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The peculiarities of patients with COVID-19 infection

Andrei Ungurean, Alina Malic, Tatiana Osipov, *Evelina Lesnic

Department of Pneumophthisiology, *Nicolae Testemitanu* State University of Medicine and Pharmacy
Chisinau, the Republic of Moldova

Authors' ORCID iDs, academic degrees and contribution are available at the end of the article

*Corresponding author – Evelina Lesnic, e-mail: evelina.lesnic@usmf.md

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Abstract

Background: The surge demand and decreased availability of the health workers determined the designation of the Clinical Municipal Hospital of Phthisiopneumology (CMHP) into a hospital for the case-management of COVID-19 patients during the period of December 2020 – April 2021 for the treatment of the mild cases. The aim of the study was to assess the main peculiarities of the patients with COVID-19 through a cross-sectional study developed during the period February-April 2021 in the CMHP.

Material and methods: A cross-sectional, analytical and prospective study was realized, which included 145 patients with COVID-19 hospitalized in the CMHP during February-April 2021. The inclusion criteria were: patient older 18 years, COVID-19 infection diagnosed by the pulmonologist with the positive polymerase chain reaction result for SARS-CoV-2 (COVID-19) and signed informed consent.

Results: The peculiarities of patients with COVID-19 were dominated by the female sex, age over 60 years, residence in the urban districts of Chisinau and the infection acquired in the Republic of Moldova. Common clinical manifestations were: high temperature, profuse sweats, asthenia and headaches, productive cough, dyspnea, loss of smell or taste, and sore throat. The typical radiological findings such ground-glass pattern or consolidation with bilateral multifocal involvement were most frequent. Were cured most of the patients and the death rate was low.

Conclusions: Peculiarities and clinical manifestations of the patients admitted in CMHP were typical for the COVID-19 infection. These findings did not show the real outcome of the standard case-management of the COVID-19 due to the restricted admission criteria.

Key words: COVID-19, risk factors, management.

Cite this article

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Introduction

The Republic of Moldova (RM) registered 258.624 coronavirus cases, of which 6.243 died and 251.489 recovered till 26th July 2021 [1]. According to the national regulation the first contact point with the patients with suspected COVID-19 infection are the ambulance service or the primary healthcare providers. The regulation recommends that at the country border (Chisinau Airport and Moldovan border entries) the police are responsible for identifying the suspected cases through the temperature screening and completion of the epidemiological cards. If suspected for COVID-19 infection case is found, the patient is transferred through the Emergency medical service (ambulance) to one of the designated for COVID-19 hospitals, depending on the severity of the clinical manifestations. The cases known for the community transmission of the infection, are quickly redirected for the screening to the Triage Center for testing through the polymerase chain reaction for SARS-CoV-2 (COVID-19) and the positive for COVID-19 cases are referred to the designated hospitals. The National Clinical Protocol Infection with Coronavirus the new type (COVID-19) PCN-371 was adopted on 31st March 2021 and was based on the World Health Organization (WHO)

clinical guidelines [2, 3]. Several comprehensive clinical standards were developed by the Moldovan specialists in the case-management in the Intensive Care Units, in pediatric service and at the level of the Primary Healthcare.

The physical infrastructure of the medical institutions and the redirection of the workforce capacity was continuously adapted by the Ministry of Health, Labour and Social Protection of the Republic of Moldova according to the evolution of the COVID-19 outbreak [4, 5]. On 4th March 2020 four hospitals in Chisinau, which integrated 512 health workforce were designated for the treatment of COVID-19 patients, among them 34 Intensive Care Unit beds and 134 beds for mild and moderate cases. Due to a surge demand and a decreased availability of the health workers the Clinical Municipal Hospital of Phthisiopneumology, which specialised in the case-management of tuberculosis patients, was designated as a hospital for COVID-19 patients during the period of December 2020 till April 2021 [5]. Since December 2020 the mild and moderate COVID-19 cases of Chisinau residents were hospitalized in medical subdivisions of the Clinical Municipal Hospital of Phthisiopneumology. The hospital's requirements were adapted and were procured the medical devices (ventilators, pulse oxymeters, oxygen

concentrators), medicines, laboratory tests and consumables. The medical personnel was trained. At the beginning there was a shortage of the medical devices and antiviral drugs, but these problems were solved through the public procurement and donations. Since the state of emergency for COVID-19 was declared, 49 training sessions on infection prevention and control, psychological intervention, clinical management of moderate, severe and critical cases were held with the support of the WHO in the Republic of Moldova. The medical and non-medical staff of the Clinical Municipal Hospital of Phthisiopneumology was trained before the initiation of the treatment management as well.

