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The Peculiarity of Hospital Letalis in COVID-19

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Abstract

Background: SARS-CoV-2 infection is still widespread worldwide and has devastating effects on people's health and lives. Understanding and identifying the risk factors contributing to mortality in this disease should remain a priority.

Aim: To assess the risk factors of hospital mortality in patients with COVID-19.

Materials and Methods: From 01.06.20 to 01.06.21, we examined 2641 patients with COVID-19 in the temporary covid hospital (TCH) at the State Clinical Hospital No. 12 in Kazan: women - 1588 people (60.1%), men - 1053 people (39.9%). The diagnosis was established according to the Temporary Guidelines "Prevention, diagnosis and treatment of a new coronavirus infection". Version No. 6 dated 04/28/20.

Results and Discussion: In our study, out of the total number of patients diagnosed with COVID-19 - 2641 people, 122 patients (4.6%) died, including 71 women (58.2%), 51 men (41.8%). The average age of deceased women was 72.6 ± 1.22 years, men - 72.9 ± 1.44 years. Among those admitted to the TCH, 1.5 times more female persons prevailed. Among the 122 who died, there were 1.37 times more women than men. According to the severity of the course of the disease, upon admission to the hospital, 87 deceased (71.3%) had an average degree, 35 people (28.7%) had a severe degree.

Conclusion: In our study, the hospital mortality rate was 4.6%. Of the concomitant diseases, upon admission, hypertension was in the first place (90.9%), chronic cardiac insufficiency (85.2%) was in the second place, coronary heart disease (50.8%) was in the third place, endocrine pathology (36.1%) was in the fourth place, obesity (32.8%) was in the fifth place, and neurological disorders (16.4%), hematological diseases are on the seventh. (14.7%), on the eighth - oncology (14.7%), on the ninth - diseases of the gastrointestinal tract (13.9%), on the tenth - kidney diseases 12.3%, on the eleventh - rheumatological patients 9.02%, on the twelfth - respiratory diseases 8.2%, on the thirteenth - allergy (3.3%). Persons of Tatar nationality died less often than Russians.

Keywords: *COVID-19; Hospital Mortality; Risk Factors*

Abbreviations

ACVA: Acute Cerebrovascular Accident; AIM: Acute Myocardial Infarction; ARF: Acute Respiratory Failure; BA: Bronchial Asthma; BD: Bekhterev's Disease; BED: Bronchiectasis Disease; CABG: Coronary Artery Bypass Grafting; CHD: Coronary Heart Disease; CHF: Chronic

Heart Failure; CI: Confidence Interval; COLD: Chronic Obstructive Lung Disease; CRP: C Reactive Protein; CT: Computed Tomography; CVD: Cardiovascular Diseases; DM: Diabetes Mellitus; DOA: Deforming Osteoarthritis; DU: Duodenal Ulcer; EBW: Excess Body Weight; FRM: Frequency of Respiratory Movements; HD: Hypertension Disease; GSD: Gallstone Disease; GERD: Gastroesophageal Reflux Disease; GIT: Gastrointestinal Tract; IDA: Iron Deficiency Anemia; NAFLD: Non-Alcoholic Fatty Liver Disease; PCR: Polymerase Chain Reaction; PICS: Postinfarction Cardiosclerosis; RA: Rheumatoid Arthritis; SLE: Systemic Lupus Erythematosus; SS: Systemic Scleroderma; SU: Stomach Ulcer; TCH: Temporary Covid Hospital; TIA: Transient Ischemic Attack; TG: Temporary Guidelines; ULD: Urolithiasis Disease; FiO_2: Amount of Inhaled Oxygen; SpO_2: Oxygen Saturation

Background

MERS-CoV-2 infection is still widespread around the world and has devastating effects on people's health and lives. Thus, the first case of the disease in Brazil was registered just 3 months after the outbreak in Wuhan in December 2019 (China) [21] and in the Netherlands - on February 27, 2020 [15].

By the beginning of 2020, COVID-19 cases were detected in 213 countries [28]. At the same time, it appeared in several waves in many regions of the world [7,18]. So, in Italy there were two of them [27]: the first from February to May 2020; the second began in September and lasted until November 20, 2020. In the second wave, the infection growth curve was low in the first weeks, then from October 10 it became very steep, until a few days later it became flat. The authors write that the comparison of the two waves was difficult, because at the first stage there was a very limited availability of tests necessary for the diagnosis of COVID-19. During the second wave, their number was much higher, but still not enough [27].

