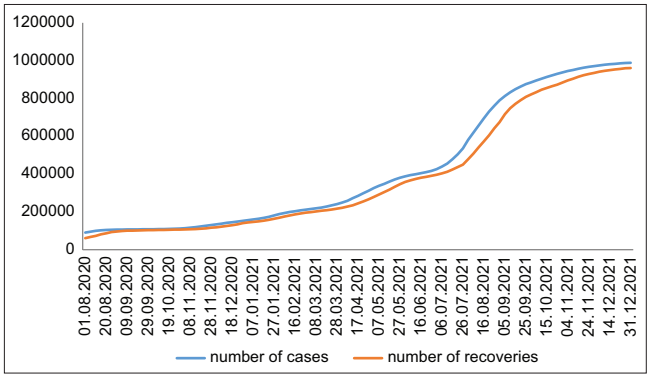

Figure 1: The number of COVID-19 cases with positive PCR results and recoveries in the Republic of Kazakhstan for the period from August 1, 2020, to December 31, 2021

The figure shows that there is approximately the same course of the epidemic process of coronavirus infection among the population of the republic, both among those with positive results of PCR test and among those who have recovered. There is an increase of 10.93 times in the number of cases by the end of December 2021 compared to August 1, 2020. A similar situation is observed with the number of recovered, which increased by 15.78 times, respectively. Hence, if on August 1, 2020, the number of cases was 90,367 cases, the number of recoveries was 60,825, and then on December 31, 2021, 987,866 and 960,211 cases were observed, respectively. The number of deaths from coronavirus infection at the beginning of the observation was 793 people, by the end of the observation – 13,012, that is, it increased by 16.4 times.

The dynamics of registered cases of pneumonia with signs of coronavirus infection, deaths, and recoveries for the period from August 1, 2020, to December 31, 2021, are shown in Figure 2.

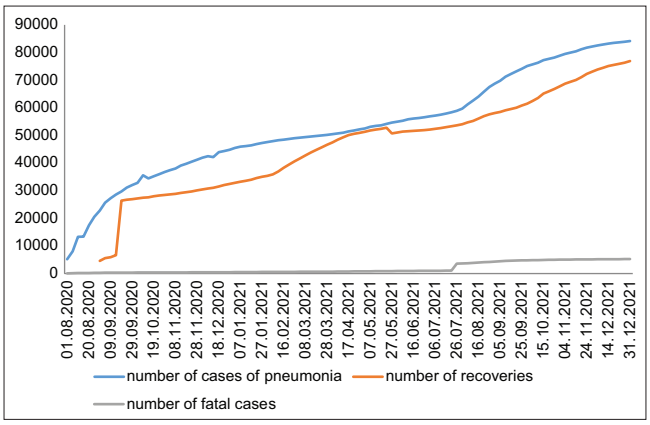

Figure 2: The number of cases of pneumonia with signs of coronavirus infection, lethal cases, and recoveries since August 1, 2020, to December 31, 2021 (interval 5 days)

As can be seen from the figure, there has been an increase in the number of cases of pneumonia with signs of coronavirus infection for the period from August 1, 2020, to December 31, 2021. If 5181 cases were registered on August 1, then by the end of December 2021 their number had already reached 84,171, that is, an increase of 16.24 times was noted. A similar situation has been found with regard to the number of cases that have recovered. So if at the beginning of the observation not a single case of recovered people was established, then by the end of 2021 this figure was 76,989 people. At the same time, an increase in the number of deaths from pneumonia with signs of coronavirus infection was registered from 30 people at the beginning of the study to 5215 by the end, respectively. Moreover, the increase in deaths increased by 173.83 times.

An analysis of the discharge records of patients with pneumonia and signs of coronavirus infection who were treated at the Central Hospital of a small town

found that 54.2% of the patients were female and 45.8% male.

Most patients diagnosed with coronavirus infection (virus not identified) were registered in the age range from 60 to 69 years (21.8%), 20.1% of cases were at the age of 70–79 years, 15.4% – at the age of 50–59 years, and 11.1% – for the age of 80–89 years. Least of all patients with this diagnosis were registered in the age group of 90–99 years – < 1%. The minimum age of female persons was 3 years, the maximum – 83 years. The smallest male patient was 1 year old; the maximum age was 90 years.