A wide range of researches confirmed the infection caused by the new coronavirus SARS CoV-2 (COVID-19) varies from asymptomatic or mild form, which counts two thirds of the cases of severe pneumonia associated with acute respiratory distress syndrome (ARDS) / acute respiratory failure with hypoxia and/or hypercapnia. A range from 16 till 35% of COVID-19 infected patients develop severe pneumonia and 2–17% of them require invasive mechanical ventilation (VMI), of which up to 15% require oxygen therapy [6-9]. In severe forms of COVID-19 the excessive inflammation leads to the onset of the massive vascular inflammation, intravascular disseminated coagulation, shock and acute respiratory distress syndrome which contributes to the death [10]. However, in majority of cases, COVID-19 infection is self-limiting with gradual spontaneous resolution [8].

The aim of this study was to assess the peculiarities of the patients with COVID-19 through a cross-sectional study developed during the period February-April 2021 in the the Clinical Municipal Hospital of Phthisiopneumology.

Material and methods

The research was cross-sectional, analytical and prospective study, which included 145 COVID-19 patients hospitalized in the Municipal Clinical Hospital of Phthisiopneumology (SCMF), Chisinau, the Republic of Moldova during February-April 2021. The inclusion criteria of the patients in the research were: age older 18 years, COVID-19 infection diagnosed by the pulmonologist, positive polymerase chain reaction (PCR) result for SARS-CoV-2 (COVID-19), and signed informed consent. The protocol schedule included the following data about the patient:

1. Biological and social peculiarities: sex (male-female rate), age (distribution in age groups through decades), demographic characteristics (urban/rural residence).
2. Economical peculiarities: economical status (employed, unemployed, retired, disabled) and health-insurance coverage (presence/lack of health insurance).
3. Characteristics with high risk: comorbidities, migration or history of returning from abroad to the Republic of Moldova within the last 2 weeks.
4. Case-management peculiarities: health care seeking behavior and addressability, methods for the detection and

medical staff involved in the case-management, comorbidities and complications.

The statistical analysis was performed using EpiInfo software. Data were appreciated as nominal or quantitative. The frequency and percentage were reported for nominal data, and the mean and standard deviations were reported for continuous data. The statistical analysis of the differences between normally distributed continuous variables was tested with the Student T-test. A p value of <0.05 was considered statistically significant.

Results

While distributing patients according to the sex it was established a higher rate of women 90 (62%) compared with 55 (38%) men with women/men rate=1.7/1. Repartition of the patients, according to the age established that the elders aged 60 years and more constituted the largest part – 89 (61%) cases. A lower rate was constituted from the patients aged between 50 and 59 years – 20 (14%) cases. A similar low number of 14 (10%) patients were between 40 and 49 years old, between 30 and 39 years old were 12 (8%) patients and between 18 and 29 years old were 10 (7%) cases. The average age was 68 ± 14 years.

While assessing the risk factors for contracting COVID-19 infection it was established that those who returned from abroad within the last 2 weeks before the sickness constituted 12 (8%) cases. Demographic distribution identified that 132 (91%) patients came from urban sectors of Chisinau and 13 (9%) patients from rural localities. No homeless or without a stable living residence were established (fig. 1).

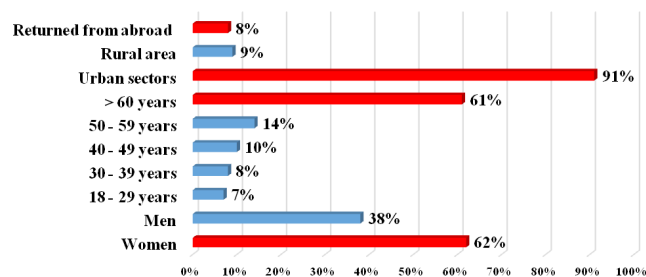


Fig 1. Distribution of the patients according to the sex, age and residence (%)