Understanding and identifying the risk factors contributing to mortality in this disease should remain a priority. In addition, the rapid appearance of new mutations of this virus, for example, "kentaur" [4] and "deltacron" [3], require a very serious attitude to the risk factors of mortality in this disease. In addition, there is some confusion in the understanding and use of the terms mortality and lethality in diseases in different countries [6]. So far, there are not so many papers devoted to hospital mortality in COVID-19 caused by already known strains of SARS-CoV-2, which would give some idea of the trends in hospital mortality from COVID-19 in different countries [22,25,26].

Aim of the Study

To assess the risk factors of hospital mortality in patients with COVID-19.

Materials and Methods

We from 01.06.20 to 01.06.21, examined 2641 patients with COVID-19 in the TCH at the State Clinical Hospital No.12 in Kazan: women - 1588 people (60.1%), men - 1053 people (39.9%), $p < 0.001$.

The diagnosis was established according to the TG "Prevention, diagnosis and treatment of a new coronavirus infection". Version No. 6 dated 04/28/20 [1]. The severity of COVID-19 was divided into: mild (body temperature below 38^0C, cough, weakness, sore throat; lack of criteria for moderate and severe course); moderate (fever above 38^0C; FRM more than 22/min, shortness of breath during exercise, pneumonia (confirmed by CT of the lungs); $SpO_2 < 95\%$; serum CRP more than 10 mg/l); severe (FRM more than 30/min; $SpO_2 \leq 93\%$; $PaO_2/FiO_2 \leq 300$ mmHg.; progression of changes in the lungs typical of COVID-19; pneumonia (according to radiography and/or CT, including an increase in the prevalence of detected changes by more than 25%, as well as the appearance of signs of other pathological conditions; decreased consciousness, agitation; unstable hemodynamics (systolic blood pressure less than 90 mm Hg or diastolic blood pressure less than 60 mmHg, diuresis less than 20 ml/hour); arterial blood lactate > 2 mmol/l; qSOFA > 2 points); extremely severe (ARF with the need for respiratory support (invasive ventilation); septic shock; multiple organ failure).

Statistical processing of the results was carried out by generally accepted methods of variational statistics [2,5] using the application programs SPSS 10 for Windows and Microsoft Excel 2010. Quantitative signs with a normal distribution are presented in the form of M ± m (M is the arithmetic mean, m is the error of the average). To check the normality of the distribution of the obtained values, the Kolmogorov-Smirnov criterion was applied. In case of abnormal distribution of the trait - in the form of Me (25%; 75%) (Me - median, 25% and 75% percentiles). Qualitative features are presented in absolute values (n) and percentages (%). To assess the statistical significance between the two groups, according to quantitative characteristics with a normal distribution, the Student's criterion was used, and for those without a normal distribution, the nonparametric Mann-Whitney criterion was used. To compare the two groups by qualitative characteristics, the criterion χ^2 was used. The differences of the compared values were recognized as reliable with a probability of 95% ($p < 0.05$).

Results

In our study, out of the total number of patients diagnosed with COVID-19 - 2641 people, 122 patients (4.6%) died, including 71 women (58.2%), 51 men (41.8%). Of all admitted women (1588 people), 71 people (4.5%) died, men (1053 people) - 51 people (5.1%). The average age of deceased women was 72.6 ± 1.22 years, men - 72.9 ± 1.44 years (Table 1).

№	Indicators	Women	Men
1	n (%)	71 (58,2%)	51 (41,8%)
a	Tatars n (%)	24 (33,8%)	23 (45,1%)
b	Russians n (%)	47 (66,2%)	28 (54,9%)
2	Average age (years)	72,6 ± 1,22	72,9 ± 1,44
3	Upon admission: moderate severity (n)	52 (73,2%)	35 (68,6%)
4	Upon admission: severe severity (n)	19 (26,8%)	16 (31,4%)
5	Average severity, age (years)	72,1 ± 1,47	73,4 ± 1,52
6	Severe severity, age (years)	73,9 ± 2,14	71,9 ± 3,21
7	Terms of admission to the hospital from the onset of the disease (days)	8,6 ± 0,54	7,9 ± 0,65
8	Terms of admission with moderate severity (days)	7,2 ± 0,43	7,3 ± 0,70
9	Terms of admission in case of severe severity (days)	12,3 ± 1,3	9,3 ± 1,39*
10	Timing of death (days)	13,1 ± 0,91	12,9 ± 1,24
11	The timing of death with moderate severity (days)	14,3 ± 1,07	13,6 ± 1,64
12	The timing of death in severe cases (days)	9,7 ± 1,54	11,4 ± 1,71
	p	a,b**; 3,4**; 8,9**; 11,12**	3,4**