The observed differences between men 52.72 ± 3.17 and women 56.77 ± 2.96 by age with coronavirus infection (virus not identified) are not significant, since t = 0.93 (t < 2); therefore, the probability of an unmistakable the forecast p < 95%, which does not allow us to recognize the difference in indicators as reliable. Therefore, the differences between men and women depending on age cannot yet be considered proven, additional research is required. The critical value of Student's t test = 1.984 at a significance level of p = 0.05.

An analysis of the residence place of patients with pneumonia with signs of coronavirus infection found that 69.4% were urban residents and 30.6% lived in rural areas.

Concomitant diseases of patients with coronavirus infection (virus not identified) who were hospitalized from August 1, 2020, to December 31, 2021, are shown in Figure 3.

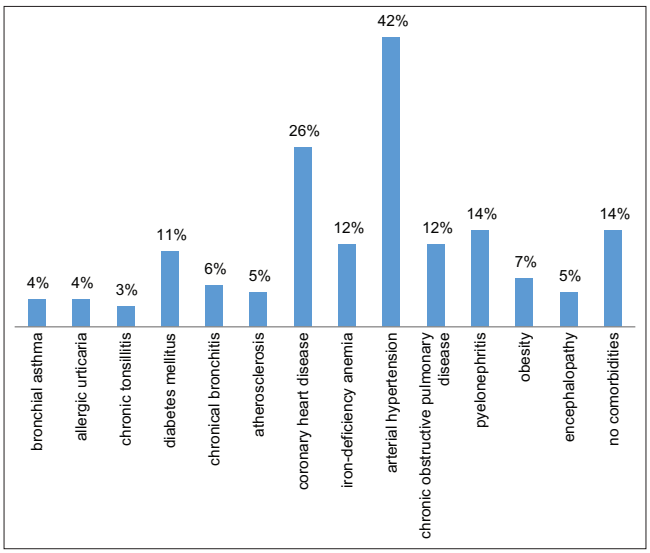

Figure 3: Comorbidities of patients with pneumonia and signs of coronavirus infection for the period from August 1, 2020, to December 31, 2021

It was found that the most common comorbidity in coronavirus infection (virus not identified) was arterial hypertension (42%), coronary heart disease (26%), pyelonephritis (14%), chronic obstructive pulmonary disease and iron deficiency anemia (12% each), and diabetes mellitus (11%). No concomitant diseases were detected in 14% of patients.

The clinical picture of patients with coronavirus infection (no virus identified), who were hospitalized from August 1, 2020, to December 31, 2021, consisted of the following symptoms (Figure 4).

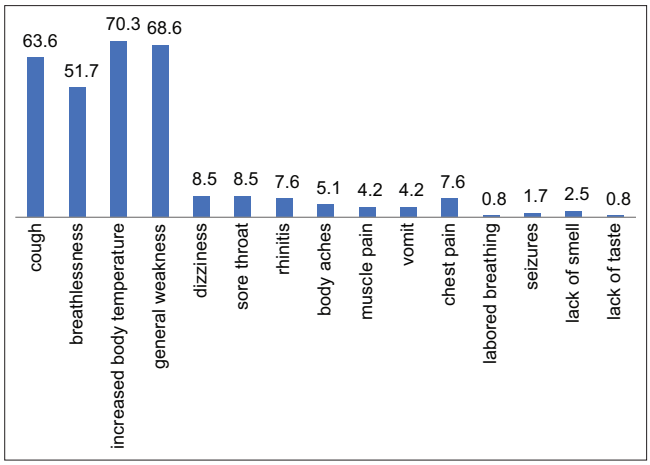

Figure 4: Symptoms in patients with pneumonia and signs of coronavirus infection for the period from August 1, 2020, to December 31, 2021 (%)

The most common symptoms of the disease in patients with pneumonia with signs of coronavirus infection were fever (70.3%), general weakness (68.6%), cough (63.6%), and shortness of breath (51.7%). Lack of smell and taste was noted in 2.5% and 0.8% of patients, respectively.

When dividing patients according to employment and professions, it was revealed that the majority of patients with pneumonia with signs of coronavirus infection (the virus was not identified) were pensioners (51.2%). Patients with the status of «housewife/unemployed» accounted for 19.7%, followed by the prevalence of children under 6 years of age – 9.7%, disabled people of group 3 – 6.8%, miners – 6.7%, students – 3.1%, and employees of private structures – 2.8%.