When distributing patients according to the economic status, it was established that employed persons, which were contributing in this way to the health budget by paying taxes, health insurance policy and social taxes were only 48 (33%) cases. Disabled patients were 7 (5%). Due to the predominance of the patients older 60 years the retired statistically prevailed compared with other economical groups – 78 (54%) cases. There were 12 (8%) unemployed. Health insurance represents the major condition for accessing health care and free of charge medical procedures (radiological investigations, laboratory tests). Due to a higher rate of retired and disabled patients the health insurance coverage supported by the public authority was

established in 90 (62%) cases and was supported by the beneficiary 48 (33%) cases. The distribution of patients in economical groups established that the largest group was represented by the patients in the economical vulnerable state (unemployed, retired, disabled), which were 97 (67%) cases. Lack of the health insurance, which represents the major barrier for accessing the specialized health treatment, was identified in 12 (8%) cases. Assessing the harmful habits, it was established 18 (12%) cases of active smokers and 3 (2%) alcohol abusers. Personal medical history suggestive of allergy had 15 (10%) patients (fig. 2).

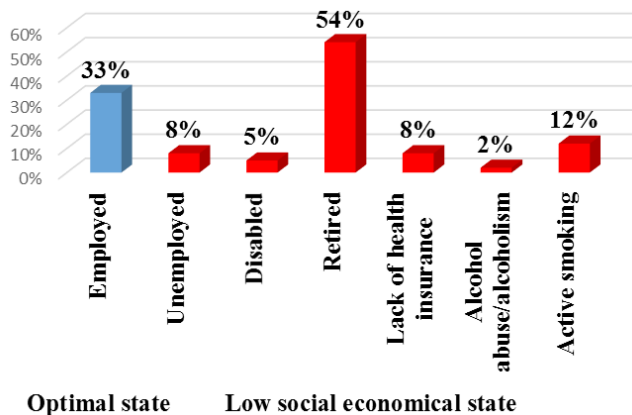


Fig. 2. Distribution of the patients according to the social and economical peculiarities (%)

The poor evolution of COVID-19 infection in comorbid patients is well recognised. Most of admitted patients, 108 (74%) had associated diseases, of which 106 (73%) had arterial hypertension, diagnosed, when blood pressure was 140/90 mmHg or higher. Grade 2 arterial hypertension was diagnosed in 84 (57%) patients and grade 3 in 12 (8%) patients. Arterial hypertension was complicated with tubulointerstitial nephritis in 16 (11%) cases and with congestive heart failure in 4 (3%) cases. In 4 patients type 2 diabetes mellitus was diagnosed. Those patients were diagnosed with arterial hypertension, as well. In 8 (6%) patients chronic respiratory disease was diagnosed mainly linked with the active smoking. Hyperthyroidism was diagnosed in 4 (3%) patients. Gastrointestinal disorders were established in 5 (3%) patients.

At the hospital admission the common symptoms such as fever was detected in 127 (87%) cases and feverish in 18 (12%) cases. The general state was moderately disturbed in all admitted cases. No severe forms, requiring the intensive care were admitted. The high temperature was associated with profuse sweats in 90 (62%) cases and tremor in 24 (16%) cases. The productive cough in 113 (78%) cases was associated with dyspnea in 86 (59%) cases, among which the 1st degree dyspnea was diagnosed in 36 (25%) cases and the 2nd degree in 50 (34%) cases. Asthenia and fatigability were confirmed in 82 (56%) cases, associated with anorexia in 6 (4%) cases and headache in 126 (87%) cases. Peripheral edema was established in 4 (3%) cases. Nausea and vomiting

were identified in 12 (8%) cases associated with diarrhea in 24 (16%) cases. Arthralgia was established in 18 (12%) cases (fig. 3).

