IMPACT OF THE SARS-COV-2 OUTBREAK ON THE EPIDEMIOLOGY AND TREATMENT OUTCOMES OF FRACTURES OF THE PROXIMAL FEMUR IN KAZAKHSTAN

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Received: 24.09.2021.
Accepted: 28.11.2021.

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sciendo

UDK:616.718.4-001.5(574)"2010/2020
616.98:578.834]:615.863(574)
Eabr 2024; 25(3):249-258
DOI: 10.2478/sjecr-2022-0026

ABSTRACT

The study aimed to assess the impact of isolation and quarantine on the frequency of registration and the treatment of fractures of the proximal femur in Kazakhstan in the context of the COVID-19 pandemic in 2020 (compared to the pre-pandemic period).
This retrospective observational comparative study included all primary patients with injuries (the code S72) in the period 2019-2020 according to the national register.
In 2020, the number of S72 fractures was 6.6 % higher compared to 2019. In comparison with 2019, in 2020 the number of bed-days of patients was reduced to 7.1±3.8 days ($p \leq 0.001$). Both in 2019 and in 2020, the number of women predominated among all patients ($p \leq 0.05$). The frequency of conservative treatment in 2020 compared to 2019 was increased from 26.6% to 35.6%, while the surgical procedure for internal fixation was reduced to 34.2% in 2020. In 2020, the highest number of cases among women with S72 fractures cases were recorded in the age groups 60-74 years and 75-90 years. In 2019 in female patients (42%) with S72 cases were registered in the age group 75-90 years.
The incidence of fractures of the proximal femur did not change significantly in 2020 compared to 2019. However, the number of conservative treatment methods has increased along with the decrease in the frequency of surgical interventions. We observed the growth of the frequency of non-surgical treatment methods in 2020 that might impose the possible risks of mortality of these patients in the long term after conservative treatment.

Keywords: *Fracture, femur hip, epidemiology; COVID-19 pandemic, Kazakhstan.*

INTRODUCTION

In December 2019, an outbreak of a new coronavirus infection (COVID-19) caused by the SARS-CoV-2 virus was reported in the Chinese province of Wuhan (1). The first case outside China was reported on January 13, 2020, in Thailand (2). The outbreak quickly spread from China to many countries around the world, and extremely concerned about the alarming spread of the infection and the severity of the consequences, the World Health Organization (WHO) declared the COVID-19 outbreak as a pandemic on March 11, 2020 (3). In Kazakhstan, since the registration of the first cases of COVID-19 infection on March 13, 2020 (4), despite the anti-epidemiological measures taken, there was a fairly high incidence amongst various age groups of the population (5). Given the severity of the epidemiological situation, health care providers have never faced such a dramatic epidemic wave before. Moreover, most health systems around the world were insufficiently equipped to deal with this serious disease (6).

In order to provide adequate medical care to combat the epidemic and growing need for drugs and intensive care units, almost all departments of hospitals in most countries of the world, including the departments of orthopedics and traumatology, were forced to re-profile into infectious diseases departments (7, 8).

The COVID-19 pandemic forced orthopaedic surgeons to consider alternative treatments for many aspects of orthopaedic emergencies and injuries, by modifying standard management plans to minimize patient exposure and overall impact on resources (9). In many countries, this also led to a deliberate reduction in planned operations, which led to an increase in morbidity rates (10).

The reduction in the number of planned hospitalizations has also led to the freeing of hospital beds and equipment (including ventilators) for the care of patients with COVID-19 (11). Although, due to the severe restrictions on movement associated with the lockdown, there was a significant reduction in the number of some injuries, such as sports, road transport, industrial ones (12). According to some reports, COVID-19 led to a slight decrease in the number of patients with fractures around the world, although according to some reports, it was noted that the frequency of brittle fractures remained unchanged (12). A brittle fracture of the proximal femur, otherwise called a “hip fracture,” is of particular importance in the management of trauma in elderly patients (13). Fractures of the proximal femur are cause of a high mortality, and they require the provision of surgical intervention within 48 hours after injury (12). However, in some cases conservative treatment methods are also applicable (14).