An analysis of the drugs used in the treatment of coronavirus infection found that 78% of patients received ceftriaxone, 56% – ambroxol, 22% – zitmak, 20.3% – dexamethasone, and 12% – ciprofloxacin.

Discussion

Changed approaches to recording coronavirus infection and pneumonia with signs of coronavirus infection make it possible to determine the correct incidence forecasts, adequately plan the necessary resources: Medical personnel, beds, medical equipment, medicines, and ensure the transparency of

statistics. This underlines the open policy of the state in its readiness to jointly confront the coronavirus pandemic and study its consequences in close connection with the international community [6], [7], [8]. To ensure the reliability of statistical data on coronavirus infection, the Ministry of Health of the Republic of Kazakhstan has developed a Coding Algorithm and instructions for entering data into information systems, and medical workers have been trained in coding COVID-19 in the ICD-10 classification.

The number of cases of coronavirus infection varies by age and gender. This has been established by a number of scientists and is also confirmed by our research. Thus, Panasyuk *et al*. showed that the gender proportion of patients with COVID-19 was 41.8% of men and 58.12% of women, the age category from 42 to 65 years (44.32%) prevailed among the sick consider the proportion of patients 66–83 years old (14.7%). There is no correlation between age and the number of cases of registration of COVID-19 in the age category from 0 to 18 years, [9], [10], [11], [12], [13], [14].

A. Chayakova *et al*. showed that during the coronavirus pandemic, the number of people aged 65 years and over increased by a third and amounted to 31.5% [15]. Symptoms in depended on the form of the course of the disease: An increase in body temperature (80–90%); dry cough or cough with little sputum (60–80%), increased fatigue (40–50%), sudden loss of smell and/or taste (60-80%), nasal congestion or mild rhinorrhea (5%), conjunctivitis or redness of the eyes (1–2%), sore throat (14%), headaches and dizziness (8–14%), joint and muscle pain (11–15%), skin rashes (8%), diarrhea, nausea, vomiting (up to 20%), chills (11–13%), shortness of breath and tachypnea (rapid breathing) (55%), increased cough and sputum (30–35%), hemoptysis (5%), loss of appetite (20%), confusion (9%), feeling of pressure and congestion in the chest (> 20%), etc. [8], [11, [16], [17], [18].

A similar situation was found, in particular, among people who fell ill with pneumonia with signs of coronavirus infection: 54.2% were female and 45.8% male. Most of the patients were registered in the age range from 60 to 69 years old (21.8%), 70 to 79 years old - (20.1%), 50 to 59 years old - (15.4%), and 80 to 89 years old (11. one%). This is due to the fact that the age category of people over 60 years of age is a risk group and has concomitant diseases. About 51.2% of the patients were pensioners, in whom arterial hypertension was recorded in 42%, coronary heart disease in 26%, pyelonephritis in 14%, chronic obstructive pulmonary disease and iron deficiency anemia in 12%, and diabetes mellitus in 11%. Among the sick, the most common symptoms are: Fever (70.3%), general weakness (68.6%), cough (63.6%), and shortness of breath (51.7%). Lack of smell and taste was observed in 2.5% and 0.8% of patients.

Thus, an increase in the incidence of pneumonia with signs of a coronavirus infection can be indicated both by an improvement in the quality of diagnosis and an increase in the number of contacts with virus carriers, asymptomatic or low-symptomatic patients during an increase in the incidence, as well as with changes in the structure of coronavirus and with the emergence of new variants of the virus that is better adapted to the environment compared to the original virus, increasing infectivity and causing a more severe course of the disease [19], [20], [21], [22].

Conclusion

1. The number of cases of coronavirus infection in the country increased by 10.93 times by the end of December 2021 compared to August 1, 2020. The number of recovered people increased by 15.78 times, deaths - by 16.4 times.
2. The number of cases of pneumonia with signs of coronavirus infection increased by 16.24 times from August 1, 2020, to December 31, 2021. If at the beginning of the observation not a single case of recovery was established, then by the end of 2021 the number of recovered people was 76,989. The number of deaths from pneumonia with signs of coronavirus infection increased by 173.83 times.
3. About 54.2% of patients with pneumonia with signs of coronavirus infection were female and 45.8% male, more often people in the age range of 60–69 years (21.8%) were sick, urban residents accounted for 69.4%, rural residents – 30.6%, pensioners – 51.2%. In 42% of cases, a concomitant disease (arterial hypertension) was recorded and in 70.3% of cases an increase in body temperature was observed.

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