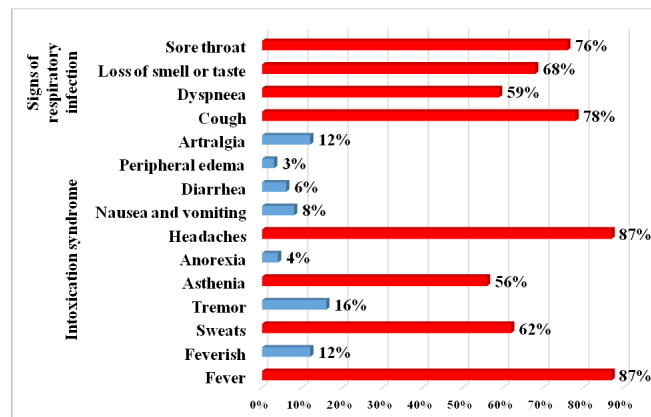


Fig. 3. Distribution of the patients according to the clinical manifestations

According to the pulse oximetry, the peripheral saturation with O₂ was between 99% and 94% in 24 (16%) cases and between 94% and 89% in 130 (88%) cases. Patients with the peripheral saturation with O₂ lower than 89% in the CMHP were not admitted. At the hospital admission the arterial tension ranged within the normal limits in 78 (54%) cases and the arterial hypertension was confirmed in 67 (46%) cases, among which the 1st class arterial hypertension was diagnosed in 31 (21%) cases, the 2nd class in 16 (11%) cases and the 3rd class in 20 (14%) cases. The respiratory rate was between 16 and 19/minute in 126 (87%) cases and between 20 and 25/minute in 19 (13%) cases. Loss of smell or taste was established in 99 (68%) cases. Sore throat (acute nasopharyngitis) at the onset of the disease was diagnosed in 110 (76%) cases.

Inflammatory biomarkers, blood count, liver enzymes (AST, ALT) and products of protein metabolism (urea, creatinine) in the serum were evaluated, as a compulsory laboratory investigation of COVID-19 patients. Erythrocyte sedimentation rate (ESR) in 114 (79%) cases was increased. Fibrinogen exceeded the normal threshold (4 g/L) in 132 (91%) cases. The alpha-amylase in 12 (8%) cases was increased. AST was increased in 78 (54%) cases, including 18 (12%) patients were diagnosed with severe hepatotoxicity with the value of AST exceeding 100 U/L. ALT was increased in 31 (21%) patients and in 15 (10%) patients was diagnosed severe hepatotoxicity. Creatinine was higher than the normal level in 65 (45%) patients. Assessing the leucocyte count was established leukocytosis in 62 (43%) cases. The lymphocyte count revealed increased number (lymphocytosis) in 58 (40%) patients and diminished number (lymphopenia) in 28 (19%) cases. No pathological deviations in the number of the thrombocytes and eosinophils were established (fig. 4).

The conventional radiological investigation of the chest in an anteroposterior projection revealed the ground-glass pattern or consolidation with unilateral involvement

Discussion

Similar studies performed in different countries since the declaration of the emergency state of COVID-19 outbreak established that the main peculiarities of the patients diagnosed with mild COVID-19 infection are female sex, older age and people with underlying chronic conditions, which increase the risk for severe infection [6-9]. This research established that two thirds of the investigated group constituted women, with the age older 60 years and diagnosed with associated diseases. Among the comorbidities, arterial hypertension was diagnosed in most of the investigated cases. One half of the group was identified with arterial hypertension at the admission. Several studies linked the predisposition to acquire severe COVID-19 infection in patients with arterial hypertension and a high risk for death [10]. One tenth of COVID-19 patients had infection complicated with the tubulo-interstitial nephropathy, which was recognised as an acute kidney injury associated with COVID-19 by a wide range of papers [11-14]. The World Health Organization's technical guidance and Clinical Management Guideline made an overview on COVID-19 and influenza similarities and differences according to the clinical aspects. While both diseases have multiple similar clinical presentations: a sore throat, fatigues, chills, muscle or body aches, headache, there are important clinical differences between the two viral infections [3]. According to the WHO Guideline the clinical manifestations with high specificity for the pneumonia caused by COVID-19 infection are: high fever, dry cough, shortness of breath (dyspnea) and hypoxemia [3, 6-9]. The conducted study proved that the evaluated patients were more frequently complaining of the high fever, sweats, headaches, cough, sore throat and loss of smell or taste, which were reported by the clinical papers [6-8, 11, 13-15]. According to the WHO study about 15% of COVID-19 cases are severe and about 5% of people get acute respiratory distress syndromes (ARDS) requiring the ventilation [3]. A true rate of severe COVID-19 infection-related pneumonia couldn't be established through the discribed research because of the admission criteria in the hospital. Only 7% of the admitted patients with mild COVID-19 infection developed ARDS and severe hypoxemia requiring mechanical ventilation. The obtained results were not reflecting the overall state of the COVID-19 pneumonia.