In general, the COVID-19 pandemic has made a negative impact on the healthcare system of all countries, including the Republic of Kazakhstan (15). However, due to an unstable epidemiological situation caused by COVID-19, its impact on the prevalence rate is still unclear. It also encompasses the problems of treatment choice (operative or conservative) for fractures of the proximal femur.

This study was aimed at assessing the impact of isolation and quarantine on the frequency of registration and the nature of the treatment of fractures of the proximal femur in the Republic of Kazakhstan in the context of the COVID-19 pandemic in 2020 (compared to the pre-pandemic period).

MATERIALS AND METHODS

Ethical Issue

To form the study cohort, we used patient data of registered cases of fractures of the proximal femur in the 2019-2020. For this study, anonymous information from the national registry of inpatients was utilized. The study was conducted in accordance with the high ethical standards of the state and national research committee. Due to the retrospective nature of the epidemiological study and the use of anonymous patient data, there was no need to obtain informed consent.

Data collection

Data for this multicenter, observational, retrospective, descriptive study were obtained from the electronic patient registry of trauma hospitals from all 17 regions of the Republic of Kazakhstan. The electronic register is a common base for collecting and storing medical data from all public trauma hospitals. Materials from the electronic register for the period from 01.01.2019 to 31.12.2020 were provided and approved by the "Republican Center for Electronic Health" of the Ministry of Health of the Republic of Kazakhstan.

For the study, the medical information of patients with fractures of the proximal femur under the code S72 was used in accordance with the 10th revision of the International Classification of Diseases (ICD-10). According to the ICD-10 classifier, the following pathologies from the S72 pathology groups were analyzed: S72.0 Fracture of the femoral neck; S72.1 Transtrochanteric fracture; S72.2 Subtrochanteric fracture; S72.3 Fracture of the body of the femur; S72.4 Fracture of the lower end of the femur; S72.7 Multiple fractures of the femur; S72.8 Fractures of other parts of the femur; S72.9 Fracture of the part of the femur, unspecified.

Demographic data such as age and gender of patients were analyzed as well. By age, the patients were divided into 6 age groups: 0-17; 18-44; 45-59; 60-74; 75-90; and 90 years of age or older.

In addition, the following indicators were determined as well: the place of residence (city or village), the capacity of the hospital for hospitalized patients depending on the number of beds, and the month of admission of patients (less than 300; from 300 to 500; more than 500 beds).

By the type of hospitalization: patients with planned or emergency hospitalization were involved in the study.

The patients were divided into 7 groups based on the type of referral of patients to the hospital: referred by ambulance, KDP, another hospital, self-referral, primary care, maternity hospital and others.

According to the outcome of inpatient treatment, the following categories were identified: improvement, recovery, no change, death and deterioration.

The patients received the following assistance in regard to the type of treatment performed: conservative treatment (non-surgical), internal fixation, total arthroplasty, hemiarthroplasty, and more.

Besides, we also studied the gender and age characteristics of patients and the territorial feature of cases of fracture of the proximal femur, depending on the period of hospitalization.

Statistical analysis

Statistical analysis was conducted using SPSS software (version 25.0, IBM SPSS Inc., Chicago, Illinois, USA). A general descriptive analysis was carried out in general and by period, including indicators of the central trend for quantitative variables. Continuous variables were presented as mean and standard deviation, and categorical variables were presented as number and percentage. We utilized demographic information obtained from the Committee on Statistics of the Ministry of National Economy of the Republic of Kazakhstan on the total population of the Republic of Kazakhstan.

RESULTS

20351 patients with fractures of the proximal femur were registered for 2019-2020 in Kazakhstan, of which n = 9514 (46.7 %) in 2019 and n = 10837 (53.3 %) in 2020. Clinical and demographic characteristics of hospitalized patients are presented in Table 1.

The average age of patients in 2019 was 58.8 ± 24.92 years, and in 2020, 57.32 ± 25.2 years. By sex, both in 2019 and in 2020, women prevailed among patients, the number of whom was 56 % (n = 5329) and 55.7 % (n = 6041), respectively.