Table 1: *Indicators (M ± m) of the deceased (n = 122).*

*Note: *: < 0,05; **: < 0,01.*

As can be seen from the data obtained, the hospital mortality rate was 4.6%. Among those admitted to the TCH, 1.5 times more female persons prevailed. Among the 122 who died, there were 1.37 times more women than men.

According to the severity of the course of the disease (Table 1), upon admission to the hospital, 87 deceased (71.3%) had an average degree, 35 people (28.7%) had a severe degree, $p < 0.01$. Thus, among the hospitalized, more patients died who had an average degree of severity of the disease at admission. Of all the deceased women and men with moderate severity (average age: 72.1 ± 1.47 and 73.4 ± 1.52

years, p > 0.05), there were 52 and 35 people, respectively (73.2% and 68.6%, p > 0.05); with severe severity (average age: 73.9 ± 2.14 and 71.9 ± 3.21 years, p > 0.05) were respectively 19 and 16 people (26.8% and 31.4%, p > 0.05).

Gender analysis shows that the deceased women and men did not differ in age, but there were more women with moderate severity than men when they were admitted.

From anamnesis: from the onset of the disease, women were admitted to the hospital (Table 1) for 8.6 ± 0.54 days, men - for 7.9 ± 0.65 days, p > 0.05. Depending on the severity of the condition, these indicators in women with an average degree were 7.2 ± 0.43 days, with severe on 12.3 ± 1.3 days (p < 0.01); in men, respectively: 7.3 ± 0.70 and 9.3 ± 1.39 days (p > 0.05). Thus, women who were hospitalized with a severe degree of the disease arrived significantly later from the onset of the disease than with an average degree. The same trend persists in men, but the difference is unreliable.

Death from the date of hospitalization (Table 1) in women occurred on 13.1 ± 0.91 days, in men on 12.9 ± 1.24 days (p > 0.05). Depending on the severity of the condition, women with an average degree of death occurred on 14.3 ± 1.07 days, with a severe degree - on 9.7 ± 1.54 days (p < 0.01); men: on 13.6 ± 1.64 days, and on 11.4 ± 1.71 days, respectively (p > 0.05). Thus, hospitalized women with a severe degree of the disease significantly died faster than those with an average degree. Men maintained the same trend, but the difference is unreliable.

Body temperature (^{0}C) in women at the beginning of the disease (Table 2) was 38.3 ± 0.09 (with moderate severity - 38.3 ± 0.09, with severe severity - 38.2 ± 0.22, p > 0.05); upon admission to the hospital - 37.1 ± 0.10 (with moderate severity - 36.9 ± 0.09, in severe cases - 37.5 ± 0.27, p > 0.05) p < 0.01, respectively. Thus, at the beginning of the disease, the women's body temperature was higher than at admission, but it did not differ in severity. However, upon admission to the hospital, persons with a severe degree had a significantly higher body temperature compared to those admitted with a moderate degree of severity.

№	Indicators	n	Women	n	Men
1	Body temperature at the beginning of the disease	71	38,3 ± 0,09	51	38,5 ± 0,13*
2	Body temperature at the beginning of the disease with moderate severity	52	38,3 ± 0,09	35	38,6 ± 0,16*
3	Body temperature at the beginning of the disease with severe severity	19	38,2 ± 0,22	16	38,2 ± 0,24
4	Body temperature at admission to the hospital	71	37,1 ± 0,10	51	37,3 ± 0,11*
5	Body temperature at admission to the hospital with moderate severity	51	37,00 ± 0,09	35	37,4 ± 0,14**
6	Body temperature at admission to the hospital with severe severity	20	37,47 ± 0,27	16	37,00 ± 0,16*
	p		1,4**; 2,5**; 3,6**		1,4**; 2,5**; 3,6**; 5,6*

Table 2: *Body temperature (^{0}C) in women and men at the beginning of the disease and upon admission to the hospital (M ± m).*
*Note: *: < 0,05; **: < 0,01.*