Evaluating the economical consequences it was identified that two thirds of the cases, which included the retired, unemployed and disabled patients had a vulnerable social and economic state. The proportion of the patients without health insurance was low. The health insurance provided a fair healthcare in all cases. The obtained data could not be compared with other studies, as no relevant information was found. The patients with harmful habits, such as active tobacco smoking and alcohol drinking were in a lower proportion. These findings can be attributed to the high proportion of women and elders, in which the prevalence of harmful habits is low.

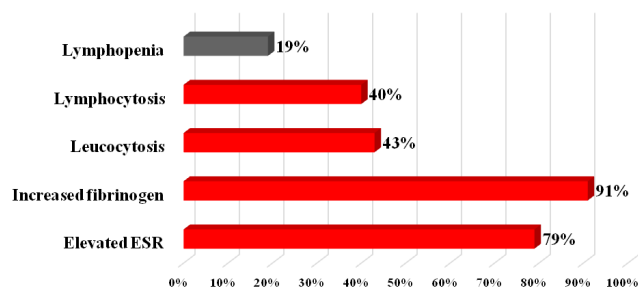


Fig. 4. Pro-inflammatory biomarkers in patients with COVID-19 (%)

in 25 (17%) cases. Bilateral multifocal involvement, seen as symmetrical localized ground-glass opacities and consolidations in lower fields were observed in 120 (83%) cases. Reticular pattern due to interstitial involvement was confirmed through the computed tomography in 12 (8%) cases. During the hospitalization the radiological findings extended in several days after the onset of the symptoms and progressed into a diffuse disease in 3 (2%) patients in which the pneumonia progressed in acute distress syndrome. Was assessed the severity of pulmonary involvement by the chest X-ray. Using a vertical line (along the spine) and the horizontal line (along the lower edge of the left main bronchus) 4 quadrants were obtained. Each quadrant was assigned with a score of 0-4 depending on the extent of consolidation or ground-glass opacities: 0 = no findings; 1 < 25%; 2 = 25%-50%; 3 = 50%-75%; 4 > 75%. In 72 (50%) cases the score was equal 1 (<25% involvement of the lung parenchyma), in 61 (42%) cases the score was equal 2 (25-50% of the lung parenchyma involved) and 12 (8%) cases the score was equal 3 (>75% of the lung parenchyma involved). Data are shown in figure 5.

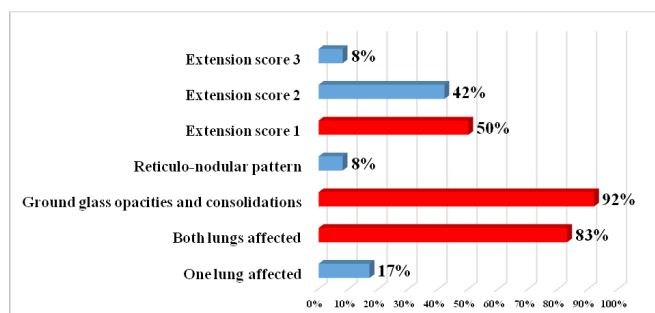


Fig. 5. Distribution of the patients according to the radiological findings

The patients were treated according to the national regulation (National Clinical Protocol 371) and the average duration of the hospitalization was 8 days. Were discharged as cured 135 (93%) patients, 3 (2%) died due to ARDS and for the mechanical ventilation in the Intensive Care Unit 7 (5%) cases were transferred.

The conventional radiological investigation of the chest revealed the ground-glass pattern or consolidations with bilateral multifocal involvement in most of the cases. The consensus statement endorsed by the Society of Thoracic Radiology and the American College of Radiology classified the radiological patterns of COVID-19 in typical, indeterminate and atypical appearance [16]. The patterns of the typical appearance are: peripheral bilateral ground-glass opacities with or without consolidation, multifocal ground glass with rounded morphology and signs of the organizing pneumonia. Indeterminate appearance is established for multifocal, diffuse, peripheral or unilateral ground-glass opacities, without a specific distribution. The atypical appearance is the isolated lobar or segmental consolidation without ground-glass opacities and small nodules. The radiological appearance in selected patients was typical for COVID-19 infection. A retrospective study identified that the most common laboratory findings in patients are: lymphopenia, thrombocytosis, increased prothrombin time, increased lactate dehydrogenase, mild elevated inflammatory markers (protein C reactive and erythrocyte sedimentation rate), elevated D-dimers, mildly elevated serum-amylase and elevated liver function enzymes [17]. Inflammatory biomarkers (erythrocyte sedimentation rate and fibrinogen) were elevated and showed a moderate inflammation in most of the selected COVID-19 cases. Leucocytosis and lymphocytosis were more frequently established in this research, than lymphopenia. It can be explained by the secondary bacterial infection, which develops on the background of the decreased host immunity, confirmed by other studies [18].