By place of residence in 2019 and in 2020, urban residents also prevailed, with indicators equal to 59.7 % (n = 5682) and 64.1% (n = 6944), respectively ($p \leq 0.05$).

Depending on the hospital capacity in 2019, 58.5 % (n = 5565) of patients were hospitalized in hospitals with less than 300 beds, and 7.4 % (n = 701) of patients were hospitalized in inpatients with more than 500 beds ($p \leq 0.001$). In 2020, 65.4 % (n = 7087) were hospitalized in hospitals with less than 300 beds, and 3.4 % (n = 371) patients were hospitalized in hospitals with more than 500 beds (n = 371) ($p \leq 0.001$).

According to the admission period, the highest frequency of registration of fractures of the proximal femur was observed in the autumn-winter period. In 2020, the highest patient registration rate was registered in December 10.9 % (n = 1185) compared to December 2019 6.8 % (n = 674) ($p \leq 0.001$). Apart from that, in April, July and October 2020, cases of fractures of the proximal femur were recorded more compared to identical months in 2019, which was regarded as a statistically significant difference ($p \leq 0.05$).

By the type of hospitalization, in 2020 the number of patients 21.6 % (n = 2344), hospitalized in a planned manner, in contrast to 2019, was 4.3 % (n = 408) ($p \leq 0.001$). The number of patients hospitalized for emergency indications in 2019, 95.7 % (n = 9106), was 78.4 % (n = 8493) ($p \leq 0.05$) compared to 2020.

By type of referral to inpatient treatment, the largest number of admissions was for emergency ambulance, which amounted to 47.7 % (n = 4538) in 2019 and 38.3 % (n = 4142) in 2020 ($p \leq 0.05$).

According to the outcome of hospital treatment in 2019, patients were discharged with an improvement of 90.7 % (n = 8632) and 91.4 % (n = 9903).

By type of treatment, in 2020 n = 3848 (35.6 %) patients were treated without surgery, and in 2019 the number of patients treated with a conservative method was less (26.6 %, n = 2530). Internal fixing operations were carried out more in 2019 in 54.7 % (n = 5202) cases, compared to 2020, where this indicator was 34.2 % (n = 3706). Total arthroplasty in 2019 and 2020 was performed in 11.5 % (n = 1091) and 13.6 % (n = 1474) cases, respectively. Statistically significant differences were found for hemiarthroplasty, since in 2020 compared to 2019, the number of this surgical procedure increased from n = 418 to n = 819 cases ($p \leq 0.05$). In addition, the number of other medical measures carried out in 2019 was 2.9 % (n = 273), which was lower than the indicators of this procedure in 2020 equal to 9.1 % (n = 990), with a statistically significant difference ($p \leq 0.05$).

The frequency of registration of various forms of S72 according to ICD-10, depending on the age category of patients in the context of 2019-2020 in the territory of the Republic of Kazakhstan, is presented in Table 2. In the age category 0-17 years in 2019, the number of fractures in general was n = 1150, and in 2020, the number of cases of S72 children was increased to n = 1397, with no statistically significant difference. In pediatric patients in 2020, n = 5 (0.4 %) cases of fracture of the unspecified part of the femur (S72.9) were recorded. In 2019, in children aged 0-17 years, this diagnosis was not made at all, which was considered statistically significant difference ($p \leq 0.001$). In the age group 60-74 years compared to 2019 (n = 2849), the total number of S72 in 2020 was higher, amounting to n = 3398, but no statistically significant difference was found. And in the group of patients 75-90 years old for all groups of nosology S72, both in 2019 and in 2020, there were almost identical rates of registration of these fractures with an insignificant difference, except for the diagnosis S72.9,

which in 2020 was defined as n = 7 (0.2 %) cases in comparison with 2019 without a single registration S72.9 ($p \leq 0.001$).

It should be noted that in the oldest age group of patients (90 years and older) diagnosed with S72.0 (hip fracture) in comparison with 2019. In 2020, there was a decrease in the number of cases of registration of this type of fracture (n = 75 vs n = 58), with a statistically significant difference ($p = 0.041$). However, according to the diagnosis S72.1 (pertrochanteric fracture) in patients aged 90 years and older compared to 2019, in 2020 there was a statistically significant increase in the detection of these injuries from n = 95 (45.0 %) to n = 112 (59.3 %) cases, respectively ($p = 0.012$).