In men at the beginning of the disease (Table 2), body temperature (^{0}C) was 38.5 ± 0.13 (with moderate severity - 38.6 ± 0.16, with severe severity - 38.2 ± 0.24 p > 0.05); upon admission to the hospital - 37.3 ± 0.11 (with moderate severity - 37.4 ± 0.14, in severe cases - 37.00 ± 0.16, p < 0.05) p < 0.02. Thus, at the beginning of the disease, men's body temperature was higher than when they were admitted to the hospital, and it was higher with moderate severity. However, men, unlike women, when admitted to the hospital with a severe degree of severity, had a significantly lower body temperature compared to patients with an average degree.

Concomitant diseases in deceased women and men, before admission to the hospital, are presented in table 3-5.

Indicators	Women (n/%)	Men (n/%)
HD (in total)	65 (91,5%)	45 (88,2%)
HD 1 stage	1 (1,5%)	1 (2,2%)
HD 2 stage	19 (29,3%)	8 (17,8%)
HD 3 stage	45 (69,2%)	36 (80,0%)
CHD (in total)	25 (35,2%)	37 (72,6%)**
Angina pectoris	13 (52%)	18 (48,7%)
Stents and CABG	3 (12%)	5 (13,5%)
PICS	9 (36%)	14 (37,8%)
Arrhythmias	13 (18,3%)	17 (33,3%)
Blockades	4 (5,6%)	6 (11,8%)
CHF (in total)	59 (83,1%)	45 (88,2%)
CHF 1	38 (64,4%)	22 (48,9%)
CHF 2a	10 (16,9%)	16 (35,5%)
CHF 2б	11 (18,6%)	7 (15,5%)
Neurology (in total)	8 (11,3%)	12 (23,5%)
TIA	2 (25%)	4 (33,3%)
ACVA	6 (75%)	8 (66,7%)
Obesity s (in total)	26 (36,6%)	14 (27,4%)
EBW	1 (3,8%)	1 (7,1%)
Obesity 1 degree	5 (19,2%)	7 (50,0)
Obesity 2 degree	9 (34,6%)	4 (28,6%)
Obesity 3 degree	11 (42,3%)	2 (14,3%)

Table 3: *Concomitant diseases in deceased women (n = 71 people) and men (n = 51 people) before admission to the hospital. Note: *: < 0,05; **: < 0,01.*

HD affected 110 people (90.9%) (Table 3), of which 65 women (92.9%), 45 men (88.2%), $p > 0.05$. According to their structure, HD 3 stage prevailed, then, as they decreased, HD 2 stage and least of all - HD 1 stage. However, it should be noted that there was no statistically significant difference in these indicators between women and men.

The number of patients with CHD was 62 people (50.8%) (Table 3), of which women - 25 people (35.2%), men - 37 people (72.6%), $p < 0.01$. There were no statistically gender differences in the structure (presence of angina pectoris, performed operations for CABG and installation of stents transferred by AIM). However, it should be noted that arrhythmias and intracardiac blockages were more common in men than in women. Thus, there were fewer women with CHD and with rhythm and intracardiac conduction disorders than men.

Among all the deceased, the number of patients with CHF was 104 people (85.2%) (Table 3), of which 59 women (83.1%), 45 men (88.2%). Men with CHF 2A were almost twice as many as women in percentage terms: 16 people (35.5%) and 10 people (16.9%), respectively, but $p > 0.05$.

Of the 122 deceased, 20 people (16.4%) had neurological disorders (Table 3), of which 8 women (11.3%), 12 men (23.5%). As can be seen from the data obtained, the percentage of men with neurological pathology was about 2 times more than women. According to the structure (TIA) and transferred ACVA), no statistical differences were found between men and women.

40 people (32.8%) suffered from obesity (Table 3): women - 26 (36.6%), men - 14 (27.4%) ($p > 0.05$). In the structure, in percentage terms, excess body weight and obesity of 1 degree in women were detected 2 times less often than in men. But obesity of the 2nd and 3rd degree was more often observed in women. However, the data obtained are statistically unreliable.