Conclusions

The peculiarities of patients with COVID-19 hospitalized in the clinical subdivisions of the Clinical Municipal Hospital of Phthisiopneumology during 2 months were dominated by female sex, age over 60 years, residence in Chisinau city and the infection acquired in the Republic of Moldova. Clinical manifestations were specific for COVID-infection: high temperature, profuse sweats, asthenia, headache, cough and dyspnea, loss of smell or taste and sore throat. The radiological findings demonstrated typical appearance with ground-glass pattern or consolidations with bilateral localization. The therapeutical approach contributed to the curing of most of the patients and the death rate was low. The treatment outcome should not be generalized as a characteristic outcome for the COVID-19 infection. It could be the consequence of the limitations due to admission criteria of the patients with mild forms of the COVID-19 infection. Large-scale studies should be developed including all forms of the COVID-19 infection.

References

1. Worldometer. Coronavirus: Reported cases and deaths by country or territory: Moldova [Internet]. USA: Worldometers.info; 2021 [cited 2021 Jul 26]. Available from: <https://www.worldometers.info/coronavirus/country/moldova/>.
2. Ministerul Sănătății, Muncii și Protecției Sociale al Republicii Moldova [Ministry of Health, Labor and Social Protection of the Republic of Moldova]. Infecția cu Coronavirus de tip nou (COVID-19). Protocol clinic național: 371 [New type coronavirus infection (COVID-19). National clinical protocol: 371] [Internet]. 5th ed. Chisinau: The Ministry; 2021 [cited 2021 Jul 26]. Available from: <https://msmps.gov.md/wp-content/uploads/2021/04/PCN-371-Infec%C8%9Bia-cu-coronavirus-de-tip-nou-COVID-19-editia-V-aprobat-prin-ordinul-MSMPS-nr.268-din-31.03.2021-1-1.pdf>. Romanian.
3. World Health Organization. Covid-19. Clinical management: living guidance [Internet]. Geneva: WHO; 2021 [cited 2021 Jun 13]. Available from: <https://www.who.int/publications/i/item/WHO-2019-nCoV-clinical-2021-1>
4. Ministerul Sănătății, Muncii și Protecției Sociale al Republicii Moldova [Ministry of Health, Labor and Social Protection of the Republic of Moldova]. Ordinul nr. 222 din 04.03.2020, cu privire la acordarea asistenței medicale persoanelor care intrunesc criteriile definiției de caz COVID-19 [Order No 222 of 04.03.2020, regarding the provision of medical assistance to persons who meet the criteria of the case definition COVID-19] [Internet]. Chisinau : The Ministry; 2020 [cited 2021 Jun 13]. Available from: https://msmps.gov.md/sites/default/files/legislatie/file_1.pdf. Romanian.
5. Ministerul Sănătății, Muncii și Protecției Sociale al Republicii Moldova [Ministry of Health, Labor and Social Protection of the Republic of Moldova]. Ordinul nr. 263 din 13.03.2020, cu privire la completarea Ordinului nr. 222 din 04.03.2020, cu privire la acordarea asistenței medicale persoanelor care intrunesc criteriile definiției de caz COVID-19 [Order No 263 of 13.03.2020, regarding the completion of Order No 222 of 04.03.2020, regarding the provision of medical assistance to persons who meet the criteria of the case definition COVID-19] [Internet]. Chisinau : The Ministry; 2020 [cited 2021 Jun 13]. Available from: https://msmps.gov.md/sites/default/files/legislatie/ordinul_nr._263_din_13.03.2020_cu_privire_la_modificarea_ordinului_nr._222_din_04.03.2020.pdf. Romanian.
6. Khan M, Khan H, Khan S, Nawaz M. Epidemiological and clinical characteristics of coronavirus disease (COVID-19) cases at a screening clinic during the early outbreak period: a single-centre study. *J Med Microbiol*. 2020 Aug;69(8):1114-1123. doi: 10.1099/jmm.0.001231.
7. Dhama K, Khan S, Tiwari R, et al. Coronavirus Disease 2019-COVID-19. *Clin Microbiol Rev*. 2020;33(4):e00028-20. doi: 10.1128/CMR.00028-20.
8. Khan S, Ali A, Shi H, et al. COVID-19: Clinical aspects and therapeutics responses. *Saudi Pharm J*. 2020;28(8):1004-1008. doi: 10.1016/j.sps.2020.06.022.
9. Bchetnia M, Girard C, Duchaine C, Laprise C. The outbreak of the novel severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2): a review of the current global status. *J Infect Public Health*. 2020 Nov;13(11):1601-1610. doi: 10.1016/j.jiph.2020.07.011.
10. Leiva Sisniegues CE, Espeche WG, Salazar MR. Arterial hypertension and the risk of severity and mortality of COVID-19. *Eur Respir J*. 2020;55(6):2001148. doi: 10.1183/13993003.01148-2020.
11. Chippa V, Aleem A, Anjum F. Post Acute Coronavirus (COVID-19) Syndrome. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2021- [cited 2021 Jun 13]. Available from: <https://www.ncbi.nlm.nih.gov/books/NBK570608/>
12. Sharma P, Ng JH, Bijol V, Jhaveri KD, Wanchoo R. Pathology of COVID-19-associated acute kidney injury. *Clin Kidney J*. 2021;14(Suppl 1):i30-i39. <https://doi.org/10.1093/ckj/sfab003>.
13. Gusev E, Sarapultsev A, Hu D, Chereshev V. Problems of pathogenesis and pathogenetic therapy of COVID-19 from the perspective of the general theory of pathological systems (General pathological processes). *Int J Mol Sci*. 2021;22(14):7582. doi: 10.3390/ijms22147582.
14. Ng JH, Zaidan M, Jhaveri KD, Izzedine H. Acute tubulointerstitial nephritis and coronavirus. *Clin Kidney J*. 2021;1-7. <https://doi.org/10.1093/ckj/sfab107>.
15. Chen N, Zhou M, Dong X, Qu J, Gong F, Han Y, et al. Epidemiological and clinical characteristics of 99 cases of 2019 novel coronavirus pneumonia in Wuhan, China: a descriptive study. *Lancet*. 2020;395(10223):507-513. [http://dx.doi.org/10.1016/S0140-6736\(20\)30211-7](http://dx.doi.org/10.1016/S0140-6736(20)30211-7).
16. Simpson S, Kay F, Abbara S, et al. Radiological Society of North American Expert Consensus Document on Reporting Chest CT findings