The gender and age characteristics of patients with fractures of the proximal femur are presented in figure 1. In 2019, among all hospitalized female patients, 42 % (n = 2239) of cases of fractures of the proximal femur were recorded in the age group 75-90 years, and among men in a given year, 24 % (n = 1006) of patients were 60-74 years old. In 2020, the highest number of cases of fractures of the proximal femur among women in 37.1 % (n = 2239) and 37.5 % (n = 2265) cases were recorded in the age groups 60-74 and 75-90 years, respectively. And among men in 2020, the highest number of cases of fractures of the proximal femur was determined in the age group 60-74 years with an indicator equal to 24.2 % (n = 1159) cases.

The territorial characteristics of cases of registration of fractures of the proximal femur, in the context of 2019 and 2020 are presented in figure 2. In 2019, in the territory of the Republic of Kazakhstan, the largest number of cases of fractures of the proximal femur was registered in the city of Almaty (n = 1419). However, in Almaty city (2020), there was an increase in the number of these fractures (n = 1545), which was regarded as a statistically significant difference ($p \leq 0.05$). Apart from that, high registrations of fractures of the proximal femur were identified in 2019 (n = 1545) and 2020 (n = 1545), in the Karaganda region, but without a statistically significant difference. A statistically significant difference was determined for cases of femoral fractures in the Almaty region, where in 2020 (n = 1324), this pathology was recorded more in comparison with 2019 (n = 1116), $p \leq 0.05$. In addition, in the Zhambyl region, in comparison with 2030 (n = 651) in 2019 (n = 478), fewer cases of femoral fractures were recorded ($p \leq 0.05$). In the Turkestan region, a high level of registration of this pathology was also determined in 2020 (n = 1011), in contrast to 2019 (n = 847), $p \leq 0.05$.

DISCUSSION

To the best of our knowledge, this is the first analysis of trauma care and treatment outcomes for patients with proximal femur fractures in Kazakhstan in the context of the COVID-19 pandemic in 2020. It should be taken into account that, according to statistical sources, more than 130 nationalities live on the territory of Kazakhstan (14), among ethnic groups Central Asians make up a large share (Kazakhs, Uzbeks, Tatars, Kyrgyz, Uighurs, Tajiks, Turkmen, etc.) (14). This fact provides an opportunity to extrapolate the results obtained from this study for the entire Central Asian region. The statistics available for review shows that in the orthopedic area the largest number of operations is associated with fractures of the proximal femur, which are the most common cause of disability in patients over 65 years of age (16).

According to the results obtained in Kazakhstan in 2020 (regardless of the fact that since March 2020 there was a strict lockdown in the country), the number of cases of fracture of the proximal femur did not decrease in comparison with 2019. Moreover, we observed a slight increase of 6.6 % ($p \leq 0.05$).

Relative growth in S72 cases in 2020 compared to 2019 was observed in both men and women. It should also be noted that, as in 2019 and in 2020, the S72 fracture was more typical for women aged 75-90 years in comparison with men ($p \leq 0.05$). However, the results of our study do not find agreement with a study conducted in Italy, where, thanks to restrictive measures for the free movement of people during quarantine, the number of S72 fractures, like other fractures, was reduced (16). In addition, our results do not conform with the data of another study conducted in Turkey, where the number of fractures in 2020 due to strict restrictive quarantine and due to a fairly high proportion of postponement of planned operations during the quarantine period was reduced by 1/3 of cases compared to COVID period (17).

There is some evidence that there is a link between falling and aging, as the frequency of falls increases significantly with age (18). The increase in the number of femoral fractures among the elderly population revealed in 2020 could be associated with the mechanism of femoral fractures. It is known that such injuries are often the result of low-energy trauma (falling from a standing height and falling from a low height) that usually occur at home, which emphasizes the importance of primary prevention measures (prevention at home). This finding finds an agreement with the results of a retrospective multicenter cohort study conducted in the UK, where the number of femoral fractures in 2020 was almost identical to the rates of this type of fracture in 2019 (19). This reflected the fact that for this category of patients, falling at home is the most common cause for a femur fracture. Therefore, social distancing and isolation during the COVID-19 pandemic could not affect the frequency of its registration (20).