Indicators	Women (n/%)	Men (n/%)
Endocrinology (total)	30 (42,2%)	14 (27,4%)
Thyroid gland	5 (16,7%)	1 (7,1%)
DM1 type	0	0
DM2 type (total)	25 (65,8%)	13 (34,2%)**
DM2 type compensated	11 (44%)	3 (23,1%)
DM2 type subcompensated	8 (32%)	4 (30,8%)
DM2 type decompensated	1 (4%)	4 (30,8%)
DM2 type insulin-consuming	5 (20%)	2 (15,4%)
Allergy	4 (5,6%)	0

Table 4: *Concomitant diseases in deceased women (n = 71 people) and men (n = 51 people) before admission to the hospital.*

*Note: *: < 0,05; **: < 0,01.*

Endocrine pathology (Table 4) was detected in 44 people (36.1%): 30 women (42.2%) and 14 men (27.4%) ($p > 0.05$). Of these, 6 patients had thyroid disease (13.6%) (mild hypothyroidism): 5 women (16.7%), 1 man (7.1%) ($p > 0.05$). 38 people (86.4%) suffered from type 2 diabetes mellitus (DM2): 25 women (65.8%) and 13 men (34.2%) ($p > 0.05$). Type 1 diabetes has not been registered in any patient. It should be noted that out of 38 patients with type 2 diabetes, the normal creatinine level, upon admission to the hospital, was in 26 people (68.4%): 17 women (68%) and 9 men (69.2%).

Hematological diseases (Table 5) mild IDA was presented in 18 people (14.7%): of them, women - 10 people (14.1%), men - 8 people (15.7%) ($p > 0.05$).

Indicators	Women (n/%)	Men (n/%)
Diseases GIT (total)	12 (16,9%)	5 (9,8%)
GERD	0	0
SU and DU (total)	2 (16,7%)	2 (40,0%)
NAFLD	2 (16,7%)	0
Cirrhosis	0	1 (20,0%)
Pancreatitis	0	1 (20,0%)
GSD	8 (66,7%)	1 (20,0%)
Intestinal diseases	0	0
Lung diseases (total)	8 (11,3%)	2 (3,9%)
COLD	0 (0%)	2 (100,0%)
BA	6 (75%)	0

BED	1 (12,5%)	0
Sarcoidosis	1 (12,5%)	
Rheumatological diseases	6 (8,4%)	5 (9,8%)
Blood diseases (total) IDA	10 (14,1%)	8 (15,7%)
Kidney diseases (total)	4 (5,6%)	11 (21,6%)
Pyelonephritis	1 (25%)	8 (72,7%)
Glomerulonephritis	0	0
ULD	1 (25%)	2 (18,2%)
Polycystic kidney disease	2	0
Removed kidney	0	1 (9,1%)
Oncology	7 (9,9%)	11 (21,6%)
Breast cancer Prostate cancer	3 (42,9%)	 5 (45,4%)
Uterine cancer Lung cancer	3 (42,9%)	 2 (18,2%)
Meningioma Lymphoma	1 (14,2%)	 1 (9,1%)
Lymphocytic leukemia		1 (9,1%)
Laryngeal cancer		1 (9,1%)
Bladder cancer		1 (9,1%)

Table 5: *Concomitant diseases in deceased women (n = 71 people) and men (n = 51 people) before admission to the hospital. Note: *: < 0,05; **: < 0,01.*

Concomitant oncological pathology (Table 5) 18 people (14.7%) suffered: 7 of them were women (9.9%), 11 men (21.6%). According to the structure, they were distributed as follows: 3 women (42.9%) had breast cancer, 3 (42.9%) had uterine cancer, 1 (14.2%) had meningioma. In men: 5 people (45.4%) suffered from prostate cancer, 2 (18.2%) - lung cancer and one each - lymphoma, lymphocytic leukemia, laryngeal cancer and bladder cancer.

Diseases of the GIT (Table 5) were detected in 17 people (13.9%). Of these, women - 12 people (16.9%), men - 5 people (9.8%) ($p > 0.05$). According to the structure, women were more likely to have liver steatosis and GSD, men were found to have DU, cirrhosis of the liver and pancreatitis. No patients with GERD and intestinal diseases were identified.

Kidney diseases (Table 5) were detected in 15 people (12.3%): of these, women - 4 people (5.6%), men - 11 people (21.6%). According to the structure, they were distributed as follows: in women - 1 case with pyelonephritis and ULD, 2 - with polycystic kidney disease; in men - 8 people with pyelonephritis, 2 with ULD and 1 after nephrectomy.