- related to COVID-19: endorsed by the Society of Thoracic Radiology, the American College of Radiology, and RSNA. *Radiol Cardiothorac Imaging*. 2021;2(2):e200152. doi: 10.1148/ryct.2020200152.
17. Mahat RK, Panda S, Rathore V, Swain S, Yadav L, Sah SP. The dynamics of inflammatory markers in coronavirus disease-2019 (COVID-19) patients: a systematic review and meta-analysis. *Clin Epidemiol Glob Health*. 2021;11:100727. doi: 10.1016/j.cegh.2021.100727.
18. Shafran N, Shafran I, Ben-Zvi H, et al. Secondary bacterial infection in COVID-19 patients is a stronger predictor for death compared to influenza patients. *Sci Rep*. 2021;11(1):12703. <https://doi.org/10.1038/s41598-021-92220-0>.

Authors' ORCID iDs and academic degrees

Andrei Ungurean, MD Resident – <https://orcid.org/0000-0002-7690-647X>

Alina Malic, MD, PhD, Assistant Professor – <https://orcid.org/0000-0002-5216-6470>

Tatiana Osipov, MD – <https://orcid.org/0000-0003-4045-0623>

Evelina Lesnic, MD, PhD, Associate Professor – <https://orcid.org/0000-0002-4259-0227>

Authors' contribution

AU collected the data; AM collected and analysed the data, TO conducted the clinical and laboratory work; EL conceptualised the project and designed the research, reviewed the statistics and interpreted the data, drafted the manuscript, revised the manuscript critically, All the authors revised and approved the final version of the manuscript.

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Ethics approval

This study was approved by the Research Ethics Committee of *Nicolae Testemitanu* State University of Medicine and Pharmacy, Chisinau, the Republic of Moldova (No 44 of 26.05.2025).

Conflict of interests

No competing interests were disclosed.