The same features were revealed in Spain, where the absolute volume of hospitalizations with osteoporotic hip fractures remained stable during the state of emergency in Spain (21). In another study conducted in Turkey, an increase in the number of cases of fractures of the proximal femur was noted, which could be explained by a decrease in mobility of people during a pandemic, and it was also published that the etiology of the development of this type of hip fracture of osteoroporotic genesis was associated in 31.2 % as a result of

slipping during ablution (a Muslim ceremony before prayer, which consists of washing the face, neck, hands and feet) (22). Given the fact that a high proportion of residents of Kazakhstan are Muslims (23), there is an assumption that this reason could also affect the increase in the frequency of falls for this reason, which could lead to the development of a fracture of the femur.

During the worst phase of the pandemic in China, according to an earlier study, 87 % of fractures were from standing falls in people with an average age of 76; and 72.7 % of patients suffered their fractures at home (24). Of the 453 fractures analyzed by these authors, 264 (53.8 %) were hip fractures (24).

It should be noted that according to the results of this study, osteoporosis in women and in older men could potentiate the risks of fractures due to low-energy trauma. In fact, the risk of developing any osteoporotic fracture at the age of 50 ranges from 40 to 50 % in women and 13-22 % in men (25). In addition, in patients with osteoporosis after a hip fracture, the risk of developing another hip fracture doubles in women and triplets in men (26). The risk increases to 9% in the first year and up to 20 % in 5 years (27). These findings indicate the necessity of proper prevention and treatment of osteoporosis at all stages of medical care (28). The high rate of osteoporotic fractures increases the risks of non-earmarked expenses from the state budget. Instead of directing funds to prevent fractures, the budget will be spent on the treatment and social benefits for disability (29).

Apart from that, the results of our study demonstrate that the frequency of S72 fractures increased in winter periods (2019-2020). This finding agrees with the results of previous studies (30, 31). It indicates that an activity of elderly in cold period plays an important role in the development of this type of fracture (31).

There was an increase in the rate of hospitalization of patients with S72 fractures in hospitals with fewer than 300 beds (65.4%) in 2020 compared with hospitals with more than 500 beds ($p \leq 0.001$). Such a finding could be explained by the fact that large multidisciplinary hospitals (more than 500 beds) were converted into infectious diseases hospitals in 2020 due to pandemics. In fact, the same temporary reorganization aimed at providing care to patients with COVID-19 (32) was carried in all countries around the world.

The number of conservative treatments of fractures of the proximal femur increased in 2020, with a decrease in the number of internal fixation operations. The rise of the frequency of conservative therapy in the treatment of fractures in 2020 could be associated not only with direct indications, but could also be linked with the epidemiological situation with COVID-19. First of all, it can be caused by lowering of the incidence of invasive surgical procedures. In an earlier study in a rural hospital in the UK, it was also noted that in the COVID period, the frequency of conservative treatment of femoral fractures increased 3 times compared with the pre-COVID period, and the length of stay of these patients in the hospital decreased ($p \leq 0.001$) (33). This finding can be explained by the exacerbation of chronic concomitant diseases, including in a number of patients with unstable cardiac pathology, which required intensive medical intervention (33). Despite the increase in the use of conservative methods in the treatment of S72 fractures in 2020, no statistically significant differences were found in 2019-2020 in treatment outcomes (mortality, etc.) at the time of discharge from the hospital.