Rheumatological patients (Table 5) were 11 people (9.02%), of which women - 6 people (8.4%), men - 6 people (9.8%) ($p > 0.05$). According to the structure, they were distributed as follows: women - one case of SLE, hemorrhagic vasculitis, SS and RA and in 2 DOA; men (1 patient with BD and RA and 3 with DOA).

Respiratory diseases (Table 5) affected 10 people (8.2%): of them, women - 8 people (11.3%), men - 2 people (3.9%) ($p > 0.05$). The structure of the women was dominated by BA, one had BED, one had lung sarcoidosis. COLD was more common in men.

Allergic reactions (Table 4) were detected in 4 women (3.3%).

Discussion

The COVID-19 pandemic has led to a disproportionately large number of deaths worldwide, including in industrialized countries. Thus, according to the data of the specialized hospital of San Gerardo (Monza, Italy), out of 1225 patients hospitalized for COVID-19 in the period from February 20 to May 13, 2020, 283 died (i.e. according to the authors, "hospital mortality was 24%") [8]. Among the deceased, 32.8% were women. The average age ± standard deviation [SD] is 65.5 ± 15.0 years (65.4 ± 14.0 years for men and 65.8 ± 16.5 years for women) [8]. If we translate these values into M ± m, then the average age of deceased women (n = 93 people) will be 65.4 ± 1.46 years, men (n = 190 people) - 65.8 ± 1.20 years. In comparison with our data (72.6 ± 1.22 years and 72.9 ± 1.44 years, respectively), the age of deceased patients in the specialized hospital of San Gerardo (Monza, Italy) is younger (in both cases $p < 0.001$). Also, if we consider the deceased by gender, among the deceased patients of the specialized hospital of San Gerardo (Monza, Italy) significantly more (2.04 times) men died, while among our patients - more women died (1.4 times).

It should be noted that in one of the Italian nursing homes during the COVID-19 pandemic in 2020, the two-month mortality rate was 40%. Increased mortality was also associated with male sex, old age, lack of previous vitamin D supplementation and low activity of patients [10]. Approximately similar conclusions are presented from the relevant national surveillance databases of Italy, Spain, Germany and Sweden, which indicate that COVID-19 affects both sexes with some differences in morbidity - higher in women, and mortality - higher in men [14].

According to a paper published in The Lancet Respiratory Medicine in Brazil, nosocomial mortality among the elderly (over 70 years old) it was more than 55%, and among patients younger than 40 years - 12% [25]. The authors of this work explain the data obtained by the overload of the healthcare system, regional differences in access to medical resources, congestion of hospital systems, socio-economic status of patients, ethnicity, low literacy.

In the UK, at the beginning of the pandemic, hospital-acquired mortality in patients over 80 years of age was more than 50%, and among those under 40 years of age - 2.9% [25]. The authors explain this by the fact that patients living in nursing homes were later admitted to hospitals [19].

As we can see, the main burden of mortality associated with COVID-19 falls on people over 65 years of age [11]. Data from the Centers for Disease Control and Prevention in the USA show a sharp age-related increase in mortality among people hospitalized with COVID-19, from 2.1% for people aged 18 to 49 years and up to 20% for people aged 65 years and older [12].

At the same time, in an observational multicenter cohort study of adults in the Netherlands with PCR-confirmed SARS-CoV-2 infection, hospitalized from March to May 2020, out of 1006 patients (63.9% men; average age 69 years), 243 people (24.6%) died [17]. However, the authors did not find an increased risk of mortality in male patients. They also note that men were less likely to recover ($p = 0.003$) than women, but there was no statistical difference between the two groups regarding death ($p = 0.05$).

In the USA (Virginia), hospitalization for COVID-19 was defined as a new admission to the hospital within 30 days after a positive test for polymerase chain reaction (PCR) COVID-19 or positive PCR COVID-19 during ongoing hospitalization [9]. Apparently, this is one of the reasons for the high hospital mortality in the United States. In this study, the final sample included 11,162 veterans, whose average age was 76 (SD 7.8) years, and 98% of them were men [9]. The patients of our study were hospitalized on day 8 - 9 (Table 1).

The impact on hospital mortality in China, which was the first to encounter COVID-19, was determined by care, early intubation and inactivity [29,34].