The data obtained in our study find some agreement with the results of another study, where, hospital mortality was the same between patients treated promptly (14.9 %) and conservatively (18.1 %) (14). In the same study, when assessing one-year mortality rates, mortality was significantly higher in the group of patients treated conservatively (67.0 %) in comparison with patients who underwent surgery (48.2 %) ($p = 0.005$) (14). However, there is a range of studies where no significant differences were found in one-year mortality after conservative or surgical treatment of fractures of the proximal femur (34). Given that the frequency of conservative treatment was increased in 2020, it should be noted that this circumstance may have some undesirable effect on treatment outcomes in the long-term perspective. In our study, among all S72 pathologies, femoral neck fracture (S72.0) and pertrochanteric femoral fracture (S72.1) were the most frequently reported types of femoral fracture. The results obtained show that in the context of 2019-2020, the age category of people from 60 to 90 years old is a risk group for the development of S72.

The results of study conducted by Lv et al. indicate that the most common mechanism of injury during a pandemic was low energy trauma (i.e. sliding, stumbling, or falling at home), in 79.1 % of cases compared with 34.4 % of low energy fractures in the control group (2019) (35). All these facts demonstrate the need for appropriate preventive measures to prevent osteoporosis (36) and reduce the incidence of low-energy household injuries among the elderly population.

In 2020, compared with the pre-COVID period (2019), the incidence of fractures of the proximal femur did not change significantly. However, the number of conservative treatment methods was increased with a corresponding decrease in the frequency of surgical interventions. Given the increase in the frequency of use of non-surgical methods of treatment in 2020, and the potential risks of mortality in patients in the long term after this type of treatment, the results of this study can be useful for the health care system. It includes the optimization of rehabilitation of patients who underwent conservative treatment at the PHC level. In addition, the findings of this study can be used for forecasting the possible shortage of hospital beds and management of patients with priority diseases in the case of high hospital occupancy caused by an epidemiological emergency.

Table 1. Clinical and demographic characteristics of hospitalized patients with S72.

Characteristics	2019	2020	p
Age	58.8±24.92	57.32±25.2	
Number of bed days	10.8±4.7	7.1±3.8	**0.001***
Sex			
male	4185(44.0)	4796(44.3)	
female	5329(56.0)	6041(55.7)	
Residence			
city	5682(59.7)	6944(64.1)	**0.05**
village	3832(40.3)	3893(35.9)	**0.05**
Number of beds			
less 300	5565(58.5)	7087(65.4)	**0.001**
300 to 500	3248(34.1)	3379(31.2)	
more 500	701(7.4)	371(3.4)	**0.001**
Time of admittance			
January	1004(10.6)	978(9.0)	
February	818(8.6)	1046(9.7)	
March	799(8.4)	935(8.6)	
April	783(8.2)	648(6.0)	**0.05**
May	825(8.7)	891(8.2)	
June	767(8.1)	841(7.8)	
July	754(7.9)	688(6.3)	**0.05**
August	783(8.2)	857(7.9)	
September	802(8.4)	920(8.5)	
October	735(7.7)	942(8.7)	**0.05**
November	770(8.1)	906(8.4)	
December	674(6.8)	1185(10.9)	**0.001**
Type of hospitalization			
Planned	408(4.3)	2344(21.6)	**0.001**
Emergency	9106(95.7)	8493(78.4)	**0.05**
Who is directed to hospitalization			
Emergency team	4538(47.7)	4142(38.3)	**0.05**
Out-patient clinic	600(6.3)	751(6.9)	
Other hospital	801(8.4)	937(8.6)	
Self-admittance	1800(18.9)	2540 (23.5)	
PCP	1453(15.3)	2466(22.7)	
pMaternity Unit	322(3.4)	1(0.01)	**0.001**
Outcome			
improvement	8632(90.7)	9903(91.4)	
convalescence	359(3.8)	319(2.9)	

Characteristics		2019	2020	p
	no changes	395(4.2)	485(4.5)	
	death	124(1.3)	119(1.1)	
	deterioration	4(0.04)	11(0.1)	
Treatment types				
	No operation (standard)	2530(26.6)	3848(35.6)	
	Innner fixation	5202(54.7)	3706(34.2)	
	Total arthroplasty	1091(11.5)	1474(13.6)	
	hemiarthroplasty	418(4.4)	819(7.5)	**0.05**
	Others	273(2.9)	990(9.1)	**0.05**
Total		9514(46.7)	10837(53.3)	

Data presented as a frequency (%);

Table 2. The frequency of registration of various forms of S72 according to ICD-10 in patients standardized by age in the context of 2019-2020 in the territory of the Republic of Kazakhstan.

Diagnosis according to ICD-10	**Age according to the WHO classification**								
	0-17			18-44			45-59		
	2019	2020	p	2019	2020	p	2019	2020	p
72.0 Fracture of the femoral neck	68 (5.9)	69 (4.9)	0.245	190(18.2)	221(16.9)	0.475	479(34.4)	632(38.4)	0.548
72.1 Transtrochanteric fracture	8 (0.7)	18 (1.3)	0.452	129(12.4)	189(14.4)	0.221	422(30.3)	404(24.6)	0.079
72.2 Subtrochanteric fracture	61(5.3)	105 (7.5)	0.324	104(10.0)	131(10.0)	0.854	106(7.6)	130(7.9)	0.354
72.3 Fracture of the body of the femur	816 (71.0)	973 (69.6)	0.108	384(36.8)	495(37.8)	0.763	160(11.5)	200(12.2)	0.124
72.4 Fracture of the lower end of the femur	153 (13.3)	182 (13.0)	0.789	148(14.2)	168(12.8)	0.367	176(12.7)	214(13.0)	0.842
72.7 Multiple fractures of the femur	13 (1.1)	11 (0.8)	0.452	53(5.1)	51(3.9)	0.471	19(1.4)	20(1.2)	0.541
72.8 Fractures of other parts of the femur	31 (2.7)	34 (2.4)	0.951	33(3.2)	53(4.0)	0.168	27(1.9)	39(2.4)	0.681
72.9 Fracture of part of femur, unspecified	0 (0)	5 (0.4)	**0.001***	2(0.2)	2(0.2)	0.978	2(0.1)	5(0.3)	0.251
Total	1150	1397	0.547	1043	1310		1391	1644	

Diagnosis	**Age according to the WHO classification**		
	60-74	75-90	90 and more

according to ICD-10	2019	2020	p	2019	2020	p	2019	2020	p
72.0 Fracture of the femoral neck	1141(40.0)	1403(41.3)	0.121	1145(39.9)	1193(41.2)	0.321	75(35.5)	58(30.7)	**0.041***
72.1 Transtrochanteric fracture	988(34.7)	1231(36.2)	0.781	1343(46.8)	1289(44.5)	0.135	95(45.0)	112(59.3)	**0.012***
72.2 Subtrochanteric fracture	185(6.5)	194(5.7)	0.982	133(4.6)	138(4.8)	0.148	13(6.2)	5(2.6)	0.2978
72.3 Fracture of the body of the femur	221(7.8)	229(6.7)	0.457	123(4.3)	110(3.8)	0.625	13(6.2)	6(3.2)	0.752
72.4 Fracture of the lower end of the femur	269(9.4)	282(8.3)	0.247	106(3.7)	126(4.3)	0.425	11(5.2)	8(4.2)	0.097
72.7 Multiple fractures of the femur	18(0.6)	16(0.5)	0.657	9(0.3)	11(0.4)	0.177	0(0)	0(0)	--
72.8 Fractures of other parts of the femur	25(0.9)	40(1.2)	0.197	11(0.4)	25(0.9)	0.684	4(1.9)	0(0)	-
72.9 Fracture of part of femur, unspecified	2(0.1)	3(0.1)	0.541	0(0)	7(0.2)	**0.001***	0(0)	0(0)	-
Total	2849	3398		2870	2899		211	189	