The mortality rate of those hospitalized for COVID-19 in June-August 2020 at the Simon Bolivar Hospital in Cajamarca (Peru) was 39.6% [30]. The authors also found significant differences between the time of hospitalization and the status of patients older than 60 years ($p < 0.001$). Age over 60 years (HR: 2.87; 95% CI: 1.76 - 4.68) request for a bed in the intensive care unit without supervision (HR: 3.49; 95% CI: 2.02 - 6.05), oxygen saturation less than 80% upon admission (HR: 2.73; 95% CI: 1.35 - 5,53) and the use of ivermectin (a drug with an antiparasitic effect) (HR: 1,68; 95% CI 1.06 - 2.68) were factors associated with mortality. The most important variables were oxygen saturation of less than 80% at admission, age over 60 years, time of hospitalization and time of onset of symptoms [30].

In the US healthcare system covering California, Oregon and Washington, in the period from March 1 to December 31, 2020, out of 8536 hospitalized patients, 1246 (14.6%) died, of which 56.1% and 54.4% were non-white, respectively. 8210 (96.2%) had a known race/ethnicity, of which 45.7% were White, 35.3% were Hispanic, 6.5% were Asian, 4.5% were Black, 1.2% were Native Hawaiians/Pacific Islanders (NH/PI), 0.9% were Native Hawaiians/Pacific Islanders NH/PI) and 5.9% - other minorities. The average age of all patients was 64.7 ± 17.6 years, and 54.5% of them were men. The most common concomitant diseases were obesity (42.4%), hypertension (40.2%) and diabetes (28.3%). Whites had the highest mean age (70.5 ± 16.2 years), and NH/PI patients had the lowest (55.9 ± 17.3 years) [13]. The authors note that the differences are obvious, especially among Latinos, who were more likely to have a positive test result, required additional hospitalization and artificial lung ventilation (ventilator), and also had a higher chance of hospital mortality, despite a younger age. The authors believe that targeted, culturally sensitive interventions and a more equitable distribution of vaccines are needed to eliminate the increased risk of worsening COVID-19 outcomes among minorities. The prevalence of comorbidities and the social environment vary by racial/ethnic group, and some of the characteristics, including obesity and overcrowded housing, are potential risk factors for COVID-19 and the severity of the disease. Hospital mortality was also independently associated with age; 3rd degree obesity; state insurance; higher score on the WHO clinical progression scale. There was a delay in seeking medical help among Spanish-speaking patients. The authors note that minorities face various obstacles to vaccination, including lack of access to healthcare, distrust of the healthcare system, communication barriers and misinformation [13].

Social and structural determinants may include occupational risk and limited access to medical care and testing [31].

Potential risk factors for COVID-19 development and severity of the disease are obesity and overcrowded housing [16,24]. The effect of hospital overcrowding on the outcome of patient treatment has already been described [20,33].

In a number of studies, high hospital mortality was explained by a large number of patients admitted within a short period of time, which emphasized the limited capabilities of the hospital system. However, the net contribution of this factor to the determination of mortality is still poorly studied [23,33].

Analyzing the cited works, we can say that hospital mortality is directly related to several reasons:

- Late hospitalization;
- A large number of patients admitted to the hospital within a short period of time;
- Overcrowding in hospitals;
- Limited access to medical care and infection testing;
- Old age;
- Racial and national differences [13,25,31];

- Differences in the social status and culture of the population;
- Lack of access to healthcare;
- Distrust of the healthcare system;
- Communication barriers;
- Misinformation;
- Hospitalization at low SpO_2 values - 80% or less;
- Early intubation;
- Physical inactivity;
- Poor patient care;
- Gender attribute: However, different clinics around the world have received contradictory data on this issue. The authors of the presented works do not explain the reason for these differences;
- Comorbidity: Thus, according to Italian colleagues, patients were more likely to have HD and cardiovascular diseases [8]. In the USA, the most common concomitant diseases were obesity (42.4%), HD (40.2%) and diabetes (28.3%) [13]. In the Netherlands, patients with COVID-19 had a comorbidity of 90.1%. Of these: CVD, including HD - 58.0%; only HD - 38.9%, pulmonary pathology - 24.5%, DM (the authors did not separate types 1 and 2 DM) - 22.8%, oncology - in 14.9%, autoimmune diseases - 12.2%, chronic renal diseases - 11.2% [17].

According to our data, the risk factors for hospital mortality of patients suffering from COVID-19 are the following:

- The time of admission to the hospital from the onset of the disease (in women it was 8.6 ± 0.54 days, in men - 7.9 ± 0.65 days ($p > 0.05$);
- Severity (the higher it is, the longer the period from the onset of the disease to admission to the hospital (See table 1);
- Oxygen saturation level (our patients were admitted to the hospital with higher SpO_2 values, namely - below 95%, which, of course, affected the further favorable outcome of the disease);
- Gender trait (high hospital mortality of women, according to our data, may be associated with several reasons. In women, compared with men, there is a difference in the temperature reaction of the body, both at the beginning of the disease and upon admission to the hospital. They also had differences in the structure of diseases before admission to the hospital (See table 1-5). Thus, women were more likely than men to have HD, obesity, endocrine pathology, NAFLD, HD, lung diseases. While in men, coronary heart disease, rhythm and conduction disorders, oncology, SU and DU, pancreatitis were more often detected. All this affects the peculiarity of the course of the disease of men and women;
- National differences (according to our data (See table 1), persons of Tatar nationality died less often than Russians. This is an interesting fact, but it requires more careful research;
- Comorbidity (HD, CHF, CHD, DM, obesity were more common among our deceased patients).

There are studies describing the clinical features of COVID-19 and risk factors associated with the frequency and timing of adverse outcome [32], although data on survival concerning the risk factors of mortality from COVID-19 are limited. At the current stage of the pandemic, when special vaccines are being developed, the correct identification of patients at risk of serious illness and mortality is important to prioritize vaccination of patients. In addition, the virus circulates among the population, and it can determine clinical decisions about careful monitoring, hospitalization in the intensive care unit or the choice of new treatment methods [17].

Thus, a lot remains unclear during COVID-19, which requires a more thorough study of materials both on the pathways of infection, the susceptibility of certain categories of citizens to the disease, risk factors for development, predisposition to severe disease and factors predisposing to mortality and hospital mortality.

Given such a variety of risk factors, the issue of hospital mortality requires further study.

Conclusion

1. In our study, the hospital mortality rate was 4.6%.
2. Among those enrolled in the TCH, 1.5 times more female persons prevailed.
3. Among the 122 deceased, there were 1.37 times more women than men.
4. Among all the deceased, there were significantly more patients with moderate severity at admission than with severe.
5. Women with a severe degree of the disease were reliably admitted later than with an average degree. The same trend persists in men, but the difference is not reliable.
6. Women with a severe degree of the disease on the background of standard therapy significantly died earlier than with an average degree. The same trend continued in men, but the difference is not reliable.
7. Women's body temperature, compared with men, was lower at the beginning of the disease, upon admission to the hospital and with moderate severity. The difference was observed in severe cases: it was the same in men and women at the beginning of the disease and significantly lower in men upon admission to the hospital.
8. Of the concomitant diseases at admission, HD was in the first place (90.9%), in women slightly more than in men. According to their structure, HD 3 stage significantly prevailed. In the second place - CHF (85.2%), equally in men and women. In terms of sexual composition and severity, they practically did not differ. On the third - coronary heart disease (50.8%), it occurred in men 2 times than in women. Men also had more arrhythmias and intracardiac blockages. On the fourth - endocrine pathology (36.1%), women were detected more often than men. 6 people have mild hypothyroidism (more in women) and 38 people. Type 2 DM. There was no type 1 diabetes in any patient. On the fifth - obesity (32.8%), slightly more in women than in men. And more often, women were obese 2 and 3 art. On the sixth - neurological disorders (16.4%), the percentage of men was about 2 times more than women. On the seventh - hematological diseases. They were represented by mild IDA (14.7%). Oncology is in eighth place (14.7%). In percentage terms, there were about 2 times more men than women. In ninth place - diseases of the gastrointestinal tract (13.9%): women 16.9%, men 9.8%. According to the structure, women had more hepatic steatosis, GSD, and men had liver cirrhosis and pancreatitis. No patients with GERD and intestinal diseases were identified. On the tenth - kidney disease 12.3%: women 5.6%, men 21.6%. On the eleventh - rheumatological patients 9.02%: women 8.4%, men 9.8%. On the twelfth - respiratory diseases 8.2%: women 11.3%, men 3.9%. On the thirteenth - allergy, which occurred only in 4 women (3.3%).
9. Persons of Tatar nationality died less often than Russians. The ratio of women was 33.8% and 66.2%, respectively; men - 45.1% and 54.9%, respectively.

Conflict of Interest

There is no financial interest or conflict of interest.

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