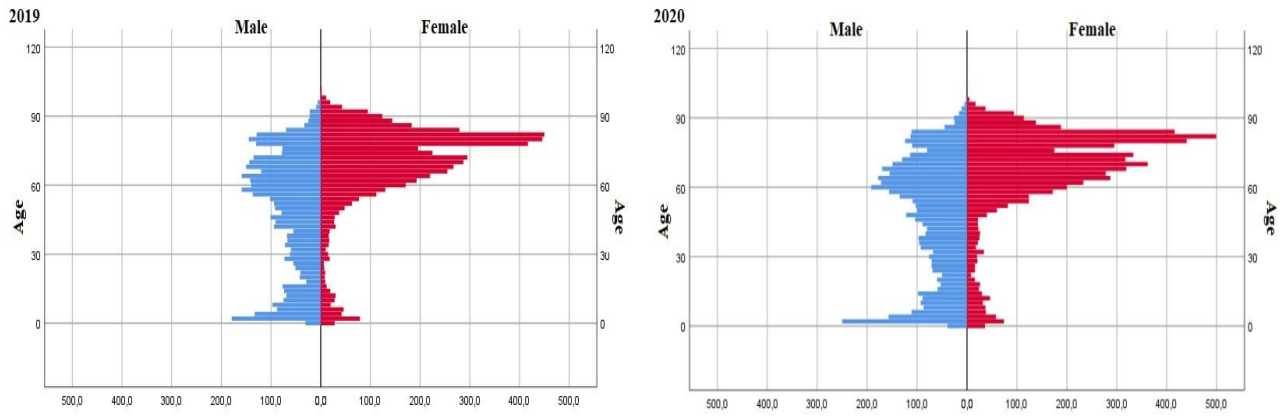


Figure 1. Age and sex characteristics of hospitalized patients with S72 for 2019, 2020.

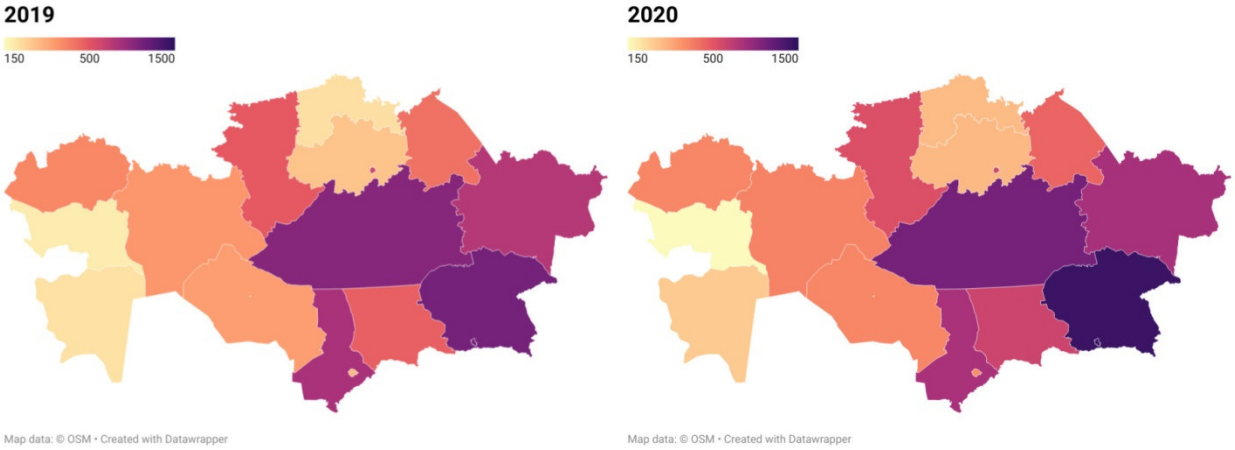


Figure 2. Territorial characteristics of cases of registration of S72 in the Republic of Kazakhstan for 2019-2020.

STRENGTHS AND LIMITATIONS OF STUDY

The retrospective observational design can be considered a limitation of the current study. In addition, the lack of data on long-term outcomes for S72 fractures cannot fully reflect an objective assessment of the impact of the COVID-19 pandemic on the quality of trauma care for this cohort of patients. So that it requires further research in this direction. On the other hand, the study strong sides, including a multicenter approach, a fairly large sample and the fact that this study was conducted for the first time on the territory of Kazakhstan during the pandemics.

ACKNOWLEDGMENTS

The authors are thankful to the S.D. Asfendiyarov Kazakh National Medical University for the administrative and technical support.

FUNDING

The study received no external funding.

CONFLICTS OF INTEREST

The authors declare no conflict of interest.

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